November 12, 2020

Sent via email to: appeals-northern-regional-office@usda.gov

To: Objection Reviewing Officer
USDA Forest Service Northern Region 26 Fort Missoula Road
Missoula, MT 59804

1. Objector's Name and Address:

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Signed this 12th day ofNovember, 2020 for Objectors

/s/
Michael Garrity

Pursuant to 36 CFR Part 218, the Alliance for the Wild Rockies (AWR), Native Ecosystems Council (NEC) and Montana Ecosystems Defense

Council (MEDC) file this Objection to the Environmental Assessment (EA) and draft Decision Notice (DN) for the Black Ram Project.

2. Name of the Proposed Project

Black Ram Project

3. Location of Project, Name and Title of Responsible Official

This timber sale is proposed for the Three Rivers Ranger District in Lincoln County on the Kootenai National Forest (KNF) and the Responsible Official is Forest Supervisor Chad Benson.

The draft DN's Selected Alternative is Alternative 2 and features "Regeneration" logging on an estimated 2,444 acres (Clearcut with Reserves – 1,783 acres, Shelterwood Cut - 38 acres, Seed Tree Cut - 623 acres), plus "Improvement Cut" – 1,356 acres, and "Commercial Thin" – 104 acres[2] for an estimated volume of 57 million board feet. Alternative 2 also features 618 acres of "Precommercial Thin/Prune", 76 acres of "Harvest Fuel Breaks," post-logging "underburning" on 1,353 acres, "Non-harvest ecosystem burning" on an additional 7,034 acres, and "Non-harvest ladder fuels reduction" on 519 acres. Also, 3.5 miles of new road construction (0.2 mile of that called "temporary"), and 90.3 miles of Road Reconstruction/Maintenance would be approved. The DN also authorizes 34 miles of road "Storage", 2.0 miles of "Undetermined" roads added to the NFS inventory, 3.0 miles of decommissioning of "Undetermined" roads, 20.0 miles of decommissioning of National Forest System Roads. The decision also authorizes 579 acres of logging of old growth forests and building .8 miles of new roads into an old growth forest.

The DN would authorize 11 miles of new, non-motorized trails, as the EA describes:

The DN would authorize 15 new scenic vistas, and improve parking lots for the Upper and Lower Hawkins Lake trailheads. Connected to that is logging using mostly "Improvement Cuts" which improve only visibility of the surrounding landscape.

Finally, The DN would authorize "funding dependent ...Road work to improve Watershed Conditions" which involves work at tens sites on nine different roads.

[1] Inferred from the 12/10/2019 legal advertisement in the *Missoulian*, although the FS doesn't specifically identify the Responsible Official there or in NEPA documents.

[2] Actually, since none of the various logging "treatments" are described in any measurable terms in the EA, these distinctions are meaningless. Clearcutting all 2,546 acres of "regeneration" logging would be consistent with this DN, and the descriptions of the "Improvement" and "Commercial Thin" logging likewise lack adequate specificity and thus commitment to other resource values.

The trails include about 2 miles of new trail on the Wood Mountain Stock Loop Trail, about 2 miles of new trail on the North Fork River, about 3 miles of new trail on the West Fork Falls Trail, and about 4 miles of new trail on Northwest Peak to Rock Candy Trail.

4. Connection between previous comments and those raised in the Objection:

AWR, NEC, MEDC provided comments on the proposed project on Jan. 23, 2020. Y2U, NEC and AWR provided comments on Jan. 14, 2020.

AWR, MEDC and NEC fully participated during the public involvement process, including submitting August 7, 2019 comments on the Black Ram EA (EA comments), and AWR's 8-8- 2018 comments on the Project Proposed Action (PA comments) and our previous objection which we submitted on January 20, 2020. We incorporate or previous objection into this objection.

In regards to the issues we raised in comments, the Forest Service (FS) responded inadequately. We therefore incorporate by reference our earlier comments into this Objection.

AWR submitted comments during the forest plan revision process, notifying the FS of the legal and ecological shortcomings of the agency's management direction at each step. Following publication of the Forest Plan and its Final EIS, we continued our participation by filing an objection identifying the many ways the Forest Plan and its EIS continued to provide unlawful and ecologically dangerous management direction of the Kootenai National Forest (KNF). The agency's response to our objection did nothing to alleviate our concerns. The Black Ram EA and draft DN provide further evidence of the FS's ill-advised direction. (See PA comment letter at pp. 1-2.) NFMA requires the FS to "not allow significant or permanent impairment of the productivity of the land." [36 C.F.R. § 219.27(a)(1).] NFMA requires the FS to "ensure that timber will be harvested from National Forest System lands only where—soil, slope, or other watershed conditions will not be irreversibly damaged." [16 U.S.C. 1604 (g)(3)(E).] AWR notified the agency of the many ways its revised forest plan fails to meet the letter of NMFA and fails to follow its own planning regulations, and how the process of forest plan development failed to comply with NEPA. At this juncture, with the unlawful implementation of the revised forest plan being initiated at the site-specific project level, AWR opposes this unlawful forest plan implementation project. This objection fully incorporates all of AWR's comments and other submissions made during the forest plan revision process, our Forest Plan Objection, and all the attachments and references included with those submissions, within these comments—on this site-specific project proposal. (See folder entitled "Forest Plan Participation".)

On November 28, 2011 the FS issued the Record of Decision for the Revised Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones on the Kootenai, Idaho Panhandle and Lolo National Forests (aka "Access Amendments"). AWR fully participated in the public process during the development of the Access Amendments, and incorporates its comments and appeal of that Decision within this objection. (See folder entitled "Acc Amend Participation".)

AWR participated during the public process as the Northern Rockies Lynx Management Direction (NRLMD) was developed. We believe that the Forest Plan/NRLMD does not consider the best available science. We incorporate the documentation of AWR's participation in the NRLMD public process within this objection to the Black Ram DN. (See folder entitled "NRLMD Participation".) The lynx issue was also raised in AWR's Forest Plan Objection concerning Indicator MON-FLS-01-02 and FW-DC-VEG-04.

As this Objection discusses, multiple aspects of the Black Ram project raise questions of significant and/or cumulative effects, necessitating the preparation of an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA). These environmental impacts would not be "insignificant" under any definition, nor without cumulative effects.

ILLEGITIMATE PURPOSE AND NEED OF THIS PROJECT

AWR's PA comments raised the issue of the FS's improper Purpose and Need for developing the Black Ram proposal at page 1. Also, see EA comments at 77-78, 89, 92-93,

The EA claims there is a need to "Promote resilient vegetation conditions" and "improve resilience and resistence to insects, disease, and fire."

First, the EA doesn't demonstrate insect and disease activity in the project area is in any way unusual or uncharacteristic of the forests in this ecosystem.

"Resiliency" tends to be a black box or red herring used by the FS to claim the forest isn't healthy in the absence of data or analysis to back up such claims. The FS doesn't disclose the metrics the agency uses to measure resiliency, so that objective measures of resiliency can be applied to the Black Ram project area by a scientist or any rational person now, immediately after the project is completed, and/or at later intervals.

Ecological resilience, which the FS implies it is creating through this project, is not the absence of natural disturbances like wildfire or beetle kill, rather it is the opposite (DellaSala and Hanson, 2015, Chapter 1, pp. 12-13). What the FS promotes is the human control of the forest ecosystem through mechanical and other heavy-handed means to maintain unnatural stasis by eliminating, suppressing or altering natural disturbances such as wildfire, to facilitate the extraction of commercial resources for human use. This is the antithesis of ecological resilience and conservation of native biodiversity. Ecological resilience is the ability to ultimately return to predisturbance vegetation types after a natural disturbance, including higher-severity fire. This sort of dynamic equilibrium, where a varied spectrum of succession stages is present across the larger landscape, tends to maintain the full complement of native biodiversity on the landscape. (Thompson et al., 2009).

The FS's view of ecosystems is inconsistent with a holistic ecosystem management approach, which would acknowledge the forest's capability of operating in a self-regulatory manner. For example, Harvey et al., 1994 state:

Although usually viewed as pests at the tree and stand scale, insects and disease organisms perform functions on a broader scale.

...Pests are a part of even the healthiest eastside ecosystems. Pest roles—such as the removal of poorly adapted individuals, accelerated decomposition, and reduced stand density—may be critical to rapid ecosystem adjustment.

...In some areas of the eastside and Blue Mountain forests, at least, the ecosystem has been altered, setting the stage for high pest activity (Gast and others, 1991). This increased activity does not mean that the ecosystem is broken or dying; rather, it is demonstrating functionality, as programmed during its developmental (evolutionary) history.

Castello et al. (1995) state:

Pathogens help decompose and release elements sequestered within trees, facilitate succession, and maintain genetic, species and age diversity. Intensive control measures, such as thinning, salvage, selective logging, and buffer clearcuts around affected trees remove crucial structural features. Such activities also remove commercially valuable, disease-resistant trees, thereby contributing to reduced genetic vigor of populations.

In dozens of places the EA uses the word "resilient" or "resilience" in terms of how the project increases it, or how it's chasing Forest Plan DCs by increasing the "resilience" of the ecosystem or some aspect of it. The Forest Plan defines "resilience" as: "The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change." The Forest Plan defines "restoration" in part, as "the process of assisting the recovery of resilience." And the Forest Plan defines Forest Health as "An ecological perspective that looks at the resiliency of an ecosystem and its ability to be sustainable."

However, the Black Ram EA provides absolutely no operational definition of resilience that would allow anybody to actually measure the resilience of the ecosystem as it stands now, or measure the change in resilience following project activities. An essential component of an operational definition is measurement. A simple and accurate definition of measurement is the assignment of numbers to a variable in which we are interested. In this case, the variable in which we are interested is resilience, and how the FS measures it in these ecosystems.

Resilience is a scientific term that may be used to characterize forest ecosystems. However, mostly what we read about resilience from the EA and Forest Plan is that it's what happens when the forest is managed (i.e., mostly logged or prescribe burned), and the more the forest is logged and burned, the more resilient it becomes. Also we read that nothing that happens naturally, without management, will increase resilience. In other words, from the FS's perspective, resilience can only be manufactured, engineered, or imposed by management. So the term "resilience" as used by the FS is invalid, rendering much of the analyses confusing and misleading.

The fact that "the entire Kootenai National Forest" was designated by the FS as "insect and disease threats" (KNF's Cover Letter for the Purple Marten Proposed Action) further illustrates the illegitimacy of the FS's entire management approach. The KNF has been claiming for decades that its timber sales are managing to prevent excessive insect and disease impacts, so if anything, this forestwide designation stands as the agency's own admission of its failure.

There is a need to "Improve big game winter range conditions and promote forage opportunities"[3] but such a need is not validated. It is merely thinly veiled justification for logging.

AWR's Objection to the Forest Plan notes that the scientific basis for its standards, guidelines, and other components/direction is not well established. Consequently since the Black Ram

[3] Any quotes in this objection without source attribution should be assumed to be from the Black Ram Environmental Assessment.

project is tiered to the Forest Plan, then in order to consider best available science the FS must finally explain what science it has considered for all forest plan components/direction.

Fire, insects & disease are endemic to western forests and are natural processes resulting in the forest self-thinning. This provides for greater diversity of plant and animal habitat than logging can achieve. In areas that have been historically and logged there are less diversity of native plants, more invasive species, and less animal diversity. Six et al., 2014 documented that logging to prevent or contain insect and disease has not been empirically proven to work, and because of lack of monitoring the FS can't content this method is viable for containing insect outbreaks.

Wales, et al. 2007 modeled various potential outcomes of fire and fuel management scenarios on the structure of forested habitats in northeast Oregon. They projected that the natural disturbance scenario resulted in the highest amounts of all types of medium and large tree forests combined and best emulated the Natural Range of Variability for medium and large tree forests by potential vegetation type after several decades. Restoring the natural disturbances regimes and processes is the key to restoring forest structure and functionality similar to historical conditions. The FS fails to reconcile this science with the premises behind the Black Ram proposal.

Other scientific information contradicts some of the premises upon which the EA is based. Bradley, et al. 2016 "found forests with higher levels of protection had lower severity values even though they are generally identified as having the highest overall levels of biomass and fuel loading." Among the major findings were that areas undisturbed by logging experienced significantly less intensive fire compared with areas that have been logged. From a news release announcing the results of the study (http://www.biologicaldiversity.org/publications/papers/):

"We were surprised to see how significant the differences were between protected areas managed for biodiversity and unprotected areas, which our data show burned more severely," said lead author Curtis Bradley, with the Center for Biological Diversity.

The study focused on forests with relatively frequent fire regimes, ponderosa pine and mixed-conifer forest types; used multiple statistical models; and accounted for effects of climate, topography and regional differences to ensure the findings were robust.

"The belief that restrictions on logging have increased fire severity did not bear out in the study," said Dr. Chad Hanson, an ecologist with the John Muir Project. "In fact, the findings suggest the opposite. The most intense fires are occurring on private forest lands, while lands with little to no logging experience fires with relatively lower intensity."

"Our findings demonstrate that increased logging may actually increase fire severity," said Dr. Dominick A. DellaSala, chief scientist of Geos Institute. "Instead, decision-makers concerned about fire should target proven fire-risk reduction measures nearest homes and keep firefighters out of harm's way by focusing fire suppression actions near towns, not in the back country."

Elsewhere we explain there is no need to "Maintain or improve old growth character within existing old growth" nor is there scientific support for this agenda.

The EA claims there is a need to "Promote early seral tree species" but if this were true, there is no explanation why the FS doesn't manage consistently with Forest Plan direction to accept natural processes and respond to the EA's expressed need to "Encourage fire's ecological function" which would do the job if the FS wasn't continuously suppressing fire and other natural processes.

The EA also fails to provide a rational explanation of the alleged need to conduct logging with "treatments ...consistent with the patch size and pattern" that would naturally occur anyway. Churchill, 2011 points out:

Over time, stand development processes and biophysical variation, along with low and mixed-severity disturbances, **break up these large patches into a finer quilt of patch types**. **These new patterns then constrain future fires**. Landscape pattern is thus generated from a blend of finer scale, feedback loops of vegetation and disturbance and broad scale events that are driven by extreme climatic events.

(Emphases added.) Churchill describes above the ongoing natural processes that will alleviate the need to "Diversify successional stages" alleged in the EA—without expensive and ecologically risky logging and road building. Since no proper spatial analysis of the landscape pattern's departure has been completed, the EA has no scientifically defensible logging solution.

The definition of Wildland Urban Interface does not conform to any rational criteria, in regards to the alleged need to reduce fire risk in the project area.

Remedy: Select the No Action alternative plus the proposed road decommissioning and storage.[4] Otherwise, respond to Objections as if they were comments on an EIS, and withdraw the Draft DN and prepare an Environmental Impact Statement.

UNLAWFUL FOREST PLAN

AWR's PA comments raised the issue of the inadequacy of the KNF's revised Forest Plan at pp. 1-2 and 4-5, and at pp. 3-7 in the section entitled and "ECOLOGICALLY DEFICIENT FOREST PLAN 'DESIRED CONDITIONS'". Also, AWR's Revised Forest Plan (RFP) Objection challenged the scientific veracity of the FS's use of Vegetation Desired Conditions as management direction for projects (pp. 3-16).

The EA insists Forest Plan consistency is demonstrated because project actions will "move" conditions "toward" Desired Conditions, meeting Objectives, etc. Such statements are made in the absence of quantitative analyses based upon the reliable data needed to scientifically support such statements.

Much of AWR's concern about the Forest Plan surround its reliance on "Desired Conditions" (DCs) as directing management, and too few standards that refrain management. As we pointed out, this results in an overall lack of accountability for the FS to ever accomplish anything positive expressed in the Forest Plan's timeless, aspirational DCs, as well as there being far too

[4] In this Objection, any request for implementing the No Action alternative is with the exception of the proposed road decommissioning, storage, and other road improvements.

few restraints that serve the conservation of biological diversity and promotion of ecological sustainability.

Hayward, 1994 states:

Despite increased interest in historical ecology, scientific understanding of the historic abundance and distribution of montane conifer forests in the western United States is not sufficient to indicate how current patterns compare to the past. In particular, knowledge of patterns in distribution and abundance of older age classes of these forests in not available. ...Current efforts to put management impacts into a historic context seem to focus almost exclusively on what amounts to a snapshot of vegetation history—a documentation of forest conditions near the time when European settlers first began to impact forest structure. ...The value of the historic information lies in the perspective it can provide on the potential variation... I do not believe that historical ecology, emphasizing static conditions in recent times, say 100 years ago, will provide the complete picture needed to place present conditions in a proper historic context. Conditions immediately prior to industrial development may have been extraordinary compared to the past 1,000 years or more. Using forest conditions in the 1800s as a baseline, then, could provide a false impression if the baseline is considered a goal to strove toward.

Frissell and Bayles (1996) ask:
From the point of view of many aquatic species, the range of natural variability at any one site would doubtless include local extirpation. At the scale of a large river basin, management could remain well within such natural extremes and we would still face severe degradation of natural resource and possible extinction of species (Rhodes et al., 1994). The missing element in this concept is the landscape-scale *pattern* of occurrence of extreme conditions, and patterns over space and time of recovery from such stressed states. How long did ecosystems spend in extreme states vs. intermediate or mean states? Were extremes chronologically correlated among adjacent basins, or did asynchrony of landscape disturbances provide for large-scale refugia for persistence and recolonization of native species? These are critical questions that are not well addressed under the concept of range of natural variability as it has been framed to date by managers.

...The concept of range of natural variability also suffers from its failure to provide defensible criteria about **which factors ranges should be measured**. Proponents of the concept assume that a finite set of variables can be used to define the range of ecosystem behaviors, when ecological science strongly indicates many diverse factors can control and limit biota and natural resource productivity, often in complex, interact-ing, surprising, and species-specific and time-variant ways. **Any simple index for measuring the range of variation will likely exclude some physical and biotic dimensions important for the maintenance of ecological integrity and native species diversity.** (Bold emphasis added.)

Dimensions that create significant adverse impacts on native species diversity include those not historically not found in nature, including road densities, edge effects due to logged openings, noxious weeds and other invasive species, livestock, compacted and otherwise productivity- deficient soil conditions, and many human-caused fires.

The EA fails to consider the extensive science that argues that the strategy of "moving towards" DCs for restoring wildlife habitat and populations is scientifically deficient. The Committee of Scientists, 1999 recommended management emphasis contrasts with the KNF's current management strategy merely emphasizing manipulation of habitat for insuring wildlife viability:

...An emphasis on focal species, including their functional importance or their role in the conservation of other species, combines aspects of single-species and ecosystem management. **It also leads to considering species directly, in recognition that focusing only on composition, structure, and processes may miss some components of biological diversity.** (Emphasis added.)

The Forest Plan relies upon static Desired Conditions (DCs) to direct active management on the KNF. The philosophy driving the FS strategy to "move toward" and replicate historic vegetative conditions (basically, replace natural processes with logging and prescribed burning) is that emulation of the **results of** disturbance processes would conserve biological diversity. McRae et al. 2001 provide a scientific review summarizing empirical evidence that finds marked contrasts between the results of logging and wildfire. A plethora of scientific evidence directs that

DCs be more properly stated in terms of **desired future dynamics**, in line with best available science. Hessburg and Agee (2003) for example.

The heavy bias toward identifying habitat manipulation options (i.e., logging and other active management activities) in the forest plan—which lacks insight into the long-term impacts of an unsustainable road system—has led to a forest plan that is a recipe for failure.

Since the Forest Plan revision process itself violated NEPA and NFMA and failed to utilize the best available science, these comments therefore identify legal deficiencies of the Forest Plan as well as the project proposal.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

INVENTORIED ROADLESS AREAS AND OTHER UNROADED AREAS

AWR's PA comments discuss the ecological value of roadless lands issue at p. 2. Objector's EA comments raise roadless issues at pp. 7 and 13. Also, issues regarding roadless areas and Wilderness were raised in our Objection to the revised forest plan (pp. 43, 47-67).

The Forest Plan lacks direction to update roadless area boundaries utilizing a transparent public procedures in order to evaluate unroaded areas contiguous with Inventoried Roadless Areas (IRAs) and Wilderness.

The FS is required to discuss a project's impacts on areas of "sufficient size" for future wilderness designation. *Lands Council*, 529 F.3d at 1231, citing 16 U.S.C. § 1131(c).

The Kootenai National Forest's Lower Yaak, O'Brien, Sheep Draft Environmental Impact Statement explains the concept of Roadless Expanse as explained in USDA Forest Service, 2010e:

Northern Region (Region 1) Direction for Roadless Area Analysis Region 1 provides additional guidance for roadless area analysis in a draft document titled “Our Approach to Roadless Area Analysis of Unroaded Lands Contiguous to Roadless Areas” (12/2/10). In summary this paper is based on court history regarding the Roadless Area Conservation Rule. The “Our Approach” document states that “projects on lands contiguous to roadless areas must analyze the environmental consequences, including irreversible and irretrievable commitment of resources on roadless area attributes, and the effects for potential designation as wilderness under the Wilderness Act of 1964. **This analysis must consider the effects to the entire roadless expanse; that is both the roadless area and the unroaded lands contiguous to the roadless area**.

(Emphasis added.) The FS must analyze and disclose impacts on the Roadless Characteristics and Wilderness Attributes of the Roadless Expanse. The public must be able to understand if the project would cause irreversible and irretrievable impacts on the suitability of any portion of Roadless Expanse for future consideration for Recommended Wilderness or for Wilderness designation under forest planning.

The FS doesn’t recognize best scientific information that indicates the high ecological integrity and functioning of roadless and unmanaged areas. Management activities have damaged the streams and other natural features found in the project area watersheds. The FS has yet to demonstrate it can extract resources in a sustainable manner in roaded areas.

Unroaded areas greater than about 1,000 acres, whether they have been inventoried or not, provide valuable natural resource attributes that are better left protected from logging and other management activities. Scientific research on roadless area size and relative importance is ongoing. Such research acknowledges variables based upon localized ecosystem types, naturally occurring geographical and watershed boundaries, and the overall conditions within surrounding ecosystems. In areas such as the Black Ram project area, where considerable past logging and management alterations have occurred, protecting relatively ecologically intact roadless areas even as small as 500 - 1,000 acres has been shown to be of significant ecological importance. These valuable and increasingly rare roadless area attributes include: water quality; healthy soils; fish and wildlife refugia; centers for dispersal, recolonization, and restoration of adjacent disturbed sites; reference sites for research; non-motorized, low-impact recreation; carbon sequestration; refugia that are relatively less at-risk from noxious weeds and other invasive non- native species, and many other significant values. (See Forest Service Roadless Area Conservation FEIS, November 2000.)

See the report by Friends of the Clearwater, "The Roadless Report: Analyzing the Impacts of Two Roadless Rules on Forested Wildlands" for an observation on how roadless rules are being exploited to downgrade the wilderness values and roadless characteristics of IRAs.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

INADEQUATE EMPHASIS ON RESTORATION

AWR's PA comments at pp. 2-3 raise this issue. Also see EA comments at 58, and 70.

True restoration of already logged and roaded watersheds would prioritize removing the impediments to natural recovery. The Montana Forest Restoration Committee, 2007 adopted 13 Principles, written collaboratively by a diverse set of stakeholders which included the Supervisors of the Bitterroot and Lolo national forests along with representatives from timber and forest products industries, conservation groups, recreation interests, and others. Principle #3 states:

Use the appropriate scale of integrated analysis to prioritize and design restoration activities: Use landscape, watershed and project level ecosystem analysis in both prioritization and design of projects unless a compelling reason to omit a level of analysis is present. While economic feasibility is essential to project implementation, **priorities should be based on ecological considerations and not be influenced by funding projections.** (Emphases added.)

Consistent with this principle, the FS would have published a landscape assessment so a genuine public scoping process could guide project restoration priorities.

Frissell and Bayles, 1996 state: “If natural disturbance patterns are the best way to maintain or restore desired ecosystem values, then nature should be able to accomplish this task very well without human intervention.”

The EA reveals that most project activities not directly related to the commercial logging, burning, or other vegetation manipulation activities are dependent upon uncertain and unidentified funding sources and are therefore left optional. As discussed in the EA at p. 22:

Funding Dependent Resource Improvement Work

The following activities are not required project design features or mitigation for project activities. These activities have been designed to improve existing resource conditions. Implementation of these activities is dependent upon available funding. One source of funding could be Knutsen Vanderberg (KV) funds in association with the timber sale, or other sources of funding. Activities will not be implemented until sufficient funding is available.

- Inter-plant rust resistant western white pine;
- Precommercial Thinning or Timber Stand Improvement work;
- Road work to improve watershed conditions as identified in Table 127;
- Road decommissioning work in the Project Area as identified in Table 129;
- Monitor effects of KV funded site preparation activities;
- Landing rehabilitation including decompaction, seeding and spreading duff and slash;
- Additional spraying of noxious weeds or use of biocontrol agents in areas where their concentrations occur;
- Road signs, mile markers and gate signs installed or replaced;
- Enhance productivity through restoration activities;
- Thinning, piling and burning of hazardous fuels in the WUI;
- Prescribed burning to enhance wildlife habitat;
- Design work and construction of the Wood Mountain Stock Loop, North Fork River, West Fork Falls, and Northwest Peak to Rock Candy Trails;
- Interpretive signs describing the Wood Creek Scenic Larch Area and Pete Creek Meadow.
- Parking area improvements for the Wood Mountain Stock Loop Trail and Hawkins Lake Trails.

This results in analyses which assume and disclose impacts as if such actions are just as certain as all the logging and road reopening, which is erroneous and a violation of NEPA.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

AL TERNA TIVES

AWR's PA comment letter expressed our perspective on alternative management direction at p. 3, also in the section entitled INADEQUATE EMPHASIS ON RESTORATION. Also see EA comments at p. 89.

The EA lacks an alternative that results in a road system which is fully affordable to maintain on an annual basis, within all of the watersheds affected by the proposal. Expected appropriations would be useful as the yardstick to measure "affordable", based on recent years' funding levels.

Such an alternative would reduce road densities to meet science-based ecological conditions for wildlife and fisheries. Wisdom et al. (2000) state:

Efforts to restore habitats without simultaneous efforts to reduce road density and control human disturbances will curtail the effectiveness of habitat restoration, or even contribute to its failure; this is because of the large number of species that are simultaneously affected by decline in habitat as well as by road-associated factors.

The actions needed to reduce the road system to this affordable level need not themselves be within expected budgets. Indeed, few restoration projects proposed or implemented by the FS are fully funded by appropriated dollars. Figuring out a way to fund road decommissioning along with address the chronic sources of sediment would follow from a Decision to implement. That would be a legitimate way to collaborate.

Such an alternative would not damage soils, degrade forest wildlife habitat, and introduce sediment into streams by logging and building new roads, but instead focuses on fixing or removing the badly designed or under-maintained roads, restoring damaged soils, upgrading culverts, addressing noxious weeds, and focusing on other sources of erosion.

In analyzing such an alternative, it may turn out that some of the actions proposed for the action alternatives would be unnecessary or would be modified. For example, some roads proposed for maintenance or upgrading may not be affordable to maintain, or may be located where chronic sedimentation into streams persists. In such cases consideration of highest restoration priorities would require full road obliteration.

Such an alternative would reduce the road network in the project area watersheds consistent with best available science for maintaining robust populations of native fish and wildlife.

By reducing the footprint of roads, such an alternative would reduce the spread of noxious weeds and their associated costs and environmental damage.

Such an alternative would not construct any new roads, including temporary roads because, as the FS is aware, construction of temporary roads creates most of the same impacts as system roads.

Such an alternative would be in compliance with the Travel Management Rule Subpart A, which requires the FS to identify the forestwide minimum road system—itself necessarily being maintainable using expected annual appropriations. This alternative would be consistent with Montana Forest Restoration Committee Principle #13, which is to "Establish and maintain a safe road and trail system that is ecologically sustainable."

Such an alternative would maximize immediate carbon sequestration, because already dangerously elevated greenhouse gases are an immediate issue that must be addressed.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses issues we've raised in timely earlier comments by fully analyzing an alternative as we previously identified.

DISCLOSURE AND ANALYSIS UNDER NEPA

AWR requested disclosure and analysis of project area conditions and other important issues so we and other interested segments of the public could better understand the context of the Black Ram project proposal. In particular, we listed many on pp. 8-11 under the sections entitled "NECESSARY ELEMENTS FOR PROJECT EIS or that need to be answered in an EA" and "ECOLOGICALLY DEFICIENT FOREST PLAN 'DESIRED CONDITIONS'." This was largely ignored.

Also, as stated above, since many project activities not directly related to the commercial logging, burning, or other vegetation manipulations dependent upon uncertain and unidentified funding sources in order to be implemented. This results in resource analyses which disclose impacts as if these actions are just as certain as all the logging and road reopening, which is erroneous and a violation of NEPA.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses these analytical and scientific issues.

ECOLOGICALLY DEFICIENT FOREST PLAN "DESIRED CONDITIONS"

AWR's PA comment letter at pp. 3 **– 7** discusses the problem with the FS's "desired conditions"

and AWR's incorporated Objection to the revised forest plan also raises this issue in much detail.

Remedy: Select the No Action alternative. Alternatively, amend/revise the Forest Plan to finally address these issues as our Forest Plan Objection requests.

CLIMATE CHANGE AND CARBON SEQUESTRATION

AWR's PA comment letter at pp. 7-8 raises these highly relevant issues. EA comments at pp. 7- 8, 76-90. Also, issues regarding climate change and carbon sequestration were raised in AWR's incorporated Objection to the revised forest plan (OBJECTION STATEMENT: FW-DC-VEG-01, OBJECTION STATEMENT: FW-DC-VEG-02, OBJECTION

STATEMENT: FW-DC- VEG-03, OBJECTION STATEMENT: FW-DC-VEG-1, and the section entitled "CARBON SEQUESTRA TION").

The EA provided a pittance of information on climate change effects on project area vegetation. The EA provides no analysis as to the veracity of the project's Purpose and Need, the project's objectives, goals, or desired conditions. The FS has the responsibility to inform the public that climate change is and will be bringing forest change. For the Black Ram project, this did not happen, in violation of NEPA.

The EA fails to consider that the effects of climate change on the project area, including that the "desired" vegetation conditions will likely not be achievable or sustainable. The EA fails to provide any credible analysis as to how realistic and achievable its desired conditions are in the context of a rapidly changing climate, along an unpredictable but changing trajectory.

Hayward, 1994 essentially calls into question the entire manipulate and control regime, as represented in project design. The managed portion of the KNF has been fundamentally changed, as has the climate, so the FS must analyze how much land has been fundamentally changed forest wide compared to historic conditions, and disclose such information to the public in the context of an EIS.

We add this observation from Frissell and Bayles (1996):
Most philosophies and approaches for ecosystem management put forward to date are limited (perhaps doomed) by a failure to acknowledge and rationally address the overriding problems of uncertainty and ignorance about the mechanisms by which complex ecosystems respond to human actions. They lack humility and historical perspective about science and about our past failures in management. They still implicitly subscribe to the scientifically discredited illusion that humans are fully in control of an ecosystemic machine and can foresee and manipulate all the possible consequences of particular actions while deliberately alter-

ing the ecosystem to produce only predictable, optimized and socially desirable outputs. Moreover, despite our well-demonstrated inability to prescribe and forge institutional arrangements capable of successfully implementing the principles and practice of integrated ecosystem management over a sustained time frame an at sufficiently large spatial scales, would-be ecosystem managers have neglected to acknowledge and critically analyze past institutional and policy failures. They say we need ecosystem management because public opinion has changed, neglecting the obvious point that public opinion has been shaped by the glowing promises of past managers and by their clear and spectacular failure to deliver on such promises.

And as the KNF's March 2017 Galton Final Environmental Impact Statement explains:
This analysis identifies specific disturbance processes, together with landform and other environmental elements, which have influenced the patterns of vegetation across the Decision Area. Vegetative Response Units (VRUs) were used to define and describe the components of ecosystems. VRUs are used to describe an aggregation of land having similar capabilities and potentials for management. These ecological units have similar properties in natural communities: soils, hydrologic function, landform and topography, lithology, climate, air quality, and natural processes (nutrient and biomass cycling, succession, productivity, and fire regimes).

Each VRU has a characteristic frequency and type of disturbance based on its climate, soils, vegetation, animals, and other factors. Populations of native plants and animals have responded and adapted to these characteristic disturbance regimes over time (~2500 years) and the resulting vegetation patterns, processes, and structure within a historical range of variability. These characteristic processes, patterns, and structure are termed "Reference Conditions".

It's clear that "reference conditions" are no longer valid conceptually as a management target. Pederson et al. (2009) note that western Montana has already passed through 3 important, temperature-driven ecosystem thresholds. Westerling, et al. 2006 state:

Robust statistical associations between wildfire and hydro-climate in western forests indicate that increased wildfire activity over recent decades reflects sub-regional responses to changes in climate. Historical wildfire observations exhibit an abrupt transition in the mid-1980s from a regime of infrequent large wildfires of short (average of one week) duration to one with much more frequent and longer-burning (five weeks) fires. This transition was marked by a shift toward unusually warm springs, longer summer dry seasons, drier vegetation (which provoked more and longer-burning large wildfires), and longer fire seasons. Reduced winter precipitation and an early spring snowmelt played a role in this shift. Increases in wildfire were particularly strong in mid-elevation forests. ...The greatest increases occurred in mid-elevation, Northern Rockies forests, where land- use histories have relatively little effect on fire risks, and are strongly associated with increased spring and summer temperatures and an earlier spring snowmelt.

Running, 2006 cites model runs of future climate scenarios from the 4th Assessment of the Intergovernmental Panel on Climate Change, stating:

(S)even general circulation models have run future climate simulations for several different carbon emissions scenarios. These simulations unanimously project June to August temperature increases of 2° to 5°C by 2040 to 2069 for western North America. The simulations also project precipitation decreases of up to 15% for that time period (*11*). Even assuming the most optimistic result of no change in precipitation, a June to August temperature increase of 3°C would be roughly three times the spring-summer temperature increase that Westerling *et al*. have linked to the current trends. Wildfire burn areas in Canada are expected to increase by 74 to 118% in the next century (*12*), and similar increases seem likely for the western United States.

The Pacific Northwest Research Station, 2004 recognizes "(a) way that climate change may show up in forests is through changes in disturbance regimes—the long-term patterns of fire, drought, insects, and diseases that are basic to forest development."

The EA fails to analyze and disclose how climate change is already, and is expected to be even more in the future, influence forest ecology. This has vast ramifications as to whether or not the forest in the project area will respond as the FS assumes. As the forest plan FEIS states, "Forest Plan management strategies may affect the composition, structure, and landscape pattern of forests. This could influence the susceptibility and resiliency of the forests to significant disturbance agents such as large intense wildfires, insect and disease epidemics, weather events, and climate change." One of the needs for forest plan revision revolves around "concerns that the forest composition, structure, and pattern had shifted away from historical conditions to the extent that ecosystems, and the goods and services that it provided, may not be sustainable, especially in light of potential impacts from climate change." (Id.) It also states:

The 1987 Forest Plan does not contain direction on moving towards historic conditions or to improve resistance and resiliency in the light of climate change. Continued deviation from historic conditions would lead to changes in disturbance and succession processes, making it difficult to provide for a sustainable ecosystem.

The EA fails to
to water stress, competing vegetation, and repeat fires that burn young stands," which will likely lead to a dramatic increase in non-forest land acres. (Johnson, et al., 2016.)

acknowledge the likelihood that "...high seedling and sapling mortality rates due

The District Court of Montana ruled in Case 4:17-cv-00030-BMM that the Federal government was required to evaluate the climate change impacts of the federal government coal program.

In March 2019, U.S. District Judge Rudolph Contreras in Washington, D.C., ruled that when the U.S. Bureau of Land Management (BLM) auctions public lands for oil and gas leasing, officials must consider emissions from past, present and foreseeable future oil and gas leases nationwide. The case was brought by WildEarth Guardians.

In March of 2018 the Federal District Court of Montana found the Miles City (Montana) and Buffalo (Wyoming) Field Office's Resource Management Plans unlawfully overlooked climate impacts of coal mining and oil and gas drilling. The case was brought by Western Organization of Resource Councils, Montana Environmental Information Center, Powder River Basin Resource Council, Northern Plains Resource Council, the Sierra Club, and the Natural Resources Defense Council.

In the recent revised Forest Plan Draft EIS for the Custer-Gallatin National Forest, the FS states, "Climate change is expected to continue and have profound effects on the Earth's ecosystems in the coming decades (IPCC 2007)." As alarming as that might sound, perhaps the Black Ram IDT members should familiarize themselves with the most recent report from the Intergovernmental Panel on Climate Change, which makes that 2007 report seem optimistic.

A landmark report from the United Nations' scientific panel on climate change paints a much darker picture of the immediate consequences of climate change than previously thought and says that avoiding the damage requires transforming the world economy at a speed and scale that has "no documented historic precedent."

The report, issued late 2018 by the Intergovernmental Panel on Climate Change, a group of scientists convened by the United Nations to guide world leaders, describes a world of worsening food shortages and wildfires, and a mass die-off of coral reefs as soon as 2040 — a period well within the lifetime of much of the global population.

The report "is quite a shock, and quite concerning," said Bill Hare, an author of previous I.P.C.C. reports and a physicist with Climate Analytics, a nonprofit organization. "We were not aware of this just a few years ago." The report was the first to be commissioned by world leaders under the Paris agreement, the 2015 pact by nations to fight global warming.

The authors found that if greenhouse gas emissions continue at the current rate, the atmosphere will warm up by as much as 2.7 degrees Fahrenheit (1.5 degrees Celsius) above preindustrial levels by 2040, inundating coastlines and intensifying droughts and poverty. Previous work had focused on estimating the damage if average temperatures were to rise by a larger number, 3.6 degrees Fahrenheit (2 degrees Celsius), because that was the threshold scientists previously considered for the most severe effects of climate change.

The new report, however, shows that many of those effects will come much sooner, at the 2.7- degree mark.

Past conditions will not predict the future in the wake of climate change. The Montana Climate Assessment (MCA) (Found at http://montanaclimate.org/) is an effort to synthesize, evaluate, and share credible and relevant scientific information about climate change in Montana. It must be considered in development of the revised forest plan. Following are key messages and conclusions:

KEY MESSAGES

- Annual average temperatures, including daily minimums, maximums, and averages, have risen across the state between 1950 and 2015. The increases range between 2.0-3.0°F (1.1-1.7°C) during this period. [high agreement, robust evidence]

- Winter and spring in Montana have experienced the most warming. Average temperatures during these seasons have risen by 3.9°F (2.2°C) between 1950 and 2015. [high agreement, robust evidence]

- Montana's growing season length is increasing due to the earlier onset of spring and more extended summers; we are also experiencing more warm days and fewer cool nights. From 1951-2010, the growing season increased by 12 days. In addition, the annual number of warm days has increased by 2.0% and the annual number of cool nights has decreased by 4.6% over this period. [high agreement, robust evidence]

- Despite no historical changes in average annual precipitation between 1950 and 2015, there have been changes in average seasonal precipitation over the same period. Average winter precipitation has decreased by 0.9 inches (2.3 cm), which can mostly be attributed to natural variability and an increase in El Niño events, especially in the western and central parts of the state. A significant increase in spring precipitation (1.3-2.0 inches [3.3-5.1 cm]) has also occurred during this period for the eastern portion of the state. [moderate agreement, robust evidence]

- The state of Montana is projected to continue to warm in all geographic locations, seasons, and under all emission scenarios throughout the 21st century. By mid century, Montana temperatures are projected to increase by approximately 4.5-6.0°F (2.5-3.3°C) depending on the emission scenario. By the end-of-century, Montana temperatures are projected to increase 5.6-9.8°F (3.1-5.4°C) depending on the emission scenario. These state-level changes are larger than the average changes projected globally and nationally. [high agreement, robust evidence]

- The number of days in a year when daily temperature exceeds 90°F (32°C) and the number of frost-free days are expected to increase across the state and in both emission scenarios studied. Increases in the number of days above 90°F (32°C) are expected to be greatest in the eastern part of the state. Increases in the number of frost-free days are expected to be greatest in the western part of the state. [high agreement, robust evidence]

- Across the state, precipitation is projected to increase in winter, spring, and fall; precipitation is projected to decrease in summer. The largest increases are expected to occur during spring in the southern part of the state. The largest decreases are expected to

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occur during summer in the central and southern parts of the state. [moderate agreement, moderate evidence]

We incorporate the Battle Creek Alliance et al., 2017 comments on the January 20, 2017 Draft California Forest Carbon Plan within this Objection. (Attachment 1.) It contains headings such as "The ...assertion that increased thinning/logging will increase carbon storage in forests is unsupported by the best available science."

In a literature review, Simons (2008) states, "Restoration efforts aimed at the maintenance of historic ecosystem structures of the pre-settlement era would most likely reduce the resilient characteristics of ecosystems facing climate change (Millar 1999).” The project area and KNF have been fundamentally changed, so the agency must consider how much native forest it has fundamentally altered compared to historic conditions forestwide before pursuing “treatments” here. And that includes considering the effects of human-induced climate change. Essentially, this means considering new scientific information on all kinds of changes away from historic conditions.

The FS’s position on project impacts on climate change is that the project would have a miniscule impact on global carbon emissions. The obvious problem with that viewpoint is, once can say the same thing about every source of carbon dioxide and other greenhouse gas emission on earth, and likewise justify inaction as does this EA. In their comments on the KNF’s Draft EIS for the Lower Yaak, O'Brien, Sheep project, the EPA rejected that sort of analysis, basically because that cumulative effects scale dilutes project effects. We would add that, if the FS wants to refer to a wider scope to analyze its carbon footprint, we suggest that it actually conduct such a cumulative effect analysis and disclose it in a NEPA document.

The FS (in USDA Forest Service, 2017b) discusses some effects of climate change on forests, including “In many areas, it will no longer be possible to maintain vegetation within the historical range of variability. Land management approaches based on current or historical conditions will need to be adjusted.” The Black Ram EA has no scientific basis for its claims that proposed vegetation “treatments” will result in sustainable vegetation conditions under likely climate change scenarios. It also fails to provide a definition of “increasing resilience” that includes metrics for valid and reliable measurement of resilience. The scientific literature even debates if the same tree species mix that has historically inhabited sites can persist after disturbances, including the types of disturbances proposed under project action alternatives.

The Black Ram EA ignores scientific opinion on forest management's negative effects on carbon sequestration. The forest plan FEIS states, "Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by vegetation through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils." Best available science supports the proposition that forest policies must shift away from logging if a priority is carbon sequestration. Forests should be preserved indefinitely for their carbon storage value.

We incorporate the following article from the *Missoulian* (" 2019):

Fire study shows landscapes such as

Bitterroot's Sapphire Range too hot, dry to restore trees") written by Rob Chaney (Burned landscapes like this drainage in the Sapphire Mountains hasn't been able to grow new trees since the Valley Complex fire of 2000, due to lack of soil moisture, humidity and seed trees, as well as excess heat during the growing season. University of Montana students Erika Berglund and Lacey Hankin helped gather samples for a study showing tree stands are getting replaced by grass and shrubs after fire across the western United States due to climate change.

Courtesy Kim Davis

Fire-scarred forests like the Sapphire Range of the Bitterroot Valley may become grasslands because the growing seasons have become too hot and dry, according to new research from the University of Montana.

“The drier aspects aren’t coming back, especially on north-facing slopes,” said Kim Davis, a UM landscape ecologist and lead investigator on the study. “It’s not soil sterilization.

Other vegetation like grasses are re-sprouting. It's too warm. There's not enough moisture for the trees."

Davis worked with landscape ecologist Solomon Dobrowski, fire pale-oecologist Philip

Higuera, biologist Anna Sala and geoscientist Marco Maneta at UM along with colleagues at the U.S. Forest Service and University of Colorado-Boulder to produce the study, which was released Monday in the Proceedings of the National Academy of Sciences journal.

"What's striking is if you asked scientists two decades ago how climate warming would play out, this is what they expected we'd see," Higuera said. "And now we're starting to see those predictions on the impact to ecosystems play out."

The study concentrated on regrowth of Ponderosa pine and Douglas fir seedlings in Montana, Idaho, Colorado, New Mexico, Arizona and northern California. Field workers collected trees from 90 sites, including 40 in the northern Rocky Mountains, scattered within 33 wildfires that had occurred within the past 20 years.

"We did over 4,000 miles of road-tripping across the West, as well as lots of miles hiking and backpacking," Davis said. The survey crews brought back everything from dead seedlings to 4-inch-diameter tree rings; nearly 3,000 samples in total. Then they analyzed how long each tree had been growing and what conditions had been when it sprouted.

Before the 1990s, the test sites had enough soil moisture, humidity and other factors to recruit new seedlings after forest fires, Dobrowski said.

"There used to be enough variability in seasonal conditions that seedlings could make it across these fixed thresholds," Dobrowski said.

“After the mid-‘90s, those windows have been closing more often. We’re worried we’ll lose these low-elevation forests to shrubs or grasslands. That’s what the evidence points to.”

After a fire, all kinds of grasses, shrubs and trees have a blank slate to recover. But trees, especially low-elevation species, need more soil moisture and humidity than their smaller plant cousins. Before the mid-90s, those good growing seasons rolled around every three to five years. The study shows such conditions have evaporated on virtually all sites since 2000.

“The six sites we looked at in the Bitterroots haven’t been above the summer humidity threshold since 1997,” Higuera said. “Soil moisture hasn’t crossed the threshold since 2009.”

The study overturns some common assumptions of post-fire recovery. Many historic analyses of mountain forests show the hillsides used to hold far fewer trees a century ago, and have become overstocked due to the efforts humans put at controlling fire in the woods. Higuera explained that some higher elevation forests are returning to their more sparse historical look due to increased fires.

“But at the lower fringes, those burn areas may transition to non-forest types,” Higuera said, “especially where climate conditions at the end of this century are different than what we had in the early 20th Century.”

The study also found that soil sterilization wasn’t a factor in tree regrowth, even in the most severely burned areas. For example, the 2000 Sula Complex of fires stripped forest cover in the southern end of the Bitterroot Valley. While the lodgepole pine stands near

Lost Trail Pass have recovered, the lower- elevation Ponderosa pine and Douglas firs haven' t.

Another factor driving regeneration is the availability of surviving seed trees that can repopulate a burn zone. If one remains within 100 meters of the burned landscape, the area can at least start the process of reseeding. Unfortunately, the trend toward high-severity fires has reduced the once-common mosaic patterns that left some undamaged groves

mixed into the burned areas.

Higuera said he hoped land managers could use small or prescribed fires to make landscapes more resilient, as well as restructure tree-planting efforts to boost the chances of heavily burned places.

The Resources Planning Act of 1974 (RPA) and National Forest Management Act of 1976 (NFMA) mandate long-range planning which impose numerous limitations on timber extraction practices and the amount of timber sold annually. These long range plans are based on assumptions, which are based on data, expert opinion, public participation and other factors which mostly view from a historical perspective. So it's time to peer into the future to examine closely (NEPA: "take a hard look at") those assumptions.

Clearly, the FS is not considering best available science on this topic.

The EA and Forest Plan FEIS fail to reexamine the assumptions relating to timber suitability, resilience and sustainability as a result of recent fires, past regeneration success/failures, and climate-risk science.

Conventional wisdom dictates that forests regenerate and recover from wildfire. If that's true, then it's logical to conclude that forests can regenerate and recover from logging. And these days, "resilience" is a core tenant of Forest Service planning. Unfortunately, assumptions of the EA and Forest Plan FEIS relating to desired conditions are incorrect. NEPA requires a "hard look" at the best available science relating to future concentrations of greenhouse gases and gathering climate risk as we move forward into an increasingly uncertain and uncharted climate future. This has not been done. The Forest Plan and Black Ram EA do not include a legitimate climate-risk analysis.

Scientific research indicates that increasing CO_2 and other greenhouse gas concentrations may preclude maintaining and attaining the anticipated forest conditions in the project area and across the KNF. The agency downplays the implications across the entire Northern Rockies bioregion and beyond, seeming unaware of the likelihood that its desired conditions are at great risk.

No amount of logging, thinning and prescribes burning will cure the cumulative effects (irretrievable loss) already baked into the foreseeably impending climate chaos. "Treatments" must be acknowledged for what they are: adverse cumulative environmental effects. Logging can neither mitigate, nor prevent, the effects of wildfire or logging. Both cause disturbance to forests that cannot be restored or retrieved—the resilience assumed no longer exists. It is way too late in the game to pretend to ignore the elephant in the room.

The Forest Service ignores best available science indicating prescribed fire, thinning and logging are actually cumulative with the dominant forces of increased heat, drought, and wildfire.

NEPA requires analysis of an alternative that reflects our common understanding of climate risk. A considerable amount of data and scientific research repeatedly confirms that we may be looking in the wrong direction (back into history, e.g., "natural range of variability") for answers to better understand our forest future.

The Forest Service fails to analyze an alternative projecting climate science into the forest's future. It fails to adequately consider that the effects of climate risk represent a significant and eminent loss of forest resilience already, and growing risk into the "foreseeable future."

Funk et al., 2014 indicate that at least five common tree species, including aspens and four conifers, are at great risk unless atmospheric greenhouse gases and associated temperatures can be contained at today's levels of concentration in the atmosphere. It is indeed time to speak honestly about unrealistic expectations relating to desired conditions.

And according to scientific literature it seems highly unlikely that greenhouse gas concentrations and the heat they trap in the atmosphere will be held at current levels.

The Forest Service fails to analyze and disclose conditions we can realistically expect as heat trapped by increasing greenhouse gas concentrations steadily tightens its grip—and impacts on forests accrue locally, regionally, nationally, and globally.

The EA fails to assess and disclose all risks associated with vegetative-manipulation as proposed.

NEPA requires disclosure of impact on "the human environment." Climate risk presents overarching adverse impacts on cultural, economic, environmental, and social aspects of the human environment—people, jobs, and the economy—adjacent to and near the Forests. Challenges in predicting responses of individual tree species to climate are a result of species competing under a never-before-seen climate regime that we have not seen before—one forests may not have experienced before either.

Golladay et al., 2016 state, "In an uncertain future of rapid change and abrupt, unforeseen transitions, adjustments in management approaches will be necessary and some actions will fail. However, **it is increasingly evident that the greatest risk is posed by continuing to implement strategies inconsistent with and not informed by current understanding of our novel future**... (Emphasis added).

In the face of increasing climate risk, growing impacts of wildfire and insect activity, plus scientific research findings, the Forest Service must disclose the significant trend in post-fire regeneration failure. The EA fails to do so. The national forests have already experienced considerable difficulty restocking on areas that have been subjected to clear-cut logging, post- fire salvage logging and other even-aged management "systems." NFMA (1982) regulation 36CFR 219.27(c)(3) implements the NFMA statute, and requires restocking in five years.

The EA doesn't address the question of how lands were determined to be suitable for the type of management ongoing or proposed. It does not cite the specific documentation which determined that the specific areas proposed for logging in this proposal are suitable for timber production.

It's time to analyze and disclose the fact that the KNF can no longer "insure that timber will be harvested from the National Forest system lands only where...there is assurance that such lands can be restocked within five years of harvest." [NFMA §6(g)(3)(E)(ii)].

Davis et al., 2019 state: "

At dry sites across our study region, seasonal to annual climate

conditions over the past 20 years have crossed these thresholds, such that conditions have become increasingly unsuitable for regeneration. High fire severity and low seed availability further reduced the probability of postfire regeneration. Together, our results demonstrate that climate change combined with high severity fire is leading to increasingly fewer opportunities for seedlings to establish after wildfires and may lead to ecosystem transitions in low-elevation ponderosa pine and Douglas-fir forests across the western United States."

Forests are already experiencing emissions-driven deforestation, on both the post-fire and post- logging acreage.

The EA does not disclose restocking monitoring data and analysis.

Stevens-Rumann, et al., (2018) state: "In the US Rocky Mountains, we documented a significant trend of post-fire tree regeneration, even over the relatively short period of 23 years covered in this analysis. Our findings are consistent with the expectation of **reduced resilience of forest ecosystems to the combined impacts of climate warming and wildfire activity**. Our results suggest that predicted **shifts from forest to non-forested vegetation**. (Emphases added.)

The FS must finally accept scientific research and opinion that recognizes the critical challenge posed by climate change to global ecosystems and the KNF. The statement in the 2010 KIPZ Climate Change Report, "Harvested wood products increase the net sequestration on these forests by an undetermined amount" is unsubstantiated by cited scientific research or information. The statement frames the position of denial that FS officials adopt as policy.

The Forest Plan and Black Ram EA are based on assumptions largely drawn from the past. These assumptions must be rejected where overwhelming evidence demonstrates a change of course is critical. It is time to take a step back, assess the future and make the necessary adjustments, all in full public disclosure to the Congress and the public.

The EA fails to analyze how proposed management actions would be affected by likely climate change scenarios. The EA fails to quantify all human-caused CO_2 emissions for all project activities or quantify carbon sequestration for each alternative. The EA doesn't disclose how climate change has affected ecological conditions in the project area, and include an analysis of these conditions under climate change scenarios.

Some politicians, bureaucrats, and industry profiteers pretend there's nothing to do about climate change because it isn't real. The FS acknowledges it's real, pretends it can do nothing, provides but a limited focus on its symptoms and—like those politicians and profiteers—ignores and distracts from the causes of climate change they enable.

Global climate change is a massive, unprecedented threat to humanity and forests. Climate change is caused by excess CO_2 and other greenhouse gases transferred to the atmosphere from other pools. All temperate and tropical forests, including those in this project area, are an important part of the global carbon cycle. There is significant new information reinforcing the need to conserve all existing large stores of carbon in forests, in order to keep carbon out of the atmosphere and mitigate climate change. The agency must do its part by managing forests to maintain and increase carbon storage. Logging would add to cumulative total carbon emissions so is clearly part of the problem, so it must be minimized and mitigated. Logging would not only transfer carbon from storage to the atmosphere but future regrowth is unlikely to ever make up for the effects of logging, because carbon storage in logged forests lags far behind carbon storage in unlogged forests for decades or centuries. And before recovery, the agency plans even more activities causing greenhouse gas emissions.

Clearly, the management of the planet's forests is a nexus for addressing the largest crisis ever facing humanity. This is an issue as serious as nuclear annihilation (although at least with the latter we're not already pressing the button).

There is no cumulative effects analysis of KNF carbon sequestration over time.

Respected experts say that the atmosphere might be able to safely hold 350 ppm of CO_2.[5] So when the atmosphere was at pre-industrial levels of about 280 ppm, there was a cushion of about 70 ppm which represents millions of tons of greenhouse gas emissions. Well, now that cushion is completely gone. The atmosphere is now over 400 ppm CO_2 and rising. Therefore the safe level of additional emissions (from logging or any other activity) is negative. There is no safe level of additional emissions that our earth systems can tolerate. We need to be removing carbon from the atmosphere—not adding to it.[6] How? By allowing forest to grow. Logging moves us away from our objective while conservation moves us toward our objective.

Pecl, et al. 2017 "review the consequences of climate-driven species redistribution for economic development and the provision of ecosystem services, including livelihoods, food security, and

[5] http://www.350.org/about/science.
[6] "To get back to 350 ppm, we'll have to run the whole carbon-spewing machine backwards, sucking carbon out of the atmosphere and storing it somewhere safely. ... By growing more forests, growing more trees, and better managing all our forests..." (http://blog.cleanenergy.org/2013/11/26/exploringbio-carbon-tools/comment-page-1/#comment-375371)

culture, as well as for feedbacks on the climate itself." They state, "Despite mounting evidence for the pervasive and substantial impacts of a climate-driven redistribution of Earth's species, current global goals, policies, and international agreements fail to account for these effects. ... To date, all key international discussions and agreements regarding climate change have focused on the direct socioeconomic implications of emissions reduction and on funding mechanisms; **shifting natural ecosystems have not yet been considered in detail**." (Emphasis added.)

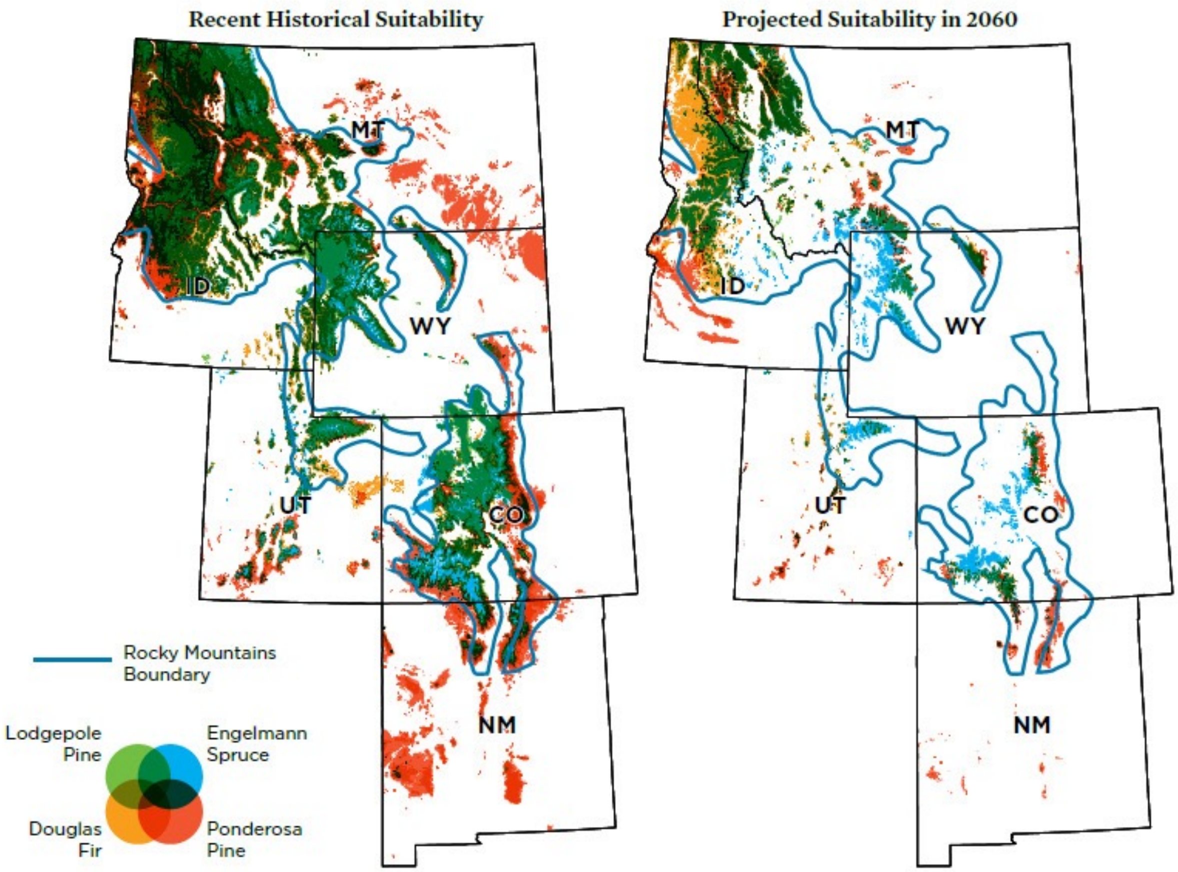
From a report by the Union of Concerned Scientists & Rocky Mountain Climate Organization (Funk et al., 2014):

The caption under Funk et al.'s Figure 5 and Table 1 states:
Much of the current range of these four widespread Rocky Mountain conifer species is projected to become climatically unsuitable for them

by 2060 if emissions of heat-trapping gases continue to rise. The map on the left shows areas projected to be climatically suitable for these tree species under the recent historical (1961–1990) climate; the map on the right depicts conditions projected for 2060 given medium-high levels of heat-trapping emissions. Areas in color have at least a 50 percent likelihood of being climatically suitable according to the models, which did not address other factors that affect where species occur (e.g., soil types). Emissions levels reflect the A2 scenario of the Intergovernmental Panel on Climate Change. For more about this methodology, see www.ucsusa.org/forestannex.

Pecl, et al. 2017 conclude:

FIGURE 5 AND TABLE 1. Projected Changes in Suitable Ranges for Key Rocky Mountain Tree Species



Species	Current	2060		
	Recent Historical Suitability (acres)	Projected Suitability (acres)	Net Change in Suitability (acres)	Percent Net Change
Lodgepole Pine	60,474,000	6,065,000	-54,409,000	-90%
Ponderosa Pine	39,842,000	7,771,000	-32,071,000	-80%
Engelmann Spruce	64,651,000	21,999,000	-42,652,000	-66%
Douglas Fir	53,620,000	22,606,000	-31,014,000	-58%

The breadth and complexity of the issues associated with the global redistribution of species driven by changing climate are creating profound challenges, with species movements already affecting societies and regional economies from the tropics to polar regions. Despite mounting evidence for these impacts, current global goals, policies, and international agreements do not sufficiently consider species range shifts in their formulation or targets. Enhanced awareness, supported by appropriate governance, will provide the best chance of minimizing negative consequences while maximizing opportunities arising from species movements—movements that, with or without effective emission reduction, will continue for the foreseeable future, owing to the inertia in the climate system.

Moomaw and Smith, 2017 identify the need for forest protection to be an urgent, national priority in the fight against climate change and as a safety net for communities against extreme weather events caused by a changing climate. As those authors explain,

Global climate change is caused by excess CO_2 and other greenhouse gases transferred to the atmosphere from other pools. Human activities, including combustion of fossil fuels and bioenergy, forest loss and degradation, other land use changes, and industrial processes, have contributed to increasing atmospheric CO_2, the largest contributor to global warming, which will cause temperatures to rise and stay high into the next millennium or longer.

The most recent measurements show the level of atmospheric carbon dioxide has reached 400 parts per million and will likely to remain at that level for millennia to come. Even if all fossil fuel emissions were to cease and all other heat-trapping gases were no longer emitted to the atmosphere, temperatures close to those achieved at the emissions peak would persist for the next millennium or longer.

Meeting the goals of the Paris Agreement now requires the implementation of strategies that result in negative emissions, i.e., extraction of carbon dioxide from the atmosphere. In other words, we need to annually remove more carbon dioxide from the atmosphere than we are emitting and store it long-term. Forests and soils are the only proven techniques that can pull vast amounts of carbon dioxide out of the atmosphere and store it at the scale necessary to meet the Paris goal. Failure to reduce biospheric emissions and to restore Earth’s natural climate stabilization systems will doom any attempt to meet the Paris (COP21) global temperature stabilization goals.

The most recent U.S. report of greenhouse gas emissions states that our forests currently "offset" 11 to 13 percent of total U.S. annual emissions. That figure is half that of the global average of 25% and only a fraction of what is needed to avoid climate catastrophe. And while the U.S. government and industry continue to argue that we need to increase markets for wood, paper, and biofuel as climate solutions, the rate, scale, and methods of logging in the United States are having significant, negative climate impacts, which are largely being ignored in climate policies at the international, national, state, and local levels.

The actual carbon stored long-term in harvested wood products represents less than 10 percent of that originally stored in the standing trees and other forest biomass. If the trees

had been left to grow, the amount of carbon stored would have been even greater than it was 100 years prior. Therefore, from a climate perspective, the atmosphere would be better off if the forest had not been harvested at all. In addition, when wood losses and fossil fuels for processing and transportation are accounted for, carbon emissions can actually exceed carbon stored in wood products.

Like all forests, the KNF is an important part of the global carbon cycle. Clear scientific information reinforces the critical need to conserve all existing stores of carbon in forests to keep it out of the atmosphere. Given that forest policies in other countries and on private lands are politically more difficult to influence, the FS must take a leadership role to maintain and increase carbon storage on publicly owned forests, in order to help mitigate climate change effects.

The effects of climate change have already been significant, particularly in the region. Westerling, et al. 2006 state:

Robust statistical associations between wildfire and hydro-climate in western forests indicate that increased wildfire activity over recent decades reflects sub-regional responses to changes in climate. Historical wildfire observations exhibit an abrupt transition in the mid-1980s from a regime of infrequent large wildfires of short (average of one week) duration to one with much more frequent and longer-burning (five weeks) fires. This transition was marked by a shift toward unusually warm springs, longer summer dry seasons, drier vegetation (which provoked more and longer-burning large wildfires), and longer fire seasons. Reduced winter precipitation and an early spring snowmelt played a role in this shift. Increases in wildfire were particularly strong in mid-elevation forests. ...The greatest increases occurred in mid-elevation, Northern Rockies forests, where land- use histories have relatively little effect on fire risks, and are strongly associated with increased spring and summer temperatures and an earlier spring snowmelt.

Running, 2006 cites model runs of future climate scenarios from the 4th Assessment of the Intergovernmental Panel on Climate Change, stating:

(S)even general circulation models have run future climate simulations for several different carbon emissions scenarios. These simulations unanimously project June to August temperature increases of 2° to 5°C by 2040 to 2069 for western North America. The simulations also project precipitation decreases of up to 15% for that time period (*11*). Even assuming the most optimistic result of no change in precipitation, a June to August temperature increase of 3°C would be roughly three times the spring-summer temperature increase that Westerling *et al*. have linked to the current trends. Wildfire burn areas in Canada are expected to increase by 74 to 118% in the next century (*12*), and similar increases seem likely for the western United States.

Pederson et al. (2009) note that western Montana has already passed through 3 important, temperature-driven ecosystem thresholds.

The Pacific Northwest Research Station, 2004 recognizes "(a) way that climate change may show up in forests is through changes in disturbance regimes—the long-term patterns of fire, drought, insects, and diseases that are basic to forest development."

Depro et al., 2008 found that ending commercial logging on U.S. national forests and allowing forests to mature instead would remove an additional amount of carbon from the atmosphere equivalent to 6 percent of the U.S. 2025 climate target of 28 percent emission reductions.

Forest recovery following logging and natural disturbances are usually considered a given. But forests have recovered under climatic conditions that no longer exist. Higher global temperatures and increased levels of disturbance are contributing to greater tree mortality in many forest ecosystems, and these same drivers can also limit forest regeneration, leading to vegetation type conversion. (Bart et al., 2016.)

The importance of trees for carbon capture will rise especially if, as recent evidence suggests, hopes for soils as a carbon sink may be overly optimistic. (He et al., 2016.) Such a potentially reduced role of soils doesn't mean that forest soils won't have a role in capture and storage of carbon, rather it puts more of the onus on aboveground sequestration by trees, even if there is a conversion to unfamiliar mixes of trees.

The KNF Forest Plan draft EIS defines carbon sequestration: "The process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils."

The analysis fails to quantify CO_2 and other greenhouse gas emissions from other common human activities related to forest management and recreational uses. These include emissions associated with machines used for logging and associated activities, vehicle use for administrative actions, recreational motor vehicles, and emissions associated with livestock grazing. The FS is simply ignoring the climate impacts of these management and other authorized or allowed activities.

Kassar and Spitler, 2008 provide an analysis of the carbon footprint of off-road vehicles in California. They determined that:

Off-road vehicles in California currently emit more than 230,000 metric tons — or
5000 million pounds — of carbon dioxide into the atmosphere each year. This is equivalent to the emissions created by burning 500,000 barrels of oil. The 26 million gallons of gasoline consumed by off-road vehicles each year in California is equivalent to the amount of gasoline used by 1.5 million car trips from San Francisco to Los Angeles.

. . . Off-road vehicles emit considerably more pollution than automobiles. According to the California Air Resources Board, off-road motorcycles and all-terrain vehicles produce 118 times as much smog-forming pollutants as do modern automobiles on a per-mile basis.

. . . Emissions from current off-road vehicle use statewide are equivalent to the carbon dioxide emissions from 42,000 passenger vehicles driven for an entire year or the electricity used to power 30,500 homes for one year.

Also, Sylvester, 2014 provides data on the amount of fossil fuel being consumed by snowmobiles in Montana, from which one can calculate the carbon footprint. The study finds that resident snowmobilers burn 3.3 million gallons of gas in their snowmobiles each year and a similar amount of fuel to transport themselves and their snowmobiles to and from their destination. Non-residents annually burn one million gallons of gas in snowmobiles and about twice that in related transportation. So that adds up to 9.6 million gallons of fuel consumed in the pursuit of snowmobiling each year in Montana alone. Multiply that by 20 pounds of carbon dioxide per gallon of gas (diesel pickups spew 22 pounds per gallon) and snowmobiling releases 192 million pounds (96 thousand tons) of climate-warming CO_2 per year into the atmosphere. Can we really afford this?

The FS distracts from the emerging scientific consensus that removing wood or *any* biomass from the forest only worsens the climate change problem. Law and Harmon, 2011 conducted a literature review and concluded ...

Thinning forests to reduce potential carbon losses due to wildfire is in direct conflict with carbon sequestration goals, and, if implemented, would result in a net emission of CO2 to the atmosphere because the amount of carbon removed to change fire behavior is often far larger than that saved by changing fire behavior, and more area has to be harvested than will ultimately burn over the period of effectiveness of the thinning treatment.

Best available science supports the proposition that forest policies must shift away from logging if carbon sequestration is prioritized. Forests must be preserved indefinitely for their carbon storage value. Forests that have been logged should allowed to convert to eventual old-growth condition. This type of management has the potential to double the current level of carbon storage in some regions. (*See* Harmon and Marks, 2002; Harmon, 2001; Harmon et al., 1990; Homann et al., 2005; Law, 2014; Solomon et al., 2007; Turner et al., 1995; Turner et al., 1997; Woodbury et al., 2007.)

Kutsch et al., 2010 provide an integrated view of the current and emerging methods and concepts applied in soil carbon research. They use a standardized protocol for measuring soil CO_2 efflux, designed to improve future assessments of regional and global patterns of soil carbon dynamics:

Excluding carbonate rocks, soils represent the largest terrestrial stock of carbon, holding approximately 1,500 Pg (1015 g) C in the top metre. This is approximately twice the amount held in the atmosphere and thrice the amount held in terrestrial vegetation. Soils, and soil organic carbon in particular, currently receive much attention in terms of the role they can play in mitigating the effects of elevated atmospheric carbon dioxide (CO_2) and associated global warming. Protecting soil carbon stocks and the process of soil carbon sequestration, or flux of carbon into the soil, have become integral parts of managing the global carbon balance. This has been mainly because many of the factors affecting the flow of carbon into and out of the soil are affected directly by **land-management practices**. (Emphasis added.)

Moomaw and Smith, 2017 state:
Multiple studies warn that carbon emissions from soil due to logging are significant, yet under-reported. One study found that logging or clear-cutting a forest can cause carbon emissions from soil disturbance for up to fifty years. Ongoing research by an N.C. State University scientist studying soil emissions from logging on Weyerhaeuser land in North Carolina suggests that "logging, whether for biofuels or lumber, is eating away at the carbon stored beneath the forest floor."

Moomaw and Smith, 2017 examined the scientific evidence implicating forest biomass removal as contributing to climate change:

All plant material releases slightly more carbon per unit of heat produced than coal. Because plants produce heat at a lower temperature than coal, wood used to produce electricity produces up to 50 percent more carbon than coal per unit of electricity.

Trees are harvested, dried, and transported using fossil fuels. These emissions add about 20 percent or more to the carbon dioxide emissions associated with combustion.

In 2016, Professors Mark Harmon and Bev Law of Oregon State University wrote the following in a letter to members of the U.S. Senate in response to a bill introduced that would essentially designate the burning of trees as carbon neutral:

The [carbon neutrality] bills' assumption that emissions do not increase atmospheric concentrations when forest carbon stocks are stable or increasing is clearly not true scientifically. It ignores the cause and effect basis of modern science. Even if forest carbon stocks are increasing, the use of forest biomass energy can reduce the rate at which forest carbon is increasing. Conservation of mass, a law of physics, means that atmospheric carbon would have to become higher as a result of this action than would have occurred otherwise. One cannot legislate that the laws of physics cease to exist, as this legislation suggests.

Van der Werf, et al. 2009 discuss the effects of land-management practices and state:
(T)he maximum reduction in CO_2 emissions from avoiding deforestation and forest degradation is probably about 12% of current total anthropogenic emissions (or 15% if peat degradation is included) - and that is assuming, unrealistically, that emissions from deforestation, forest degradation and peat degradation can be completely eliminated.

...reducing fossil fuel emissions remains the key element for stabilizing atmospheric CO_2 concentrations.

(E)fforts to mitigate emissions from tropical forests and peatlands, and maintain existing terrestrial carbon stocks, remain critical for the negotiation of a post-Kyoto agreement. Even our revised estimates represent substantial emissions ...

Keith et al., 2009 state:
Both net primary production and net ecosystem production in many old forest stands have been found to be positive; they were lower than the carbon fluxes in young and mature stands, but not significantly different from them. Northern Hemisphere forests up to 800 years old have been found to still function as a carbon sink. Carbon stocks can continue to accumulate in multi-aged and mixed species stands because stem respiration rates decrease with increasing tree size, and continual turnover of leaves, roots, and woody material contribute to stable components of soil

organic matter. There is a growing body of evidence that forest ecosystems do not necessarily reach an equilibrium between assimilation and respiration, but can continue to accumulate carbon in living biomass, coarse woody debris, and soils, and therefore may act as net carbon sinks for long periods. Hence, process-based models of forest growth and carbon cycling based on an assumption that stands are even- aged and carbon exchange reaches an equilibrium may underestimate productivity and carbon accumulation in some forest types. Conserving forests with large stocks of biomass from deforestation and degradation avoids significant carbon emissions to the atmosphere. Our insights into forest types and forest conditions that result in high biomass carbon density can be used to help identify priority areas for conservation and restoration.

Hanson, 2010 addresses some of the false notions often misrepresented as “best science” by agencies, extractive industries and the politicians they’ve bought:

Our forests are functioning as carbon sinks (net sequestration) where logging has been reduced or halted, and wildland fire helps maintain high productivity and carbon storage.

Even large, intense fires consume less than 3% of the biomass in live trees, and carbon emissions from forest fires is only tiny fraction of the amount resulting from fossil fuel consumption (even these emissions are balanced by carbon uptake from forest growth and regeneration).

"Thinning" operations for lumber or biofuels do not increase carbon storage but, rather, reduce it, and thinning designed to curb fires further threatens imperiled wildlife species that depend upon post-fire habitat.

Campbell et al., 2011 also refutes the notion that fuel-reduction treatments increase forest carbon storage in the western US:

It has been suggested that thinning trees and other fuel-reduction practices aimed at reducing the probability of high-severity forest fire are consistent with efforts to keep carbon (C) sequestered in terrestrial pools, and that such practices should therefore be rewarded rather than penalized in C-accounting schemes. By evaluating how fuel treatments, wildfire, and their interactions affect forest C stocks across a wide range of spatial and temporal scales, we conclude that this is extremely unlikely. Our review reveals high C losses associated with fuel treatment, only modest differences in the combustive losses associated with high-severity fire and the low-severity fire that fuel treatment is meant to encourage, and a low likelihood that treated forests will be exposed to fire. Although fuel-reduction treatments may be necessary to restore historical functionality to fire-suppressed ecosystems, we found little credible evidence that such efforts have the added benefit of increasing terrestrial C stocks.

Mitchell et al. (2009) also refutes the assertion that logging to reduce fire hazard helps store carbon, and conclude that although thinning can affect fire, management activities are likely to remove more carbon by logging than will be stored by trying to prevent fire.

Forests affect the climate, climate affects the forests, and there's been increasing evidence of climate triggering forest cover loss at significant scales (Breshears et al. 2005), forcing tree species into new distributions "unfamiliar to modern civilization" (Williams et al. 2012), and raising a question of forest decline across the 48 United States (Cohen et al. 2016).

In 2012 Forest Service scientists reported, "Climate change will alter ecosystem services, perceptions of value, and decisions regarding land uses." (Vose et al. 2012.)

The 2014 National Climate Assessment chapter for the Northwest is prefaced by four "key messages" including this one: "The combined impacts of increasing wildfire, insect outbreaks, and tree diseases are already causing widespread tree die-off and are virtually certain to cause additional forest mortality by the 2040s and long-term transformation of forest landscapes. Under higher emissions scenarios, extensive conversion of subalpine forests to other forest types is projected by the 2080s." (Mote et al. 2014.)

None of this means that longstanding values such as conservation of old-growth forests are no longer important. Under increasing heat and its consequences, we're likely to get unfamiliar understory and canopy comprised of a different mix of species. This new assortment of plant species will plausibly entail a new mix of trees, because some familiar tree species on the (KNF) may not be viable—or as viable—under emerging climate conditions.

That said, the plausible new mix will include trees for whom the best policy will be in allowing them to achieve their longest possible life-span, for varied reasons including that big trees will still serve as important carbon capture and storage (Stephenson et al. 2014).

Managing forest lands with concerns for water will be increasingly difficult under new conditions expected for the 21^{st} century. (Sun and Vose, 2016.) Already, concerns have focused on new extremes of low flow in streams. (Kormos et al. 2016.) The 2014 National Climate Assessment Chapter for the Northwest also recognizes hydrologic challenges ahead: "Changes in the timing of streamflow related to changing snowmelt are already observed and will continue, reducing the supply of water for many competing demands and causing far-reaching ecological and socioeconomic consequences." (Mote et al. 2014.)

Heat, a long-established topic of physics, plays an equally important role at the level of plant and animal physiology—every organism only survives and thrives within thermal limits. For example, Pörtner et al. (2008) point out, "All organisms live within a limited range of body temperatures... Direct effects of climatic warming can be understood through fatal decrements in an organism's performance in growth, reproduction, foraging, immune competence, behaviors and competitiveness." The authors further explain, "Performance in animals is supported by aerobic scope, the increase in oxygen consumption rate from resting to maximal." In other words, rising heat has the same effect on animals as reducing the oxygen supply, and creates the same difficulties in breathing. But breathing difficulties brought on by heat can have important consequences even at sub-lethal levels. In the case of grizzly bears, increased demand for oxygen under increasing heat has implications for vigorous (aerobically demanding) activity including digging, running in pursuit of prey, mating, and the play of cubs.

Malmsheimer et al. 2008 state, "Forests are shaped by climate. Along with soils, aspect, inclination, and elevation, climate determines what will grow where and how well. Changes in temperature and precipitation regimes therefore have the potential to dramatically affect forests nationwide."

Kirilenko and Sedjo, 2007 state "The response of forestry to global warming is likely to be multifaceted. On some sites, species more appropriate to the climate will replace the earlier species that is no longer suited to the climate."

Some FS scientists recognize this changing situation, for instance Johnson, 2016:
Forests are changing in ways they've never experienced before because today's growing conditions are different from anything in the past. The climate is changing at an unprecedented rate, exotic diseases and pests are present, and landscapes are fragmented by human activity often occurring at the same time and place.

The current drought in California serves as a reminder and example that forests of the 21st century may not resemble those from the 20th century. "When replanting a forest after disturbances, does it make sense to try to reestablish what was there before? Or, should we find re-plant material that might be more appropriate to current and future conditions of a changing environment?

“Restoration efforts on U.S. Forest Service managed lands call for the use of locally adapted and appropriate native seed sources. The science-based process for selecting these seeds varies, but in the past, managers based decisions on the assumption that present site conditions are similar to those of the past.

“This may no longer be the case.”

The issue of forest response to climate change is also of course an issue of broad importance to community vitality and economic sustainability. Raising a question about persistence of forest stands also raises questions about hopes—and community economic planning—for the sustainability of forest-dependent jobs. Allen et al., 2015 state:

Patterns, mechanisms, projections, and consequences of tree mortality and associated broad-scale forest die-off due to drought accompanied by warmer temperatures—hotter drought”, an emerging characteristic of the Anthropocene—are the focus of rapidly expanding literature.

...(R)ecent studies document more rapid mortality under hotter drought due to negative tree physiological responses and accelerated biotic attacks. Additional evidence suggesting greater vulnerability includes rising background mortality rates; projected increases in drought frequency, intensity, and duration; limitations of vegetation models such as inadequately represented mortality processes; warming feedbacks from die-off; and wildfire synergies.

...We also present a set of global vulnerability drivers that are known with high confidence: (1) droughts eventually occur everywhere; (2) warming produces hotter droughts; (3) atmospheric moisture demand increases nonlinearly with temperature during drought; (4) mortality can occur faster in hotter drought, consistent with fundamental physiology; (5) shorter droughts occur more frequently than longer droughts and can become lethal under warming, increasing the frequency of lethal drought nonlinearly; and (6) mortality happens rapidly relative to growth intervals needed for forest recovery.

These high-confidence drivers, in concert with research supporting greater vulnerability perspectives, support an overall viewpoint of greater forest vulnerability globally. We surmise that mortality vulnerability is being discounted in part due to difficulties in predicting threshold responses to extreme climate events. Given the profound ecological and societal implications of underestimating global vulnerability to hotter drought, we highlight urgent challenges for research, management, and policy-making communities.

Moomaw and Smith, 2017 conclude:
With the serious adverse consequences of a changing climate already occurring, it is important to broaden our view of sustainable forestry to see forests ...as complex ecosystems that provide valuable, multiple life-supporting services like clean water, air, flood control, and carbon storage. We have ample policy mechanisms, resources, and funding to support conservation and protection if we prioritize correctly.

...We must commit to a profound transformation, rebuilding forested landscapes that sequester carbon in long-lived trees and permanent soils. Forests that protect the climate also allow a multitude of species to thrive, manage water quality and quantity and protect our most vulnerable communities from the harshest effects of a changing climate.

Protecting and expanding forests is not an “offset” for fossil fuel emissions. To avoid serious climate disruption, it is essential that we simultaneously reduce emissions of carbon dioxide from burning fossil fuels and bioenergy along with other heat trapping gases and accelerate the removal of carbon dioxide from the atmosphere by protecting and expanding forests. It is not one or the other. It is both!

Achieving the scale of forest protection and restoration needed over the coming decades may be a challenging concept to embrace politically; however, forests are the only option that can operate at the necessary scale and within the necessary time frame to keep the world from going over the climate precipice. Unlike the fossil fuel companies, whose industry must be replaced, the wood products industry will still have an important role to play in providing the wood products that we need while working together to keep more forests standing for their climate, water, storm protection, and biodiversity benefits.

It may be asking a lot to "rethink the forest economy" and to "invest in forest stewardship," but tabulating the multiple benefits of doing so will demonstrate that often a forest is worth much more standing than logged. Instead of subsidizing the logging of forests for lumber, paper and fuel, society should pay for the multiple benefits of standing forests. It is time to value U.S. forests differently in the twenty-first century. We have a long way to go, but there is not a lot of time to get there.

The FS doesn't consider that the "desired" vegetation conditions may not be achievable or sustainable, nor conduct an analysis as to how realistic and achievable Forest Plan desired conditions are in the context of a rapidly changing climate, along an unpredictable but changing trajectory.

Global warming and its consequences are effectively *irreversible* which implicates certain legal consequences under NEPA and NFMA and ESA (e.g., 40 CFR § 1502.16; 16 USC §1604(g); 36 CFR §219.12; ESA Section 7; 50 CFR §§402.9, 402.14). All net carbon emissions from logging represent "irretrievable and irreversible commitments of resources."

The Committee of Scientists, 1999 recognize the importance of forests for their contribution to global climate regulation. Also, the 2012 Planning Rule recognizes, in its definition of *Ecosystem services*, the "Benefits people obtain from ecosystems, including: (2) *Regulating services,* such as long term storage of carbon; climate regulation...”

Harmon, 2009 is the written record of “Testimony Before the Subcommittee on National Parks, Forests, and Public Lands of the Committee of Natural Resources for an oversight hearing on The Role of Federal Lands in Combating Climate Change.” The author “reviews, in terms as simple as possible, how the forest system stores carbon, the issues that need to be addressed when assessing any proposed action, and some common misconceptions that need to be avoided.” His testimony begins, “I am here to ...offer my expertise to the subcommittee. I am a professional scientist, having worked in the area of forest carbon for nearly three decades. During that time I have conducted numerous studies on many aspects of this problem, have published extensively, and provided instruction to numerous students, forest managers, and the general public.”

Climate change science suggests that logging for sequestration of carbon, logging to reduce wild fire, and other manipulation of forest stands does not offer benefits to climate. Rather, increases in carbon emissions from soil disturbance and drying out of forest floors are the result. The FS can best address climate change through minimizing development of forest stands, especially stands that have not been previously logged, by allowing natural processes to function. Furthermore, any supposedly carbon sequestration from logging are usually more than offset by carbon release from ground disturbing activities and from the burning of fossil fuels to accomplish the timber sale, even when couched in the language of restoration. Reducing fossil fuel use is vital. Everything from travel planning to monitoring would have an important impact in that realm.

There is scientific certainty that climate change has reset the deck for future ecological conditions. For example, Sallabanks, et al., 2001:

(L)ong-term evolutionary potentials can be met only by accounting for potential future changes in conditions. ...Impending changes in regional climates ...have the capacity for causing great shifts in composition of ecological communities.

Remedy: Choose the No Action Alternative. Revise the Forest Plan to take a hard look at the science of climate change. Alternatively, revise the EA for this project if the FS still wants to pursue it, which includes an analysis that examines climate change in the context of project activities and Desired Conditions. Better yet, it's time to prepare an EIS on the whole bag of U.S. Government climate policies.

TRAVEL MANAGEMENT

AWR's PA comments raised the issue of travel and access management at page 8. This relates directly to the issue of access management we discuss throughout our comments concerning habitat security for grizzly bears. Also, issues regarding the minimum road system were raised in our Objection to the revised forest plan (OBJECTION STATEMENT: Inadequate direction to designate the minimum road system).

Consistent with genuine restoration, we support implementation of FS policy to **right-size the road network** to achieve the ecologically sustainable **minimum road system** necessary. Annual maintenance must be affordable, leaving no significant chronic unmet needs which tend to cause long-term ecosystem stressors. We believe that the Transportation Analysis Process is something in which the agency should be inviting the public to collaboratively participate, and indeed provisions in the forest plan require this be addressed in all project planning.

We incorporate the documents in the folder titled "WildEarth Guardians-TAP" which are letters to the KNF regarding the Travel Analysis Process.

The 2003 Analysis of the Management Situation Technical Report presented information on the financial liabilities of the KNF's National Forest System Roads:

For the KNF, the annual maintenance budget would need to be approximately $28.8 million dollars and the cost to bring all roads up to their assigned maintenance level is estimated at $515 million dollars.

(AMS Technical Report, 115.) It is important to note that the $28.8 million estimated annual maintenance costs far exceed all published estimates of road maintenance funding the KNF has received annually at least since the AMS was published. And although the FS never likes to conduct an analysis of—nor disclose the forest-wide ecological impacts of—its road maintenance funding shortfalls, projecting from discussion in Gucinski et al. 2001 (cited in the AMS) helps for imagining the scale of the impacts.

Table 1-28: Summary of Road Miles and Estimated Maintenance Costs by Objective Maintenance Levels

FOREST	Total Miles	Estimated Annual Maintenance Costs	Estimated Deferred Maintenance Costs
Idaho Panhandle			
Objective Maint. Level 5	99	$206,415	$99,000
Objective Maint. Level 4	258	$894,228	$1,291,290
Objective Maint. Level 3	1,965	$3,075,225	$44,275,380
Objective Maint. Level 2	2,452	$1,500,624	$96,008,060
Objective Maint. Level 1	6,819	$988,755	$378,454,500
TOTAL	**11,593**	**$6,665,247**	**$520,128,230**
Kootenai			
Objective Maint. Level 5	98	$576,534	$76,815,242
Objective Maint. Level 4	121	$3,477,540	$91,161,521
Objective Maint. Level 3	1,526	$7,347,690	$190,441,748
Objective Maint. Level 2	1,759	$3,410,701	$34,173,852
Objective Maint. Level 1	4,419	$14,043,582	$122,927,742
TOTAL	**7,923**	**$28,856,047**	**$515,520,105**

Source: USFS Infra database

Note: Approx. 28 miles of road on the IPNFs has unassigned Objective. Maint. Levels.
Approx. 31 miles of road on the KNF has unassigned Objective. Maint. Levels

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)

The EA fails to demonstrate compliance with FW-OBJ-AR-03: "The outcome is:
• Annually, meet maintenance level requirements on 20 to 30 percent of Operational Maintenance Level 3, 4, and 5 roads (roads that are drivable by passenger vehicles and provide primary access to many recreation opportunities).
• Annually, meet maintenance level requirements on 10 to 20 percent of Operational Maintenance Level 2 roads (roads that are drivable by high clearance vehicles and provide additional access to recreation opportunities)."

NEPA regulations at 40 CFR § 1502.24 state, under **Methodology and scientific accuracy**: "Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements." The EA violates NEPA in terms of methodology, scientific accuracy, and scientific integrity.

INFISH Forest Plan Standard #RF-2 requires development and implementation of a Road Management Plan or a Transportation management Plan, which must address, among other items, 'Criteria that govern road ...maintenance and management.' Project area criteria were not disclosed in the EA analysis. The EA also fails to address "Requirements for pre-, during, and post storm inspection and maintenances."

The EA doesn't disclose how the project would be consistent with the Travel Management Rule 36 CFR Part 212, Subparts A, B, and C, which are regulations that affect the project area.

The EA doesn't provide an analysis demonstrating consistency with the Road Management Objectives for each road in the project area.

The EA doesn't the annual expenditures for road maintenance in the project area, nor the level of maintenance deferred due to insufficient funding.

The EA doesn't disclose ongoing soil and water impacts from roads not being adequately maintained. Please disclose the impacts of roads that are not maintained because they are unauthorized or non-system.

The EA doesn't provide documentation of surveys of conditions on all roads (system, non- system, undetermined, etc.) conducted in the project area.

To address its unsustainable and deteriorating road system, the FS promulgated the

Roads Rule (referred to as "subpart A") in 2001. The rule directs each national forest to conduct "a science-based roads analysis," generally referred to as the "travel analysis process." The Forest Service 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.

Early in the forest plan revision process, the FS recognized the opportunity the process provided for addressing the excessive road system on the Forest. This was indicated in statements made in the AMS:

The revised Forest Plans need to be in compliance with new laws, regulations, and management direction. Forest Plans also need to incorporate new research and science that has been developed. The new strategies have been developed to aid in the sustainability of all native and desired non-native species.

In January of 2001, a new Forest Roads Rule and Policy was issued which revised regulations concerning the management, use, and maintenance of the National Forest Transportation System. Forest Plan Revision provides the opportunity to incorporate this direction into the Forest Plans (USDA 2001b).

Possible Strategies in Revising Management Direction for Access and Recreation:

• Provide management direction for Access and Travel Management Planning, including criteria for developing access strategies by appropriate modes and season of use.

On the verge of taking bold, necessary strides towards reforming its roads and access management into something ecologically sustainable, the FS issued the revised Forest Plan and FEIS which failed to analyzed or address the problem, and then followed that up with a sham Region 1-directed Travel Analysis Process that failed to follow the Travel Management Rule Subpart A requirements for involving the public in a science-based effort to identify the forestwide minimum road system. The FS is obligated to disclose the project area road system's long-term financial liabilities, and the associated ecological impacts due to inadequate maintenance funding.

Huge bibliographies of scientific information indicate the highly significant nature of departures from historic conditions that are the impacts on forest ecosystems caused by motorized travel routes and infrastructure. That there are no road density standards in the forest plan suggests the biased and arbitrary manner of the FS's use of its own "best available science." From the Wisdom et al. (2000) Abstract:

Our assessment was designed to provide technical support for the ICBEMP and was done in five steps. ... Third, we summarized the effects of roads and road-associated factors on populations and habitats for each of the 91 species and described the results in relation to **broad-scale patterns of road density.** Fourth, we mapped classes of the current abundance of source habitats for four species of terrestrial carnivores in relation to **classes of road density** across the 164 subbasins and used the maps to identify areas having high potential to support persistent populations. And fifth, we used our results, along with results from other studies, to describe broad-scale implications for managing habitats deemed to have undergone long-term decline and for managing species negatively affected by **roads or road-associated factors**. (Emphases added.)

Carnefix and Frissell, 2009 make a very strong scientific rationale for including ecologically- based road density standards:

Roads have well-documented, significant and widespread ecological impacts across multiple scales, often far beyond the area of the road "footprint". Such impacts often create large and extensive departures from the natural conditions to which organisms are adapted, which increase with the extent and/or density of the road network. Road density is a useful metric or indicator of human impact at all scales broader than a single local site because it integrates impacts of human disturbance from activities that are associated with roads and their use (e.g., timber harvest, mining, human wildfire ignitions, invasive species introduction and spread, etc.) with direct road impacts. Multiple, convergent lines of empirical evidence summarized herein support two robust conclusions: 1) no truly "safe" threshold 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., threat 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.**

(Emphases added.) Wisdom et al., 2000, which was cited heavily in the forest plan FEIS and is thus considered to be "Best Available Science" by the FS, state in their Abstract:

Our analysis also indicated **that >70 percent of the 91 species are affected negatively by one or more factors associated with roads.** Moreover, maps of the abundance of source habitats in relation to classes of road density suggested that road-associated factors hypothetically may reduce the potential to support persistent populations of terrestrial carnivores in many subbasins. Management implications of our summarized road effects include the potential to mitigate a diverse set of negative factors associated with roads. **Comprehensive mitigation of road-associated factors would require a substantial reduction in the den-**

sity of existing roads as well as effective control of road access in relation to management of livestock, timber, recreation, hunting, trapping, mineral development, and other human activities. (Emphases added.)

The heavy bias toward identifying habitat manipulation options (i.e., logging and other active management activities) in the forest plan—which lacks Wisdom et al. (2000) implications for road management—has led to a forest plan that is a recipe for failure.

The EA does not reduce ecological damage the way it intends for vegetative historical range of variability (HRV). Other factors that have been heavily influenced by management along with their historical range of variability include:

FACTOR HRV Road density zero Noxious weed occurrence zero Milesoflong-termstreamchanneldegradation(“press”disturbance) zero Culverts zero Human-induced detrimental soil conditions <1% Maximum daily decibel level of motorized devices zero Acres of significantly below HRV snag levels for many decades zero

Roadless extent 100% Extent of veg. communities affected by exotic grazers (livestock) rare Extent of veg. communities affected by fire suppression zero

The Black Ram project would not “move” those factors anywhere close to the HRV, and thus the adverse legacy impacts would continue. Holistic restoration is beyond the scope of the Black Ram project.

The Black Ram EA does not demonstrate the project area is being managed consistent with Travel Management Regulations at 36 CFR 212 (Subparts, A, B, and C) and the Executive Orders related to Subpart B. Subpart A requires the FS to involve the public in a scientifically based process which designates the Minimum Road System both in the analysis area and forestwide, so that unnecessary or ecologically damaging roads are targeted for decommissioning and the economic liabilities of roads are minimized.

The Black Ram EA does not disclose compliance with motorized route restrictions, and if violations exist, perform an analysis of the resultant harm to wildlife habitat, soil, and water.

We ask the FS disclose the following information concerning the project area:

- The deferred road maintenance backlog
- The annual road maintenance funding needs
- The annual road maintenance budget
- The capital improvement needs for existing roads
- The road density in the project area
- The number of miles of project area roads that fail to meet BMP standards or design
  standards
  The Forest Plan makes a **Decision** prioritizing vast but unspecified acreage of the KNF for motorized recreation, in the absence of the travel planning required by the Travel Management Regulations. The Forest Plan makes **Decisions** designating unspecified mileages of the KNF for motorized recreation, in the absence of the travel planning required by Travel Management Regulations and completed by 2015.

The EA states, "Both storage and decommissioning would be primarily passive; that is, there is no on-the ground watershed or other stabilization needed." It's clear that the FS is making it standard practice to re-use such abandoned road templates—and even roads actively decommissioned—not including them on the official road inventory therefore constantly avoiding responsibilities, regulations, and forest plan requirements for roads.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

WILDLIFE AND DIVERSITY

AWR's PA comments raised wildlife and biological diversity issues at pp. 8 - 13. Also see our extensive inquiries regarding wildlife in EA comments, e.g. pp. 2, 5-6, 8, and 74. Also, issues regarding old growth and associated wildlife were raised in our Objection to the revised forest plan (pp. 4-5, 7-11, 31-40, 71-72).

Because the EA fails to adequately specify the amount of large live and dead tree structure to be retained in treated areas, and since most of the EA's wildlife analyses pretend or assume to know otherwise, the analyses of impacts on most wildlife are base upon insufficient analysis, in violation of NEPA.

AWR objected to the use of "Landbird Assemblage" in the revised forest plan. The EA provides inadequate analyses for the Forest Plan MIS landbird assemblage (olive-sided flycatcher, dusky flycatcher, Hammond's flycatcher, chipping sparrow, and hairy woodpecker). Little or nothing is presented on the specific habitat needs of all of these bird species, nor any analysis of cumulative impacts. The Forest Plan and FEIS do not include scientific justification for the adoption of the MIS Landbird Assemblage as MIS representing other wildlife (including old-growth associated wildlife species) on the KNF. In fact the FEIS contains an explicit assumption that its implementation cannot possibly affect viability of its chosen indicator species: “These MIS, elk and insectivores, were not proposed because of a viability concern.” The EA fails to their current population abundance, so that a baseline is established for later comparisons to determine population trends.

The FS has not disclosed the connection between population monitoring, management activities, and habitat condition for the landbird assemblage species. The FS has not provided reasoning as to why these species are responsive to forest activities, nor explained the monitoring objectives for those MIS.

There is no accuracy assessment including confidence intervals in the Forest Plan EIS wildlife analyses.

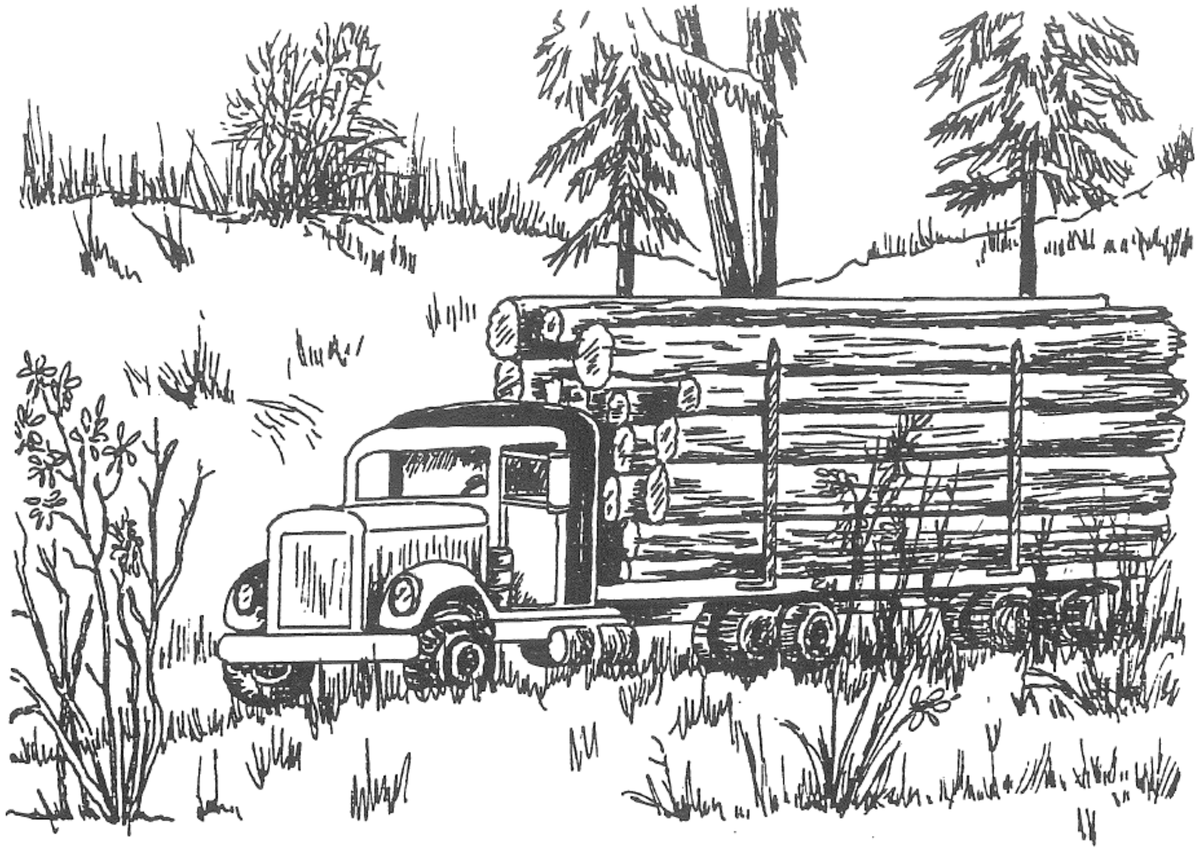
The FS has not disclosed statistically robust estimates of population trends for all Sensitive species. There isn’t a sound scientifically-based explanation for any species’ apparent absence from the project area. The EA doesn’t disclose whether or not surveys for wildlife, or their dens or nests, have been conducted in the project area. It doesn’t disclose the intensity of surveys for Sensitive species that have been conducted in the project area.

The Forest Plan does not cite the scientific basis for the minimum amounts of coarse woody debris to be retained.

The use of vegetation habitat proxy is invalid for insuring viable populations of wildlife.

The EA doesn’t disclose the cumulative effects of recreational activities and motorized/mechanic access on wildlife populations.

Old Growth



Logging is the chief systematic pressure affecting old-growth communities.

The Kootenai National Forest's own analysis (Gautreaux, 1999) indicates 22% old growth is at the lower limit for "reference conditions" on the KNF, and the present forestwide situation is far below 22%. Also: "We recognize that historical conditions probably provided a higher level of old forest habitat through time than what is provided by the Forest Plan direction (a mean of 27.7% as opposed to 10%)." (Dueker and Sullivan, 2001.)

Gautreaux, 1999 states:
...research in Idaho (Lesica 1995) of stands in Fire Group 4, estimated that over 37% of the dry Douglas-fir type was in an old growth structural stage (>200 years) prior to European settlement, approximately the mid 1800's.

Based on research of Fire Group 6 in northwest Montana (Lesica 1995) it was estimated that 34% of the moist Douglas-fir type was in an old growth structural stage (>200 yrs.) prior to European settlement, approximately the mid 1800's.

Based on fire history research in Fire Group 11 for northern Idaho and western Montana (Lesica, 1995) it was estimated that an average of 26% of the grand fir, cedar, and hemlock cover types were in an old growth structural stage prior to European settlement.

...fire history research in Fire Group 9 for northern Idaho and western Montana (Lesica, 1995) estimated that 19-37% of the moist lower subalpine cover types were in an old growth structural stage (trees > 200 yrs.) prior to European settlement. While this estimate is lower than suggested by Losensky's research...

(USDA Forest Service, 1987d)

Lesica found an estimated 18% of the cool lodgepole pine sites was in an old growth structural stage (>200 years) prior to European settlement, approximately the mid 1800's. ... This same research in Fire Group 8 in drier, lower subalpine types of Montana had over 25% of the stands in an old growth structural stage during the same historical period.

Despite the KNF's previously developed estimations of historic forest-wide old growth, the EA attempts to walk this back:

> harvest and wildfires. Regarding the historic range of variability of old growth in the analysis area, there is no way to accurately determine how much of the Forest may have met the Green definitions of old growth (Green et al., 1992). To determine whether a forest stand meets those definitions, it requires detailed information on how many trees per acre exist in the stand over a certain diameter and age, the total stand density, the forest type and lastly, the habitat type group that the stand occupies. No historical information exists that can provide that level of detail. Therefore, a numeric desired condition or an HRV estimate for old growth is not included in this analysis. Refer to the

We notice the FS has no qualms about speculating on the amounts of various other categories of forest on the KNF and in the project area based upon Forest Plan Desired Conditions, and basing the goals of projects such as Black Ram on such speculation. In essence the FS admits it doesn't know the amount of old-growth habitat historically needed to maintain viability of its 1987 forest plan old-growth Management Indicator Species and other old-growth associated wildlife. The FS refuses to discuss the issue because the amount of old growth on the KNF is far below amounts estimated by best available science—and its own experts.

USDA Forest Service, 1987a states:
Richness in habitat translates into richness in wildlife. **Roughly 58 wildlife species on the Kootenai (about 20 percent of the total) find optimum breeding or feeding conditions in the "old" successional stage,** while other species select old growth stands to meet specific needs (e.g., thermal cover). Of this total, **five species are believed to have a strong preference for old growth and may even be dependent upon it for their long- term survival** (see Appendix I[7]). While individual members or old growth associated species may be able to feed or reproduce outside of old growth stands, **biologists are concerned that viable populations of these species may not be maintained without an adequate amount of old growth habitat.**

Wildlife richness is only a part of the story. Floral species richness is also high, particularly for arboreal lichens, saprophytes, and various forms of fungus and rots**. Old growth stands are genetic reservoirs for some of these species, the value of which has probably yet to be determined.** (Bold emphases added.)

Lesica (1996) states, "Results of this study and numerous fire-history studies suggest that **old growth occupied 20-50% of many pre-settlement forest ecosystems in the Northern Rockies**." (Emphasis added.) Lesica, 1996 (also cited in Gautreaux, 1999) stated forest plan standards of maintaining approximately 10% of forests as old-growth **may extirpate some**

[7] USDA Forest Service 1987b.

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species. This is based on his estimate that 20-50% of low and many mid-elevation forests were in old-growth condition prior to European settlement. This should be considered some of the best science on historic range of old growth necessary for insuring viability of old-growth associated species.

The FS relies upon the rather vague promise of the concept of "recruitment old growth" or "recruitment potential old growth" as some sort of supplement to the Forest Plan's weak conservation of old-growth habitat. The EA doesn't explain the criteria used for designation of "recruitment potential" old growth other than vaguely stating, "These stands have the potential to develop into old growth within 40 years."

Recruitment potential old growth is defined in the forest plan as forest stands that do not meet the definition of old growth currently but that are being managed with the goal of meeting that definition in the future. This is another erratic characteristic of the Forest Plan; although its Glossary mentions some "goal" of meeting the old growth definition in the future, the Forest Plan actually contains no such goal. The FS also doesn't disclose the best available science the KNF uses to manage recruitment potential old growth stands. There is no official decision document designating recruitment/potential old growth in the project area. The KNF has no formal, official process for documenting this forestwide old-growth recruitment policy.

The EA doen't indicate if any stands in the Black Ram project area were previously identified and designated in the past as old growth, since switched to recruitment old growth, or potential old growth.

The EA also does not engender confidence in the FS's estimates of either project area or forestwide old growth amounts, based vaguely on "KNF

Old Growth Layer File" for forestwide and vaguely "updated as of March 2019[8]" for the project area.

The Forest Plan FEIS includes a "Large/Very Large" size class (20"+ dbh). Yet the EA does not utilize such a metric in the EA—probably to avoid any analysis that would assist the public in seeing through the smokescreen and understanding the FS's old growth inventory problem. This is seen by reading between the lines of the EA's analyses, e.g.:

> "Old-Growth Forest Types of the Western Montana Zone" was used as the criteria to identify stands that may qualify as old growth habitat (Green et al., 1992). Data sources to identify old growth stands include district files and surveys, R1 summary database old growth reports, the Kootenai National Forest old growth GIS layer which was developed from stand-level old growth inventory that was aggregated and summarized at the forest scale, and the Forest Inventory and Analysis (FIA) data which collects and reports data at the forest scale. The most current information and data for old growth are displayed in this analysis.

The KNF's Purple Marten EA states, "For the old growth resource, accurate stand origin year may be inaccurate due to many of the stands being selected through photo interpretation." The Black Ram EA states, "Older stand exams are less reliable than recent exams because the

[8] Even though the EA also admits, "The most recent stand exam data available for the Project Area is from 2004" meaning older than the intended lifespan of forest plans themselves.

The probability of unpredictable damages caused by insects, diseases, and weater increase withtime since stand examination." Might this mean—all of the stand exams for the Black Ram project, being over 15 years old now?

The EA doesn't indicate how old the FIA data is, which the old growth analysis (forestwide and project level) relies upon. It doesn't say how many FIA plots fall within the project area, and how many of those are classified as old growth.

The FS Region 1 report Bollenbacher, et al., 2009 (cited in the EA) states concerning the FIA inventory: "All northern Idaho plots utilized a primary sample unit (PSU) composed of four fixed radius plots with trees 5 – 20.9 inches tallied on a 1/24th acre plot and trees 21.0 inches DBH and larger tallied on a 1⁄4 acre plot.” We assume the methodology was similar for the KNF. Also, Czaplewski, 2004 states, “Each FIA sample location is currently a cluster of field sub-plots that collectively cover an area that is nominally one acre in size, and FIA measures a probability sub-sample of trees at each sub-plot within this cluster.” In addition, Bollenbacher and Hahn, 2008 under “Defining Old Growth” state: “There are no specific criteria for minimum patch size for OG in the Northern Region definitions” but recognize “There are, however, some Forest Land Management Plans that may include guidance for a minimum map unit for OG stands.” Despite that, Bollenbacher and Hahn, 2008 try to make a case for smaller minimum stand sizes, saying “The regional vegetation minimum map unit of 5 acres for a stand polygon would be a reasonable lower limit for all vegetation classes of forest vegetation including OG stands.” Clearly, whether the FS is using a 1⁄4-acre, one-acre, or five-acre minimum map unit, none conform to the Forest Plan old-growth minimum stand size criteria. Furthermore, it would be ludicrous to propose that any old-growth associated MIS, Sensitive, or ESA-listed species could survive on even a five-acre old-growth stand—there is no scientific evidence to support such a premise.

The EA does disclose the amount of publicly-owned old growth the FS would log:

The EA explains that the Forest Plan allows logging of virtually all old growth found outside of Wilderness on the KNF:

(T)he 2015 Forest Plan deliberately includes language within two components (FW-DC- VEG-03, FW-GDL-VEG-01) that would allow vegetation management activities to occur within old growth stands **if** the activities were designed to increase the resistance and resiliency of the stands to disturbances or stressors, **and** if the activities would maintain the criteria for age and number of trees and basal area for the specific old growth type as described in Green et al., 1992. (Emphases in the original.)

As the footnote explains, though: "the terms resilience as well as resistence (see 2015 Forest Plan glossary...) are used **in the context of forest ecosystems** and the desire to increase the resistance

> resilience to disturbances. Alternatives 2 and 3 propose to treat 922 and 780 acres in old growth and 441 and 435 acres in recruitment potential old growth to increase their resistance and resilience by modifying their structure and species composition. They are designed not to modify the characteristics beyond meeting Green et al., the definition of old growth. Therefore, the Black Ram project was designed in accordance with this guideline.

and resiliency of the forest vegetation to disturbances and stressors..." (Emphasis added.) In other words, the FS is conflating a landscape level attribute (which has no numerical measurement attached to it) with stand level attributes. This leaves the Green et al., 1992 criteria as the only criteria, as EA describes: "age and number of trees and basal area for the specific old growth type". This is an extremely narrow, and scientifically undefensible definition of old growth.

Furthermore, the EA itself nullifies the FS's claim to be helping old growth by logging it. It cites model results the FS apparently believe, indicating "a dramatic increase in old growth-like stands ...despite a substantial amount of predicted wildfire, root disease, bark beetle and defoliator caused disturbances ...**if no active management (except for fire suppression) were to occur on the Forest for the next 50 years** and the future climate scenario of a warmer/drier climate is assumed" resulting in "78 percent over current amounts." (Emphasis added.) So where's the scientific support for the risky, likely destructive proposed logging of old growth? And the "need" to conduct "intermediate" logging of old growth? They don't exist.

The EA indicates that there are 548 total acres of old growth in the Warm/Dry biophysical setting in project area, and of that 409 acres are proposed for logging. That leaves 513 acres of old-growth logging outside of the Warm/Dry. This isn't even consistent with the science the EA cites of the Forest Plan: "...classic old-growth within the wetter habitat types be reserved, and that appropriate fuel treatments be undertaken in the drier habitat types...” The EA attempts to justify this using the results of the Forest Vegetation Simulator showing how fire burning through old growth would leave fewer live large trees under treatment scenarios vs. no action. Yet the accuracy of such modeling isn’t disclosed. Nor does the EA say the duration of such claimed benefits—a few years, 5 years, 10, 20? Who knows? Regardless, the EA already says old growth would increase “dramatically” over the next 50 years, without such Project-proposed meddling in old growth.

The EA does not identify the old growth type for each stand the FS would log, nor does it state in any quantitative terms what would be left of the logged old growth. All it offers is:

> alternatives 2 and 3 would be designed to maintain the characteristics of the old growth stands so they would continue to meet the definition of old growth post treatment. All the proposed units within old growth have pre-treatment exams, units would have a silvicultural prescription written by a silviculturist and would have post treatment monitoring scheduled to monitor the effects of the treatment and verify the old growth character. Stands identified as recruitment potential old growth would have post treatment monitoring scheduled as well and future treatments would help them reach old growth status. The Black Ram project activities

The EA doesn’t even cite the results of the compliance or success of past logging in old growth, merely assuming all results of this heavy-handed logging will be fine.

The Forest Plan contains no minimum acreage or distribution requirements for maintaining old growth, ignoring 36 CFR 219.19 viability provisions that would prevent large areas of the KNF becoming devoid of old growth or old-growth associated wildlife. The FS has not ana

wildlife viability implications of managing the KNF well outside the HRV for old growth, based upon the best available scientific information.

The FS has not compared patch size of old-growth areas to scientific information on minimum size needed for utilization by old-growth associated wildlife.

The KNF failed to monitor populations of old-growth associated wildlife, in favor of striving towards DCs for habitat (vegetation) in project planning. The Committee of Scientists (1999) state:

Habitat alone cannot be used to predict wildlife populations...The presence of suitable habitat does not ensure that any particular species will be present or will reproduce. Therefore, **populations of species must also be assessed and continually monitored.** (Emphasis added.)

In USDA Forest Service, 1987a the KNF considers smaller patches of old growth to be of lesser value for old-growth associated wildlife:

A unit of 1000 acres would probably meet the needs of all old growth related species (Munther, et al., 1978) but does not represent a realistic size unit in conjunction with most other forest management activities. On the other hand, units of 50-100 acres are the smallest acceptable size in view of the nesting needs of pileated woodpeckers, a primary cavity excavator and an old growth related species (McClelland, 1979). However, **managing for a minimum size of 50 acres will preclude the existence of species which have larger territory requirements**. In fact, Munther, et al. (1978), report that **units of 80 acres will meet the needs of only about 79 percent of the old growth dependent species** (see Figure 1). Therefore, while units of a minimum of 50 acres may be acceptable in some circumstances, 50 acres should be the exception rather than the rule. Efforts should be made to provide old growth habitat in blocks of 100 acres or larger. ...**Isolated blocks of old growth which are less than 50 acres and surrounded by young stands contribute very little to the long-term maintenance of most old growth dependent species**. (Bold emphasis added.)

Since old growth is below the historic range for the Forest and project area, then viability for old- growth associated species cannot be assured—especially in the context of more proposed logging of mature/old forest and large trees.

The defining characteristics of old growth, discounted by the Forest Plan, are acknowledged by Green et al., 1992:

Old growth forests encompass the late stages of stand development and are distinguished by old trees and related structural attributes. These attributes, such as tree size, canopy layers, snags, and down trees generally define forests that are in and old growth condition.

Definition
Old growth forests are ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function.

(O)ld growth is typically distinguished from younger growth by several of the following attributes:

1. Large trees for species and site.
2. Wide variation in tree sizes and spacing.
3. Accumulations of large-size dead standing and fallen trees that are high relative to earlier stages.
4. Decadence in the form of broken or deformed tops or bole and root decay.
5. Multiple canopy layers
6. Canopy gaps and understory patchiness.

Green et al., 1992 also recognize that “Rates of change in composition and structure are slow relative to younger forests.”

In preparing and adopting Green et al. 1992 old-growth guidelines, the FS did not use an independent scientific peer review process, as discussed by Yanishevsky, 1994:

As a result of Washington Office directives, Region 1 established an Old-Growth Committee. In April 1992, Region 1 issued a document entitled “Old-Growth Forest Types of the Northern Region,” which presented Old-Growth Screening Criteria for specific zones on Western Montana, Eastern Montana, and North Idaho (U.S.D.A. Forest Service 1992). This was an attempt to standardize criteria for classifying the variety of old-growth types across the Region. ...The committee, however, executed this task without the benefit of outside scientific peer review or public input, either during or after the process (Yanishevsky 1990, Shultz 1992b). Moreover, the methodology used by the committee was unscientific and did not even include gathering field data to verify the characteristics of old-growth stands as a basis for the definition (*id*.). A former member of the Region 1 Old- Growth Committee described a “definition process” that relied heavily upon the Committee members’ pre-conceived notions of the quantifiable characteristics of old-growth forests (Schultz 1992b).

The old-growth definition in its present state, without field verification of assumptions, and without addressing the issue of quality, is inadequate to scientifically describe, define, delineate, or inventory old-growth ecosystems.

(*id*.) Not only did the Committee fail to obtain new field data on old-growth forest characteristics, it failed even to use existing field data on old-growth definition and classification previously collected for Region 1 (Pfister 1987). Quality of old growth was not addressed during the definition process. The Committee did not take into account the legacy of logging that has already destroyed much of the best old growth. This approach skewed the characteristics that describe old-growth forests toward poorer remaining examples. ...It’s premature for the Forest Service to base management decisions with long- term environmental effects on its Region 1 old-growth criteria, until these criteria are validated by the

Yanishevsky (1994) also points out the scientific inadequacy of maintaining merely “minimum” amounts of old-growth habitat and its components such as snags.

The FS wants to make the definition of old growth to be a simplistic numbers and database analysis game, devoid of biologically vital data gathered in the field which might document what is unique about old growth—not just a few large trees left over after logging, but decadence, rot, snags, down logs, patchy irregular canopy layers—things that can’t be created by the agency’s version of “restoration” and which would be depleted by such management actions.

The IPNF’s 1987 Forest Plan included standards for protection of old growth and associated wildlife (USDA Forest Service 1987c). The IPNF’s 1987 Forest Plan Appendix 27 (USDA Forest Service, 1987d) provided other direction and biological information concerning old growth and old-growth associated wildlife species. The FS has never explained what it is about the IPNF’s 1987 Forest Plan’s old growth standards, and its Appendix 27 that is *inconsistent with the best available science*.

Likewise the Kootenai National Forest’s 1987 Forest Plan included standards for protection of old growth and associated wildlife, along with Appendix 17 (USDA Forest Service 1987a, USDA Forest Service 1987b). The FS has never explained what it is about the KNF’s 1987 Forest Plan old growth standards and its Forest Plan Appendix 17 that is *inconsistent with the best available science*.

After forest plan revision the KNF has greatly weakened protections for old growth, and in fact the Forest Plan provides direction for logging old growth that lacks scientific support. We incorporate USDA Forest Service, 1987a as well as USDA Forest Service, 1987b which contains a list of “species ...(which) find optimum habitat in the “old” successional stage...” We also incorporate the KNF document (“Old Growth validation”) which states that “we’ve recognized its (old growth) importance for vegetative diversity and the maintenance of some wildlife species that depend on it for all or part of their habitat.” USDA Forest Service 1987a, and USDA Forest Service 1987b also provides biological information concerning old growth and old-growth associated wildlife species.

The KNF has conducted no research or monitoring comparing pre- and post-logging old growth occupancy by or abundance of the wildlife species with strong biological association with habitat components found in old growth. Biologically speaking, the FS refuses to check in with the real experts to see if logged old growth is still functioning for their survival.

The KNF has failed to cite any evidence that its managing for old growth habitat (i.e., logging and burning old growth) strategy will improve old-growth wildlife species’ habitats over the short-term or long-term. In regards to this theory often offered by the FS, Pfister et al., 2000 state:

(T)here is the question of the appropriateness of management manipulation of old-growth stands... Opinions of well-qualified experts vary in this regard. As long term results from active management lie in the future – likely quite far in the future – considering such manipulation as appropriate and relatively certain to yield anticipated results is an informed guess at best and, therefore, encompasses some unknown level of risk. **In other** words, producing “old-growth” habitat through active management is an untested hypothesis. (Pp. 11, 15 emphasis added).

Hutto, et al., 2014 set out to understand the ecological effects of forest restoration treatments on several old-growth forest stands in the Flathead National Forest. They found:

Relative abundances of only a few bird species changed significantly as a result of restoration treatments, and these changes were characterized largely by **declines in the abundances of a few species associated with more mesic, dense-forest conditions, and not by increases in the abundances of species associated with more xeric, old-growth reference stand conditions.** (Emphasis added.)

The Black Ram project would log hundreds of acres of this mesic, dense forest old growth.

Forest Plan allows active mechanical treatments in old growth but as or plan objection asserts, this ignores scientific information indicating such active management is the very antithesis of old growth. The Forest Plan cites no scientific research or monitoring results from the KNF that demonstrate management manipulations will create net ecological benefit rather than harm old growth and old-growth associated wildlife.

Viability

Schultz (2010) provides a critique of FS wildlife analyses the most prominent being they are based on habitat availability, which alone is insufficient for understanding the status of populations (Noon et al. 2003, Mills 2007). Schultz (2010) recommendations generally call for more peer review of large-scale assessments and project level management guidelines, and to adopt more robust scientifically sound monitoring and measurable objectives and thresholds if maintaining viable populations of all native and desirable non-native wildlife species is to be accomplished.

Traill et al., 2010 and Reed et al., 2003 are published, peer-reviewed scientific articles addressing what a true "minimum viable population" would be, and how that number is typically drastically underestimated. The FS has not identified the best available science that provides scientifically sound, minimum viable populations of any Sensitive species or MIS on the KNF.

Considering potential difficulties of using population viability analysis at the project analysis area level (Ruggiero, et. al., 1994a), the cumulative effects of carrying out multiple projects simultaneously across the KNF makes it imperative that population viability be assessed at least at the forestwide scale (Marcot and Murphy, 1992). Also, temporal considerations of the impacts on wildlife population viability from implementing something with such long duration as a Forest Plan must be considered (id.) but this has never been done by the KNF. It is also of paramount importance to monitor population during the implementation of the Forest Plan in order to validate assumptions used about long-term species persistence i.e., population viability (Marcot and Murphy, 1992; Lacy and Clark, 1993).

In the absence of meaningful thresholds of habitat loss and no monitoring of wildlife populations at the Forest level, projects will continue to degrade wildlife habitat across the KNF over time.

(See also Schultz 2012.). The FS would never be able to detect the likelihood of complete extirpation of any wildlife species from the KNF, using such methodology.

The EA provides no analysis for the RFP MIS "Landbird Assemblage." Nothing about the analysis considers the specific habitat needs of any of those bird species, nor does it analyze impacts. Population trend monitoring—a key part of MIS under the NFMA regulations—is also neglected by the forest plan and Black Ram EA.

The FS has still not sufficiently dealt with the issue of fragmentation, road effects, and past logging on old-growth species' habitat. The Forest Plan lacks meaningful direction maintaining Landscape Connectivity for wildlife. Lehmkuhl, et al. (1991) state:

Competition between interior and edge species may occur when edge species that colonize the early successional habitats and forest edges created by logging (Anderson 1979; Askins and others 1987; Lehmkuhl and others, this volume; Rosenberg and Raphael 1986) also use the interior of remaining forest (Kendeigh 1944, Reese and Ratti 1988, Wilcove and others 1986, Yahner 1989). Competition may ultimately reduce the viability of interior species' populations.

Microclimatic changes along patch edges alter the conditions for interior plant and animal species and usually result in drier conditions with more available light (Bond 1957, Harris 1984, Ranney and others 1981).

Fragmentation also breaks the population into small subunits, each with dynamics different from the original contiguous population and each with a greater chance than the whole of local extinction from stochastic factors. Such fragmented populations are metapopulations, in which the subunits are interconnected through patterns of gene flow, extinction, and recolonization (Gill 1978, Lande and Barrowclough 1987, Levins 1970).

In terms of "quality of habitat" the continued fragmentation of the KNF is a major ongoing concern. It is documented that edge effects occur 10-30 meters into a forest tract (Wilcove et al., 1986). The size of blocks of interior forest that existed historically before management (including fire suppression) was initiated must be compared to the present condition. USDA Forest Service, 2004a states:

Forested connections between old growth patches ...(widths) are important because effective corridors should be wide enough to "contain a band of habitat unscathed by edge effects" relevant to species that rarely venture out of their preferred habitats (Lidicker and Koenig 1996 and Exhibit Q-17).

Timber harvest patterns across the Interior Columbia River basin of eastern Washington and Oregon, Idaho, and western Montana have caused an increase in fragmentation of forested lands and a loss of connectivity within and between blocks of habitat. This has isolated some wildlife habitats and reduced the ability of some wildlife populations to move across the landscape, resulting in long-term loss of genetic interchange (Lesica 1996, U.S. Forest Service and Bureau of Land Manage

Harvest or burning in stands immediately adjacent to old growth mostly has negative effects on old growth, but may have some positive effects. Harvesting or burning adjacent to old growth can remove the edge buffer, reducing the effective size of old growth stands by altering interior habitats (Russell and Jones 2001). Weather-related effects have been found to penetrate over 165 feet into a stand; the invasion of exotic plants and penetration by predators and nest parasites may extend 1500 feet or more (Lidicker and Koenig 1996). On the other hand, adjacent management can accelerate regeneration and sometimes increase the diversity of future buffering canopy.

The occurrence of roads can cause substantial edge effects on forested stands, sometimes more than the harvest areas they access (Reed, et al. 1996; Bate and Wisdom, in prep.). Open roads expose many important wildlife habitat features in old growth and other forested stands to losses through firewood gathering and increased fire risk.

Effects of disturbance also vary at the landscape level. Conversion from one stand condition to another can be detrimental to some old growth associated species if amounts of their preferred habitat are at or near threshold levels or dominated by linear patch shapes and limited interconnectedness (Keller and Anderson 1992). Reducing the block sizes of many later-seral/structural stage patches can further fragment existing and future old growth habitat (Richards et al. 2002). Depending on landscape position and extent, harvest or fire can remove forested cover that provides habitat linkages that appear to be “key components in metapopulation functioning” for numerous species (Lidicker and Koenig 1996, Witmer et al. 1998). Harvest or underburning of some late and mid seral/structural stage stands could accelerate the eventual creation of old growth in some areas (Camp, et al. 1996). The benefit of this approach depends on the degree of risk from natural disturbances if left untreated.

Effects on old growth habitat and old growth associated species relate directly to ... "Landscape dynamics—Connectivity"; and ... "Landscape dynamics—Seral/structural stage patch size and shapes."

The FS relies upon unpublished reports by Samson alleged to prove viability is being maintained for various wildlife species of concern on the KNF. However, those reports have not been subject to scientific peer review and thus fail to meet the best available science standard. The Samson reports rely upon the databases of outdated, unreliable information as its quantitative source.

The Forest Plan omits old-growth Management Indicator Species (MIS), which means there would be no monitoring of wildlife whose special habitat needs are best found in old growth. The Forest Plan's failure to designate MIS according to the requirements of the 1982 planning regulations violates NFMA.

The Committee of Scientists (1999) report stresses the importance of monitoring as a necessary step for the FS's overarching mission of sustainability: "Monitoring is the means to continue to update the baseline information and **to determine the degree of success in achieving ecological sustainability.**" (Emphasis added.) The Committee of Scientists (1999) provide still more emphases on the importance of monitoring:

The proposal is that the Forest Service monitor those species whose status allows inference to the status of other species, are indicative of the soundness of key ecological processes, or provide insights to the integrity of the overall ecosystem. This procedure is a necessary shortcut because monitoring and managing for all aspects of biodiversity is impossible.

No single species is adequate to assess compliance to biological sustainability at the scale of the national forests. Thus, several species will need to be monitored. The goal is to select a small number of focal species whose individual status and trends will collectively allow an assessment of ecological integrity. That is, the individual species are chosen to provide complementary information and to be responsive to specific conservation issues. Thus, the Committee proposed for consideration a broad list of species categories reflecting the diversity of ecosystems and management issues within the NFS.

Another Kootenai NF project EIS (USDA Forest Service, 2007a) notes the limitations of modeling methodology the EA relies upon for wildlife analyses (by Samson):

In 2005, the Regional Office produced a Conservation Assessment of the Northern goshawk, black-backed woodpecker, flammulated owl, and pileated woodpecker in the Northern Region (Samson 2005). This analysis also calculated the amount of habitat available for these species, but was based on forest inventory and analysis (FIA) data. FIA data is consistent across the Region and the state, but **it was not developed to address site- specific stand conditions for a project area.** In some cases, these two assessments vary widely in the amount of habitat present for a specific species. (P. 116, emphasis added.)

The FS relies upon Region-wide database analyses by Samson to conclude that species viability is assured, although the FS does not address the age and reliability of the data. The EA fails to consider Samson's conclusions for any wildlife species over the long term, which is very uncertain.

Sampson did not evaluate long-term viability for the fisher and marten, but did for the goshawk, pileated woodpecker, flammulated owl and black-backed woodpecker. Sampson concluded that "In regard to long-term viability, this conservation assessment has found that long-term habitat conditions in terms of Representativeness, Redundancy, and Resiliency are "low" for all species." The FS must disclose Sampson's long-term viability conclusions. Sampson merely uses home range size for each species and makes assumptions of overlap in ranges of males and females. Home range size is then multiplied by the effective population size (n_e - a number that includes young and non-breeding individuals - Allendorf and Ryman 2002) and this is projected as the amount of habitat required to maintain a minimal viable population in the short-term. This simplistic approach ignores a multitude of factors and makes no assumptions about habitat loss or change over time. For the fisher and marten, Samson uses a "critical habitat threshold" as calculated in another publication (Smallwood 2002).

There are several problems with such an approach and the risk to the species would be extremely high if any of the species ever reached these levels in the Northern Region. Surely, all six species would be listed as endangered if this was to occur and the probabilities for their continued existence would be very low. There is also no way that National Forest Management Act (NFMA) and Endangered Species Act (ESA) requirements could be met of maintaining species across their range and within individual National Forests with such an approach. Mills (2007) captured the futility of such approach in his book on Conservation of Wildlife Populations: "MVP is problematic for both philosophical and scientific reasons. Philosophically, it seems questionable to presume to manage for the minimum number of individuals that could persist on this planet. Scientifically, the problem is that we simply cannot correctly determine a single minimum number of individuals that will be viable for the long term, because of inherent uncertainty in nature and management..."

Samson also admits that "Methods to estimate canopy closure, forest structure, and dominant forest type may differ among the studies referred to in this assessment and from those used by the FS to estimate these habitat characteristics" and that "FIA sample points affected within the prior 10 years by either timber harvest or fire are excluded in the estimates of habitat for the four species" and finally that "FIA does not adequately sample rare habitats." This especially concerning given the reliance on the FIA queries to identify suitable habitat and the fact that the data used in the analysis is now likely mostly out-of-date.

Habitat fragmentation and connectivity

Assuring viability also means addressing the issue of fragmentation, road effects, and past logging on wildlife species' habitat. Viability is only assured if individuals of a species can survive migration and dispersal for genetic diversity. The Forest Plan lacks meaningful direction maintaining landscape connectivity for wildlife. Lehmkuhl, et al. (1991) state:

Competition between interior and edge species may occur when edge species that colonize the early successional habitats and forest edges created by logging (Anderson 1979; Askins and others 1987; Lehmkuhl and others, this volume; Rosenberg and Raphael 1986) also use the interior of remaining forest (Kendeigh 1944, Reese and Ratti 1988, Wilcove and others 1986, Yahner 1989). Competition may ultimately reduce the viability of interior species' populations.

Microclimatic changes along patch edges alter the conditions for interior plant and animal species and usually result in drier conditions with more available light (Bond 1957, Harris 1984, Ranney and others 1981).

Fragmentation also breaks the population into small subunits, each with dynamics different from the original contiguous population and each with a greater chance than the whole of local extinction from stochastic factors. Such fragmented populations are metapopulations, in which the subunits are interconnected through patterns of gene flow, extinction, and recolonization (Gill 1978, Lande and Barrowclough 1987, Levins 1970).

The EA doesn't disclose the natural historic range vs. current conditions regarding patch size, edge effect, and amount of interior forest old growth in the project area and forestwide.

Harrison and Voller, 1998 assert "connectivity should be maintained at the landscape level." They adopt a definition of landscape connectivity as “the degree to which the landscape facilitates or impedes movement among resource patches.” Also:

Connectivity objectives should be set for each landscape unit. ...Connectivity objectives need to account for all habitat disturbances within the landscape unit. The objectives must consider the duration and extent to which different disturbances will alienate habitats. ... In all cases, the objectives must acknowledge that the mechanisms used to maintain connectivity will be required for decades or centuries.

(Id., internal citations omitted.) Harrison and Voller, 1998 further discuss these mechanisms: Linkages are mechanisms by which the principles of connectivity can be achieved. Although the definitions of linkages vary, all imply that there are connections or movement among habitat patches. Corridor is another term commonly used to refer to a tool for maintaining connectivity. ...the successful functioning of a corridor or linkage should be judged in terms of the connectivity among subpopulations and the maintenance of potential metapopulation processes. (Internal citations omitted.)

Harris, 1984 discusses connectivity and effective interior habitat of old-growth patches:
Three factors that determine the effective size of an old-growth habitat island are (1) actual size; (2) distance from a similar old-growth island; and (3) degree of habitat difference of the intervening matrix. ...(I)n order to achieve the same effective island size a stand of old- growth habitat that is surrounded by clearcut and regeneration stands should be perhaps ten times as large as an old-growth habitat island surrounded by a buffer zone of mature timber.

Harris, 1984 discusses habitat effectiveness of fragmented old growth:
(A) 200-acre (80 ha) circular old-growth stand would consist of nearly 75% buffer area and only 25% equilibrium area. ...A circular stand would need to be about 7,000 acres (2,850 ha) in order to reduce the 600-foot buffer strip to 10% of the total area. It is important to note,

however, that the surrounding buffer stand does not have to be old growth, but only tall enough and dense enough to prevent wind and light from entering below the canopy of the old-growth stand.

Harris, 1984 believes that "biotic diversity will be maintained on public forest lands only if conservation planning is integrated with development planning; and site-specific protection areas must be designed so they function as an integrated landscape system." Harris, 1984 also states:

Because of our lack of knowledge about intricate old-growth ecosystem relations (see Franklin et al. 1981), and the notion that oceanic island never achieve the same level of richness as continental shelf islands, a major commitment must be made to set aside representative old-growth ecosystems. This is further justified because of the lack of sufficient acreage in the 100- to 200-year age class to serve as replacement islands in the immediate future. ...(A) way to moderate both the demands for and the stresses placed upon the old-growth ecosystem, and to enhance each island's effective area is to surround each with a long-rotation management area.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above. Display the KNF inventory of forestwide and project area "recruitment potential old growth" on a map and provide links on the Forest website to the forestwide spreadsheet of stands which are designated or otherwise considered to be "recruitment potential old growth." Do the same for old growth the KNF alleges meets sufficient criteria to be considered effective old growth.

BIG GAME SPECIES

Big game species were discussed in AWR's PA comments at p. 12. See also our EA comments at pp. 6 and 72. Also, issues regarding the elk were raised in our Objection to the revised forest plan (pp. 31, 32, 42, 46, 77).

The EA claims there is a need to "Improve big game winter range conditions and promote forage opportunities." This EA fails to cite any data supporting this alleged "need" of the project area. What does Montana Fish, Wildlife and Parks say about the population trends of big game species here? Below objective levels. What are their concerns about factors affecting these populations?

The EA says all the newly accessible roads and routes to be created for logging access would not be "open during the firearms hunting season" so there would be no impacts to elk security. The biologically insufficient definition in the Forest Plan is highlighted here. The analysis is not credible given the FS's inability to effectively prevent motorized traffic behind roads, as discussed in the grizzly bear section of this objection. Moreover, it's not just hunters in season— it's poachers during every season. Also, this ignores the fact that lawful hunters find easier travel on newly accessible routes. Although this is usually by walking, it is also increasingly by bicycle—even eBikes not considered in the Forest Plan EIS.

The science is clear that motorized access via trail, road, or oversnow adversely impact habitat for the elk. Servheen, et al., 1997 indicate that motorized trails increase elk vulnerability and reduce habitat effectiveness, and provide scientific management recommendations.

Also, the EA fails to provide a meaningful analysis of cumulative impacts of recreational activities on elk. Wintertime is an especially critical time for elk, and stress from avoiding motorized activities takes its toll on elk and populations.

The EA doesn't demonstrate consistency with Forest Plan requirements for these medium priority Planning Subunits, probably because of its false assumptions noted above.

Scientific information recognizes the importance of thermal cover, including Lyon et al, 1985. Christensen et al., 1993 also emphasize "maintenance of security, landscape management of coniferous cover, and monitoring elk use...” This USFS Region 1 document also states, “management of winter range to improve thermal cover and prevent harassment may be as important as anything done to change forage quantity or quality.”

And Black et al. (1976) provide definitions of elk cover, including “Thermal cover is defined as a stand of coniferous trees 12 m (40 ft) or more tall, with average crown exceeding 70 percent. Such stands were most heavily used for thermal cover by radio-collared elk on a summer range study area in eastern Oregon (R.J. Pedersen, Oregon Department of Fish and Wildlife—personal communication).” Black et al. (1976) also state:

Optimum size for thermal cover on summer and spring-fall range is 12 to 24 ha (30 to 60 acres). Areas less than 12 ha (30 acres) are below the size required to provide necessary internal stand conditions and to accommodate the herd behavior of elk.
...Cover requirements on winter ranges must be considered separately and more carefully. Animals distributed over thousands of square miles in spring, summer and fall are forced by increasing snow depths at higher elevations to concentrate into much restricted, lower- elevation areas in mid- to late-winter. Winter range, because of its scarcity and intensity of use, is more sensitive to land management decisions.

Regarding Black et al. (1976) conclusions, Thomas et al., 1988a state, “We concur. New research on elk use of habitat on summer and winter ranges has become available, however (Leckenby 1984). Land-use planning requirements indicate that a model of elk winter-range habitat effectiveness is required.”

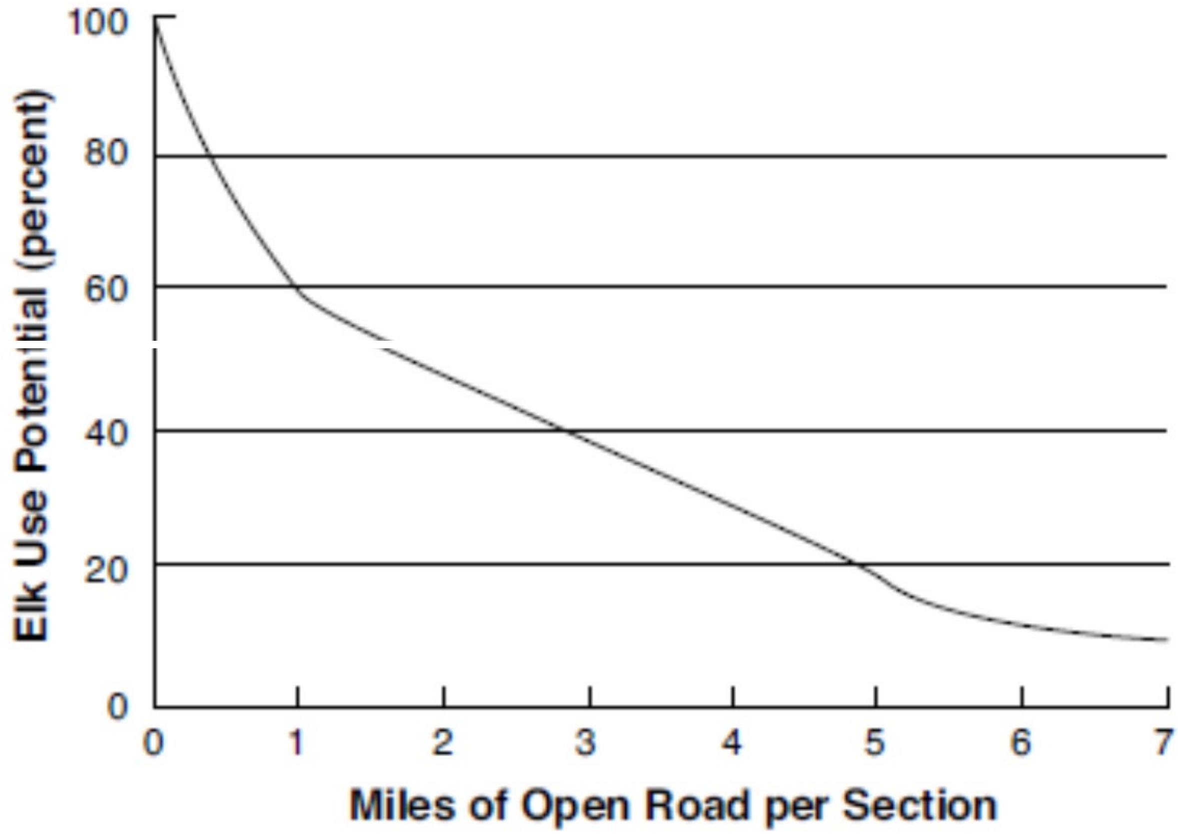
Thomas et al., 1988a also state:
Thomas and others (1979, p. 104-127) defined two types of cover: thermal and hiding. Thermal cover was "any stand of coniferous trees 12 meters (40 ft) or more tall, with an average canopy closure exceeding 70

percent" (p. 114). Disproportionate use of such cover by elk was thought to be related to thermoregulation. Whether such thermoregulatory activity occurs or is significant has been argued (Geist 1982,Peek and others 1982). In the context of the model presented here, arguing about why elk show preference for such stands is pointless. They do exhibit a preference (Leckenby 1984; see Thomas 1979 for a review). As this habitat model is based on expressed preferences of elk, we continue to use that criterion as a tested habitat attribute. We cannot demonstrate that the observed preference is an expression of need, but we predict energy exchange advantages of such cover to elk (Parker and Robbins 1984). We consider it prudent to assume that preferred kinds of cover provide an advantage to the elk over nonpreferred or less preferred options.

The EA acknowledges that noxious weeds are an issue, so where is the analysis of how weed populations and trends are affecting and will affect the forage the FS claims will be improved by the project?

Christensen, et al. (1993) is a Region One publication on elk habitat effectiveness. Meeting a minimum of 70% translates to about 0.75 miles/ sq. mi. in key elk habitat, as shown in their graph:

5. Levels of habitat effectiveness:



Also, Ranglack, et al. 2017 investigated habitat selection during archery and rifle hunting seasons.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

GRIZZLY BEAR

Grizzly bear issues were discussed in our EA comments at pp. 19 – 69. Also, issues regarding the grizzly bear were raised in our incorporated Objection to the revised forest plan (OBJECTION STATEMENT: Landscape Connectivity, OBJECTION STATEMENT: FW-OBJ-AR-04, OBJECTION STATEMENT: Road Density, pp. 51-52, 56, 59-60, 64, 67, OBJECTION STATEMENT: Monitoring Question MON-FLS-01). We fully incorporate all of those previous submissions.

The EA states the Black Ram project "is likely to adversely affect" grizzly bears. There is no Biological Assessment (BA) published on the project website, nor a Biological Opinion (BO), so we are unable to see results of U.S. Fish & Wildlife Service consultation, including terms and conditions to regulate "take." The BA and BO must be made available to the public before a draft Decision is published in order for the public to be properly informed at this final step of public involvement—the objection stage.

Our DEIS comments explain the known inadequacies of road closures, storage and decommissioning—leading to closure violations and habitat degradation not allowed or anticipated under the Forest Plan/Access Amendments. As our EA comments state, "The recurring problem of road closure failures undermines the foundation of the Access Amendment management regime, which relies on these road closures to achieve certain densities of open and total roads both inside and outside the Recovery Zone."

Please see the attached road closure violations report by the Yaak Valley Forest Council which documents over 21 road closure violations in the project area.

How many road closure violations has the Kootenai national Forest documents in the last 5 years. In a conversation I had with Supervisor Benson, he stated that people have Benn violating road closures in the Kootenai National Forest for the last 100 years and they will continue to violate road closures for the next 100 years.

Since road closure violations are pervasive throughout the project area and the Forest, the KNF is in violation of not only the access amendment to the Forest Plan but also the big game security standards.

It is fair to assume that there are many more violations that regularly occur and are not witnessed and reported. It is also fair to assume that you have made no effort to request this available information from your own law enforcement officers, much less incorporate it into your analysis. Considering your own admissions that road density is the primary factor that degrades elk and grizzly habitat, this is a material and significant omission from your analysis– all of your ORD and HE calculations are wrong without this information.

The veracity of the FS's inventory of system and nonsystem ("undetermined" or "unauthorized") roads is at issue here also. This is partly because the FS basically turns a blind eye to the situation with insufficient commitment to monitoring, and also because violations are not always remedied in a timely manner.

Our EA comments also point out the Black Ram project would violate the Forest Plan/Access Amendment standards, a violation of NFMA.

The EA indicates there is a downward trend in core habiat in the Garver Bear Management Unit (BMU). It also states, "Areas of core can be exchanged (in-kind replacement) so long as there is no reduction. Core areas must have provided a minimum of 10 consecutive years of core benefit prior to entry." The latter is interpretation of Forest Plan/Access Amendment mandates.

The EA does not disclose how many years the existing core ares have provided the habitat benefits assumed under the Forest Plan. As pointed out, some has been lost (due to “private infrastructure development”) and we’re not told of other likely and forseeable reductions.

The EA does not quantify the impacts from project related helicopter use. The Forest Plan fails to provide adequate direction to minimize such management impacts.

The EA says increased nonmotorized travel from implementation of the Pacific Northwest National Scenic Trail in the grizzly bear analysis area is anticipated, and that “...expected use does not appear to be high enough to consider reviewing core.” The EA does not take a hard look as such impacts. It also shows the inadequacy of Forest Plan road density metrics.

Since we are awaiting the results of updated ESA consultation on the Forest Plan, the issuance of the Black Ram draft DN is premature and subverts NEPA and the ESA.

Furthermore, this population is currently warranted for uplisting to Endangered, in recognition of its biological and legal status.

Part of the problem is the lack of connectivity between the Cabinet and Yaak portions of the Cabinet-Yaak Ecosystem (CYE), creating virtual isolation between portions the recovery area.

Also, the FS’s population estimates of grizzly bears in the CYE (“improvements”) are not scientifically defensible. The FS therefore assumes increased impacts with this timber sale are acceptable. Both are refuted in great detail in our EA comments as written by Mattson. The populations of grizzly bears in the CYE and Yaak portion are not viable.

Our EA comments/Mattson explain several other problems of the FS’s approach to grizzly bear habitat management. This includes misinterpretation of science. I have also attached Dr. Mattson’s objection which we are incorporating.

Also, the EA assumes that abundance of huckleberries are demographically limiting for grizzly bears in this region, and further assumes that Project treatments will substantially enhance abundance of huckleberries to an extent sufficient to offset any losses of habitat security. As our EA comments/Mattson explain:

There is little or no evidence that food abundance is a significantly limiting factor for grizzly bears in the Cabinet-Yaak Ecosystem—especially as manifest in reproduction. On the other hand, there is ample evidence that human-caused mortality had governed and continues to govern the fate of this population, with food effects manifest primarily in the extent to which grizzly bears are exposed to human-related hazards during years when berries are in shorter supply.

The FS should be identifying key habitat components for grizzly bears for prioritizing road density reductions (Proctor, et al., 2020) so populations can recover.

Our EA comments/Mattson state Proctor et al. (2017) "is highly relevant to judging the trade-off between proposed forest treatments and habitat security for grizzlies, especially vis-à-vis any prospective increase in huckleberry production and hazards associated with road access" and list "relevant recommendations from Proctor et al. (2017)."

Our EA comments/Mattson also explain that the Black Ram EA failed to evaluate the impacts of proposed activities on grizzly bears in a larger geospatial context, and that Impacts of the project will be synergistically amplified by the Pacific Northwest Trail.

There is no analysis in the EA regarding existing road densities located outside of and between BMUs, both at present and during project implementation. The forest plan BO states, "In BORZ, we anticipate that high linear miles of road are likely causing adverse effects on grizzly bears."

Moreover, the questionable definition of decommissioning used in this EA also makes it impossible to tell if roads will be effectively barriered or otherwise prevent public use. Even barriered roads allow public access over and above completely obliterated roads.

The Forest Plan allows "temporary" reductions in Core and "temporary" increases in road density as if the BMUs will then get reprieve from such "temporary" adverse effects. However, the Forest Plan has no genuine limitations on how much, how often and for how long these "temporary" adverse effects will occur or persist. The FS basically takes the position that upon completion of project-related activity, amount of road will be consistent with the Access Amendment. The question is, *when*? **When** will this ever be realized, if there is continuous, temporally and spatially overlapping road building and logging activities? And for how long?

So the numbers for Open Motorized Roads and Total Motorized Roads in Tables are disingenuous, misleading at best.

The FS is aware of the best Plan direction it has adopted to date, established in Flathead Forest Plan Amendment 19.[9] It established Open Motorized Route Density (OMRD)/Total Motorized Route Density (TMRD)/Security Core indices. These are based upon the scientific information concerning security from roads and road density requirements for grizzly bears as found in Mace and Manley, 1993 and Mace et al., 1996. Also see McLellan, et al., 1988.

[9] Although that Forest Plan has been revised and the Amendment 19 direction dropped and/or weakened, AWR has objected to the Flathead NF's revised forest plan and filed notice of intent to sue on this issue.

The EA does not demonstrate that project implementation is consistent with the best available science, so EA and Draft DN violate the ESA, NFMA, and NEPA.

According to the Cabinet-Yaak Grizzly Bear Recovery Area 2011 Research and Monitoring Progress Report (Kasworm, W.F. et al, 2012): In 2011 there were 5 known mortalities, 3 (60%) of which occurred on USFS lands; in 2010 there were 4 known mortalities, 2 (50%) which occurred on USFS lands; in 2009 there were 4 known mortalities, 3 (75%) which occurred on USFS lands; in 2008 there were 4 known mortalities, none of which occurred on USFS lands; in 2007 the 1 known mortality occurred on USFS lands (100%); in 2006, 2005, and 2004 there were 8 known mortalities, none of which occurred on USFS lands; in 2002 there were 7 known mortalities, 2 (29%) of which occurred on USFS lands; in 2001 there were 4 known mortalities, 1 (25%) of which occurred on USFS lands. Thus the trend has been an increase in grizzly bear mortalities on USFS lands. This should have been disclosed and considered in the Black Ram grizzly bear analysis.

The Forest Plan Biological Opinion (BO) states:
The Revised Plan also incorporates the Guidelines of the IGBC (USFS 1986, entire). The IGBC Guidelines are applied across the grizzly bear Management Situations (MS) (1 through 5) as delineated throughout the two recovery zones in the KNF. All of the lands within each recovery zone have been delineated into one of the management situations. As information and science related to grizzly bears evolved, the USFS began managing MS1 and MS2 essentially the same on NFS lands, according to direction for MS1. Management focuses on grizzly bear habitat maintenance, improvement and minimization of grizzly- human conflict. **Management decisions will favor the needs of the grizzly bear when grizzly habitat and other land use values compete.**

(Emphasis added.) Black Ram project impacts would not consistent with the requirement to prioritize the needs of the grizzly bear for the applicable Management Situations.

Additional direction in the Interagency Grizzly Bear Guidelines (IGBG) (1986) for MS 1 habitat included the following for timber management:

Logging and/or fire management activities which will adversely affect grizzly bear populations and/or their habitat will not be permitted; adverse population effects are population reductions and/or grizzly positive conditions; adverse habitat effects are reduction in habitat quantity and/or quality.

The FS manages most of the habitat in the CYE, but instead of exercising its discretion to increase habitat security via substantial road reductions and minimizing industrial and motorized disturbance, the agency prefers to log, mine, and otherwise manipulate and disrupt the grizzly's habitat to the limits allowed by its already inadequate regulatory mechanisms. Since 2010, the FS:

- Declined the opportunity to select an Access Amendment alternative that would have provided a higher level of habitat protections for grizzly bears and for a whole host of other wildlife species;

- Continued to neglect its duty to identify the forestwide minimum road system under the Travel Management Rule Subpart A;

- Recommended a minimum of the inventoried roadless areas in the CYE Recovery Zone (RZ) for Wilderness in the RFP; and

- Approved more major timber sales and mining in the CYE RZ. Such actions reveal a practice and pattern of failing to prioritize the needs of the grizzly bear. The FS must undertake a full cumulative effects analysis that considers all management activities (public and private) in the CYE.
  We also incorporate into these comments Louisa Willcox's commentary entitled "The Future of the Cabinet-Yaak

Grizzlies" (https://www.counterpunch.org/2017/09/08/95644/). Grizzly bears are winter-sleepers rather than true hibernators. If high density motorized routes are known to disturb, displace, habituate, and raise mortalities among grizzlies in spring, summer, and fall, there's no logical, or scientific reason to believe they don't do the same to sleeping bears in winter. The BO states:

In the CYE and NCDE, incidental take may occur where late season snowmobiling overlaps with grizzly bear post-denning habitat. The incidental take is expected to be in the form of harassment to individual female grizzly bears and/or cubs caused by premature den emergence or premature displacement from the den site area, resulting in reduced fitness of females and cubs. We expect the amount and extent of take would be very low.

Cumulative incidental take under the revised forest plan has not been low.

The BO also states:

The Revised Plan's desired condition for patches which includes a range of larger opening sizes may result in adverse effects if lack of cover leads to under use of foraging habitat or increased risk of human-grizzly bear conflicts causing mortality of a grizzly bear. Openings created by timber harvest, depending on site conditions, may retain features that interrupt the line of sight and provide cover for bears (J. Anderson 03/12/2012 pers. comm.).

The FS does not show that the openings to be newly created by the project don't exceed levels of allowed incidental take. The FS's July 18, 2019 "Request to Exceed 40-Acre Opening Limitation for the Black Ram Project" indicates the FS is proposing to use "even-aged silviculture" to create "21 even-aged regeneration opening made of 36 proposed harvest units totaling approximately 2,016 acres." From smallest to largest, openings would be 41, 44, 44, 48, 50, 53, 53, 60, 66, 81, 85, 94, 96, 104, 121, 123, 152, 169, 240, and 292 acres.[10] These 40+ acre clearcuts would comprise 3.15 square miles with no cover, essentially lethality zones for grizzly bears.

Together with the smaller Black Ram timber project clearcuts, this would be almost 4 square miles.

As explained elsewhere in this Objection, the EA makes no meaningful distinction between the types of "regeneration" logging methods to be utilized. Although commonly known that clearcuts leave fewer trees that seed tree cuts, and seed tree cuts leave fewer trees than shelterwood cuts, this EA and DN do not require the FS to meet any measurable, numerical

[10] The FS's "Request..." document actually lists 20—not 21 openings.

criteria or distinctions for such cuts during implementation. The best the EA does is provide blurry forest stand pizza diagrams as copied here via screenshot:

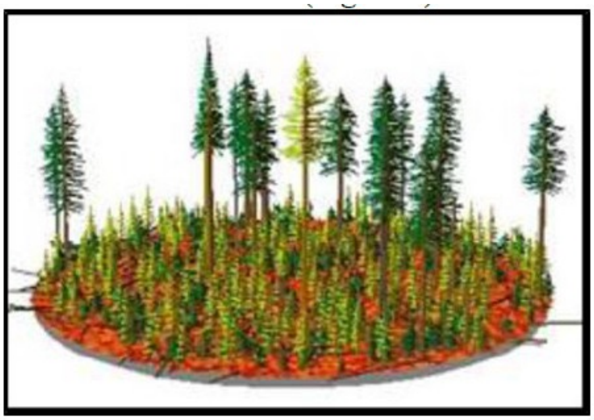


Figure 3. Simulation of a shelterwood cut.

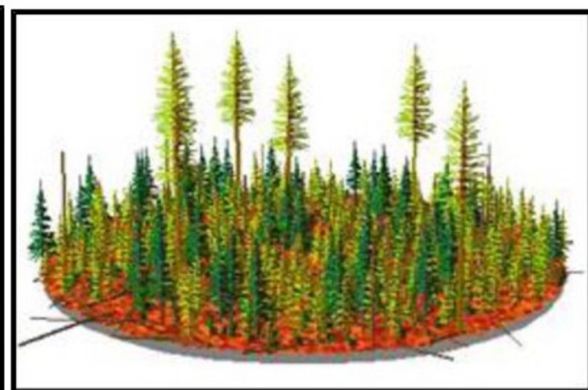


Figure 4. Simulation of a seed-tree cut

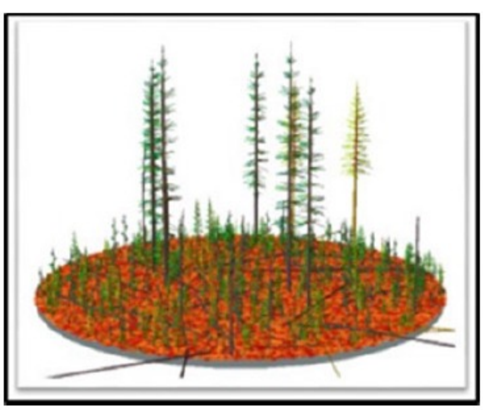


Figure 5. Simulation of a clearcut with reserves

And the pizza diagram of "Improvement Cut" isn't much different than that of Shelterwood:

Figure 1. Simulation of an Improvement Cut

At best these diagrams represent the logged areas a number of years after cutting since they don't show the slash, burned vegetation, damage to leave trees and raw earth from machine impacts—

and this assumes overcoming regeneration challenges that increase every year due to climate change. To provide a clearer perspective, below are post-monitoring photographs of shelterwood cuts implemented for the

Orogrande Community Protection Project in the Nez Perce-Clearwater National Forest:

The conditions shown immediately above better represent the lack of cover grizzly bears would face for at least 4 square miles than do the EA diagrams. And this doesn't even include the 1,262 acres of "Improvement Cuts" with poorly specified retention criteria.

In the CYE, the population size is far below the recovery goal of 100 bears (Kendall et al. 2016), with human-caused mortality being the primary factor keeping the population in peril. Any conclusion that the CYE population is stable or increasing is not based in good science.

The effects to grizzly bears from the project include potential disturbance or displacement due to human presence, road construction and use, motorized use and other mechanized equipment. The presence of these activities and the presence of roads leads grizzly bears to avoid otherwise suitable habitat.

The EA doesn't adequately analyze and disclose cumulative impacts on land of other ownerships due to their unknown duration, location, and intensity.

The FS still has not provided solid scientific basis for its assumption that an isolated small core habitat of a few acres are considered just as useful to grizzly bears as the acres in a 10,000-acre block of core.

The EA inadequately analyzes the effectiveness of road closures, for the purpose of eliminating human access. Again, we refer to AWR's Amended Complaint for case CV-18-67-DWM for the purposes of explaining how roads affect wildlife, how pervasive are ineffective closures on national forest land, and also for forest plan consultation requirements.

Reducing roads and therefore their impacts beyond what the FS seems willing would benefit not only grizzly bears, but most other natural aspects of the ecosystem, as the Access Amendment Draft SEIS states:

- Alternative D Modified would convert the most roads and consequently would provide the highest degree of habitat security and a lower mortality risk to the **Canada lynx**. (P. 70.)

- Alternative D Modified would provide a higher degree of habitat security (for **gray wolves**) than Alternative E Updated... (P. 74.)

- Alternative D Modified ... could contribute to a cumulative increase in habitat security for **black-backed woodpeckers** (and **pileated woodpeckers**) because timber sales or other ground disturbing or vegetation management activities would be less likely to occur in Core Areas. Newly dead trees that support wood boring beetle populations would be less likely to be removed during vegetation management activities or by woodcutters. Alternative D Modified could provide slightly more secure habitat than Alternative E Updated. (P. 84, 112.)

- Alternative D Modified ... could contribute to a cumulative increase in habitat security because timber sales or other ground disturbing or vegetation management activities would be less likely to occur in Core Areas. Snags would be less likely to be removed during vegetation management activities or by woodcutters. Alternative D Modified could provide slightly more secure habitat(for **Townsend's big-eared bats, flammulated owls, fringed myotis bats**) than Alternative E Updated. (Pp. 85, 86, 95.)

- Alternative D Modified and Alternative E Updated provide different levels of habitat security (for **peregrine falcon, fisher, wolverine**) based on the relative amount of wheeled motorized vehicle access. (Pp. 87, 89, 91.)

- Alternative D Modified, which closes the most miles of road in suitable habitat, would be the preferred alternative for the western toad. (P. 101.)

- Alternative D Modified closes the most miles of road in suitable habitat and would provide the greatest benefits for the **goshawk**. (P. 103.)

- Alternative D Modified, which closes the most miles of road in suitable habitat, would be the best Alternative for **elk**. (P. 104.)

- Alternative E Updated would provide some security and reduced vulnerability (for **moose**), but not as much as Alternative D Modified. (P. 104.)

- Although Alternative D Modified and Alternative E Updated would benefit **mountain goats**, Alternative D Modified would improve security and reduce the risk of displacement more than Alternative E Updated. (P. 109.)

- Alternative D Modified would improve security (for **pine marten**) more than Alternative E Updated. (P. 110.)

Great Bear Foundation et al., 2009 discusses in great detail how the Access Amendment Alternative eventually selected leads to a significant deterioration in an already unacceptable baseline condition for grizzly bears. The scientific discussions in Great Bear Foundation et al. 2009, as well as AWR comments on the Access Amendment DSEIS refute the FS's claim to be utilizing the best available science for the grizzly bear.

The FS fails to recognize that Bear Management Units (BMUs) do not protect enough habitat to satisfy most individual grizzly bears' needs in the CYE.

"Our analysis shows that grizzly bears have little or no opportunity to select home ranges with lower road density or higher percentages of core... Because grizzly bears could not have selected home ranges having more core area and lower road densities, and there has been no growth in the population, there is no basis to conclude the proposed access standards are sufficient to insure the recovery of the Cabinet-Yaak and Selkirk grizzly bear populations" (Merrill 2003).

The FS has no plan to provide scientifically defensible habitat protections outside the CYE that would allow for a larger protected zone and/or natural augmentation from outside the CYE. The FS has no cogent methodology that provides scientifically defensible habitat protections inside the CYE that would facilitate functional connectivity between and among BMUs. The Forest Plan fails to provide any scientific basis that baseline road densities outside the CYE can support grizzly bear population natural augmentation or recovery.

Schwartz et al. (2010) noted that management for grizzly bears requires not only the provision of security area, but control of open road densities between security areas. Otherwise, grizzly bear mortality risks will be high as bears attempt to move across highly

> roaded landscapes to another security area. The forest plan lacks direction regarding road densities located outside of and between security areas. The Forest Plan is not consistent with best available science on road density in grizzly bear habitat outside of Bear Management Units.

We are incorporating Dr. Mattson's objection below.

Black Ram Environmental Assessment & Decision Notice Objection

Objector: David J. Mattson, Ph.D. (see signature at end)

Address: P.O. Box 2406, Livingston, Montana 59047

Email: davidjmattson@gmail.com

Issues Addressed: Provisions for conserving and protecting grizzly bears

The reasons for this objection are listed below, with each objection identified by a step-down hierarchy

of capital letter, number, lower-case letter. I conclude with a concise statement of proposed remedies

and solutions. My objections reference numerous documents and publications. Most of these were

referenced in the Black Ram Environmental Assessment or in the U.S. Fish & Wildlife Service "Biological

Opinion on the Effects of the Kootenai National Forest Land Management Plan on the Grizzly Bear,"

dated 28 August, 2020. These referenced publications should be in the records of the Kootenai National

Forest. I have attached the remaining newly-cited publications to emails that I have submitted as

addenda to the email conveying the main body of my objection, as follows.

Introduction

I welcome the opportunity to provide additional input on the Kootenai National Forest's proposed Black

Ram Project in the form of objections that reiterate and amplify on comments I submitted 8 August

2019 high-lighting issues with the draft Environmental Assessment.

My objections to the Draft Decision Notice & FONSI (DN) for the Black Ram Project—focused on grizzly

bear-related impacts—encompass not only the DN, but also the final Environmental Assessment (EA)

and U.S. Fish & Wildlife Service Biological Opinion (BiOp) that the DN invokes. I include the BiOp because

the DN and EA authors reference this document as if it were a definitive representation of prospective

impacts and relevant science. It is neither, and hence represents a flawed underpinning for both the DN

and EA.

My objections organize around several thematic problems with the DN, EA, and BiOp:

• Systematic disregard for the best available science in preference for science convenient to what

appears to be a prior purpose.

• Failure to recognize that "the best available science" is, at its core, a rigorous set of methods

and standards for collecting, analyzing, and interpreting data as well as critically appraising

published research—and not simply a collection of published research reports and publications

to be uncritically used on the basis of last in time.

• Substitution of unsubstantiated assertion for the best available science.

• Deployment of convoluted or otherwise faulty logic to serve what appears to be preordained purposes.

• Systematic failure to employ the precautionary principle in assessment of project impacts on grizzly bears with amplification rather than mitigation of risk to an acutely vulnerable population of bears in the many instances where project impacts are uncertain.

• Systematic failure to commit to any project actions that promote grizzly bear recovery other than the minimum specified in the Forest Plan—in spite of direction in the same Plan to undertake actions in excess of this minimum.

• Systematic failure to take a hard look—or, in some instances, any look—at how project-related actions will ameliorate or exacerbate the factual reasons that grizzly bears die on Forest Service jurisdictions.

• Failure to address cumulative effects on grizzly bears of on-going and foreseeable human activities and environmental change.

On a related note, the Forest Service failed in the final EA to meaningfully address my many substantive

comments submitted in response to the draft EA. The Forest Service ignored some of these comments

outright and for the remainder deployed assertions or circular internal references largely devoid of substance.

These thematic problems are not trivial. In one way or another they manifest a failure of the Forest

Service and US Fish & Wildlife Service to fulfill legal duties and obligations specified in the Endangered

Species Act and National Environmental Policy Act. As such, these problems require remedy in the form

of a substantially modified EA and DN for the Black Ram Project that prospectively includes

consideration of additional Alternatives (see Section I, at end).

My initial objections organize around a core structural argument deployed by the Forest Service to

justify adopting Alternative 2 in the Black Ram Project DN. This core argument is fatally flawed and thus

an invalid basis for judging or justifying project impacts on grizzly bears. It is not based on the best

available science nor is it precautionary. Alternative 2 will merely serve to perpetuate a highly risky

environment for an acutely vulnerable bear population.

The logic of the Forest Service and US Fish & Wildlife Service argument is: (1) Minimum security

standards described in the Forest Plan are adequate for recovery of the Yaak grizzly bear population. (2)

Little more than the minimum is thus demanded of the Forest Service. (3) Status of the Yaak grizzly bear

population has improved since 2012. (4) This improvement is evidence for the adequacy of minimally fulfilling security standards. (5) Regardless, the U.S. portion of the Yaak/Yahk grizzly bear population is contiguous with robust grizzly bear populations in Canada. None of these contentions are valid, supported by the best available science, or consistent with a precautionary approach to recovering Yaak grizzly bears.

In what follows, I articulate major issues and related objections that bear on foundational elements of the Forest Service justification and argument for adopting Alternative 2 and for the large Black Ram EA.

A. The Yaak Population of Grizzly Bears is Acutely Vulnerable and Not Viable

As per Point D in my comments submitted during August 2019 (hereafter Comments), the Yaak population of grizzly bears is acutely vulnerable to decline and extirpation within the next 50-100 years—even accounting for grizzly bears in the contiguous Yahk population of Canada (i.e., in spite of the implicit claim on pg 31, BiOp).

The Forest Service response to this fundamentally important point amounts to: “Monitoring results indicate that the population has increased substantially since listing and the early population estimates

[sic].” (p120, EA Appendix). They further reference the Introduction to the Response to Comments Section, pages 117-118, in which the Forest Service states: “More recent information (Kasworm 2019) provided from DNA analysis of hair snags from 2017 in the CYE resulted in a minimum population of at least 54 bears present during 2017.”

These responses signify either a profound misunderstanding of or willful disregard for: (1) factors configuring the vulnerability of bear populations; (2) factors driving the fates of small bear populations; (3) the isolation of Yaak population from the Cabinet Mountains population; and (4) the small size and comparative isolation of the Yahk grizzly bear population in Canada. Point (4) is implicated because of numerous comments made in the EA asserting, first, that grizzly bears will be able to move freely into and out of Canada through the Project areas and, second, that this movement will implicitly make a substantial difference to status of the Yaak grizzly bear population (pgs 31 & 103, BiOp).

A.1. No Conclusions Are Warranted Regarding Growth of the Yaak Grizzly Bear Population

A.1.a. No Conclusions are Warranted Regarding Population Growth Rate Since 2012

Points A-C in my Comments thoroughly cover why no conclusions are warranted regarding growth rate for the Yaak grizzly bear population since 2012, which is when Kendall et al. (2016) produced the only reliable estimate of total number of bears in the Cabinet-Yaak Ecosystem (44-62), of which 18-22 resided in the Yaak population. Problems with methods and data debar any justifiable conclusions, including mismatch of time frames for the growth rate applied since 2012 (my Point A.1.b); the use of an overly optimistic subset of bears (research trapped adult females) to calculate growth rate for the entire population (for which Forest Service claims are being made; my Point A.1.a); the huge bounds of uncertainty attending any estimate of population growth extrapolated over such an extended period of time (my Point A.1.c); application of a retrospective growth rate to project population size; and evidence that population growth stalled rather than accelerated beginning in 2014 (my Point A.2).

The Forest Service response to these fundamentally important points was to (1) quote a verbal conversation during 2019 with Wayne Kasworm in which assertions were made that the growth rate calculated for 1983-2017 was based on methods used by other researchers and "described in peer-reviewed journal articles..." and to (2) further assert that "...the reporting and incorporated methodology used by the Forest Service, as provided by the U.S. Fish and Wildlife Service, is the best available information [sic]." (pg116, EA Appendix)

This response is disingenuous, at best, and fails to address in any way the substantive fundamentally important issues raised in my Comments.

Regarding the first part of the Forest Service response (1): None of the referenced publications on page 116 of the EA Appendix exhibited the fundamental flaws I described in my Comments. Hence, these flaws were not addressed nor sanctioned by any peer review or publication in a scientific journal. Just because an annual report (as per Kasworm et al. [2018]) used methods that are, in essence, elaborations on subtraction, addition, multiplication, and division (i.e., the basis for calculating a growth rate), this is not synonymous with addressing the problems arising from an estimate based on aged largely irrelevant data, obtained from a biased sample, attended by enormous statistical uncertainty, and used to extrapolate population size into the future. One might as well say that because cashiers use fundamentally the same mathematical constructs in a check-out lane, all sins of scientific method are absolved for an estimate of a complicated population dynamic using the same constructs of addition and subtraction.

Regarding the second part of the Forest Service response (2): Just because some fundamentally flawed and unreliable information has been published in an annual report (as per Kasworm et al. [2018]) does not legitimize adopting this information as the “best available.” Use of such information, especially in light of a cogent and unaddressed critique (as per my Points A-C), is tantamount to a willful embrace of error and disregard for the precautionary principle. Under such conditions, the most defensible and “best” approach is to conclude that no conclusions are warranted regarding growth rate of the Yaak grizzly bear population since 2012.

A.1.b. No Conclusions are Warranted Regarding Change in Population Size Since 2012

Regarding a presumed improvement in status of the Yaak grizzly bear population since 2012, the Forest Service further adds on page 117 of the EA Appendix: “More recent information (Kasworm 2019) provided from DNA analysis of hair snags from 2017 in the CYE resulted in a minimum population of at least 54 bears present during 2017. A number of other bears known to exist at that time were not identified by DNA sampling, thus the absolute number was greater than 54. There is no reason to suspect that demographic rates in the Cabinets differ from the U.S. Purcell’s (Yaak).”

The presumption here is that a minimum estimate of 54 bears based on a reference for which no information is provided somehow yields a total number of grizzly bears in the Cabinet-Yaak Ecosystem

that is greater than the 62 constituting the upper bounds of confidence for the 2012 estimate re-
ported

by Kendall et al. (2016).

There are a number of fundamental problems with this presumption. First, the minimum number
of

bears reported by Kasworm et al. (2009) for the entire CYE for the period 2000-2008 (i.e., 47) is
nearly

identical to the total number estimated by Kendall et al. (2016; i.e., 49) for 2012, which is tanta-
mount to

saying that a more recent minimum estimate of 54 is not much different from a likely total of
perhaps

56-57. Which is to say, two or three is not plausibly equivalent to “A number of other bears...”.

Perhaps more problematic, Kasworm et al. (2018, pg 27) report a minimum number of 35 bears
for

2016, of which 23 were documented to live in the Yaak population, in contrast to the Forest Ser-
vice

claim that a minimum of 54 bears lived in the ecosystem one year later (presumably this applies
to 2018,

as per Kasworm et al. [2020], who allotted 31 of these bears to the Yaak region). According to
the Forest

Service, this is a 50% jump in a one-year period for the ecosystem and a 35% increase for the
Yaak

region, which prima facie fails to pass critical scrutiny, especially when the referenced material (i.e., Kasworm [2019]) is not provided in the EA for independent evaluation. The numerous methodological problems in Kasworm et al. (2018, 2020) and uncritical, if not disingenuous, deployment of information by the Forest Service in the EA does not inspire uncritical belief in these sorts of claims.

Parenthetically, there is, in fact, every reason to conclude that demographic rates of grizzly bears in the Cabinets differ from those of grizzly bears in the Yaak given numerous and repeated statements in annual reports (most recently, Kasworm et al. [2020]; see also pg 98, BiOp) that the Cabinet Mountains population was rescued and persists only because of an aggressive augmentation program. If, indeed, vital rates did not differ between the Yaak and Cabinet populations, one would have to conclude that the Yaak population needs to be sustained by aggressive augmentation, which is contrary to most other claims made by the Forest Service in the EA.

A.1.c. Why This Matters

The Forest Service maintains that its only obligations are to comply “with Forest Plan direction,” which it further maintains consist almost wholly of “indicators for Forest Plan standard, FW-STD-WL-02” consisting of “core and motorized route densities” (pg 288, EA; pg 116-117, EA Appendix). Yet these very standards are not justified by the best available and credible science (see Point C.1, below). Moreover, in a display of circular argumentation, the Forest Service (pg 290, EA) and U.S. Fish & Wildlife Service (pgs 21, 22, 93, & 103, BiOp) emphasize presumed growth in the grizzly bear population as justification for the adequacy of minimum security standards described in the Forest Plan. The US Fish & Wildlife Service even goes so far as to say that “the population is growing at an increasing trend” as justification for claims of success (pg 29 BiOp), but then shows a figure on page 30 of the BiOp showing a taper if not decline in instantaneous growth rate since 2014 (as per Point A.2 in my Comments), which renders the claim of increasing growth a contradiction of the best available information.

The upshot is, barring the repeated invocation of a single white paper reporting dated and questionable science (i.e., Wakkinen & Kasworm [1997]; see Point C.1, below), the entire edifice of claims related to adequacy of provisions in the Forest Plan for ensuring grizzly bear habitat security and benign impacts of Alternative 2 for the Black Ram Project rest, in turn, on claims regarding improvement in status of the Yaak grizzly bear population since 2012.

In other words, the Forest Service is obliged to not only address current status of the Yaak grizzly bear population, but to also do so in a precautionary credible way that gives due regard to uncertainties and probable drivers. The last point is critical because an adequate treatment of plausible causation provides important context for, in turn, addressing the adequacy of minimum habitat security standards and related impacts of the Black Ram Project on grizzly bears (see Point B, below).

A.2. The Yaak/Yahk Population of the United States & Canada is Not Viable

The U.S. Fish & Wildlife Service invokes connectivity between the Yaak grizzly bear population in the United States and the Yahk population in Canada as a basis for disingenuously implying that this connectivity alleviates concerns about status of the Threatened Yaak bears (pgs 31 & 103, BiOp). This less than transparent device is misleading.

A.2.a. The Yaak/Yahk Population is Semi-Isolated and Small

The best available information shows that the combined Yaak/Yahk grizzly bear population is less than or little more than 50 bears and is isolated to a significant extent from larger more robust grizzly bear populations in all directions. Apps et al. (2016) estimated that there were roughly 24 grizzlies in the Canadian Yahk population, which, together with the 20-31 grizzlies making some use of the Yaak area (Kendall et al. 2016, Kasworm et al. 2020), amounts to perhaps 44-55 bears. This estimate is consistent with an earlier one of roughly 44 bears for the Purcell-South Yaak transboundary population by Proctor et al. (2012).

Proctor et al. (2005, 2012, 2015, 2018) and Apps et al. (2016) also document major impediments to movement imposed by vehicular traffic and settled areas along Canada Highway 3 to the north, U.S. Highway 2 to the south, the Creston Valley to the northwest, U.S. Highway 95 to the west, and Lake Koocanusa and the surrounding industrial landscape to the east. These fracture zones are not absolute barriers to bear movements, yet sufficient to genetically and demographically differentiate grizzly bears living in the Yaak/Yahk as a separate semi-isolated population (Proctor et al. 2005, 2012, 2015, 2018; Apps et al. 2016). Only 10 bears have moved into the Yaak from elsewhere during a 30-year span of time, of which 5 were killed, which amounts to only one surviving immigrant every 6 years (from Kasworm et al. 2020). Of these, 3 were known to contribute genes to the Yaak population, amounting to one contribution every 10 years. This amounts to minimal gene flow and insufficient immigration for demographic rescue.

A.2.b. Bear Populations of Less Than 100 Individuals Are Acutely Vulnerable to Extinction

The entire corpus of research produced on viability of isolated or semi-isolated populations of bears and other large long-lived mammals shows that populations of 50-100 animals are acutely vulnerable to extinction (50-95% likely) over a relatively short period of time (100 years or less; e.g., Samson et al. [1985], Shaffer & Samson [1985], Suchy et al. [1985], Wiegand et al. [1998], Howe et al. [2007], McLellan [2020]). Mattson & Reid (1991) and Wielgus (2002) present additional evidence that grizzly bear populations of fewer than 200 to 450 animals are at great risk and require aggressive conservation efforts or large protected areas to be rescued. More recent research shows, in fact, that demographically and genetically contiguous populations of large mammals need to number in the thousands to be considered viable (95-99% change of survival) over meaningful periods of time (40 generations; e.g., Reed et al. [2003]; Frankham & Brooks [2004]; O'Grady et al. [2004, 2008]; Trail et al. [2007]; Frankham et al. [2014]).

Results specific to the Yaak/Yahk grizzly bear population affirm concerns about inviability. Proctor et al.

(2005, 2012) made specific reference to the threatened status of this transboundary population.

Estimates of population density are also relevant, especially given that density of the Cabinet-Yaak

grizzly bear population is the lowest documented for any population in North America outside of some

harsh arctic environments (Kendall et al. 2016), and that density of the Yahk population is 3-4 times less

than that of nearby bear populations in Canada (Apps et al. 2016). It is also noteworthy that 70% of all

bears and 100% of all females in the transboundary region are direct descendants of a single female

(Kasworm et al. 2018), which highlights the extent to which the fate of a single individual can govern the

fate of a small bear population (see A.2.c).

A.2.c. Very Small Increases in Mortality Have Dramatic Consequence

On a related note, populations as small as that of the Yahk/Yaak transboundary area are acutely

vulnerable to very small increases in mortality, especially of adult females. As per Point D in my

comments, an increased loss of even 1 adult female bear every 2-5 years can dramatically escalate risks

of population extirpation, a point that has been emphasized in research on viability of bear populations

(Suchy et al. 1985, Sæther et al. 1998).

This foundational result highlights the extent to which fates of populations as small as that of the Yaak/Yahk region are governed by very small changes in mortality, much of which cannot be anticipated or even controlled by managers—a type of mortality that is often relegated to the category of chance events. Because of this, extinction risk for populations of around 100 mature individuals (i.e., not including adolescents or cubs) are driven by chance events more than by short-term (i.e., 10-year) population trajectory (O'Grady et al. 2004).

A.3. Implications for Management of Yaak Bears

Claims that the Yaak grizzly bear population increased by a few individuals—true or not—should not configure management. If true, an increase is certainly better than a decrease, but not cause to employ a minimalist—even deficient—suite of security standards and related management actions (see Points B.3 & C, below) for an acutely vulnerable bear population, as is being proposed under all Alternatives for the Black Ram project area. All of these Alternatives, including Alternative 2, are risk embracing rather than precautionary. The Black Ram project instead needs to promote more aggressive and far-seeing recovery efforts required to address risks engendered by small population size and low population densities, including ample habitat protections in the form of additional road closures (see Point C, below) and increased law enforcement (see Point B.3, below). Measures such as these are needed if the

Yaak grizzly bear population is to be buffered from risks engendered by variability in lethality of humans

and productivity of the natural environment.

B. There is No Evidence That Management of Federal Lands Caused Population Gains

None of the points raised in Section A of my objections address factors that likely caused putative

changes in grizzly bear numbers during the last several decades, which is what I address here.

The Forest Service claims or strongly implies that management of its jurisdictions and, more specifically,

management of roads and attractants on its lands has been a major cause of phantom increases in Yaak

grizzly bear numbers (but see Point A.1, above), including on page 290 of the EA where road and

attractant management are invoked as explicit reasons for presumed population increases, concluding

that "This indicates that land management activities are conducive to and support recovery"; on page

306, where "Forest Service activities...have been successful at supporting recovery" is offered; and on

page 120 of the Appendix G where "motorized access standards...have been so successful at reducing

[sic]” risk of malicious killing is asserted.

B.1. Changes in Size of the Yaak Population Have Been Driven by Environmental Variability

As I elaborate in Point K.2 of my Comments, the weight of available evidence shows that most variation in size of the Yaak population between 1990 and 2015 was driven by variation in berry crops. This variation affected exposure of grizzly bears to people, with resulting effects on numbers of human-caused bear deaths. In others words, changes in human-caused grizzly bear mortality have likely been driven more by the vagaries of weather and climate than by systematic changes in factors under the control of the Forest Service.

This is not to say that on-the-ground changes in road access, law enforcement, and conflict prevention are unimportant, but rather that these efforts have so far been inadequate in the Yaak and on Forest Service jurisdictions, with the proposed Black Ram project being positioned to perpetuate an inadequate regime.

The Forest Service and US Fish & Wildlife Service altogether failed to address this issue and my related concerns in the DN, EA, and BiOp. This willful disregard for a factor of vital importance to judging the effects of management actions and environmental change is, at best, puzzling.

B.2. No Data or Valid Evidence Are Provided for Judging Effects on Grizzly Bear Mortality

On a related note, none of the Forest Service claims regarding benefits of its past management are substantiated by evidence. The Forest Service fails to provide data regarding why, in fact, grizzly bears die on its jurisdictions; nor does the Forest Service then use these data to appraise past or prospective benefits of management actions, including on the Black Ram project area. Likewise, the US Fish &

Wildlife Service (USFWS) makes pro forma observations regarding the association of known human-caused mortalities with roads (specifically, 500-m zones of influence; e.g., pgs 29-30, BiOp), and then

merely summarizes mortality in bar graph form for the totality of the Selkirk and Cabinet-Yaak Ecosystems, without differentiating mortality that occurred on private or federal lands (p30, BiOp). Nor do the USFWS or Forest Service offer any information on how estimated unreported bear mortalities—which adds considerably to the toll taken by malicious killing—inform the appraisal of benefits arising from management of roads and attractants on Forest Service lands.

B.2a. Claimed Benefits of Managing Attractants on Forest Service Lands Are Spurious

Interestingly, both the Forest and USFWS note that no grizzly bears have died because of conflicts over attractants on Forest Service lands in the Yaak and Cabinets, strongly implying that this was a result of effective Forest Service management of attractants (pg 42, BiOp; pg 306, EA). A tally of mortality going back to 1983 does indeed show that no grizzly died because of attractant-related conflicts on Forest Service lands during this entire period (from Kasworm et al. [2019, 2020]). However, this period includes 28 years that predate issuance of a forest-wide attractant storage order in 2011 (p.25, BiOp). The point here is that no change in bear mortalities on Forest Service lands correlates with changes in how attractants have been managed. Mortalities related to attractants have never been a major problem, which is not to say that this dynamic is not and has not been a major driver of grizzly bear mortality on other jurisdictions or in other ecosystems. Quite simply, management of attractants on Forest Service jurisdictions cannot be invoked as an explanation for any presumed improvement of population status for grizzly bears in the Yaak with, then, benefits offsetting impacts of the Black Ram project.

Parenthetically, both the Forest and USFWS claim that considerable benefits have accrued and will

continue to accrue from better management of attractants on private lands (pg 88, BiOp; pgs 298 & 306,

EA; see also Proctor et al. [2018]), largely attributable to efforts of a conflict management specialist paid

through a cost-share arrangement with the Forest Service (pgs 30 & 88, BiOp). Whether this claimed

benefit is true or not, the point here is that this applies only to conflicts and related grizzly bear

mortalities on private lands, not Forest Service jurisdictions, and that greater benefits for grizzly bear

recovery would likely arise from the Forest Service investing in additional conflict management

specialists rather than additional management activities on remote lands in the Black Ram project area.

B.2.b. Claims Regarding Reduced Mortalities on Forest Lands Are Not Supported

The USFWS claims that numbers of known grizzly bear mortalities declined in the Cabinet-Yaak

Ecosystem after 2009, which it then uses as further evidence for presumed improvements in status of

the Cabinet and Yaak populations (pg 97, BiOp). The Forest Service claim of having made substantial

contributions to this improvement further implies that there have been disproportionate improvements

on its jurisdictions.

Neither of these explicit or implicit claims is supported by the available evidence. I elaborate on why in

Points C & G of my earlier Comments, highlighting failures of the Forest Service and USFWS to account for: (1) estimated unreported mortalities; (2) substantial statistical uncertainties; (3) little or no change in averages between earlier and later comparison periods; and (4) an increase (not decrease) in the proportion of mortalities on Forest Service jurisdictions after 2008.

The Forest Service fails to meaningfully respond to these concerns raised in my earlier Comments and, instead, does little more than repeat "See the introduction to the grizzly bear section of this response to comments" (pgs 120 & 121, EA Appendix G), as if repetition of this mantra somehow addresses the very real issues I raised. In fact, the Introduction on pages 116 and 117 of Appendix G fails altogether to address these issues, at best offering the spurious claim that because Kasworm et al. (2018) used standard methods (e.g., for calculating proportions, ratios, and averages), this consilience somehow

remedies problems of bias, statistical uncertainty, and lack of support in available data (see also my Point A.1.a, above). It doesn't.

B.2.c. Illegal Killing and Mistaken ID Are Dominant Causes of Grizzly Bear Deaths on USFS Lands

A compilation of grizzly bear deaths and related causes on Forest Service jurisdictions was missing from the EA and BiOp—despite the critical importance of this information. To remedy this deficiency, I used data provided in government reports and databases from the Cabinet-Yaak, Selkirk, and Northern Continental Divide Ecosystems to produce such a compilation. My sources included Kasworm et al. (2018, 2019, 2020), Costello et al. (2016), and two excel databases obtained from Montana Fish, Wildlife, and Parks through requests under Montana's Public Records Act. I restricted my compilation of deaths in the NCDE to the Flathead National Forest because of similarity of conditions on this Forest to conditions in the Kootenai NF, in contrast to conditions on the Helena-

Lewis & Clark NFs. The results of this

compilation are in Figure 1.

Some grizzly bear deaths in this compilation are unambiguously listed as caused by poaching or malicious killers, but many are listed as "under investigation" or human-caused but for otherwise "undetermined" reasons. The USFWS makes clear that most of the deaths in these latter two categories were likely illegal, either because of proximal circumstances or failure of the involved people to report the bear deaths they caused (i.e., most deaths were caused by "bullet wounds" and/or radio-collars "had been cut off"; pg29, BiOp). Given that there is

some degree of ambiguity about these distinctions, I show these deaths in Figure 1 differentiating the "under investigation" and human-caused but "undetermined" as a gray bar, and then combining these categories with documented malicious kills shown as a brown bar behind the burgundy bar denoting known poaching.

The basic point from this compilation is straight-forward. Malicious and other illegal killings are far and away the dominant cause of grizzly bear deaths on Forest Service lands, followed by black bear hunters mistakenly killing grizzlies (i.e., Mistaken ID). When an estimate of unreported mortalities is included, which disproportionately loads onto illegal kills, the outright dominance of this cause is even more unambiguous (I made both points in Point E of my earlier comments).

As the Forest Service and USFWS amply acknowledge, known human-caused mortality—without differentiating causes—is disproportionately concentrated near roads. Reasonably enough, both agencies conclude from this that access management is critical to limiting human-caused mortality. This point is not in dispute.

My main objections here—of relevance to the Black Ram project—are that the Forest Service and Fish & Wildlife Service: (1) employ access management standards that do not adequately address the nature and magnitude of human-caused mortality on Forest Service jurisdictions; and (2) fail to consider other actions that would be of more direct relevance to limiting grizzly bear deaths from malicious causes and mistaken IDs.

Parenthetically, the Forest Service responded to the first issue (1), as articulated in Points E and F of my Comments, by tritely observing “Risk reduction is why the motorized access management standards were developed, and have been so successful [sic] at reducing this risk” (pg 120, EA Appendix G). This response is essentially a non-response because it failed to address my concerns regarding adequacy of the referenced standards (see my Point C, below) and employed an unsubstantiated assertion about benefits arising from past access management, which is what I address in this section of my objections.

B.3. No Provisions Are Made for Adequate Prevention of Mortality on USFS Lands

Aside from managing road networks (for which standards are deficient, see Point C, below) and reducing availability of attractants (which is a moot issue on Forest Service lands), the only other measure offered by the Forest Service and USFWS for reducing grizzly bear mortalities is “outreach and education” (e.g., pgs 30, 79-81, 87-88, 92,97, 99-100, 119, BiOp; pgs, 290 & 306, EA). Although the USFWS offers highly qualified statements regarding the past efficacy of outreach and education (pgs 30 & 97, BiOp), the

Forest Service takes a breath-taking leap beyond this more temperate stance by making unqualified claims about contributions of outreach and education to “extensive improvements” in population status and (pg 290, EA) the “current positive population trend” (pg 306, EA, but see Point 1.A, above). Although the selective benefits of outreach and education are plausible and supported by anecdotal evidence, the USFWS and Forest Service mainly deploy an ad nauseum argument in support of this management tool; i.e., proof through repetition. But in addition to this evidentiary and argumentative

weakness, there is little or no likelihood that outreach and education will, in fact, address the problem of illegal killing.

By definition, illegal and unreported killing of grizzly bears (e.g., poaching) is an illegal act which, also by definition, is often attributable to criminals. Without providing an extensive review, a large corpus of research on human social-psychology and criminology suggests that outreach and education will not deter criminal activity unless backed by the threat of coercion and/or a comprehensive social, economic, and political program (I can provide list of references if needed).

More specific to poaching, the available research shows or otherwise strongly suggests that this activity is motivated primarily by resentments, displacement of anxieties, ideology, worldviews, and community solidarity (e.g., Kaltenborn et al. 1998, Bjerke & Kaltenborn 1999, Johansson & Karlsson 2011, Johansson et al. 2012, Slagle et al. 2012, Zajac et al. 2012, Kaltenborn et al. 2013, Gangass et al. 2013, Lüchtrath & Schraml 2015, Kaltenborn & Brainerd et al. 2016, Højberg et al. 2017, Schroeder et al. 2018, Von Essen et al. 2018, Peterson et al. 2019). None of these motivations are likely to be changed by “education” (Clayton & Myers 2009, Koger & Du Nann Winter 2010; sorry, you’ll have to buy your own copies of these insightful books).

The upshot of this is that the Forest Service needs to aggressively pursue both support for increased law enforcement and additional limitations on road access if the problem of illegal killing on Forest Service lands is to be addressed, including in the Black Ram project area. The Forest Service has already demonstrated that it is willing to support additional personnel employed by Montana’s Department of Fish, Wildlife, & Parks through a cost-share arrangement (i.e., Kim Annis). Given the size of budgets being entertained for the Black Ram project, there should be ample funds to cost-share additional Fish, Wildlife, & Parks positions with a law enforcement focus. The Forest Service, moreover, has a Law Enforcement & Investigations branch that is fully empowered to enforce federal law and should be augmented in the project area to assist in deterring and apprehending individuals engaged in illegal activities.

The current DN and EA carry no provisions for meaningfully addressing the dominant reason why grizzly bears have died and will continue to die on the Kootenai National Forest and, prospectively, in the Black Ram project area. Current provisions rely on deficient security standards, measures that are moot, and measures with little likelihood of otherwise addressing the problem.

C. Security Standards Employed by the Kootenai National Forest Are Inadequate

The entire edifice of decisions made regarding prospective impacts of the Black Ram project on grizzly bears rests on the foundational notion that Wakkinen & Kasworm (1997) is the best available science, which is, in turn, presumably substantiated by evidence of phantom increases in the critically small Yaak grizzly bear population. As I elaborated in my earlier comments submitted during 2019 and in Point A.1 above, there is no credible basis for concluding that this small population has increased since 2012, the import of which is further mooted by the limited effect of short-term demographic changes on fates of

populations <100 animals (as per my Point A.2, above). These well-substantiated points debar the

invocation of “improvements” as basis for judging the efficacy of security standards. Further-more,

Wakkinen & Kasworm (1997) is not “the best available science.” I elaborate on this last point in what

follows.

C.1. The Scientific Basis for Current Standards is Inadequate and Outdated

Wakkinen & Kasworm (1997) is the sole source for the trinity 26, 33, 55—?26% of a BMU with total road

densities >2 miles/mile2

; ?33% of a BMU with open road densities >1 mile/mile2

; ≥55% of a BMU >500 m

from the nearest road—that presumably guarantees the recovery of grizzly bears in the Cabinet-Yaak

Ecosystem. This agency report is repeatedly invoked as “the best available science” by the US-FWS (pgs

26, 54-56, 95, BiOp) as sanctification for the entire edifice of land management decisions on the Kootenai National Forest, including the Black Ram project area.

This invocation is based on several core assumptions: (1) no matter how dated, last in time is "best"; (2) any science done in other geographic areas, no matter how close and of what quality, is automatically of lesser merit; (3) the quality, relevance, and interpretation of area-specific, last-in-time research is exempt from critical evaluation; and (4) comparative assessments of research results are irrelevant.

Interestingly, according to these precepts, unreplicated research done in 1989 at the University of Utah should have been adopted by people living in Salt Lake City as a basis for on-going struggles to successfully build power plants utilizing cold fusion. My point here is that none of the tenets employed by the USFWS as a basis for claiming Wakkinen & Kasworm (1997) as "the best available science" is, in fact, a feature of good scientific practice or even prudent and precautionary management. The best that can be said for these precepts is that they appear to be expedient for social-political purposes.

C.1.a. Prima facie, Wakkinen & Kasworm (1997) Does Not Warrant Use as Best Available Science

Wakkinen & Kasworm (1997) is a 23-year-old agency publication reporting research results based on a sample size of 6 female bears (4 from the Selkirks and two from the Yaak) represented by 413 radio-telemetry locations obtained through use of VHF technology. If this research were submitted to a journal for publication today, it would be rejected out of hand during the first editorial screening, not only because the sample sizes are too small to support meaningful inferences, but also because the methods fall far short of current best practices and the interpretations far outstrip any support from the limited evidence that is presented.

But, in addition to being based on a small sample that imposes severe limits on scope of inference, Wakkinen & Kasworm (1997) compounded this problem by not controlling for the effects of habitat productivity and composition, a notion that was established as early as the late 1980s (e.g., Mattson et al. [1987]), and that has since become a fundamental requirement for robust inferences about avoidance of humans by bears (e.g., Nielsen et al. [2002, 2010] and Proctor et al. [2017]). Even more problematic, Wakkinen & Kasworm (1997) only documented bear behavior in a landscape where their few study animals had limited opportunity to select truly remote secure habitat, which debarred any conclusions regarding what bears would select, even prefer, if they had access to larger areas free of human access. In other words, if a bear only has access to home-range-sized areas that are

50-60% secure, they can't exhibit selection for areas that are any more secure than that (see Proctor et al. [2017]). Given this constraint, claims by Wakkinen & Kasworm (1997), and the USFWS thereafter, that female grizzly bears in the Cabinet-Yaak and Selkirk Ecosystems only need areas that are 55% secure to adequately avoid humans is little more than circular reasoning (see C.3, below).

Finally, most problematic of all, the USFWS commits a classic non sequitur by arguing that, because the 6 grizzly bear females used in the Wakkinen & Kasworm analysis survived several years to produce locational data, ipso facto, the landscapes they occupied provide a template for habitat security standards that ensure recovery of grizzly bears in the Cabinet-Yaak Ecosystem.

This is yet another truly breath-taking and unsubstantiated leap of logic on the part of the USFWS and, as a derivative, the Kootenai National Forest. The chain of illogic is roughly: (1) because these 6 females were alive after producing locational data, this fact somehow provides a basis for inferences about survival rates (it doesn't); and (2) that de facto survival of these females for a couple of years somehow translates into a basis for reaching inferences about average survival rates of all females in this ecosystem, past, present, and future (it doesn't). This chain doesn't meet even minimal standards for cogent logic and, moreover, violates precepts for estimating vital rates that go back decades (e.g., Heisey & Fuller 1985, Krebs 1989).

C.1.b. The USFWS Neglects Its Trust Duties by Not Updating Relevant Analyses

The USFWS holds a monopoly on all data collected from grizzly bears in the Cabinet-Yaak Ecosystem, including permitting authority over access to these data by outside researchers. So far, the only researchers given direct access for independent analysis have been employed by the USFWS, directly affiliated with the USFWS (i.e., Michael Proctor), or employed by the states of Montana and Idaho.

These monopolistic arrangements increase the burden on the USFWS to fulfill public trust responsibilities by updating analyses with substantial implications for land management decisions—as is the case with analyses relating to development of habitat security standards.

The USFWS has clearly failed in this particular trust responsibility. The last analysis of direct relevance to security standards was reported by Wakkinen & Kasworm (1997) 23 years ago, which the USFWS has subsequently invoked as "the best available science." This pattern of invocation seems to be one of convenience to political purposes, especially in light of the amount of data collected subsequent to Wakkinen & Kasworm (1997), and patterns suggested by the summary data available in annual reports.

More specifically, a total of 49 years of locational data have been collected from research-trapped adult female grizzly bears in the Cabinet-Yaak Ecosystem, post 1996, which is 1.8-times more years than were covered by data collected prior to 1997 (28 years; Kasworm et al. [2018]: Table 17). In other words, the amount of data relevant to judging behavioral responses of grizzly bears to human features (as reckoned in terms of total monitoring time) has nearly tripled. As important, summaries of estimated home range sizes provided in annual progress reports (e.g., Kasworm et al. [2018]: Table 18) suggest that average sizes have declined since 1996, even after accounting for the effects of temporal duration on estimations (c. 940 km2 versus 870 km2 for earlier and later periods, respectively; see Figure 2). This diminishment alone has potentially noteworthy implications given that small size could correlate with

greater concentration of radiolocations in available core secure habitat, with implications for security standards.

The USFWS needs to remedy this situation by updating the analysis of grizzly bear habitat selection in

the Cabinet-Yaak Ecosystem using best available scientific methods, accompanied by prudent and

defensible conclusions, as per the direction evidenced by Proctor & Kasworm (2020).

C.1.c. Research Shows That Habitat Security Was Inadequate During the Baseline Period of 1983-1996

Importantly, noteworthy research exists that directly contradicts assertions made by the USFWS that

configurations of habitat used by animals included in the Wakkinen & Kasworm (1997) analysis are

sufficient to ensure long-term population stability and growth. Of most relevance, Wakkinen & Kasworm

(2004) reported estimated vital rates for the Cabinet-Yaak grizzly bear population using data collected

during 1983-2002—a period that overlapped 70% with years during which locational data were collected

for use in the 1997 report. Cumulative population growth rates for this period are also routinely shown

in annual progress reports, most recently in Kasworm et al. (2020).

One would expect that, if habitat used by a handful of females bears during 1983-1996 was emblematic of conditions needed to promote recovery, this would be evidenced in a stable if not positive population trajectory. It was not. Wakkinen & Kasworm (2004) estimate a potentially catastrophic negative trajectory of roughly -4% per annum during the concurrent period, 1983-2002. This result has been consistently confirmed for this period in subsequent annual research reports for the Cabinet-Yaak Ecosystem (e.g., Kasworm et al. [2020]).

In other words, the most defensible conclusion in light of available evidence is that configurations of habitat vis-à-vis human access features during 1983-1996 were not in fact adequate to promote growth of the grizzly bear population. Regardless of total configurations of human access on the Kootenai National Forest at the time of the 1983-1996 study, the females that survived to produce the data used by Wakkinen & Kasworm (1997) were not only using configurations of habitat that were used, in turn, as a template for security standards, but were also foundational to estimates of population growth during 1983-2002.

Parenthetically, this begs the question of why status of the Yaak grizzly bear population seemed to improve between 2006 and 2012 (Kasworm et al. 2018:37). As I point out in B.1 and B2.a, above, recovery of the population during this period was likely driven primarily by beneficial environmental change (i.e., increased fruit crops), with improvements in management of attractants and conflicts on

private lands plausibly contributing to sustaining the Yaak bear population since then.

In summary, the most defensible conclusion in light of available evidence is that configurations of

habitat used to develop the presumed 23, 33, 55 trifecta are not sufficient to sustain growth of the

Cabinet-Yaak Ecosystem, especially in the face of on-going and foreseeable environmental variability.

More certainly, invocations of this trifecta as a proven formula for ensuring contributions of Forest

Service land management to recovery of Yaak grizzly bears is not defensible, much less precautionary.

But there is more that lends weight to this conclusion.

C.2. Core Security Areas are Too Small

C.2.a. USFWS Ignores the Best Available Science on Core Area Size

As I suggested in my earlier Comment H, the best available science unambiguously shows that core

areas >500 m from roads need to be of a minimum size if bears are to be able to meet daily foraging

requirements without incurring unsustainable risks of human-caused mortality arising from using areas

near (within 500-m of) human facilities.

This basic notion was first articulated by Mattson (1993; cited by the USFWS, pg 51, BiOp) as a basis for

defining what he called “micro-scale security areas.” Using data from the Greater Yellowstone

Ecosystem, he calculated that these security areas needed to be roughly 7,000 acres in size. Gibeau et al.

(2001) deployed this concept to appraise habitat security in and near Banff National Banff, estimating

that, based on data from this ecosystem, security areas needed to be roughly 2,200 acres in size. Proctor

et al. (2015) subsequently employed this parameter to define core security areas for the Cabinet-Yaak

and Yahk Ecosystems. More recently, Proctor et al. (2017) estimated that secure areas needed to be

roughly 12,400 acres in size at the scale of home ranges (50-km2

) and 4,700 acres at the scale of

seasonal movements (19-km2

). Interestingly, Wakkinen & Kasworm (1997) also recommended that

security areas ("patches") be of a minimum size, somewhere between 1,280 and 5,120 acres. The

average and median of these minimum sizes produces an estimate of 4,100-4,700 acres for daily or

seasonal security areas (i.e., secure "patches" or "blocks").

Despite this corpus of research, the USFWS in its BiOp (pg 56) and thence the Forest Service in its Land Management Plan (FW-STD-WL-02) and the Black Ram EA (pgs 292-293) argue that percent secure habitat can be defined “regardless of patch [block] size.” The USFWS presumes to justify this prescriptive statement by claiming that Wakkinen & Kasworm (1997) “...did not identify a minimum patch size at which grizzly bears failed to use the secure habitat,” when in fact they did recommend that patches be of a substantial (1,280-5,120 acre) size. The USFWS compounds its disingenuousness by further noting that “...in the Yaak, 89% [of radiolocations] were in patches” >2,560 acres in size, but then concludes “...because no minimum size polygon that grizzly bears would utilize could be detected, the...LMP [Land Management Plan] for the KNF [Kootenai National Forest] does not include a minimum block size for core habitat.”

The disingenuousness of these assertions and related conclusions is, again, breath-taking. If nothing else, the USFWS is either implying, if not stating outright, that the only basis for judging inadequacy of core secure areas is a total absence of observed grizzly bear use. Nowhere have I ever encountered use of such a standard for judging the impacts of human-related features on grizzly bear habitat use. In every instance where researchers and managers have previously judged avoidance or under-use, and thus magnitude of human impacts (including in the many publications given pro forma consideration by the USFWS; pgs 47-51) the standard has been whether some reckoning of use is proportionately less than what might be expected by some reckoning of availability. An adequately secure area is thus identified on the basis of parameters associated with levels of use greater than expected. Likewise, a human-impacted area is identified on the basis of parameters associated with use less than expected—not by a total absence of use.

Applying this notion, Proctor et al. (2015) show that only 17% of the entire Black Ram project area is in secure core areas greater than roughly 2,200 acres in size, which increases to 20% if dispersal habitat is included.

Assuming that much of the data collected from grizzly bears in the Yaak comes from this area (see Kasworm et al. [2020]; Appendix 4) and is thus the basis for the USFWS calculation that 89% of radiolocations were in areas >2,560 acres in size, this handily translates into a disproportionality: Core secure areas >2,560 acres are used by bears >5-times as intensively as expected by chance; remaining areas are used roughly 1⁄5 as much as expected by chance. This is an unambiguous disproportionality of a magnitude only rarely evident in distributions of bears relative to human features (see the many

references given pro forma review by the USFWS, pgs 47-51, BiOp), and ample grounds for establishing a standard requiring that core “blocks” be at least 2,500 acres—but more defensibly 4,000-5,000 acres—in size (but see C.3, below).

The USFWS has thus violated basic precepts and norms of science and management in asserting that there is no basis for defining a minimum size for secure “patches” or “blocks” and that none is thus warranted. The USFWS needs to remedy this deficiency by establishing a minimum size for core secure areas/patches/blocks, most defensibly in the range of 4,000 to 5,000 acres.

C.2.b. Implications of a Minimum Core/Block Size for Judging Habitat Security

The implications of establishing a minimum size for core security areas or blocks are substantial, even taking at face value the deficient standard of 55% secure habitat (see C.3, below) adopted by the Kootenai National Forest for judging impacts of the proposed Black Ram project.

The Forest Service has aided assessment of these implications by helpfully providing a list of “secure blocks” along with blocks sizes in Tables 85 and 86 on pages 292-293 of the EA. A summation of these so-called secure blocks leads the Forest Service to conclude that BMU 14 is 56% secure and BMU 15 55% secure, and thus that both meet standards. If one trims these blocks to delete those that are below any defensible size threshold, neither BMU meets standards. If a 2,000-acre threshold is applied, BMU 14 is 54% secure and BMU 15 52% secure. If a more defensible 4,000-acre threshold is applied, BMU 14 is 51% secure and BMU 15 again 52% secure. Both are thus 6-7% below standard.

This conclusion is predicated on adequacy of the 55% standard for secure habitat enshrined by the USFWS and Kootenai National Forest. However, this standard is not justified by either the best available science or cogent comparison with standards employed and met in other grizzly bear ecosystems.

C.3. The Percent Core Security Standard for Kootenai NF BMUs is Inadequate

As I note in Point F of my earlier Comments, Forest Service standards for establishing percentages of secure habitat (>500 m from human facilities) on a BMU-basis are deficient and not supported by the best available science. Rather than the current 55%, as applied to the Black Ram project area, the standard should be closer to 75-80%.

C.3.a. Comparatively Lax Security Standards in the Cabinet-Yaak Ecosystem are Indefensible

I observed in Point F of my Comments that security standards employed by the Kootenai NF and endorsed by USFWS are much laxer than those employed in other grizzly bear ecosystems. The Forest

Service failed altogether to respond to this critically important point.

This greater laxness of security standards in the Cabinet-Yaak Ecosystem is prima facie illogical and not

precautionary. The two grizzly bear populations occupying this ecosystem—in the Yaak and in the

Cabinet Mountains—are each 30- to 40-times smaller than grizzly bear populations in the Northern

Continental Divide (NCDE) and Greater Yellowstone (GYE) Ecosystems. The Cabinet-Yaak populations are

indisputably acutely vulnerable to extirpation (>50-90% chance) within the next 100 years (Point A.2.b,

above), unlike the larger populations in

the NCDE and GYE. Growth of the Cabinet

and Yaak populations is also highly

uncertain and, at best, amounting to only

a handful of individuals (Point A, above),

with gains most likely driven by recent

favorable environmental conditions and

modest improvements in management on

private lands (Point B.2, above). These

facts alone would suggest that security

standards should be more stringent, not less, in the Cabinet-Yaak Ecosystem.

Figure 3 puts the comparative laxness of habitat security in the Cabinet-Yaak Ecosystem in visual form. In this figure I summarize percent secure habitat in BMUs and BMU-Subunits as box plots for the GYE, NCDE, and Cabinet-Yaak Ecosystems (data from Van Manen et al. [2019]:115-116; NCDE Conservation Strategy, Appendix 3:27-29; Kootenai NF Plan Monitoring & Evaluation Report [2013]:16-17). I also show the standard for percent BMU habitat security for each ecosystem as a lighter-shaded bar (75% for the GYE, 68% for the NCDE, and 55% for the Cabinet-Yaak). Median habitat security across all BMUs is 90% in the GYE, 84% in the NCDE, and only 56% in the Cabinet-Yaak.

Given the comparatively small sizes and acute vulnerabilities of the Yaak and

Cabinet grizzly bear populations,

deployment of a security standard that is

20-25% less than in other ecosystems, realized on-the-ground in security that is 34-38% less, is not only

nonsensical, but also scientifically and biologically indefensible (see also my Points A-B, above,

addressing faults in both the referencing of and the selectively referenced science).

C.3.b. Standards for BMU-Level Security Are Not Scientifically Defensible

A number of researchers have emphasized, post-1997, the importance of extensive areas of productive

habitat remote from humans for conservation of grizzly bears populations. Such areas buffer

populations from the vagaries of environmental variation, increase the extent of source populations,

and sustain longer-term positive growth rates. Some of the most definitive studies supporting these

conclusions come from areas near and even adjacent to the Yaak region, including McLellan (2015),

Proctor et al. (2017), Lamb et al. (2018), and Lamb et al. (2020).

Notably, the remote productive areas invoked by these researchers as key to robustness of grizzly bear

populations are >4,500 acres in size. Of even greater relevance to Kootenai NF security standards and judgements regarding impacts of the Black Ram project, Proctor et al. (2017:37) noted that "...females across our study area had home ranges that contained 78% of habitat >500m from an open road, when the available proportion was 56%." This is a critically important observation given that there is no evidence that Wakkinen & Kasworm (1997) monitored female bears with access to home-range-sized areas encompassing >55% secure habitat. In other words, if a bear does not have access to extensive tracts of secure productive habitat, de facto, it cannot select for such tracts. Selection manifest by the handful of bears monitored by Wakkinen & Kasworm (1997) is almost certainly an artifact of limited options rather than a reflection of preference or optimal conditions; nor, as I elaborate in A.1, B, and C1, is there any basis for confidently concluding that 55% habitat security on Forest Service lands is, in fact, sufficient to sustain long-term population growth.

Results from Proctor et al. (2015) and Mattson & Merrill (2004) are also directly relevant to judging adequacy of habitat security for grizzly bears in the Black Ram project area (see Figure 5, below). These results provide important complementary information given that Proctor et al. (2015) modeled core security areas at a finer grain on the basis of grizzly bear habitat selection and movements, whereas

Mattson & Merrill (2004) modeled population source areas on the basis of coarser-grain distributions of habitat productivity and grizzly bear mortalities. However, both found that areas of secure productive habitat were far less prevalent in BMUs 14 and 15 than the 55-56% claimed by the Forest Service in the Black Ram EA. Proctor et al. (2015) show that approximately 17% of the project area qualifies as secure core, although an additional 3% qualifies as dispersal habitat—for a total of 20%. Mattson & Merrill (2004) show that only 38% of the project area probably functions as source habitat. By either reckoning, these results based on direct evidence—as opposed to unwarranted inferences from faulty science—show that functional security in the Black Ram project area is roughly 30-60% less than that claimed by the Forest Service.

All of this is relevant to judging the merits of a purported appraisal by the USFWS of habitat security standards for the Cabinet-Yaak Ecosystem reported on page 95 of the BiOp. More specifically, without offering any details about their analysis, the USFWS states: “We found no evidence from 2011-2019 to suggest mortalities are more abundant [sic] in BMUs that do not meet standards” and “We found no correlation to suggest that occupancy of a BMU by females with cubs is directly tied [?] to a BMU meeting access management standards or benchmarks." These statements and the related conclusion that habitat security standards are ipso facto adequate is an example of arguing from a false premise—

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the premise that any of the Cabinet-Yaak BMUs are adequately secure. Moreover, the range of variation in levels of security among BMUs is so small that it precludes any statistically significant correlation (see Figure 3; I can provide references to substantiate this very basic point if needed).

All of the evidence I've provided in Points A.1, B, and C provides robust support for concluding that essentially all of Cabinet-Yaak BMUs are insufficiently secure. In other words, a spectrum of security conditions doesn't exist in the Cabinet-Yaak Ecosystem (i.e., see Figure 3) that support any meaningful conclusions regarding whether bears are faring better in one area versus another as a function of meaningful variation in habitat security.

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As visual evidence of this basic point, Figure 4 shows the distribution of known and probable grizzly bear mortalities on the Kootenai, Flathead, and Helena National Forests relative to the distribution of lands in these forests actively managed as part of the timber base (burgundy) or as areas where some sort of harvest or treatment is allowed (orange)—both of which correlate with the extent of open and closed road systems. There are two main points from this graphic: first, that the Cabinet-Yaak Ecosystem lacks large roadless areas managed for primitive characteristics comparable in size to those of the Northern Continental Divide Ecosystem (as per Point F in my earlier Comments); second, that grizzly bear mortalities are highly positively correlated geospatially with these roaded areas (regardless of gated or stored status); and, third, that grizzly bear mortalities are, in fact, rare in large roadless areas >100,000 acres in size.

D. Summary Conclusions and Objections for Sections A-C

The main points of Sections A-C are: (1) Kootenai NF habitat security standards are inadequate; (2) claims made by the USFWS in it BiOp regarding adequacy of these standards are not substantiated by the best available science or by credible logic; and (3) the Black Ram EA does not provide a meaningful or substantiated assessment of grizzly bear habitat security and prospective project impacts on grizzly bear survival and habitat alienation.

E. The USFWS and Forest Service Apply Vagarious, Minimalist, Unjustifiable Standards

The entire edifice of decisions regarding effects of the Black Ram project on grizzly bears rests on a house of cards: science standards that are not supported by logic or the best available science (Point C, above); substantiated by phantom increases in numbers of bears (Point A.1, above); making unwarranted invocations of changes in management on Kootenai NF lands as partial cause for these phantom increases (Point B, above); and all, despite acute vulnerability of the Yaak and Cabinets grizzly bear populations (Point A.2, above), in defiance of prudence and the precautionary principle.

But the USFS and Forest Service exacerbate this already problematic situation by liberally obfuscating decision-making processes in the BiOp—and thence the Kootenai Land Management Plan (LMP) and Black Ram EA—with vagarious invocations of ill-defined and unjustified standards.

E.1. The USFWS Employs Unjustifiable Standards to Judge LMP Security Standards

The USFWS presumes to appraise adequacy of the LMP security standards by asserting, in reference to adult female grizzly bears, that impacts or efficacies can judged by “an individual “ (pg 54, BiOp), “some individual...bears” (pg 57, BiOp), “some bears” (pg 54, BiOp), “only a few” (pg108, BiOp), “not...all” (pg

61, BiOp), “individual bears” (pg 62, BiOp), “individual grizzly bears” (pg 63, BiOp), “a few bears” (pg 86,

BiOp), “a low [sic] number” (pg 108, BiOp), “not...all” (pg 108, BiOp), and “low numbers” (pg 109, BiOp).

The USFWS also makes statements asserting that LMP security standards will “support continued grizzly

bear use”, “support occupancy”, “support...connectivity”, “allow for reproduction” (all on pg 100, BiOp),

“support grizzly bear occupancy”, and “favor occupancy and reproduction” (both on pg 101, BiOp);

followed by the interesting conclusion that “not all actions...will result in adverse effects” (pg 102, BiOp).

The USFS seems to be claiming that if not all grizzlies bears are harmed by an action, or if a few, some,

or one manages to remain unharmed, this verdict is relevant to judging whether land management

practices can prudently be expected to sustain meaningful recovery of a small imperiled and semi-

isolated grizzly bear population that is half the size deemed necessary for recovery and acutely

vulnerable to the vagaries of natural variation in climate and fire regimes.

This claim cannot be substantiated by any widely-accepted standard or principle. The fates of at-risk populations are governed by statistical averages reckoned over long periods of time, with demonstrable relevance to future projections (unlike what the Black Ram EA invokes, as per Point A, above). Although these averages are built on the fates of individual animals, the fate of one (or a few bears) provides essentially no basis for judging whether landscape-level management practices are adequate, much less precautionary.

On a similar note, it is altogether unclear what, precisely, supporting, favoring, or allowing means when it comes to judging the adequacy of landscape-level management practices. If one female grizzly bear survives for a month?...a year?...two years?, or is observed to reproduce within such periods of time, is this tantamount to supporting, favoring, or allowing? In other words, these terms are essentially meaningless, yet the USFWS employs them to reach the weightiest conclusions of the entire BiOp.

The USFWS concludes this litany of obfuscations with a faith-based statement; i.e.: “The Service believes that the KNF’s LMP [Kootenai NF Land Management Plan] reduces the potential for and minimizes the effect of incidental take of grizzly bears.” Belief is not an adequate basis for evidence-based rational judgements regarding the adequacy of the LMP and, as a derivative, the Black Ram EA.

E.2. The USFWS & Forest Service Employ Circular Reasoning When Judging Harm

The population of grizzly bears in the Yaak area totals roughly 30 animals, existing at one of the lowest densities on the continent, and at roughly half the density required to meet the USFWS's minimal recovery standards. From this, the Forest Service estimates that roughly 6 bears occupy the Black Ram project area, including the two BMUs overlapped by the project area (see Point C, above).

The USFWS and Forest Service use these basic facts to reach some ill-founded if not illogical conclusions.

The illogic goes something like this: if there are very few bears in the Yaak population or Black Ram project area, then, ipso facto, only a few bears at most are likely to be harmed by human activities allowed under the LMP (pgs 108 & 109, BiOp), and thus these activities are not likely to jeopardize the bear population. As a derivative, the USFWS and Forest Service surmise that, because grizzly bears exist at such low densities, there is surplus secure habitat that any given bear can use to offset any alienation caused by additional human activities (pg 109, BiOp; pgs 299 & 303, EA).

The first conclusion is fallacious for the simple reason that, with a population of only a few bears, harm to even one bear is of proportionally greater consequence to population persistence compared to if the population numbered in the hundreds. There are no surplus or irrelevant bears; and harm to even one has serious population-level ramifications.

The second derivative conclusion is not particularly logical or supported by judicious consideration of the best available information. If a surfeit of secure productive habitat existed then one would expect the female bears studied by Wakkinen & Kasworm (1997) to have avoided areas near people and roads altogether, and that there would be ample evidence of the same from more recent data, yet this isn't the case. Moreover, this conclusion rests in part on the unstated assumption that black bears don't exist and/or don't matter in configuring—even limiting—availability of food and security resources. In fact, the comparatively high density of black bears in the Yaak area likely does affect resource use and habitat selection by grizzly bears in detrimental ways (Mattson et al. 2005, Stetz et al. 2019).

F. The Forest Service Prioritization of Mechanical Treatments is Unjustified

The Forest Service states on page 304 of the Black Ram EA that: "A primary purpose and need of the project is to move vegetative characteristics towards desired conditions which in turn improve habitat conditions favorable to the grizzly bear in treated areas [sic].” If a primary purpose of the project is, indeed, to improve habitat conditions for grizzly bears, then the best available tools would logically be candidate for inclusion.

F.1. Grizzly Bears Select for Habitats Produced by Natural Disturbances and Environmental Conditions

One proxy for identifying the best management tools is the types of landscape conditions favored by grizzly bears, and whether any given tool is more or less likely to produce those conditions. A comprehensive review of the relevant research addressing grizzly bear habitat selection in ecosystems inclusive of or similar to that of the Yaak (Zager 1980; Waller 1992; Mace et al. 1996, 1999; Waller & Mace 1997; McLellan & Hovey 2001; Wielgus & Vernier 2003; Apps et al. 2004, 2016; Nielson 2011; Proctor et al. 2015; Proctor & Kasworm 2020) shows that some of the most consistent and strongest positive selection by grizzly bears is for habitat features within which managers have little or no control over productivity: avalanche chutes and riparian areas—both of which tend to support abundant Heracleum, Angelica, Osmorhiza, and Equisetum, all of which thrive in shade or semi-shade (Scaggs 1979, Mace 1984).

Given the well-documented avoidance of roads and human activity by grizzly bears (see pg 53, BiOp) and the presumed priority given habitat improvement in the Black Ram, perhaps the single best action that could be taken to achieve this goal is closure and/or storage of all roads within 500 m of an avalanche chute or riparian area. Even so, I could find no indication that this probable single best improvement of habitat conditions—i.e., facilitating free access by bears to highly-preferred habitat components—was even considered by the Forest Service in its EA.

Insofar as successional habitats are concerned, there is no ambiguity about the consistently strong positive selection by grizzly bears for shrublands and timbered-shrublands roughly 40-50 years or even longer post fire (see also Martinka [1976], McLellan [2015], Proctor et al. [2017]). McLellan (2015) also observed that large burns of productive uplands are highly beneficial to grizzly bears, consistent with the long history of intensive exploitation of huckleberries by grizzly bears in the Apgar Mountains of Glacier National Park (Shaffer 1971, Martinka 1976).

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By contrast, observed selection of cutting units is vagarious, and more often strongly negative than even modestly positive. This result holds even when controlling for the effects of roads (e.g., Waller & Mace 1996, McLellan & Hovey 2001, Apps et al. 2016, Proctor & Kasworm 2020), and is consistent with the results of Proctor et al. (2017) regarding distribution of productive huckleberry patches in adjacent areas of British Columbia: "“We found 74% of huckleberry patches were not in cut blocks. The ~26% of huckleberry patches that were in cut blocks occurred where the proportion of our focal area in cut blocks was only 18%."

Parenthetically, despite Forest Service claims that habitat use in the Yaak area is "well-documented" (pg 296, EA; citing Kasworm et al. [2007] reiterated by Johnson & Gatreaux [2008]), the better reference is Proctor & Kasworm (2020). Habitat use reported in Kasworm et al. (2007) is based on a small sample size, spanning only a few years, and without being adjusted to account for availability of different types.

There is no information to be found in Kasworm et al. (2007) about habitat selection and how use varies with environmental conditions. It has long been recognized that estimates of selection (i.e., use versus availability)—not rote use—are required for judging the effects of changed habitat configurations resulting from natural or anthropogenic causes.

The upshot of all this is that management activities proposed under Alternative 2 of the Black Ram project have little prospect of improving habitat conditions and related access by bears to intrinsically productive areas, especially in contrast to allowing natural disturbances such as wildfire to play a greater role.

F.2. The Forest Service Disregards the Best Option for Improving Habitat Conditions for Grizzly Bears

F.2.a. Forest Service Claims Regarding Benefits of Alternative 2 Treatments Are Implausible

The Forest Service invokes Management Direction MA6-DC-VEG-01 as a principle directive to use timber harvest and prescribed human-ignited fires as the sole means of achieving its primary purpose of improving or maintaining habitat conditions for grizzly bears in the Black Ram project area—albeit giving a nod to the fact that natural processes will continue to occur. The Forest Service further justifies reliance on anthropogenic tools together with active suppression of natural fires by claiming that these measures will protect resources such as roads and campgrounds as well as "urban" areas potentially threatened by natural ignitions in the project area.

On the face of it, these claims are not very plausible. It is hard to imagine that wildfires would severely damage physical road prisms or any features in campgrounds other than picnic tables and outhouses.

The Forest Service has also amply demonstrated that it can and will deal with hazard trees in the aftermath of fire. Insofar as the urban-wildland zone or interface is concerned, most of the Black Ram project area is far removed from this designated zone, as are many of the harvest treatments proposed under Alternative 2 (see Figure 5).

There is, moreover, a tacit assumption in the Forest Service's argument that: (1) the agency will be able to control wildfires burning under extreme weather conditions (i.e., the recipe for almost all large fires);

and (2) that, because of this, the trade-off between natural fire and timber harvest/prescribed fire is largely a zero-sum proposition. Neither assumption is supported by the best available science, of which there is an enormous amount (e.g., Bessie & Johnson 1995, Moritz 1997, Barbero et al. 2014, Parks et al. 2018)—and a review of which is beyond the scope of these objections. Large fires will continue to burn, very likely affecting similar acreage, regardless of whether the Forest Service undertakes management actions proposed under Alternative 2. And, moreover, these wildfires will likely result in habitats that are more productive and secure compared to any produced by timber harvest (see F.1., above).

Parenthetically, the Forest Service further justifies fire suppression in combination with timber harvest and prescribed fire by claiming: “...a severe wildfire occurring on a large number of acres would greatly reduce both cover and forage compared to proposed harvest activities and prescribed fire” (pg 304, EA). Yet two pages later, in reference to the large Davis fire that burned during 2018, the Forest Service contradicts itself by stating: “...In the long term, this burn area is likely to be high-quality foraging habitat...,” while also claiming on page 304 that timber harvest and prescribed fire under Alternative 2 will mimic natural conditions “...to which local bear populations are adapted.” Of relevance, these natural conditions to which grizzly bears are purportedly adapted shaped the Yaak ecosystem for millennia.

In other words, the Forest Service has deployed inflated and contradictory claims together with logical gymnastics to reach the conclusion that timber harvest and prescribed fire will mimic the effects of natural disturbances on grizzly bear habitat (they won’t; see F.1., above, also pg 82, BiOp), and that the agency will somehow preempt the large wildfires that produce demonstrable benefits for grizzly bears

(it won't). Thus, according to this logic, the Forest Service is required to cut timber, employ prescribed

fire, and maintain a supporting road infrastructure to meet habitat improvement goals for grizzly bears.

It isn't.

F.2.a. The Forest Service Should Prioritize Natural Disturbance and Road Closures in Most of the

Project Area

The obvious and more straight-forward alternative is to adopt natural wildfire and other disturbances as

the primary habitat management tool for most of the Black Ram project, especially in areas farther

removed from human habitations; drop all of the harvest units in these areas (see Point G, below); and,

moreover, aggressively close/store roads in these same remote areas to remedy deficient habitat

security in the Black Ram project area (see Point C, in toto, above).

As important as conforming with the best available evidence and standards for logical decision-making,

an alternative that embraces natural processes while at the same time substantially reducing human

disturbance is consistent with Forest Service management direction (GOAL-WL-01; pg 294, EA) as well as

USFWS recommendations: "Continue to manage access on the Forest to achieve lower road densities and higher [sic] amounts of secure habitat," and "Where grizzly bear use is known or likely to occur and where practicable, minimize or restrict disturbing activities or activities that increase the likelihood of a human-bear interaction." (pg 219, BiOp). There is no reason why these latter directions and recommendations would be axiomatically trumped by another management direction (MA6-DC-VEG-

01), especially when the current preferred Alternative 2 is at odds with the best available science and does nothing to substantively improve deficient habitat security in the project area.

F.3. The Forest Service Failed to Address These Issues Raised in My Prior Comments

I raised most of the issues presented here in Point H of my previous Comments. The Forest Service addressed these comments with essentially a non-response. In fact, the main part of the Forest Service response entailed seizing upon a nit and picking at it; specifically taking umbrage at a statement I made regarding the Forest Service's tacit claim that it would "offset" harm caused by human activity under Alternatives 2 and 3 through improvements in habitat conditions (pg 121, Appendix G EA). Picking at nits does not amount to a substantive response. There is, moreover, ample reason to conclude that the

Forest Service is, in fact, arguing that (1) it will improve habitat conditions (but see F.1, above), and (2) that any impacts attributable to increased human activity during execution of Alternative 2 is justified (off-set) by these improvements (see F.2., above).

Aside from this, the Forest Service employed the same device as it used to address most of my other comments, referring me and other concerned readers to "...the introduction of the grizzly bear section of this response to comments" and "...the EA for the assessment of risks related to and management [sic] of motorized access." However, the introduction to the Response to Comments section does not in any way address the issues I raised regarding the efficacies of timber harvest and scientific basis for claims made by the Forest Service regarding these efficacies. Points C and E, above, also elaborate why the EA does not, in fact, adequately assess risks related to management of motorized access, especially in relation to Alternatives 2 and 3.

In short, the Forest Service yet again failed here (as well as per Points A, B, and C, above) in fiduciary duties to the American public that include substantively engaging with issues raised in public comments rather than resorting to pro forma, insubstantial, and trite non-responses.

G. Evaluation of Connectivity and Geospatial Configuration of Secure Habitats Is Inadequate

The Forest Service references several management directives in the Black Ram EA to create and maintain landscapes that promote and sustain connectivity for the Yaak grizzly bear population, including FW-DC-WL-02 ("A forestwide system of large remote areas...") and FW-DC-WL-17 ("Forest management contributes to wildlife movement within and between national forest parcels"; pg308, EA).

The Forest Service then goes on to assert that these directives have been fulfilled, stating that "Desired conditions for the Yaak geographic area...include broad areas for movement provided from Buckhorn Ridge to Northwest Peaks and along the Canada-U.S. border" (pg 294, EA); "...large blocks of core facilitate movement throughout the BMUs, into adjacent BMUs, and north into Canada" (pg 297, EA); and, with regard to the Alternative 2, "Landscape connectivity would remain unaffected in the long term."

In every instance where the adequacy of current connectivity in the Black Ram project area or BMUs 14 and 15 is asserted, the primary landscape features invoked to justify this assertion are the Inventoried Roadless Areas (IRAs) #663 and #694 (Northwest Peaks & West Fork Yaak).The Forest Service moreover assumes that standards for defining secure core ("blocks") and for percent total secure habitat in any given BMU are adequate and defensible. They are not, nor, after critical assessment, are IRAs 663 and 694 likely to be sufficient for providing secure connectivity between adequately secure blocks of habitat to the west, north, and east.

G.1. The Forest Service Failed to Address Comments Regarding Inadequate Geospatial Configurations of Secure Habitat

I raised these issues in Point I of my earlier comments. As with so many of my comments, the Forest Service response amounted to "...see the introduction to the grizzly bear section of this response to comments," followed by "Potential cumulative effects were considered in the EA" (pg 121, Appendix G, EA). In fact, none of the substantive issues I raised in my comments were addressed in either the Introduction to the Grizzly Bear Section of Responses or in the EA. In fact, as I note immediately above, the EA dealt with the issue of connectivity and "geospatial context" by simply asserting the adequacy of (1) grizzly bear habitat security standards and (2) IRAs 663 and 694, the latter without offering any substantiating evidence or analysis.

I address the inadequacy of habitat security standards in Points C and B, above. Here, I address the adequacy of Inventoried Roadless Areas within the Black Ram project area for ensuring population connectivity for grizzly bears and the related Forest Service assertion that existing conditions are not only sufficient, but likely to be unimpaired by Alternative 2 project activities.

G.2. Existing Connectivity in the Black Ram Project Area is Inadequate

When assessing connectivity—which is fundamentally a geospatial consideration—it is imperative to look at configurations of secure habitat in map form using the best available scientific information along with other pertinent information. The Forest Service does not do this in the Black Ram EA, certainly not in any explicit form.

As remedy, Figures 5 and 6 (above) shows key features of the Black Ram project landscape, with an emphasis on IRAs (in dusky green); zones relegated to intrusive mechanical treatments by virtue of being within a designated wildland-urban interface (dusky pink); areas impacted by proposed mechanical harvest and related hauling activities under Alternative 2 (red blocks with orange zones of influence); along with the route of the upgraded Pacific Northwest Trail (in lavender). These features are overlain in Figure 5 on two different but complementary reckonings of joint habitat security and productivity introduced under Point C.3.b, above (Mattson & Merrill 2004, Proctor et al. 2015) and, in Figure 6, on recent maps of fine-scale habitat selection from Proctor & Kasworm (2020).

Several patterns are noteworthy. Most prominently, the IRAs are attenuated and intruded upon by "cherry-stems" that accommodate existing motorized access. The two roadless areas are furthermore bisected by Forest Road 747-748. More importantly, IRA 694 coincides with an area identified as being only a marginally functioning grizzly bear population source area (Mattson & Merrill 2004; Figure 5b), well outside any areas serving as core or high probability dispersal habitat (Proctor et al. 2015; Figure 5a). Figure 6 also shows some problematic patterns, most notably the extent to which Harvest Units 19-

25, 32-44, and 79-83 along with associated road systems intrude upon areas of highly productive summer habitat (Figure 6a); and extent to which existing road systems in and near the IRAs already compromise grizzly bear habitat use, with greater impairment promised by additional activity associated with Harvest Units 66-78.

There are four main points to be drawn from these patterns. First, designation of an area "roadless" under Roadless Rule criteria is not tantamount to supporting adequate landscape-level connectivity for grizzly bears. Second, the two IRAs in the project area are compromised by intrusions of motorized access, as well as by non-motorized human use of the PNT and associated spurs (see H.1, below). Third, the attenuation of these IRAs, especially through core portions of the Black Ram project area, reduce the intrinsic ability of these roadless areas to provide security for bears that use them (i.e., the ratio of edge to core matters; e.g., see Mattson & Merrill [2002]). Fourth, there is no empirical support for concluding that IRA 694 adequately functions as connective habitat within the project area.

Given these considerations, the overall configuration of large blocks of putatively secure habitat in the Black Ram project area is problematic. Most prominently, there is no defensible basis for concluding that there is functional connectivity west-east across the northern portion of the project area, along the Canadian border and between the Northwest Peaks and the West Fork of the Yaak River. This lack of connectivity impairs the capacity of central portions and the eastern half of the Black Ram project area to sustain source conditions for the Yaak grizzly bear population, which is in turn critical to doubling the densities of grizzlies in this area and thereby achieving even the minimal definition of recovery posited by the USFWS.

Forest Service arguments based on assertion and ad nauseum repetition do not remedy nor address this evidence for deficient connectivity in the Black Ram project area under baseline conditions. There is certainly no credible evidence to support concluding that IRAs in the project area do sustain adequate connectivity. By contrast, the most prudent, precautionary, and defensible conclusion is the opposite—that current connectivity is inadequate, especially given deficiencies in overall levels of security within BMUs 14 and 15 (see Point C, above).

G.3. Alternative 2 Will Further Impair Already Inadequate Connectivity

Again, a visual depiction (Figure 5) is requisite to judging the effects of Alternative 2—indeed the effects of all alternatives considered in the Black Ram EA—on geospatial configures of project activities and secure grizzly bear habitat.

Several problematic patterns are clear. For one, a significant portion of mechanical harvest units are to the north and west of the IRAs, impairing the security of habitat in this remote portion of the Black Ram project area, and dictating increased traffic along FR 747-748 to accommodate not only removal of cut timber, but also post-harvest treatments. This unambiguously worsens conditions for grizzly bears, certainly for the duration of the project. A number of other harvest units and associated road infrastructure is located near or immediately adjacent to and impinging upon the IRAs at four different locations. Of these, the harvest units and associated roads fed by FR 757 in the West Fork area are

especially problematic by sitting astride potential connectivity between northwestern and north-eastern

portions of the Black Ram project area.

The bottom line here is that Alternative 2, and indeed none of the alternatives considered in the Black

Ram EA, will remedy a deficient situation insofar as security and connectivity are concerned. As certain,

Alternative 2 will create additional impairment for at least the duration of the project.

G.4. The Black Ram Project Needs to Drop Alternative 2 and Develop an Alternative That

Substantially Increases Habitat Connectivity and Security.

The implications of and remedy for my objections up to this point are relatively straight-forward. (1) At a

minimum, the Black Ram Project needs to develop and adopt an alternative that more aggres-sively

restricts motorized access and eliminates regeneration and intermediate harvest units planned for

problematic locations. (2) More specifically, the harvest units to be eliminated include—but are not

limited to—Units 19-25, 32-36, 42-44, and 66-84. (3) In addition to, at a minimum, gating and restricting access to administrative personnel on FR 757 and its associated road system, the Forest Service likewise needs to restrict access to the terminus of FR 5857 beyond Unit 41. (4) Given the need to improve security for grizzly bears (as per Points A-E, & G.4., above), the Forest Service would ideally also gate and restrict access to FRs 3389, 5894, 5896, 5900, 5902, and 5910; and consider restricting public access to FRs 338 and 747 along with distal portions of FR 748 passing near or through IRAs. (5) At a minimum, the Forest Service, in cooperation with Montana Fish, Wildlife & Parks, should target the environs of FRs 5857, 338, 747, and distal portions of 748 for an increased law enforcement presence.

H. The Forest Service Did Not Adequately Analyze Cumulative Effect

The Forest Service has both a legal duty as well as a moral and pragmatic obligation to analyze the effects of Alternative 2—and other Black Ram alternatives—on grizzly bears, in combination or synergy with the effects of other past, on-going, and reasonably foreseeable environmental changes. Given the vagaries of policy directives, legal duties allow from ample game playing, including the pretense that climate change does not exist. However, pragmatism as well as ethics dictate that the Forest Service give full and meaningful consideration to the cumulative effects of all past, on-going, and foreseeable environmental changes—human or natural—likely to substantively affect grizzly bears. This unambiguously includes the effects of on-going and foreseeable climate change.

My life-time of experience with cumulative effects analysis informs this portion of my objection. I was central to developing the concept and tools of cumulative effects analysis (CEA) for application to grizzly bear management, not only in the Greater Yellowstone Ecosystem, but also in Canada (e.g., Mattson et al. 1986, 2004; Mattson & Knight 1991; Mattson 1995; Weaver et al, 1986). I am well-acquainted with the issues of dimension, temporal scale, and spatial extent in application to CEA—including, again, the games that can be played to avoid confronting challenging ecological and management issues.

Without mincing words, the Forest Service analysis of cumulative effects in the Black Ram EA is grossly deficient. I broached this issue in Points I and J of my Comments. The Forest Service response, yet again, failed to engage substantively with the issues that I and others raised on this front (e.g., #205, pg 119;

#219 & 220, pg 121, #226, pg 122, Appendix G, EA), resorting, yet again, to bland assertions such as "potential cumulative effects were considered in the EA," "Cumulative (i.e., synergistic) effects were analyzed in the EA," and "...a cumulative effects analysis was completed for this project." Yet the referenced cumulative effects analysis remains demonstrably deficient. This Forest Service tactic is little better than that of a someone in a school yard presuming to refute a genuine concern or cogent argument by asserting previous assertions ever more forcefully.

I elaborate on several issues related to cumulative effects below.

H.1. The Yaak Region and Next 100-Years are the Appropriate Scales for Reckoning Cumulative Effects

As I note under Section A, above, the Forest Service repeatedly invokes the status of grizzly bears throughout the entire Cabinet-Yaak Ecosystem going back to 1983 as context for judging security standards for the Kootenai National Forest as well as effects of the Black Ram project. Yet the putative analysis of cumulative effects on page 306 of the EA is limited to planned or on-going human activities in or immediately adjacent to the project area. This mismatch of time-scales and spatial extent is inexplicable and arbitrary, especially in ecologically meaningful terms.

More to the point, the most meaningful spatial scale for reckoning cumulative effects of the Black Ram project is the full extent of the Yaak (even Yahk) grizzly bear population. Given that the Yaak/Yahk population is genetically and demographically semi-isolated (see Point A.2.a, above), the entire

Yaak/Yahk region logically bounds the ecological and demographic phenomena that dictate the fates of grizzly bears likely to occupy the Black Ram project area now and in the foreseeable future. Having said this, it is also demonstrably the case that the climate of this region is fully contiguous with that of North America—at a minimum. It does not exist in a hermetically sealed bubble.

The appropriate temporal extent is fuzzier. However, given that demographic responses by grizzly bears to environmental change are likely to lag by at least 10 years (Doak 1995), past actions 10-years old should reasonably be considered. The combined temporal and spatial specifics of landscape dynamics are uncertain, but variations in fruit abundance play out over periods of 20-60 years in a mosaic largely dictated by the frequency and extent of fires—especially large fires (see F.1, above, and Martinka [1976], McLellan [2015], Proctor et al. [2017]). Looking to the future, projections of climate and related ecological change are typically least uncertain at scales of 50-100 years—long enough to encompass the interplay of short-term dynamics and longer-term trends (see H.4, below). Insofar as human activities are concerned, the Kootenai Forest LMP presumes to cover matters on that front out for 10 years or so.

These considerations recommend a temporal window extending reaching back 10 years in the past and projecting 100 years into the future.

Lending weight to this conclusion, the acute vulnerability of the Yaak/Yahk grizzly bear population to

decline and even extirpation (see Point A.2, above) demands prudent consideration of dynamics playing

out over the next century—the most common time-frame invoked in population viability analyses (see

Point A.2.b. above). Even though the specifics of these dynamics cannot be reliably foreseen or

controlled over a period this long, they nonetheless impose the need to create an environment that

buffers grizzly bears against longer-term risks. The obvious way to do this is by creating a much more

secure environment for bears through substantial increases in law enforcement (see Point B.3, above)

and limitations on intrusive human activities (see points F.2.a and G.4, above).

More specifics follow.

H.2. Effects of the Pacific Northwest National Scenic Trail Were Not Adequately Addressed

Several commenters raised concerns about inadequacies of the Forest Service analysis regarding

impacts of the Pacific Northwest National Scenic Trail (PNT). The Forest Service response was, yet again,

an ad nauseum argument rather than one of substance: for example, #207, pg 119 of Appendix G, “The

EA reports the potential effects of reasonably predictable trail use"; #220, pg, 121 "Please see the introduction to the grizzly bear section of this response to comments. Cumulative (i.e., synergistic) effects were analyzed in the EA"; and #225, pg 122 "The potential cumulative effects of PNNST activity were addressed in the EA."

The Forest Service provides an additional response to #225, pg 122 of Appendix G: "...there is a lack of definitive research relating population-level impacts from non-motorized trail use [sic]. Current use of non-motorized routes in general, and the PNNST route specifically, do not indicate high-use is occurring..." This last statement is inconsistent with implications of the best available science—Forest Service protests notwithstanding. The statement is also a telling window into how Forest Service allocates burden of proof in service of expediency.

The portion of this statement regarding "lack of definitive research" is a classic ad ignorantiam argument that requires an impact or effect to be proven beyond any doubt. Otherwise, such an impact is assumed to not exist. This is certainly not precautionary. The disposition of evidentiary burden also begs for an explanation. Is any impact deemed to be problematic for the Forest Service position burdened with need for definitive proof, whereas any position deemed favorable given the benefit of doubt? Such dispositions bespeak an arbitrary and politicized treatment of science by the Forest Service.

More specific to the best available science, Mattson (2019; cited by the USFWS, pgs 44 & 93, BiOp)

provides the best current compilation and synthesis of science regarding effects of hikers and other

pedestrians on grizzly bears, including a specific application to the PNT (Mattson 2019: Section 8.b).

Briefly, the main conclusions are (quoting from Mattson [2019]: pgs 41-43):

• Whether judged in absolute or comparative terms, foreseeable pedestrian activity on the

proposed PNT is guaranteed to adversely affect the small highly vulnerable population of grizzly

bears in the Yaak region.

• Spatial overlap with the highest regional densities of grizzly bears alone guarantees a high

likelihood of encounter between trail users and bears with both short- and long-term impacts.

• Perhaps paradoxically, impacts will likely be exacerbated by low grizzly bear densities and

pedestrian traffic light enough to preclude predictability for bears.

• Under these circumstances, grizzly bears stand a good chance of being “startled” or “surprised”

by trail users, or by simply responding as if encounters posed a threat.

• Grizzly bears will likely avoid the PNT as a natural consequence of strong reactions to

encounters with trail users (Section 6.a.), with resulting alienation from otherwise important

foraging habitats and displacement into lower-elevation areas that are likely to be less secure

from human-caused mortality.

• Finally, hazards will be amplified for people and impacts accentuated for bears to the extent that off-trail pedestrian activity increases, the PNT is used by mountain bikers, or spur trails are constructed through high-elevation open habitats.

Mattson (2019) and the conclusions therein were referenced in submitted comments (Point J of Comments). However, the Forest Service altogether failed to consider the best available science in this

report and, instead, fell back on an outdated and unsubstantiated invocation of "high-use" versus "low-

use" for reckoning probable impacts of trails and trail-related human activity on grizzly bears. This

deficiency needs to the rectified.

H.3. The Forest Service Failed to Adequately Assess Implications of the Davis Fire and Other Wildfires

The Davis fire that burned a large area in the northwest quadrant of the Black Ram project area during 2018 has clear implications for Alternative 2. The Forest Service assessment of these implications amounted to little more than noting: "In the long term, this burn area is likely to be high-quality foraging habitat as soon as nutritious vegetation is established." However, the implications go beyond this pro forma statement.

Notably, the Davis fire obviated any presumed need to “maintain,” “improve,” or otherwise “move” habitat conditions for grizzly bears in the area between Inventoried Roadless Areas #663 and #694 and the Canadian border. Consistent with my recommendations under G.4, above, there is no probable benefit to proceeding, at a minimum, with Harvest Units 66-68 as means of somehow remedying deficient habitat trends and conditions in this area. Moreover, natural wildfires will almost certainly continue to create beneficial habitat conditions for grizzly bears in the majority of the Black Ram project area given (1) the certitude of wildfires in the foreseeable future (see H.5, below) and (2) the almost equally certain inability of Forest Service managers to control wildfires during extreme fire weather events that will become more common (see F.2, above). This is not mere speculation. Moreover, for the Forest Service to maintain otherwise stretches credulity and runs counter to a large body of research on wildfire history in the northern Rocky Mountains.

The area within 10 miles of the Black Ram project provides evidence for these last points, as well as the likelihood that wildfires will provide any habitat enhancements needed to sustain and recover grizzly bears without the need for intrusive human activities associated with mechanical harvest or prescribed wildfire. During the last 30 years alone, over 58,000 acres have burned, largely as a result of just 5 large

fires each >5,000 acres in size (Caribou, Davis, Keystone, North Fork of Big Creek, and Upper Beaver),

and this despite the best efforts of the Forest Service to extinguish them.

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H.4. Effects of Other Existing and Planned Projects in the Yaak Were Not Adequately

Addressed

The Kootenai NF recently issued a scoping notice for another large "restoration" project – called Knotty

Pine – roughly 10 miles south of the Black Ram project, encompassing a substantial portion of grizzly

bear distribution in the Yaak region. As with the Black Ram project, this project also involves road

construction, additional roads added to the National Forest Road System, and 14 regeneration and

intermediate harvest aeras >40 acres in size, including one of more than 200 acres.

Knotty Pine is the fourth "restoration" project in western portions of the Yaak, encompassing the full arc

of grizzly bear distribution from the Canadian border in the north to the Kootenai River in the south

(Figure 7a). In addition to Knotty Pine and Black Ram, the Kootenai NF also approved the Buckhorn

Project circa 2014 and the Lower Yaak, O'Brien, Sheep ("OLY") Project in 2016. Including Alternative 2 of the Black Ram project, cumulative impacts of these contiguous projects will have unfolded, and continue to unfold, over a 10-year period.

As with the Black Ram project, there is little plausible basis for concluding that the cumulative effects of the other three projects along the western rim of the Yaak are benign—certainly not beneficial. As with the Black Ram project (see all my points up to here), grizzly bears will have likely been harmed and

deficient habitat and security conditions more certainly perpetuated. Given the large home range sizes of grizzly bears in this area (Kasworm et al. 2020: Appendix 4), impacts of these projects will have accrued across boundaries and over time (as per the criterion that secure "blocks" need to be left free of intrusion for a minimum of 10 years).

The Forest Service assessment of these probable project-related cumulative effects amounts to: "The Buckhorn Project is partially in BMU 14 and is ongoing. All harvest has been completed, as well as most of the post-harvest burning. Several of the landscape burns have been completed also" (pg 306, EA), to

which was added: "It is also in this project where we have photographic documentation of a sow grizzly

with a cub on a gated road between several harvest units, as well as several other individual grizzlies in

the same site." This assessment is, at best, a cypher given the probable true complexity and extent of

cumulative effects broached here, with this deficiency compounded by the disingenuous invocation of

anecdote as presumed reliable evidence for lack of impacts or even for benefits.

Figure 7 shows additional information that flags potentially problematic cumulative effects of the four

on-going or planned projects on western margins of the Yaak related to overlap with major areas of

ostensibly secure core and source habitats identified by Proctor et al. (2015; Figure 7b) and Mattson &

Merrill (2004; Figure 7c). The percentages in each panel show the extent of overlap by each project area

with core, dispersal, or source habitat. The models are in greatest agreement about the extent of

overlap by the Buckhorn and Knotty Pine projects, with the source areas substantially overlapped in the

Black Ram area, and core and dispersal habitat substantially overlapped in the OLY area.

Although not a definitive reckoning of impacts, these patterns are cause for concern and yet more

reason for the Forest Service to treat an analysis of cumulative effects seriously rather than as what the

Forest Service seems to view an inconvenient exercise to be addressed pro forma. The Forest Service needs to remedy this deficiency by undertaking a good faith analysis of cumulative effects arising from these four contiguous on-going and proposed projects.

H.5. On-Going and Foreseeable Effects of Climate Change Were Not Addressed

Anthropogenic climate warming is real (IPCC 2013, Joyce et al. 2018) and tracking a worse-case scenario (Schwalm et al. 2020), with potentially catastrophic implications for life on Earth (IPCC 2019). To deny this reality is tantamount to embracing ignorance and fantasy. More importantly, for public servants to willfully not consider impacts of climate warming on imperiled species is a betrayal of trust responsibilities held on behalf of the American public. Of relevance to the Black Ram EA, failure of the Forest Service to consider impacts of on-going and foreseeable climate warming on Yaak grizzly bears as part of a cumulative effects analysis is scientifically and morally inexcusable; and the impacts are likely to be substantial.

H.5.a. There Will Be Less Fruit in the Yaak

Huckleberries are a critically important food of grizzly bears in the Yaak (Kasworm et al. 2020), with interannually availability of fruit production governed by annual and seasonal weather (Holden et al. 2012). This interannual variation has implications for the distributions and demography of bear populations that are reliant on huckleberries (McCall et al. 2013), including grizzly bears in the Yaak region (Proctor et al. 2017). Crops of other heavily-consumed fruit such as serviceberry and buffaloberry also vary substantially from one year to the next (Kasworm et al. 2020), although with less conclusively demonstrated effects on distributions and demography of grizzly bears.

The recently published paper by Prevéy et al. (2020) is thus of considerable importance. This research shows a high probability that climate conditions favorable to huckleberry will diminish during the next 50-100 years in the Yaak region. This diminishment will almost certainly affect the distribution and density of Yaak grizzly bears, more likely in detrimental rather than neutral or beneficial ways.

H.5.b. Increased Wildfire Will Change the Yaak Landscape

The scientific literature covering foreseeable effects of climate warming on wildfire regimes in the West is compendious. A review of this literature is beyond the scope of my objections, although of relevance to analyzing foreseeable impacts of climate change on grizzly bears in the Yaak. What immediately follows thus references only a small fraction of the relevant literature, with the burden of more fully uploading and applying this enormous body of scientific research falling on the Forest Service.

Briefly, Wildfires in the western United States are being increasingly driven by extreme or severe fire

weather conditions, resulting in more frequent large and erratic wildfires (e.g., Luo et al. 2013, Barbero

et al. 2015, Abatzoglou & Williams 2016). This increase in extreme fire weather is, in turn, linked to on-

going climate change, ultimately driven by anthropogenic warming (e.g.; Kirchmeier-Young et al. 2017,

Abatzouglou et al. 2019). Although projected changes in wildfires regimes are heterogenous across

western North America, there is consensus that large wildfires will become more common in the Yaak

region (Barbero et al. 2015, Littell et al. 2018, Brown et al. 2020), and that post-fire succession will likely

produce lasting changes in vegetation composition and structure (e.g.; Keane et al. 2015, 2018).

All of this will obviously affect Yaak grizzly bears, including those occupying the Black Ram project area.

This follows from the simple fact that grizzly bear habitat selection in this region is correlated with

vegetation composition and structure, including patterns produced by wildfire (see Point F.1, above).

Although the exact effects on grizzly bears are intrinsically uncertain given the complexity of the Yaak ecosystem, this uncertainty contains its own lesson and related mandate. Rather than blithely assuming stasis or that increased wildfire will produce beneficial changes, as is the Forest Service's current default stance, the prudent approach is to use uncertainty to craft precautionary management actions during the next decade.

H.5.c. Implications for Yaak Grizzly Bears and the Black Ram EA

The future will almost certainly bring less productive conditions for grizzly bears in the Yaak; changes in distributions of productive patches; and related changes in distributions of bears relative to humans and human facilities. Intrinsic carrying capacity for bears will also very likely decline (see Proctor et al. [2017]). The vulnerability of an already acutely vulnerable grizzly bear population in the Yaak will correspondingly increase.

Parenthetically, the often-repeated assertion that grizzly bears are unaffected by environmental change simply because they are adaptable omnivores is without merit. The reasons are simple. The quality of different grizzly bear foods varies by orders of magnitude, with dramatic effects on digestibility and availability of energy and nutrients (Mattson et al. 2004). These differences in food quality interact with

differences in food abundance to in turn produce orders-of-magnitude differences in grizzly bear

densities in North America (Mowat et al. 2013), as well as detectable differences in bear densities even

within the much smaller spatial extent of southeastern British Columbia (Apps et al. 2016, Proctor et al.

2017).

Implications for the Forest Service are straight-forward. Rather than blindly continuing to employ

deficient security standards for grizzly bears in the Yaak region and in the Black Ram project area (as per

Points C-D & G, above), and, moreover, manage to the bare minimum required of even those deficient

standards, the Forest Service needs to set about proactively and aggressively increasing the extent of

secure habitat for grizzly bears in the Yaak and, through this, increase the literal and figurative buffer for

this population against foreseeable future exigencies.

H.6. A Worsening of Population Trend is Evidence of Problematic Cumulative Effects

The existence of problematic cumulative effects is given further weight by the updated information on

cumulative and current growth of the female subpopulation of the Yaak area shown in Figure 12 of

Kasworm et al. (2020; see also my previous Comment A for clarification of what these growth rates do and do not signify). This figure shows a reduction in the annual rate of increase in growth rate (i.e., the first derivative) that began in 2014. Importantly, this decline accelerated during the last two years (2018-2019). A decline in the current (not historical; i.e., 1983-2012) population growth rate axiomatically must be substantial to have drawn down a central estimate back-weighted by over 30 years of irrelevant data—which is to say, data from 1983-2012 that offer no information about conditions unfolding during the last 5-6 years. As I emphasize in Point A, above, and in Point A of my Comments, this adds further weight to the conclusion that population status has worsened, not improved, since 2012, most likely because of cumulative human and environmental effects.

I. Recommended Solutions and Proposed Resolutions

For all of the reasons articulated above, the Decision Notice & FONSI and final Environmental Assessment for the Black Ram Project fail to conserve grizzly bears on the Kootenai National Forest and fail to include the plan components or ecological conditions necessary to contribute to the legal fulfillment of grizzly bear recovery. Furthermore, the Black Ram Environmental Assessment fails to fulfill NEPA requirements to adequately evaluate and analyze the direct, indirect, and cumulative impacts of all Alternatives considered in the Black Ram Project on grizzly bears, grizzly bear habitat, and grizzly bear recovery on the Kootenai National Forest and in the larger Yaak/Yahk region. The related Endangered

Species Act Section 7 consultation documents and Biological Opinion also fail this requirement. The

Black Ram Environmental Assessment additionally fails to fulfill NEPA requirements to meaningfully

engage with and address comments submitted and concerns raised by the public.

In light of these legal deficiencies I respectfully offer the following solutions and remedies:

I.1. The Kootenai National Forest needs to develop and adopt an Alternative that fulfills ESA

requirements to recover the Yaak population of grizzly bears in the Cabinet-Yaak Recovery Area. Such an

Alternative should include the following:

I.1.a. Wildfire caused by natural ignitions should be adopted as a primary mechanism of vegetation

change in the Black Ram Project Area outside of the designated Wildland-Urban interface. This

provision needs to be included for factual reasons (large wildfires will continue to burn, likely with

greater frequency) and as a means of creating habitat conditions of greater utility and value for grizzly

bears compared to habitat conditions created by mechanical treatments.

I.1.b More specifically, and at a minimum, Harvest Units 19-25, 32-36, 42-44, and 66-84 should be

dropped from consideration because they are planned for areas where impacts on grizzly bears will be greatest. Abandonment of these Units will serve to reduce spill-over effects on secure habitat conditions in existing Inventoried Roadless Areas and also help to maintain and restore habitat connectivity for grizzly bears east-west in the northern half of the Black Ram Project Area.

I.1.c. As a related measure, access to FRs 3389, 5894, 5896, 5900, 5902, and 5910 should be restricted by gates and other measures. Restrictions on public access to FRs 338 and 747 along with distal portions of FR 748 passing near or through Inventoried Roadless Areas should also be implemented on a seasonal basis. These measures would serve to reduce current harm caused by road-related habitat alienation and also serve to reduce levels of malicious or other illegal killing facilitated by road access into potentially secure habitat.

I.1.d. As part of this preferred Alternative, the Forest Service should also establish a minimum size for determining patches or "blocks" of secure grizzly bear habitat in the Black Ram area—and, indeed, Forest-wide. To be functional and scientifically defensible, this minimum size criterion should be >>2,250 acres and ideally nearer 4,000 acres.

I.1.e. In addition, this preferred Alternative should include provisions, as per those listed above, that increase the amount of secure grizzly bear habitat in BMUs 14 and 15 to >75%. This amount of secure habitat would comport with the best available science and align these portions of the Kootenai NF with well-established and well-justified norms for managing habitat security in other Grizzly Bear

Ecosystems.

I.1.f. Information in Proctor et al. (2017) provides guidance on measures needed to bring current very

low grizzly bear densities (roughly 4.5 bear /1000 km2

) to levels needed to meet the U.S. Fish &

Wildlife Service minimalist population recovery goal (roughly 9 bears/1000 km2

)—amounting to an

approximate doubling of grizzly bear numbers. Proctor et al. (2017) estimate that grizzly bear densities

in adjacent portions of British Columbia increase by 7% for every 0.1 km/km2

reduction in road

density. Applied to BMUs 14 and 15, a doubling of bear densities thus translates into BMU-wide

reductions of average road density by 0.6 km/km2

(ca. 1 mile/mile2

). In other words, the preferred

Alternative should include provisions that reduce BMU-wide average road densities by 1 mile/mile2

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I.1.g. Finally, this preferred Alternative should contain explicit provisions to increase the presence of

law enforcement and investigation officers in the Project Area, whether through funding Forest

Service positions or cost-share arrangements with Montana Fish, Wildlife & Parks to support increased

numbers of Wardens. This provision would help address the factual reasons that virtually all

adolescent and adult grizzly bears die in the Cabinet-Yaak Ecosystem—from people illegally killing

them or because black bears hunters mistake a grizzly bear for a black bear.

I.2. The Kootenai National Forest needs to adequately fulfill duties required by NEPA. At a minimum,

this includes:

I.2.a. Complete an analysis of the cumulative effects of past, present, and foreseeable environmental

changes in the Yaak region that comports with the best available scientific information and offers a

realistic, rather than arbitrary and capricious, assessment of how these changes in the human and

natural environments have affected and will foreseeably affect grizzly bears. This analysis should employ a scientifically defensible spatial extent (the entirety of the Yaak region) and time-frame (e.g., 10 years into the past and 100 years into the future—the latter to address viability concerns and climate change).

I.2.b. Take an evidence-based and scientifically defensible hard look at the actual reasons why grizzly bears die on the Kootenai National Forest (i.e., from malicious and other illegal human causes and from black bear hunters mistakenly identifying a grizzly bear) and at patterns of grizzly bear habitat use and selection. This latter consideration entails a meaningfully rather than capricious assessment of the comparative benefits of wildfire versus mechanical treatments; the impacts of roads; and adequacy of current habitat connectivity.

I.2.c. Engage in a meaningful and substantive way with comments submitted by the public in response to Alternatives developed and analyzed for the Black Ram Project under NEPA provisions. My comments above provide evidence of the Forest Service's systematic disregard for and dismissal of substantive issues raised by the public regarding Black Ram Project Alternatives. This pattern is not only arbitrary and capricious, but also gives the appearance of serving politically pre-ordained outcomes. As such, the response to public comments in Appendix G of the final Black Ram EA not only disrespects the concerned public, but also further undermines public confidence in Forest Service decision-making.

These objections are respectfully submitted by:

David J. Mattson, Ph.D.

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Because the FS fails to use the best available science and for the reasons stated above, the FS is unable to demonstrate it is managing consistent with Forest Plan standards FW-STD-WL-02 and FW-STD-WL-03, guidelines FW-GDL-WL-01 and FW-GDL-WL-15, the National Environmental Policy Act (NEPA) and the Endangered Species Act.

Remedy: Select the No Action alternative, or prepare an EIS that remedies the deficiencies of analyses and habitat protections identified in this section.

FISHER

Sensitive species were discussed in our EA comments at pp. 3, 5-6, 74 and our PA comments at pp. 9, 12-13. Also, issues regarding the fisher were raised in our Objection to the revised forest plan (OBJECTION STATEMENT: Management Indicator Species, OBJECTION STATEMENT: Sensitive species, OBJECTION STATEMENT: NFMA requirements for viability, OBJECTION STATEMENT: Old Growth Management Indicator Species).

The EA states, "Fisher are uncommon, and occupancy of the Project Area is questionable." It doesn't explain why the sensitive fisher are not expected to be present here—well within the range of historic occupation. It is not clear that thorough surveys have been conducted. The EA claims Forest Plan direction "relevant to the maintenance and/or promotion of ...large forest structure" protects fisher habitat sufficiently, but if anything, the logging would destroy such habitat, harming viability and preventing or delaying population recovery in the project area.

The FS has not conducted a scientifically-sound analysis on the spatial and structural requirements for fisher survival and successful reproduction. There is no sound, scientifically- based analysis for the Forest Plan or entire KNF comparing forestwide conditions with habitat metrics required to insure fisher viability. The analyses for other wildlife exhibit these same flaws.

Jones and Garton, 1994 noted "Fishers seemed to prefer large-diameter Engelmann spruce trees and hollow grand fir logs as resting sites in north-central Idaho (Jones 1991)." Yet the FS with the Black Ram proposal and others wants to substantially reduce grand fir incidence on the Forest. Where's the analysis of cumulative effects?

Sauder (2014) suggests that five national forests (Clearwater, Nez Perce, Coeur d'Alene, Kaniksu, and Kootenai) hold the key to recovery of the species in the Northern Region. As with most of the Sensitive wildlife, fishers receive little habitat protection emphasis in the Forest Plan—mostly just move it (via logging) toward desired conditions. The EA does not disclose the direct, indirect and cumulative impacts on important habitat components such as snags, logs, foraging habitat configuration, connectivity, cover, and impacts on predator and prey species.

The EA does not include a quantitative cumulative effects analysis for fisher considering trapping and use of the road and trail networks in the project area. Hayes and Lewis, 2006 state "The two most significant causes of the fisher's decline were over-trapping by commercial trappers and loss and fragmentation of low to mid-elevation late-successional forests." Hayes

and Lewis, 2006 also present a science synthesis in the context of a recovery plan for fisher in the state of Washington. Hayes and Lewis, 2006 state:

Trapping reduced populations quickly. Despite decades of protection from harvest, fisher populations never recovered in Washington. Fishers use forest structures associated with late-successional forests, such as large live trees, snags and logs, for giving birth and raising their young, as well as for rest sites. Travel among den sites, rest sites, and foraging areas occurs under a dense forest canopy; large openings in the forest are avoided. Commercial forestry removed the large trees, snags and logs that were important habitat features for fishers, and short harvest rotations (40-60 years) didn't allow for the replacement of these large tree structures. Clearcuts fragmented remaining fisher habitat and created impediments to dispersal, thus isolating fishers into smaller populations that increased their risk of extinction.

The EA does not disclose the direct, indirect or cumulative impacts on important habitat components, such as snags, logs, foraging habitat configuration, connectivity, cover, prey species impacts, etc.

Wisdom et al. (2000) state:
Carnivorous mammals such as marten, fisher, lynx, and wolverine are vulnerable to over- trapping (Bailey and others 1986, Banci 1994, Coulter 1966, Fortin and Cantin 1994, Hodgman and others 1994, Hornocker and Hash 1981, Jones 1991, Parker and others 1983, Thompson 1994, Witmer and others 1998), and over-trapping can be facilitated by road access (Bailey and others 1986, Hodgman and others 1994, Terra-Berns and others 1997, Witmer and others 1998).

Ruggiero et al. 1994b state, "(T)he fisher is unique to North America and is valued by native and nonnative people as an important member of the complex natural communities that comprise the continent's northern forests. Fishers are an important component of the diversity of organisms found in North America, and the mere knowledge of the fisher's existence in natural forest communities is valued by many Americans." Ruggiero et al. 1994b discuss fisher habitat disruption by human presence:

...The fisher's reaction to humans in all of these interactions is usually one of avoidance. Even though mustelids appear to be curious by nature and in some instances fishers may associate with humans (W. Zielinski, pers. obs.), they seldom linger when they become aware of the immediate presence of a human. In this regard, fishers generally are more common where the density of humans is low and human disturbance is reduced. Although perhaps not as associated with "wilderness" as the wolverine (V. Banci, Chapter 5), the fisher is usually characterized as a species that avoids humans (Douglas and Strickland 1987; Powell 1993).

Also Jones, (undated) recognizes:
Roads are directly correlated with trapper access, and consequently, fisher vulnerability. Even in areas where fishers cannot be legally trapped, trapping pressure for other furbearers (i.e., marten) may contribute significantly to fisher mortality. Roads bisecting or adjacent to preferred habitats (i.e., drainage bottoms) have the greatest potential of increasing a trapper's probability of encountering fishers."

And Witmer et al., 1998 state, "The range and population levels of the fisher have declined substantially in the past century, primarily the result of trapping pressure and habitat alteration through logging (Powell and Zielinski 1994)."

Heinemeyer and Jones, 1994 state:
Fishers are susceptible to trapping, and are frequently caught in sets for

other furbearers. Additionally, populations are vulnerable to trapping, as even light pressure may cause local extinction. Western fisher populations may have lower natality and higher natural mortality rates as compared to eastern populations. Consequently, western populations may be more susceptible to over-trapping. It has been suggested that incidental captures may limit population growth in some areas.

Forest Plan protections for the fisher revolve entirely around the rather random likelihood of a fisher den site being detected, so that measures might be taken: "Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened, or endangered species not covered under other forest-wide guidelines." (FW-GDL-WL-25.) The Forest Plan provides no further direction on how motorized activities would be avoided or minimized other than vaguely stating, "Use the best available information to set a timeframe and a distance buffer around active nests or dens." (Id.) Please disclose this best available science.

Schultz (2010) concludes that "the lack of management thresholds allows small portions of habitat to be eliminated incrementally without any signal when the loss of habitat might constitute a significant cumulative impact."

In the absence of meaningful thresholds of habitat loss and no monitoring of fisher populations at the Forest level, projects will continue to degrade fisher habitat across the KNF over time. (Also see also Schultz 2012, who identified these problems in analyses for many wildlife species.)

The Forest Plan/FEIS fail to describe the quantity and quality of habitat that is necessary to sustain the viability of the fisher.

Scientific research strongly suggests that fishers are heavily associated with older forests throughout the year. (Aubry et al. 2013, Olsen et al.

2014, Raley et al. 2012, Sauder 2014, Sauder and Rachlow 2014, Schwartz et al. 2013, Weir and Corbould 2010).

Sauder, 2014 found that "fishers selected landscapes for home ranges with larger, more contiguous patches of mature forest arranged in connected, complex shapes with few isolated patches and open areas comprising < 5% of the landscape" (Sauder and Rachlow 2014).

Most studies have found that fishers are reluctant to stray from forest cover and that they prefer more mesic forests (Olson et al. 2014, Schwartz et al. 2013, Sauder 2014, Sauder and Rachlow 2014, Weir and Corbould 2010). Both Sauder and Rachlow (2014) and Weir and Corbould (2010) predicted the influence of openings on fisher habitat occupancy based on their data. For example, Weir and Corbould predicted that a 5% increase in forest openings would decrease the likelihood of fisher occupancy by 50%. Sauder and Rachlow (2014) suggested that an "increase of open area from 5% to 10% reduces the probability of occupation by fishers by 39%. Sauder and Rachlow (2014) reported that the median amount of open area within fisher home ranges was 5.4%. This was consistent with "results from California where fisher home ranges, on average, contained < 5.0% open areas" (Raley et al. 2012).

Sauder and Rachlow (2014) report the average home range size is approximately 12,200 acres and for a female fisher and approximately 24,300 acres for a male fisher. Home ranges generally do not overlap greatly for the individual sexes (21.3% for females and 15.3% for males), but male home ranges can overlap female home ranges. Preferred habitat would likely occur in upland areas and stands composed of cedar and grand fir forests (Schwartz et al. 2013).

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

PINE MARTEN

Pine marten were raised in our PA comments at p. 9. Marten were not considered at all in the EA.

The EA doesn't explain the FS's strategy and best available science for insuring viable populations of the pine marten, a species whose habitat is significantly altered by thinning and other active forest management (Moriarity et al., 2016; Bull and Blumton, 1999; Hargis et al., 1999 and Wasserman et al., 2012).

Moriarty et al., 2016 found that the odds of detecting a marten was 1,200 times less likely in openings and almost 100 times less likely in areas treated to reduce fuels, compared to structurally-complex forest stands.

Ruggiero et al. 1994b recognize that for martens, "trapper access is decreased, and de facto partial protection provided, by prohibitions of motorized travel."

Old growth allows martens to avoid predators, provides resting and denning places in coarse woody debris and large diameter trees, and allows for access under the snow surface. USDA Forest Service, 1990 reviewed research suggesting that martens prefer forest stands with greater than 40% tree canopy closure and rarely venture more than 150 feet from forest cover, particularly in winter. USDA Forest Service, 1990 also cites research suggesting that at least 50% of female marten home range should be maintained in mature or old growth forest. Also, consideration of habitat connectivity is essential to ensuring marten viability: "To ensure that a viable population of marten is maintained across its range, suitable habitat for individual martens should be distributed geographically in a manner that allows interchange of individuals between habitat patches (Ibid.).

Ruggiero et al. 1994b recognize that for martens, "trapper access is decreased, and de facto partial protection provided, by prohibitions of mo

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

NORTHERN GOSHAWK

Northern Goshawk was raised in our PA comments at p. 9.

The species was not considered at all in the EA. Therefore the FS saw no reason to utilize goshawk survey methodology consistent with the best available science. For example the recent and comprehensive protocol, "Northern Goshawk Inventory and Monitoring Technical Guide" by Woodbridge and Hargis 2006. Also, USDA Forest Service 2000b state:

A common thread in the interviews was the lack of a landscape approach in providing goshawk habitat well distributed across the Forest (Squires, Reynolds, Boyce). Reynolds was deeply concerned that both alternatives focus only on 600 acres around known goshawk nests. He was concerned that this direction could be keeping the goshawk population artificially low**. Because goshawks move around within their territories, they are very difficult to find (Reynolds). There might be more goshawks on the Forest than currently known (Squires). One or two years of goshawk surveys is not enough (Reynolds). Some pairs may not lay eggs for five years (Reynolds). To get confidence in identifying nesting goshawk pairs, four to six years of surveys are needed (Reynolds).** (Emphasis added.)

Reynolds et al. 1992 goshawk guidelines recommend ratios of (20%/20%/20%) each in the mid- aged forest, mature forest, and old forest Vegetative Structural Stage (VSS) classes for post- fledging areas (PFA)s and foraging areas. Reynolds et al. 1992 calls for 100% in VSS classes 5 & 6 and 0% in VSS classes 1-4 in nest areas.

In addition, Reynolds et al. 1992 recommend logged openings of no more than 2 acres in size or less in the PFAs, depending on forest type, and logged openings of no more than 1-4 acres or less in size in the foraging areas, depending on forest type. Clough (2000) noted that in the absence of long-term monitoring data, a very conservative approach to allowing logging activities near active goshawk nest stands should be taken to ensure that goshawk distribution is not greatly altered. This indicates that the full 180-acre nest area management scheme recommended by Reynolds et al. (1992) should be used around any active goshawk nest. Removal of any large trees in the 180-acre nesting area would contradict the Reynolds et al. (1992) guidelines.

Crocker-Bedford (1990) noted:
After partial harvesting over extensive locales around nest buffers, reoccupancy decreased by an estimated 90% and nestling production decreased by an estimated 97%. Decreases were probably due to increased competition from open-forest raptors, as well as changes in hunting habitat and prey abundance.

Moser and Garton (2009) reported that all goshawk nests examined in their study area were found in stands whose average diameter of overstory trees was over 12.2 inches and all nest stands had > 70% overstory tree canopy. They described their findings as being similar to those

described by Hayward and Escano (1989), who reported that nesting habitat "may be described as mature to overmature conifer forest with a closed canopy (75-85% cover)...."

The FS's Samson (2006) reports says that 110 breeding individuals (i.e. 55 pairs) are necessary for a viable goshawk population in R1. USDA Forest Service, 2005e is a map showing the results from the 2005 R1 region-wide goshawk survey using the FS's Woodbridge and Hargis goshawk monitoring protocol. That 2005 detection map says there were 40 detections in 2005 in Region 1. So the results of this survey essentially show that the population in Region 1 has not been viable according to the agency's own science (only 40 instead of 55). And some of the detections may have been individuals using the same nest, so the number of nests (and therefore number of breeding pairs) could be even lower than 40.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

BLACK-BACKED WOODPECKER

The black-backed woodpecker was discussed in EA comments at pp. 9 and 13. Also, issues regarding the black-backed woodpecker were raised in our Objection to the revised forest plan (OBJECTION STATEMENT: Management Indicator Species, OBJECTION STATEMENT: Sensitive species, OBJECTION STATEMENT: NFMA requirements for viability, OBJECTION STATEMENT: Old Growth Management Indicator Species).

The FS doesn't consider best available science for insuring viable populations of the black- backed woodpecker.

The Boise National Forest adopted this species as an indicator species in its revised forest plan in 2010:

The black-backed woodpecker depends on fire landscapes and other large- scale forest disturbances (Caton 1996; Goggans et al. 1988; Hoffman 1997; Hutto 1995; Marshall 1992; Saab and Dudley 1998). It is an irruptive species, opportunistically foraging on outbreaks of wood-boring beetles following drastic changes in forest structure and composition resulting from fires or uncharacteristically high density forests (Baldwin 1968; Blackford 1955; Dixon and Saab 2000; Goggans et al. 1988; Lester 1980). Dense, unburned, old forest with high levels of snags and logs are also important habitat for this species, particularly for managing habitat over time in a well-distributed manner. These areas provide places for low levels of breeding birds but also provide opportunity for future disturbances, such as wildfire or insect and disease outbreaks (Dixon and Saab 2000; Hoyt and Hannon 2002; Hutto and Hanson 2009; Tremblay et al. 2009). Habitat that supports this species' persistence benefits other species dependent on forest systems that develop with fire and insect and disease disturbance processes. The black-backed woodpecker is a secondary consumer of terrestrial invertebrates and a primary cavity nester. Population levels of black-backed woodpeckers are often synchronous with insect outbreaks, and targeted feeding by this species can control or depress such outbreaks (O'Neil et al. 2001). The species physically fragments standing and logs by its foraging and nesting behavior (Marcot 1997; O'Neil et al. 2001). These KEFs influence habitat elements used by other species in the ecosystem. Important habitat elements (KECs) of this species are an association with medium size snags and live trees with heart rot. Fire can also benefit this species by stimulating outbreaks of bark beetle, an important food source. Black-backed woodpecker populations typically peak in the first 3–5 years after a fire. This species' restricted diet renders it vulnerable to the effects of fire suppression and to post-fire salvage logging in its habitat (Dixon and Saab 2000).

... Black-backed woodpeckers are proposed as an MIS because of their association with high numbers of snags in disturbed forests, use of late-seral old forest conditions, and relationship with beetle outbreaks in the years immediately following fire or insect or disease outbreaks. Management activities, such as salvage logging, timber harvest, and firewood collection, can affect KEFs this species performs or KECs associated with this species, and therefore **its role as an MIS would allow the Forest to monitor and evaluate the effects of management activities on identified forest communities and wildlife species.** (Emphasis added.)

All the areas to be logged are potential habitat. To increase its value for this species, all it takes is a fire, which could happen naturally or as a result of project activities. Those areas logged before a fire would have far less habitat value to this species.

Hutto, 2006 addresses this subject; from the Abstract:
The bird species in western North America that are most restricted to, and therefore most dependent on, severely burned conifer forests during the first years following a fire event depend heavily on the abundant

standing snags for perch sites, nest sites, and food resources. Thus, it is critical to develop and apply appropriate snag-management guidelines to implement postfire timber harvest operations in the same locations. Unfortunately, existing guidelines designed for green-tree forests cannot be applied to postfire salvage sales because the snag needs of snag-dependent species in burned forests are not at all similar to the snag needs of snag-dependent species in green-tree forests. Birds in burned forests have very different snag-retention needs from those cavity-nesting bird species that have served as the focus for the development of existing snag-management guidelines. Specifically, many postfire specialists use standing dead trees not only for nesting purposes but for feeding purposes as well. Woodpeckers, in particular, specialize on wood-boring beetle larvae that are superabundant in fire-killed trees for several years following severe fire. Species such as the Black-backed Woodpecker (Picoides arcticus) are nearly restricted in their habitat distribution to severely burned forests. Moreover, existing postfire salvage- logging studies reveal that most postfire specialist species are completely absent from burned forests that have been (even partially) salvage logged. I call for the long-overdue development and use of more meaningful snag-retention guidelines for postfire specialists, and I note that the biology of the most fire-dependent bird species suggests that even a cursory attempt to meet their snag needs would preclude postfire salvage logging in those severely burned conifer forests wherein the maintenance of biological diversity is deemed important.

Hutto, 2008 cautions against the common practice of landscape scale thinning to “restore” forests to a condition thought to be more congruent with historical conditions:

Black-backed Woodpeckers ...require burned forests that are densely stocked and have an abundance of large, thick-barked trees favored by wood-boring beetles (Hutto 1995, Saab and Dudley 1998, Saab et al. 2002, Russell et al. 2007, Vierling et al. 2008). Indeed, data collected from within a wide variety of burned forest types show that **the probability of Black-backed Woodpecker occurrence decreases dramatically and incrementally as the intensity of traditional (pre-fire) harvest methods increases.** (Emphases added.)

The Hutto, 2008 Abstract states:
I use data on the pattern of distribution of one bird species (Black-backed Woodpecker, *Picoides arcticus*) as derived from 16,465 sample locations to show that, in western Montana, this bird species is extremely specialized on severely burned forests. Such specialization has profound implications because it suggests that the severe fires we see burning in many forests in the Intermountain West are not entirely "unnatural" or "unhealthy." Instead, severely burned forest conditions have probably occurred naturally across a broad range of forest types for millennia. These findings highlight the fact that severe fire provides an important ecological backdrop for fire specialists like the Black- backed Woodpecker, and that the presence and importance of severe fire may be much broader than commonly appreciated.

Please see Hanson Declaration, 2016 for an explanation of what a cumulative impact is with regard to the backed woodpecker, how the FS failed apply the best available science in their analysis of impacts to Black-backed Woodpeckers for a timber sale, why FS's (including Samson's) reports are inaccurate and outdated, and why FS's reliance on them results in an improper minimization of adverse effects and cumulative impacts to black-backed woodpeckers with regard to the agency's population viability assessment.

Forestwide suppression of habitat conditions as per the Forest Plan would eliminate population viability. The viability of the black-backed woodpecker is threatened by fire suppression and other "forest health" policies which specifically attempt to prevent its habitat from developing. "Insect infestations and recent wildfire provide key nesting and foraging habitats" for the black- backed woodpecker and "populations are eruptive in response to these occurrences" (Wisdom et al. 2000). A basic purpose of the FS's management strategies, including the Black Ram project, are to negate the natural processes that the black-backed woodpecker biologically relies on; the emphasis in reducing the risk of stand loss due to stand density coupled with the increased risk of stand replacement fire events. Viability of a species cannot be assured, if habitat suppression is a forestwide policy.

Hutto, 1995 states: "Fires are clearly beneficial to numerous bird species, and **are apparently necessary for some**." (p. 1052, emphasis added.) Hutto, 1995 whose study keyed on forests burned in the 1988 season, noted:

Contrary to what one might expect to find immediately after a major disturbance event, I detected a large number of species in forests that had undergone stand-replacement fires. Huff et al. (1985) also noted that the density and diversity of bird species in one- to two- year-old burned forests in the Olympic Mountains, Washington, *were as great as adjacent old-growth forests*...

...Several bird species seem to be relatively *restricted* in distribution to early post-fire conditions... I believe it would be difficult to find a forest-bird species more restricted to a single vegetation cover type in the northern Rockies than the Black-backed Woodpecker is to early [first 6 years] post-fire conditions. (Emphasis added).

USDA Forest Service 2011c states:
Hutto (2008), in a study of bird use of habitats burned in the 2003 fires in northwest Montana, found that within burned forests, there was one variable that exerts an influence that outstrips the influence of any other variable on the distribution of birds, and that is fire severity. Some species, including the black-backed woodpecker, were relatively abundant only in the high-severity patches. . **Hutto's preliminary results also suggested burned forests that were harvested fairly intensively (seed tree cuts, shelterwood cuts) within a decade or two prior to the**

fires of 2003 were much less suitable as post-fire forests to the black-backed woodpecker and other fire dependent bird species. Even forests that were harvested more selectively within a decade or two prior to fire were less likely to be occupied by black-backed woodpeckers. (Emphasis added.)

Also see the agency's Fire Science Brief, 2009, which states, "Hutto found that Black-backed Woodpeckers fared best on sites unharvested before fire and poorest in the heavily harvested sites."

Hutto, 2008 states, "severely burned forest conditions have probably occurred naturally across a broad range of forest types for millennia. These findings highlight the fact that severe fire provides an important ecological backdrop for fire specialists like the black-backed woodpecker, and that the presence and importance of severe fire may be much broader than commonly appreciated."

Cherry (1997) states:
The black-backed woodpecker appears to fill a niche that describes everything that foresters and fire fighters have attempted to eradicate. For about the last 50 years, disease and fire have been considered enemies of the 'healthy' forest and have been combated relatively successfully. We have recently (within the last 0 to 15 years) realized that disease and fire have their place on the landscape, but the landscape is badly out of balance with the fire suppression and insect and disease reduction activities (i.e. salvage logging) of the last 50 years. Therefore, the black-backed woodpecker is likely not to be abundant as it once was, and **continued fire suppression and insect eradication is likely to cause further decline.** (Emphasis added.)

The FS continues to manage against severely burned forests, as evident from the proposed Purpose and Need.

The black-backed woodpecker is a primary cavity nester, and also the closest thing to an MIS for species depending upon the process of wildland fire in the ecosystem. Cherry (1997) notes:

Woodpeckers play critical roles in the forest ecosystem. Woodpeckers are primary cavity nesters that excavate at least one cavity per year, thus making these sites available to secondary cavity nesters (which include many species of both birds and mammals). Black-

backed and three-toed woodpeckers can play a large role in potential insect control. The functional roles of these two woodpecker species could easily place them in the 'keystone' species category—a species on which other species depend for their existence.

Wickman (1965) calculated that woodpeckers may eat up to 50 larvae per day that were each about 50 mm in length. The predation on these larvae is significant. It has been estimated that individual three-toed woodpeckers may consume thousands of beetle larvae per day, and insect outbreaks may attract a many-fold increase in woodpecker densities (Steeger et al. 1996). The ability of woodpeckers in to help control insect outbreaks may have previously been underestimated.

Cherry (1997) also notes:
Black-backed woodpeckers preferred foraging in trees of 34 cm (16.5 in) diameters breast height and (63 ft) 19 m height (Bull et al. 1986). Goggans et al. (1987) found the mean dbh of trees used for foraging was 37.5 cm (15 in) and the mean dbh of trees in the lodgepole pine stands used for foraging was 35 cm (14 in). Steeger et al. (1996) found that both (black-backed and three-toed) woodpecker species fed in trees from 20-50 cm (8-20 in) dbh.

Black-backed woodpeckers excavate their own cavities in trees for nesting. Therefore, they are referred to as primary cavity nesters, and they play a critical role in excavating cavities that are later used by many other species of birds and mammals that do not excavate their own cavity (secondary cavity nesters). Black-backed woodpeckers peel bark away from the entrance hole and excavate a new cavity every year. Other woodpeckers sometimes take over their cavities (Goggans et al. 1987).

Also, FS biologists Goggans et al., 1989 studied black-backed woodpecker use of unburned stands in the Deschutes NF in Oregon. They discovered that the black-backed woodpeckers used unlogged forests more than cut stands. In other words, effects to the black-backed woodpecker accrue from logging forest habitat that has not been recently burned.

FS biologists Hillis et al., 2002 note that "In northern Idaho, where burns have been largely absent for the last 60 years, black-backed woodpeckers are found amid bark beetle outbreaks, although not at the densities found in post-burn conditions in Montana." Those researchers also state, "The greatest concerns for this species, however, are decades of successful fire suppression and salvage logging targeted at recent bark beetle outbreaks." Hillis et al., 2002 also state:

Black-backed woodpeckers occupy forested habitats that contain high densities of recently dead or dying trees that have been colonized by bark beetles and woodborer beetles (Buprestidae, Cerambycidae, and Scolytidae). These beetles and their larvae are most abundant within burned forests. In unburned forests, bark beetle and woodborer infested trees are found primarily in areas that have undergone natural disturbances, such as wind- throw, and within structurally diverse old-growth forests (Steeger and Dulisse in press, Bull et al. 1986, Goggans et al. 1987, Villard 1994, Hoffman 1997, Weinhagen 1998).

Bond et al., 2012a explain the need for a conservation strategy for the black-backed woodpecker: In California, the Black-backed Woodpecker's strong association with recently burned forest, a habitat that is ephemeral, spatially restricted, and often greatly modified by postfire logging, as well as the species' relative rarity, may make the woodpecker vulnerable to declines in the state. Additionally, Black-backed Woodpeckers in California are affected by the management of unburned forests – both because pre-fire stand conditions affect the suitability of post-fire habitat for the species, and because a substantial proportion of California's Black-backed Woodpeckers nest and forage at a low population density in unburned forests. Conserving the Black-backed Woodpecker in California likely requires appropriate management and stewardship of the habitat where this species reaches its highest density – recently bur.ned forest – as well as appropriate management of 'green' forests that have not burned recently.

The Forest Plan/FEIS fail to describe the quantity and quality of habitat that is necessary to sustain the viability of the black-backed woodpecker.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

PILEATED WOODPECKER

Concerns over pileated woodpeckers was raised in our PA comments at p. 9. The species was not considered at all in the EA. Also, issues regarding the pileated woodpecker were raised in our Objection to the revised forest plan (OBJECTION STATEMENT: Management Indicator Species, OBJECTION STATEMENT: Sensitive species, OBJECTION STATEMENT: NFMA requirements for viability, OBJECTION STATEMENT: Old Growth Management Indicator Species).

By dumping its old-growth MIS during development of the Forest Plan, the FS ignores the scientific information linking old growth to the pileated woodpecker.

The EA indicates that the proposed logging would impact forest that provides habitat for species needing the kind of habitat features found in mature and old-growth forests, such as the pileated woodpecker.

The Committee of Scientists, 1999 defines Keystone species as a: ...species whose effects on one or more critical ecological processes or on biological diversity are much greater than would be predicted from their abundance or biomass (e.g., the red-cockaded woodpecker creates cavities in living trees that provide shelter for 23 other species).

Consistent with the notion of the pileated woodpecker as a keystone species, USDA Forest Service 2011c states:

Many types of disturbances, such as timber harvest, fuel reduction, road construction, blow-down, wildland fire, or insect or disease outbreaks, can affect old growth habitat and old growth associated species. This is well illustrated by **the pileated woodpecker, a "keystone" species**, which provides second-hand nesting structures for numerous old growth species such as boreal owls, kestrels, and flying squirrels (McClelland and McClelland 1999, Aubry and Raley 2002). A disturbance can reduce living tree canopy cover to levels below that needed by the pileated woodpecker's main food source, carpenter ants, forcing the pileated to forage and possibly nest elsewhere. Carpenter ants, which live mostly in standing and downed dead wood, can drastically reduce populations of species such as spruce budworm (Torgersen 1996), the most widely distributed and destructive defoliator of coniferous forests in Western North America. (Emphasis added.)

The FS does not consider best available science for insuring viable populations of the pileated woodpecker. Bull et al. 2007 represents over 30 years of investigation into the effects of logging on the pileated woodpecker and is the latest information on such effects.

USDA Forest Service, 1990 indicates measurements of the following variables are necessary to determine quality and suitability of pileated woodpecker habitat:

- Canopy cover in nesting stands

- Canopy cover in feeding stands

- Number of potential nesting trees >20” dbh per acre

- Number of potential nesting trees >30” dbh per acre

- Average DBH of potential nest trees larger than 20” dbh

- Number of potential feeding sites per acre

- A verage diameter of potential feeding sites

This preferred diameter of nesting trees for the pileated woodpecker recognized by R-1 is notable. USDA Forest Service, 1990 uses an index of the “Number of potential nesting trees >30” dbh per acre” for the pileated woodpecker, and McClelland and McClelland (1999) found in their study in northwest Montana, with the average nest tree being 73 cm. (almost 29”) dbh. The pileated woodpecker’s strong preference for trees of rather large diameter is not adequately considered in the Forest Plan. Effectively, the KNF provides absolutely no numerical commitments for leaving specific numbers and sizes of largest trees favored by so many wildlife species.

The EA promises, vaguely:

In regards to snags, the EA states:

For “Snag Retention” the EA’s only “Design Features” are: 79

Alternatives 2 and 3 would have an emphasis in snag retention and recruitment in the silvicultural prescriptions and would contribute to achieving this desired condition.

FW-DC-WL-12: Trees and snags greater than 20-inch DBH are available throughout the Forest. Wildlife species associated with the warm dry biophysical setting find large-diameter ponderosa pine, Douglas-fir, and other species of snags for nesting (see also FW-DC-VEG-07, FW-GDL-VEG-04, and FW-GDL-VEG-05).

- Trees of the larger size classes would continue to be available throughout the Forest on appropriate sites. Snags would remain as per Forest Plan guidelines and design criteria. Intermediate treatments would promote accelerated growth and reduced risk to stands. Therefore, the Black Ram project would contribute to progress toward achieving FW-DC-WL-12.

All snags felled for safety reasons would be left on site and would be cut as high as possible, to retain some value for wildlife use (foraging opportunities or other habitat), where it is safe and reasonable to do so.

The EA discusses snags in the context of Forest Plan consistency:

And here is Table 4 of the Forest Plan:

FW-GDL-VEG-04 Vegetation management activities should retain snags greater than 20 inches DBH and at least the minimum number of snags and live trees (for future snags) that are displayed in table 4 of the 2015 Forest Plan. Where snag numbers do not exist to meet the recommended ranges, the difference would be made up with live replacement trees. Exceptions occur for issues such as human safety and instances where the minimum numbers are not present prior to the management activities.

Table 4. Snag and Snag Recruitment Levels to retain (where they exist) after Vegetation Management Activities (including Post-harvest Activities), by Harvest Type

Dominance Group	Biophysical Setting	Snags > 15"+ DBH	Live Trees > 15.0" DBH
Ranges per Acre where Treatments result in a Seed/Sap Size Class (Regeneration Harvest)			
All except lodgepole Pine	**Warm/Dry**	1.5 – 3.5	1.5 – 4.0
	Warm/ Moist	3.5 – 8.5	1.5 – 4.5
	Subalpine	4.0 – 5.5	1.5 – 2.5
Lodgepole pine	**All**	0.5 – 1.5	0.5 – 1.0
Ranges per Acre where Treatments result in a Small or Medium Size Class (e.g., Commercial Thin)			
All except lodgepole pine	**Warm/Dry**	0.5 – 2.5	9.5 – 16.5
	Warm/Moist	3.0 – 7.5	10.0 – 20.5
	Subalpine	3.0 – 4.5	10.0 – 13.0
Lodgepole pine	**All**	0.5 – 1.5	4.0 – 7.0
Ranges per Acre for Treatments in the Large Size Class (e.g., Restoration)			
All except lodgepole pine	**Warm/Dry**	2.0 – 5.0	22.0 – 30.5
	Warm/Moist	3.5 – 13.0	31.0 – 54.0
	Subalpine	5.5 – 8.5	29.5 – 36.5

It's easily seen that with "Regeneration" units (2,546 acres) the FS "should" (in other words, might possibly) retain only leave 1.5 snags per acre. This is inconsistent with best available science.

And the EA doesn't say if "Improvement Cut" would fall within the Regeneration category or the "Small or Medium Size Class (e.g., Commercial Thin)" category, so we don't know which "should" sort of applies for those 1,262 acres.

And with the exception of only eight units totaling 467 acres, the EA fails to make any quantifiable commitment to leave *live standing* tree structure in the logged areas, in violation of the Forest Plan and NEPA. That exception, from the EA, is:

This is the only place the FS explicitly states numbers for live tree retention in the entire EA.

Even for "Improvement Cut" and "Commercial Thinning" there are no numbers. The EA mentions "...improvement harvests which resulted in moderately open stands..." The following, for unit 53a in in the analysis for scenic integrity, is exemplary as the most detail the EA provides:

And in keeping with the EA's tendency to avoid analysis of the impacts of past management actions, it fails to analyze and disclose tree retention and snag retention success or failure in past logged units, and fails to cite the results of up-to-date surveys for current snag numbers in in past logged units or anywhere else in the project area.

There's little to nothing on the amounts of snags, recruitment snags, and down woody debris left after previous logging operations, and how they might compare to current forest plan standards and objectives. And the snag loss expected because of safety concerns and also from the proposed methods of log removal are not quantitatively estimated.

USDA Forest Service, 1990 states, "To provide suitable pileated woodpecker habitat, strips should be at least 300 feet in width..."

The Idaho Panhandle NF's original Forest Plan old-growth standards (USDA Forest Service, 1987c) were largely built around the habitat needs of its indicator species, the pileated woodpecker. Bull and Holthausen 1993, provide field tested management guidelines. They recommend that approximately 25% of the home range be old growth and 50% be mature forest.

In Harvest Units 67, 68, 69, 71, 72, 73, 74, and 76B all western larch, western white pine, Douglas-fir, and western redcedar greater than 7 inches in diameter would be retained for species diversity, structure and visuals.

Also see Bull et al., 1992, Bull and Holthausen, 1993, and Bull et al., 1997 for biology of pileated woodpeckers and the habitats they share with cavity nesting wildlife.

Hutto 2006, notes from the scientific literature: "The most valuable wildlife snags in green-tree forests are relatively large, as evidenced by the disproportionate number of cavities in larger snags (Lehmkuhl et al. 2003), and are relatively deteriorated (Drapeau et al. 2002)."

B.R. McClelland has extensively studied the pileated woodpecker habitat needs. McClelland, 1985 (a letter to the Flathead NF forest supervisor) states:

Co-workers and I now have a record of more than 90 active pileated woodpecker nests and roosts, ...the mean dbh of these trees is 30 inches... A few nests are in trees 20 inches or even smaller, but the minimum cannot be considered suitable in the long-term. Our only 2 samples of pileateds nesting in trees <20 inches dbh ended in nest failure... At the current time there are many 20 inch or smaller larch, yet few pileateds selected them. Pileateds select old/old growth because old/old growth provides habitat with a higher probability of successful nesting and long term survival. They are "programmed" to make that choice after centuries of evolving with old growth.

McClelland (1977), states:
(The Pileated Woodpecker) is the most sensitive hole nester since it requires old growth larch, ponderosa pine, or black cottonwood for successful nesting. The Pileated can be considered as key to the welfare of

most hole-nesting species. If suitable habitat for its perpetuation is provided, most other hole-nesting species will be accommodated.

Pileated Woodpeckers use nest trees with the largest dbh: mean 32.5 inches; Pileated Woodpeckers use the tallest nest trees: mean 94.6 feet;

The nest tree search image of the Pileated Woodpecker is a western larch, ponderosa pine, or black cottonwood snag with a broken top (status 2), greater than 24 inches dbh, taller than 60 feet (usually much taller), with bark missing on at least the upper half of the snag, heartwood substantially affected by Fomes laracis or Fomes pini decay, and within an old- growth stand with a basal area of at least 100 sq feet/acre, composed of large dbh classes.

A cluster analysis based on a nine-dimensional ordination of nest tree traits and habitat traits revealed close association between Yellow-bellied Sapsuckers, Mountain Chickadees, and Red-breasted Nuthatches. These three species plus the Pileated Woodpecker and Hairy Woodpecker are relatively grouped by coincident occurrence in old growth. Tree Swallows, Black-capped Chickadees, and Common Flickers are separated from the above five species by their preference for more open areas and their frequent use of small dbh nest trees.

(Most) species found optimum nesting habitat in stands with a major component of old growth, particularly larch. Mean basal area for pileated woodpecker nest sites was 150 square feet per acre. (McClelland. B.R. and others, 1979)

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Many large snags are being cut for firewood. Forest managers should limit firewood cutting to snags less than 15 inches in d.b.h. and discourage use of larch, ponderosa pine, and black cottonwood. Closure of logging roads may be necessary to save high-value snags. Logging slash can be made available for wood gatherers.

Lorenz et al., 2015, which ought to be considered best available science to replace inadequate forest plan direction for snag retention, state:

Our findings suggest that higher densities of snags and other nest substrates should be provided for PCEs (primary cavity excavators) than generally recommended, because past research studies likely overestimated the abundance of suitable nest sites and underestimated the number of snags required to sustain PCE populations. Accordingly, the felling or removal of snags for any purpose, including commercial salvage logging and home firewood gathering, should not be permitted where conservation and management of PCEs or SCUs (secondary cavity users) is a concern (Scott 1978, Hutto 2006).

This means only the primary cavity excavators themselves, such as the pileated woodpecker, are able to decide if a tree is suitable for excavating. This also means managers know little about how many snags per acre are needed to sustain populations of cavity nesting species. The FS and Forest Plan fails to recognize this scientific finding, and the result could be only 1½ snags per acre over several square miles of logging as per the forest plans vague, permissible guidelines.

Spiering and Knight (2005), also needing consideration as best available science to replace inadequate forest plan direction for snag retention, examined the relationship between cavity- nesting birds and snag density in managed ponderosa pine stands and examined if cavity-nesting bird use of snags as nest sites was related to the following snag characteristics (DBH, snag height, state of decay, percent bark cover, and the presence of broken top), and if evidence of foraging on snags was related to the following snag characteristics: tree species, DBH, and state of decay. The authors state:

"Many species of birds are dependent on snags for nest sites, including 85 species of cavity-nesting birds in North America (Scott et al. 1977). Therefore, information of how many and what types of snags are required by cavity-nesting bird species is critical for wildlife biologists, silviculturists, and forest managers."

"Researchers across many forest types have found that cavity-nesting birds utilize snags with large DBH and tall height for nest trees (Scott, 1978; Cunningham et al., 1980; Mannan et al., 1980; Raphael and White, 1984; Reynolds et al., 1985; Zarnowitz and Manuwal, 1985; Schreiber and deCalesta, 1992)."

Spiering and Knight (2005) found the following.
Larger DBH and greater snag height were positively associated with the presence of a cavity, and advanced stages of decay and the presence of a broken top were negatively associated with the presence of a cavity. Snags in larger DBH size classes had more evidence of foraging than expected based on abundance.

Percent bark cover had little influence on the presence of a cavity. Therefore, larger and taller snags that are not heavily decayed are the most likely locations for cavity-nesting birds to excavate cavities.

The association of larger DBH and greater height of snags with cavities is consistent with other studies (Scott, 1978; Cunningham et al., 1980; Mannan et al., 1980; Raphael and White, 1984; Reynolds et al., 1985; Zarnowitz and Manuwal, 1985; Schreiber and deCalesta, 1992).

Spiering and Knight (2005) state that the "lack of large snags for use as nest sites may be the main reason for the low densities of cavity-nesting birds found in managed stands on the Black Hills National Forest. ...The increased proportion of snags with evidence of foraging as DBH size class increased and the significant goodness-of-fit test indicate that large snags are the most important for foraging."

The FS's Vizcarra, 2017 notes that researchers "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**." (Emphasis added.)

Dudley & Vallauri, 2004 state:
Up to a third of European forest species depend on veteran trees and deadwood for their survival. Deadwood is providing habitat, shelter and food source for birds, bats and other mammals and is particularly important for the less visible majority of forest dwelling species: insects, especially beetles, fungi and lichens. Deadwood and its biodiversity also play a key role for sustaining forest productivity and environmental services such as stabilising forests and storing carbon.

Despite its enormous importance, deadwood is now at a critically low level in many European countries, mainly due to inappropriate management practices in commercial forests and even in protected areas. Average forests in Europe have less than 5 per cent of the deadwood expected in natural conditions. The removal of decaying timber from the forest is one of the main threats to the survival of nearly a third of forest dwelling species and is directly connected to the long red list of endangered species. Increasing the amounts of deadwood in managed forests and allowing natural dynamics in forest protected areas would be major contributions in sustaining Europe's biodiversity.

For generations, people have looked on deadwood as something to be removed from forests, either to use as fuel, or simply as a necessary part of "correct" forest management. Dead trees are supposed to harbour disease and even veteran trees are often regarded as a sign that a forest is being poorly managed. Breaking up these myths will be essential to preserve healthy forest ecosystems and the environmental services they provide.

In international and European political processes, deadwood is increasingly being accepted as a key indicator of naturalness in forest ecosystems. Governments which have recognised the need to preserve the range of forest values and are committed to these processes can help reverse the current decline in forest biodiversity. This can be done by including deadwood in national biodiversity and forest strategies, monitoring deadwood, removing perverse subsidies that pay for its undifferentiated removal, introducing supportive legislation and raising awareness.

Bate et al. (2007), found that snag numbers were lower adjacent to roads due to removal for safety considerations, removal as firewood, and other management activities. This fact is acknowledged in the EA, however its viability implications remain unanalyzed.

Other literature has also indicated the potential for reduced snag abundance due to human influence (Wisdom et al. 2000). And Bate and Wisdom, 2004 investigated management and other human influences on snag abundance. Some findings include:

1. Stands far from roads had almost three times the density of snags as stands adjacent to open or closed roads. No difference in snag density existed for stands adjacent to open versus closed roads. Rather, snag density declined with increasing proximity to nearest road. Consequently, the presence of any road near or adjacent to a stand is an important predictor of substantially reduced density of snags. Ease of access for firewood cutting and other forms of timber harvest is the most likely explanation for reduced snag density near roads.

2. Stands closer to the nearest town had a lower density of snags than those farther from nearest town. This finding implies that stands closer to town, and therefore more accessible to human activities, also are likely areas where firewood cutting is concentrated, resulting in reduced snag density.

3. Stands in the late-seral stage had three times the density of snags as stands in the mid- seral stage, and almost nine times that of stands in the early-seral stage. Stands in the late- seral stage provide essential snag habitat for wildlife that does not appear to be consistently present in younger stands.

4. Stands with no history of timber harvest had three times the density of snags as stands that were selectively harvested, and 19 times the density as that in stands that had undergone a complete harvest. These results suggest that past timber harvest practices have substantially reduced the density of snags, and that snag losses have not been effectively mitigated under past management.

5. Stands adjacent to private land had a lower density of snags within mid- and late-seral stages, in contrast to a higher density in stands surrounded by Forest Service land. These results are likely explained by safety and fire management policies, which call for removal of snags along property boundaries, where such snags often are deemed to pose safety or fire hazards. In addition, increased human access likely contributes to lower snag densities in stands adjacent to private land.

The EA does not *quantify* the degree of snag loss expected because of safety concerns and also from the proposed methods of log removal.

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The EA does not cite in the analysis the science that supports the FS assumption that the management will result in snags and down logs in abundance to someday, maybe, several decades later, support viable populations. Is there monitoring to support any claims of benefits to snag and down log-dependent species' population numbers or distribution?

The FS has stated: "Well distributed habitat is the amount and location of required habitat which assure that individuals from demes, distributed throughout the population's existing range, can interact. Habitat should be located so that genetic exchange among all demes is possible." (Mealey, 1983.) That document also provides guidance as to how habitat for the pileated woodpecker must be distributed for populations to persist.

The project is in violation of the KNF old growth requrements.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

CANADA LYNX

Canada lynx were discussed in our EA comments at pp. 14-19. Also, issues regarding the Canada lynx were raised in AWR's incorporated Objection to the revised forest plan (pp. 3-4, OBJECTION STATEMENT: Old Growth Management Indicator Species, OBJECTION STATEMENT: Indicator MON-FLS-01-02).

A big problem with the Forest Plan (including the NRLMD) is that it allows with few exceptions the same level of industrial forest management activities that occurred prior to Canada lynx ESA listing. The FS approval and implementation of the NRLMD is arbitrary and capricious, violates NEPA's hard look requirement and scientific integrity mandate and fails to apply the best available science necessary to conserve lynx. The NRLMD contains no protection or standard for conservation of winter lynx habitat (old growth forests).

The NRLMD doesn't manage the entire landscape. The best available science states the entire landscape has to be managed for lynx, see Kosterman and the attached Holbrook et al. 2019. This is a violation of NFMA, NEPA, the ESA and the APA. The entire landscape had to be surveyed for lynx to make sure where the best lynx habitat is.

The EA states the project area includes the entirety of the Hawkins Lynx Analysis Unit (LAU) and part of the Robinson LAU.

The EA states, "...lynx have occupied the Project Area vicinity for a long time." The EA doesn't disclose if the FS conducted lynx occurrence surveys of habitat in the Hawkins and Robinson LAUs.

The EA states, "...mapping of lynx habitat based on stand data provides a broad estimation of lynx habitat within a LAU, but may need to be fine-tuned based on field review." The FS surveyed areas proposed for logging and/or burning thought to be lynx habitat based on mapping or stand data, and the EA claims some areas were discovered to not be lynx habitat after all. The EA doesn't disclose if surveys target snowshoe hare occurrence data in these stands newly considered unsuitable for lynx. Also, the EA doesn't indicate if the FS surveyed any areas (proposed for logging and/or burning or not) thought to *not* be lynx habitat based on mapping or stand data were surveyed to confirm unsuitable habitat conditions.

The EA explains the project area is within Northern Rocky Mountains Critical Habitat Unit #3.

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The current science demonstrates that lynx must travel between areas of high hare densities and resist traveling through low cover areas in winter. The EA fails to identify the amount of non- cover or low-cover areas that will be created from the project.

The Montana Federal District Court ruled on 10/15/2018 that the Forest Service must complete forest-wide consultation with the U.S. Fish & Wildlife Service (USFWS) to determine effects Forest Plans may have on lynx.

It appears the FS doesn't have a coherent strategy for recovering lynx from their Threatened status, including linking currently populated areas with each other through important linkages such as project area LAUs.

The EA fails to analyze and disclose cumulative impacts of recreational activities on lynx, such as snowmobiles. As the KNF's Galton FEIS states, "The temporal occurrence of forest uses such ... winter (skiing and snowmobiling) ... may result in a temporary displacement of lynx use of that area..."

The Black Ram EA also fails to quantify and disclose the cumulative effects on Canada lynx due to trapping or from use of the road and trail networks in the project area.

In failing to properly analyze and disclose cumulative effects, the EA violates NEPA and the ESA.

The EA claims that sufficient denning habitat occurs in the LAU, but it fails to explain how it arrived at that conclusion. Habitat capacity for denning will be impaired by project activities.

The USFWS listed the Canada lynx as a threatened species under the Endangered Species Act in 2000 due to "lack of guidance for conservation of lynx and snowshoe hare habitat..." and subsequent authorization of actions that may cumulatively adversely affect the lynx. Relatively little is known about lynx in the contiguous United States. Historically, lynx inhabited states spanning from Maine to Washington, but it is unknown how many lynx remain.

Lynx are highly mobile and generally move long distances [greater than 60 mi. (100 km.)]; they disperse primarily when snowshoe hare populations decline; subadult lynx disperse even when prey is abundant, presumably to establish new home ranges; and lynx also make exploratory movements outside their home ranges. 74 Peg. Reg. at 8617. The contiguous United States is at the southern edge of the boreal forest range, resulting in limited and patchy forests that can support snowshoe hare and lynx populations.

Lynx subsist primarily on a prey base of snowshoe hare, and survival is highly dependent upon snowshoe hare habitat, forest habitat where young trees and shrubs grow densely. In North America, the distribution and range of lynx is nearly "coincident" with that of snowshoe hares, and protection of snowshoe hares and their habitat is critical in lynx conservation strategies.

Since more often than not when the FS conducts logging projects in LAUs surveys of stands for lynx habitat result in less suitable habitat than previously assumed, the FS needs to take a few steps backward and consider that its range-wide Canada lynx suitable habitat estimations were too high.

Squires et al. (2013) noted that long-term population recovery of lynx, as well as other species as the grizzly bear, require maintenance of short and long-distance connectivity. The importance of maintaining lynx linkage zones is also recognized by the FS's Lynx Conservation Assessment and Strategy (LCAS), as revised in 2013, which stresses that landscape connectivity should be maintained to allow for movement and dispersal of lynx.

Squires et al. (2013) noted in their research report that some lynx avoided crossing highways; in their own report, they noted that only 12 of 44 radio-tagged lynx with home ranges including 2- lane highways crossed them.

The current best science indicates that lynx winter foraging habitat is critical to lynx persistence (Squires et al. 2010), and that this habitat should be "abundant and well-distributed across lynx habitat." (Squires et al. 2010; Squires 2009.) Existing openings such as clearcuts not yet recovered are likely to be avoided by lynx in the winter. (Squires et al. 2010; Squires et al. 2006a.)

Lynx winter habitat, provided only in older, multi-storied forests, is critical for lynx preservation. (Squires et al. 2010.) Winter is the most constraining season for lynx in terms of resource use; starvation mortality has been found to be the most common during winter and early spring. (Squires et al. 2010.) Prey availability for lynx is highest in the summer. (Squires et al. 2013.)

Openings, whether small in uneven-aged management, or large with clearcutting, remove lynx winter travel habitat on those affected acres, since lynx avoid openings in the winter. (Squires et al. 2010.)

Squires et al., 2010 reported that lynx winter habitat should be “abundant and spatially well- distributed across the landscape.” Those authors also noted that in heavily managed landscapes, retention and recruitment of lynx habitat should be a priority.

The LCAS (Ruediger et al. 2000) recommends, until conclusive information is developed concerning lynx management, the agencies retain future options; that is, choose to err on the side of maintaining and restoring habitat for lynx and their prey. To err on the side of caution, the KNF would retain all remaining stem exclusion forests for recruitment into lynx winter habitat, so that this key habitat would more closely resemble historic conditions.

As early as 2000, the LCAS noted that lynx seem to prefer to move through continuous forest (1- 4); lynx have been observed to avoid large openings, either natural or created (1-4); opening and open forest areas wider than 650 feet may restrict lynx movement (2-3); large patches with low stem densities may be functionally similar to openings, and therefore lynx movement may be disrupted (2-4). Squires et al. 2006a reported that lynx tend to avoid sparse, open forests and forest stands dominated by small-diameter trees during the winter. Squires et al. 2010 again reported that lynx avoid crossing clearcuts in the winter; they generally avoid forests composed of small diameter saplings in the winter; and forests that were thinned as a silvicultural treatment were generally avoided in the winter.

Squires et al. 2010 show that the average width of openings crossed by lynx in the winter was 383 feet, while the maximum width of crossed openings was 1240 feet.

Recent scientific findings undermine the Forest Plan/NRLMD direction for management of lynx habitat. This creates a scientific controversy the FS fails to resolve, and in fact it essentially ignores it.

For one, Kosterman, 2014 found that 50% of lynx habitat must be mature undisturbed forest for it to be optimal lynx habitat where lynx can have reproductive success and no more than 15% of lynx habitat should be young clearcuts, i.e. trees under 4 inched dbh. Young regenerating forest should occur only on 10-15% of a female lynx home range, i.e. 10-15% of an LAU. This renders inadequate the agency's assumption in the Forest Plan/NRLMD that 30% of lynx habitat can be open, and that no specific amount of mature forest needs to be conserved. Kosterman, 2014 demonstrates that Forest Plan/NRLMD standards are not adequate for lynx viability and recovery.

Also, the Forest Plan essentially assumes that persistent effects of vegetation manipulations other than regeneration logging and some intermediate treatments are essentially nil. However, Holbrook, et al., 2018 "used univariate analyses and hurdle regression models to evaluate the spatio-temporal factors influencing lynx use of treatments." Their analyses "indicated ...there was a consistent cost in that lynx use was low up to ~10 years after **all silvicultural actions**." (Emphasis added.) From their conclusions:

First, we demonstrated that lynx clearly use silviculture treatments, but there is a ~10 year cost of implementing any treatment (thinning, selection cut, or regeneration cut) in terms of resource use by Canada lynx. This temporal cost is associated with lynx preferring advanced regenerating and mature structural stages (Squires et al., 2010; Holbrook et al., 2017a) and is consistent with previous work demonstrating a negative effect of precommercial thinning on snowshoe hare densities for ~10 years (Homyack et al., 2007). Second, if a treatment is implemented, Canada lynx used thinnings at a faster rate post- treatment (e.g.,~20 years posttreatment to reach 50% lynx use) than either selection or regeneration cuts (e.g., ~34–40 years post-treatment to reach 50% lynx use). Lynx appear to use regeneration and selection cuts similarly over time suggesting the difference in vegetation impact between these treatments made little difference concerning the potential impacts to lynx (Fig. 4c). Third, Canada lynx tend to avoid silvicultural treatments when a preferred structural stage (e.g., mature, multi-storied forest or advanced regeneration) is abundant in the surrounding landscape, which highlights the importance of considering landscape-level composition as well as recovery time. For instance, in an area with low amounts of mature forest in the neighborhood, lynx use of recovering silvicultural treatments would be higher versus treatments surrounded by an abundance of mature forest (e.g., Fig. 3b). This scenario captures the importance of post-treatment recovery for Canada lynx when the landscape context is generally composed of lower quality habitat. Overall, these three items emphasize that both the spatial arrangement and composition as well as recovery time are central to balancing silvicultural actions and Canada lynx conservation.

So Holbrook et al., 2018 fully contradict Forest Plan assumptions that clearcuts/regeneration can be considered useful lynx habitat as early as 20 years post-logging.

Results of a study by Vanbianchi et al., 2017 also conflict with Forest Plan/NRLMD assumptions: "Lynx used burned areas as early as 1 year postfire, which is much earlier than the 2–4 decades postfire previously thought for this predator." The NRLMD erroneously assumes clearcutting/regeneration logging have basically the same temporal effects as stand-replacing fire as far as lynx re-occupancy.

Kosterman, 2014, Vanbianchi et al., 2017 and Holbrook, et al., 2018 demonstrate that Forest Plan direction is not adequate for lynx viability and recovery, as the FS assumes.

The Forest Plan/FEIS fail to describe the quantity and quality of habitat that is necessary to sustain the viability of the Canada lynx.

At present, the EA's "not likely to adversely affect" determination for lynx and its critical habitat is not adequately supported.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

WESTERN (BOREAL) TOAD

Sensitive species were discussed in our EA comments at pp. 3, 5-6, 74 and our PA comments at pp. 9, 12-13. Also, issues regarding the western toad were raised in our Objection to the revised forest plan (OBJECTION STATEMENT: Management Indicator Species, OBJECTION STATEMENT: Sensitive species, OBJECTION STATEMENT: NFMA requirements for viability, OBJECTION STATEMENT: Old Growth Management Indicator Species).

The EA doesn't disclose the FS's strategy and best available science for insuring viable populations of the boreal toad. USDA Forest Service, 2003a states:

Little quantitative data are available regarding the boreal toad's use of upland and forested habitats. However, boreal toads are known to migrate between the aquatic breeding and terrestrial nonbreeding habitats (TNC Database 1999), and that juvenile and adult toads are capable of moving over 5 km between breeding sites (Corn et al. 1998). It is thought than juveniles and female boreal toads travel farther than the males (Ibid). A study on the Targhee National Forest (Bartelt and Peterson 1994) found female toads traveled up to 2.5 kilometers away from water after breeding, and in foraging areas, the movements of toads were significantly influenced by the distribution of shrub cover. Their data suggests that toads may have avoided macro-habitats with little or no canopy and shrub cover (such as clearcuts). Underground burrows in winter and debris were important components of toad selected micro-sites in a variety of macro-habitats. The boreal toad digs its own burrow in loose soil or uses those of small mammals, or shelters under logs or rocks, suggesting the importance of coarse woody debris on the forest floor. ...(T)imber harvest and prescribed burning activities could impact upland habitat by removing shrub cover, down woody material, and/or through compaction of soil.

Montana Fish, Wildlife & Parks, 2005 (a more recent version of the above cite "TNC Database, 1999") also discuss boreal toad habitat:

Habitats used by boreal toads in Montana are similar to those reported for other regions, and include low elevation beaver ponds, reservoirs, streams, marshes, lake shores, potholes, wet meadows, and marshes, to high elevation ponds, fens, and tarns at or near treeline (Rodgers and Jellison 1942, Brunson and Demaree 1951, Miller 1978, Marnell 1997, Werner et al. 1998, Boundy 2001). Forest cover in or near encounter sites is often unreported, but toads have been noted in open-canopy ponderosa pine woodlands and closed-canopy dry conifer forest in Sanders County (Boundy 2001), willow wetland thickets and aspen stands bordering Engelmann spruce stands in Beaverhead County (Jean et al. 2002), and mixed ponderosa pine/cottonwood/willow sites or Douglas-fir/ponderosa pine forest in Ravalli and Missoula counties (P. Hendricks personal observation).

Elsewhere the boreal toad is known to utilize a wide variety of habitats, including desert springs and streams, meadows and woodlands, mountain wetlands, beaver ponds, marshes, ditches, and backwater channels of rivers where they prefer shallow areas with mud bottoms (Nussbaum et al. 1983, Baxter and Stone 1985, Russell and Bauer 1993, Koch and Peterson 1995, Hammerson 1999). Forest cover around occupied montane wetlands may include aspen, Douglas-fir, lodgepole pine, Engelmann spruce, and subalpine fir; in local situations it may also be found in ponderosa pine forest. They also occur in urban settings, sometimes congregating under streetlights at night to feed on insects (Hammerson 1999, P. Hendricks personal observation). Normally they remain fairly close to ponds, lakes, reservoirs, and slow-moving rivers and streams during the day, but may range widely at night. Eggs and larvae develop in still, shallow areas of ponds, lakes, or reservoirs or in pools of slow-moving streams, often where there is sparse emergent vegetation. Adult and juvenile boreal toads dig burrows in loose soil or use burrows of small mammals, or occupy shallow shelters under logs or rocks. At least some toads hibernate in terrestrial burrows or cavities, apparently where conditions prevent freezing (Nussbaum et al. 1983, Koch and Peterson 1995, Hammerson 1999).

Maxell et al., 1998 state:
We believe that the status of the Boreal toad is largely uncertain in all Region 1 Forests. ...Briefly, factors which are a cause for concern over the viability of the species throughout Region 1 include: (1) a higher degree of genetic similarity within the range of Region 1 Forests relative to southern or coastal populations; (2) a general lack of both historical and current knowledge of status in the region; (3) indications of declines in areas which do have historical information; (4) low (5-10%) occupancy of seemingly suitable habitat as detected in recent surveys; (5) some evidence for recent restriction of breeding to low elevation sites and; (6) recent crashes in boreal toad populations in the southern part of its range which may indicate the species' sensitivity to a variety of anthropogenic impacts.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

WOL VERINE

Sensitive species were discussed in our EA comments at pp. 3, 5-6, 74 and our PA comments at pp. 9, 12-13. The wolverine was discussed in our EA comments at pp. 72 - 75. Also, issues regarding the wolverine were raised in our Objection to the revised forest plan (OBJECTION STATEMENT: Management Indicator Species, OBJECTION STATEMENT: Sensitive species, OBJECTION STATEMENT: NFMA requirements for viability, OBJECTION STATEMENT: Old Growth Management Indicator Species).

The wolverine is proposed for listing as a threatened species under the ESA. The proposed rule was issued in 2013. 78 Fed. Reg. 7864 (February 4, 2013). FWS withdrew the rule on August 13, 2014, and the withdrawal of the rule was deemed unlawful and vacated in 2016. *Defenders of Wildlife v. Jewell*, 176 F.Supp.3d 975 (D. Mont. 2016). Thus, the wolverine is currently proposed for listing under the ESA.1 81 Fed. Reg. 71670 (October 18, 2016). The FS must undergo formal consultation with the U.S. Fish & Wildlife Service.

Logging and road activities may affect wolverines; published, peer-reviewed research finds: "Roaded and recently logged areas were negatively associated with female wolverines in summer." Fisher et al., 2013. The "analysis suggests wolverines were negatively responding to human disturbance within occupied habitat. The population consequences of these functional habitat relationships will require additional focused research." Id.

There has been no project formal or informal consultation regarding the wolverine. The FS didn't include its Biological Assessment (the document submitted to the U.S. Fish & Wildlife Service in consultation or concurrence stages) on the project website. The project is in violation of the Endangered Species Act.

Wolverines use habitats ranging from Douglas-fir and lodgepole pine forest to subalpine whitebark pine forest (Copeland et al., 2007). Lofroth (1997) in a study in British Columbia, found that wolverines use habitats as diverse as tundra and old-growth forest. Wolverines are also known to use mid- to low-elevation Douglas-fir forests in the winter (USDA Forest Service, 1993).

Aubry, et al. 2007 note that wolverine range in the U.S. had contracted substantially by the mid- 1900s and that extirpations are likely due to human-caused mortality and low to nonexistent immigration rates.

May et al. (2006) cite: "Increased human development (e.g. houses, cabins, settlements and roads) and activity (e.g. recreation and husbandry) in once remote areas may thus cause reduced ability of wolverines to perform their daily activities unimpeded, making the habitat less optimal or causing wolverines to avoid the disturbed area (Landa & Skogland 1995, Landa et al. 2000a)."

Ruggiero, et al. (2007) state: "Many wolverine populations appear to be relatively small and isolated. Accordingly, empirical information on the landscape features that facilitate or impede immigration and emigration is critical for the conservation of this species."

Roads result in direct mortality to wolverines by providing access for trappers (Krebs et al., 2007). Trapping was identified as the dominant factor affecting wolverine survival in a Montana study (Squires et al. 2007). Female wolverines avoid roads and recently logged areas, and respond negatively to human activities (Krebs et al., 2007)

Ruggiero et al. (1994b) recognized that "Over most of its distribution, the primary mortality factor for the wolverines is trapping." Those authors also state, "Transient wolverines likely play a key role in the maintenance of spatial organization and the colonization of vacant habitat. Factors that affect movements by transients may be important to population and distributional dynamics."

Results from Scrafford et al., 2018:
...show that roads, regardless of traffic volume, reduce the quality of wolverine habitats and that higher-traffic roads might be most deleterious. We suggest that wildlife behavior near roads should be viewed as a continuum and that accurate modeling of behavior when near roads requires quantification of both movement and habitat selection. Mitigating

the effects of roads on wolverines would require clustering roads, road closures, or access management."

Roads and human density are important factors influencing current wolverine distribution (Carroll et al. 2001b); and wolverine habitat selection is negatively correlated with human activity – including roads (Krebs et al. 2007). Wolverine occurrence has shown a negative relationship with road densities greater than 2.8 mi/mi^2 (1.7 km/km^2) (Carroll et al. 2001b).

(T)he presence of roads can be directly implicated in human-caused mortality (trapping) of this species. Trapping was identified as the dominant factor affecting wolverine survival in a Montana study (Squires et al. 2007).

Krebs et al. (2007) state, "Human use, including winter recreation and the presence of roads, reduced habitat value for wolverines in our studies."

Wisdom et al. (2000) state:
Carnivorous mammals such as marten, fisher, lynx, and wolverine are vulnerable to over- trapping (Bailey and others 1986, Banci 1994, Coulter 1966, Fortin and Cantin 1994, Hodgman and others 1994, Hornocker and Hash 1981, Jones 1991, Parker and others 1983, Thompson 1994, Witmer and others 1998), and over-trapping can be facilitated by road access (Bailey and others 1986, Hodgman and others 1994, Terra-Berns and others 1997, Witmer and others 1998).

...Snow-tracking and radio telemetry in Montana indicated that wolverines avoided recent clearcuts and burns (Hornocker and Hash 1981).

Copeland (1996) found that human disturbance near natal denning habitat resulted in immediate den abandonment but not kit abandonment.

wolverine are heli-skiing, snowmobiles, backcountry skiing, logging, hunting, and summer recreation (Copeland 1996, Hornocker and Hash 1981, ICBEMP1996f).

Carroll et al. (2001b) state:
The combination of large area requirements and low reproductive rate make the wolverine vulnerable to human-induced mortality and habitat alteration. Populations probably cannot sustain rates of human-induced mortality greater than 7–8%, lower than that documented in most studies of trapping mortality (Banci 1994, Weaver et al. 1996).

... (T)he present distribution of the wolverine, like that of the grizzly bear, may be more related to regions that escaped human settlement than to vegetation structure.

Wisdom et al. (2000) offered the following strategies:

- Provide large areas with low road density and minimal human disturbance for wolverine
  and lynx, especially where populations are known to occur. Manage human activities and
  road access to minimize human disturbance in areas of known populations.

- Manage wolverine and lynx in a metapopulation context, and provide adequate links
  among existing populations.

- Reduce human disturbances, particularly in areas with known or high potential for
  wolverine natal den sites (subalpine talus cirques).
  The Forest Plan includes no coherent viability strategy for wolverine protection. Forest Plan protections for the wolverine revolve

entirely around the rather random likelihood of a wolverine den site being detected, so that measures might be taken: "Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened, or endangered species not covered under other forestwide guidelines." (FW-GDL- WL-25.) The Forest Plan provides no further direction on how motorized activities would be avoided or minimized other than vaguely stating, "Use the best available information to set a timeframe and a distance buffer around active nests or dens." (Id.) What is this best available science?

The Forest Plan/FEIS fail to describe the quantity and quality of habitat that is necessary to sustain the viability of the wolverine.

The Analysis of the Management Situation Technical Report for Revision of the Kootenai and Idaho Panhandle Forest Plans states:

Direct mortality (related to access) from trapping, legal hunting, and illegal shooting has impacted all wide-ranging carnivores (e.g. lynx, wolverine, grizzly and black bears, wolves)...

...Wolverine populations may have declined from historic levels, as a result of over- trapping, hunting, habitat changes, and intolerance to human developments. As the amount of winter backcountry recreation increases, wolverine den sites may become more susceptible to human disturbance.

In regards to the 2013 memo from the Regional Office (2013_0305_USDAWolverine Guidance), clearly the district-level wildlife specialists are prohibited from arriving at effects conclusions based upon their own expertise and judgment.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

WATER QUALITY AND FISHERIES

These issues were discussed in our PA comments at pp. 13-14. See also our EA comments at pp. 2, 12-13, and 74. Also, issues regarding water quality and aquatic species were raised in our Objection to the RFP (pp. 16-19, 23-30, 55, 74-79).

The EA provides no quantitative estimates of instream sediment or sediment yield directly, indirectly, and cumulatively. And although log haul and other traffic significantly increases the amounts of sediments transported from road surfaces to streams, the EA fails to quantify such impacts.

The Nez Perce-Clearwater NF's Johnson Bar EIS states, "Increased heavy-truck traffic related to log hauling can increase rutting and displacement of road-bed material, creating conditions conducive to higher sediment delivery rates (Reid and Dunne, 1984)." From an investigation of the Bitterroot Burned Area Recovery Project, hydrologist Rhodes (2002) notes, "On all haul roads evaluated, haul traffic has created a copious amounts of mobile, non-cohesive sediment on the road surfaces that will elevate erosion and consequent sedimentation, during rain and snowmelt events." USDA Forest Service, 2001a also presents an analysis of increased sedimentation because of log hauling, reporting "Increased traffic over these roads would be expected to increase sediment delivery from a predicted 6.30 tons per year to 7.96 tons per year."

USDA Forest Service, 2017e states:
Potential sediment delivery from roads used for log haul was evaluated using three methods: road encroachment, stream crossings, and sediment modeling. ... Roads within 300 feet of a water body are the most probable to deliver sediment (Belt et al. 1992). ... Road/stream crossings have a high potential to deliver sediment directly into streams. ... Sediment delivery to streams from existing roads and from project-related road activities was modeled using the Roaded WEPP module of the Water Erosion Prediction Project (WEPP).

Whereas sediment impacts from log hauling are potentially significant, the Black Ram EA fails to analyze or disclose such impacts.

The EA doesn't indicate proper and thorough analysis has occurred to justify logging and/or burning in RHCAs, as required by the Forest Plan. The Forest Plans allows for vegetation management to occur in RHCAs to meet desired conditions, so long as project activities do not prevent attainment of desired conditions. A large body of scientific research shows that logging near streams can have long-term and devastating consequences for stream ecological integrity and water quality. Logging in RHCAs can cause degradation of water quality such as stream temperature increases, changes to stream temperature patterns, increased fine sediment inputs, stream bank instability, and other problems. The EA and Forest Plan ignore and downplay the well-documented negative effects and ecological risks associated with logging within streamside corridors. Even non-commercial thinning in RHCAs is, at best, a large scale and ecologically risky experiment in which little is known about the outcome. Risks are considerable, and the outcome can have unintended negative consequences. Rieman et al. (2001)

noted: **"...vulnerable aquatic species could be impacted in the short term in ways from which they could not easily recover, even if long-term benefits eventually became evident in later years."**

Studies have found even 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). Flaspohler et al. (2002) noted that changes to biota associated with selective logging were found decades after logging. These studies strongly suggest that alterations caused by logging within RHCAs may result in significant changes in water quality parameters and stream biota in many areas; these results are likely tied to dynamics that may be common to many forested streams to varying degrees.

Guenther et al. (2012) found increases in stream temperature in relation to selective logging. They 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 logged area from 1.6 to 3 degrees Celsius.

In the draft Forest Plan Revision for the Blue Mountains, the FS discloses: "Research has shown that effective vegetated filter strips need to be at least 200 to 300 feet wide to effectively capture sediment mobilizing by overland flow from outside the riparian management area." It is logical that logging or thinning within 50 to 100 feet from streams (or closer) would cause fine sediment production and allow for sediment delivery into streams, and potentially contribute to stream temperature increases, increased variability in waters quality and aquatic habitat parameters, alterations to stream hydrology, and other negative impacts.

Furthermore, headwater streams and non-fish bearing streams need more, not less, protection (Rhodes et al., 1994; Moyle et al., 1996; Erman et al., 1996; Espinosa et al., 1997). Both Erman et al., 1996 and Rhodes et al., 1994 conclude, based on review of available information, that intermittent and non-fish-bearing streams should receive stream buffers significantly larger than those afforded by PACFISH/ INFISH. The revised forest plan should have fully protected buffers of at least 300 feet for all waterbodies.

The EA doesn't take a hard look at the condition of all streams and water bodies in the affected watersheds, and explain how those conditions contribute to fish population and trends. The EA doesn't disclose populations of fish species in the project area, and compare those numbers to minimum viable populations.

The Forest Plan has so much discretion as to render the aquatic standards arbitrary. The standards pertaining to watersheds and water quality, riparian, aquatic species and habitat are limited, narrowly focused, and contain language that could subvert the intent of the standard. No matter how badly degraded a drainage might be, no aquatic standards or thresholds would properly limit timber sales.

The FS must address the case law requirement that the FS insure that there exists the quantity and quality of habitat necessary to insure viability of aquatic species of concern. The Ninth Circuit Court of Appeals ruled that the FS "must both describe the quantity and quality of habitat that is necessary to sustain the viability of the species in question and explain its methodology for measuring this habitat." (*Lands Council v. McNair*). Assuring viability of most wildlife species is forestwide issue. The Forest Plan is not based upon scientific research regarding the forestwide amount and distribution of habitat needed to insure viability of vertebrate species of concern. Furthermore, the FS maintains an inaccurate old-growth inventory. What is the FS's way of describing the quantity and quality of habitat that is necessary to sustain the viability of the aquatic species in question on the KNF? Also, please "explain (the) methodology for measuring this habitat."

The Forest Plan's aquatic Macroinvertebrate Assemblage MIS does not comply with 36 CFR 219.19(a)(1), because the FS does not explain how it assures well-distributed, viable populations of other aquatic species such as bull trout, westslope cutthroat trout, inland redband trout, and western pearlshell mussel. Please disclose the results of monitoring the Macroinvertebrate Assemblage Management Indicator Species.

The EA doesn't disclose how the streams and the project area compare to forest plan standards, guidelines, and objectives. Please disclose the results of the most up-to-date monitoring of fish habitat, stream hydrological functioning, and fish population surveys in these same waters.

The desired conditions for the project area do not include fully functioning stream ecosystems that include healthy, resilient populations of native fish.

The EA doesn't disclose the areas of unstable and highly erosive soils that are at risk of mass movement and erosion—naturally or in combination with management activities.

USDA Forest Service, 2017c explains that native westslope cutthroat trout have declined due to habitat degradation:

The distribution and abundance of westslope cutthroat trout has declined from historic levels (less than 59 percent of historically occupied stream habitat) across its range, which included western Montana, central and northern Idaho, a small portion of Wyoming, and portions of three Canadian provinces (Liknes and Graham 1988, Shepard et al. 2005). Westslope cutthroat trout persist in only 27 percent of their historic range in Montana. Due to hybridization, genetically pure populations are present in only 2.5 percent of that range (Rieman and Apperson 1989). Introduced species have hybridized or displaced westslope cutthroat trout populations across their range. Hybridization causes loss of genetic purity of the population through introgression. Within the planning area, genetically pure populations of westslope cutthroat trout are known to persist in Ruby Creek (MFISH 1992, 2012). Some of these remaining genetically pure populations of westslope cutthroat trout are found above fish passage barriers that protect them from hybridization, but isolate them from other populations.

Brook trout are believed to have displaced many westslope cutthroat trout populations (Behnke 1992). Where the two species co-exist, westslope cutthroat trout typically predominate in higher gradient reaches and brook trout generally prevail in lower gradient reaches (Griffith 1988). This isolates westslope cutthroat trout populations, further increasing the risk of local extinction from genetic and stochastic factors (McIntyre and Rieman 1995).

Habitat fragmentation and the subsequent isolation of conspecific populations is a concern for westslope cutthroat trout due to the increased risk of local and general extinctions. The probability that one population in any locality will persist depends, in part on, habitat quality and proximity to other connected populations (Rieman and McIntyre 1993). Therefore, the several small, isolated populations left in the project area are at a moderate risk of local extirpation in the event of an intense drainage-wide disturbance.

Habitat degradation also threatens the persistence of westslope cutthroat trout throughout their range. Sediment delivered to stream channels from roads is one of the primary causes of habitat degradation. Sediment can decrease quality and quantity of suitable spawning substrate and reduce overwintering habitat for juveniles which reduces spawning success and increases overwinter mortality. Roads can also alter the drainage network of a watershed and thereby increase peak flows. The end result of increased peak flows is decreased channel stability and accelerated rates of mass erosion. Across their range the strongest populations of westslope cutthroat trout exist most frequently in the wilderness, Glacier National Park, and areas of low road densities or roadless areas (Liknes and Graham 1988, Marnell 1988, Rieman and Apperson 1989, Lee et al. 1997).

The Kootenai NF's Flower Creek Forest Health project EA states:
Fine sediment can greatly reduce the capability of winter and summer rearing habitats and decrease survival to emergence when sediment levels reach 30% or greater (Shepard et al. 1984). Fine sediment may have the greatest impact on winter rearing habitat for juvenile salmonids. Fine sediments can cap or fill interstitial spaces of streambed cobbles. When interstitial rearing space is unavailable, juvenile salmonids migrate until suitable wintering habitat can be found (Hillman et al. 1987). Fine sediment can also alter macroinvertebrate abundance and diversity.

US Fish and Wildlife Service (1998) recognizes, upland forest canopy removal raises stream temperatures. The FS must address best available science which indicates the openings created by the project clearcuts would result in increases to water in streams. (Id.):

Groundwater entering streams (especially small streams) may be an important determinant of stream temperatures (Spence et al. 1996) or may provide localized thermal refugia in larger stream systems. Where groundwater flows originate above the neutral zone (16-18 meters below the surface in general) groundwater temperatures will vary seasonally, as influenced by air temperature patterns (Spence et al. 1996). Timber harvest from upland areas exposes the soil surface to greater amounts of solar radiation than under forested conditions (Carlson and Groot 1997), elevating daytime temperatures of both air and soil (Fleming et al. 1998, Buckley et al. 1998, Morecroft et al. 1998) and increasing diurnal temperature fluctuations (Carlson and Groot 1997). Relationships between shallow source groundwater flows and air and soil temperatures indicate that harvest activities in upland areas may increase stream temperatures via increasing temperature of shallow groundwater inflows. Other pathways for harvest actions to influence stream temperature include changing the volume and timing of peak flows, elevating suspended sediment levels, and altering channel characteristics (Chamberlin et al. 1991, Spence et al. 1996, USDA and USDI 1998a).

US Fish and Wildlife Service, 1998 also states:

Frissell, 2014 states:
Roads are ecologically problematic in any environment because they affect biota, water quality, and a suite of biophysical processes through many physical, chemical, and biological pathways (Trombulak and Frissell 2000, Jones et al. 2000). The inherent contribution of forest roads to nonpoint source pollution (in particular sediment but also nutrients) to streams, coupled with the extensive occurrence of forest roads directly adjacent to streams through large portions of the range of bull trout in the coterminous US, adversely affects water quality in streams to a degree that is directly harmful to bull trout and their prey. This impairment occurs on a widespread and sustained basis; runoff from roads may be episodic and associated with annual high rainfall or snowmelt events, but once delivered to streams, sediment and associated pollutant deposited on the streambed causes sustained impairment of habitat for salmon and other sensitive aquatic and amphibian species. Current road design, management of road use and conditions, the locations of roads relative to slopes and water bodies, and the overall density of roads throughout most of the Pacific Northwest all contribute materially to this

impairment. This effect is apart from, but contributes additively in effect to the point source pollution associated with road runoff that is entrained by culverts or ditches before being discharged to natural waters.

Bull trout spawning typically occurs in areas influenced by groundwater (Allan 1980; Shepard et al. 1984; Ratliff 1992; Fraley and Shepard 1989). In a recent investigation in the Swan River drainage, bull trout spawning site selection occurred primarily in stream reaches directly influenced by groundwater upwellings or directly downstream of these upwelling reaches (Baxter and Hauer, *in prep.*). In addition, warmer summer stream temperatures, as well as extreme winter cold temperatures that can result in anchor ice, may be moderated by cold water upwellings.

Surface/groundwater interaction zones, which are typically selected by bull trout for redd construction, are increasingly recognized as having high dissolved oxygen; constant cold water temperatures; and increased macro-invertebrate production (R. Edwards, University of Washington, pers. comm. 1998).

Ongoing and proposed activities will deliver sediment into stream networks. Sediment in streams degrades native fish habitat by filling in interstitial spaces and pools, and decreasing inter-gravel dissolved oxygen concentrations. Deposited sediments harm native fish directly by smothering eggs in redds, altering spawning habitat, and reducing overwintering habitat for fry, and indirectly by altering invertebrate species composition, thereby decreasing abundance of preferred prey.

The EA doesn't disclose the trends of project area stream segments in terms of forest plan Riparian Management Objectives (RMOs)

The EA doesn't explain how the timber sale would comply with the Clean Water Act and all state water quality laws and regulations. Designating BMPs is not sufficient for compliance with CWA and NFMA. Please disclose the actual effectiveness of proposed BMPs in preventing sediment from reaching streams in or near the analysis area. What BMP failures have been noted for past projects with similar landtypes? Also, please disclose which segments of roads in the watersheds to be affected by this proposal would not meet BMPs following project activities.

The FS assumes that this project will adequately mitigate the problems chronically posed by the road network by project road work and BMP implementation, despite the fact that the FS knows otherwise. The KNF admits such problems in a non-NEPA context (USDA Forest Service, 2010t):

Constructing and improving drainage structures on Forest roads is an ongoing effort to reduce road-related stream sediment delivery. Although BMPs are proven practices that reduce the effects of roads to the watershed, it is not a static condition. Maintaining BMP standards for roads requires ongoing maintenance. Ecological processes, traffic and other factors can degrade features such as ditches, culverts, and surface water deflectors. Continual monitoring and maintenance on open roads reduces risks of sediment delivery to important water resources.

Also in a non-NEPA context, a forest supervisor (Lolo National Forest, 1999) frankly admits that projects are a "chance to at least correct some (BMP) departures rather than wait until the funding stars align that would allow us to correct all the departures at once."

Please disclose the temporal effectiveness or non-effectiveness of all the road maintenance and upgrading, because merely assuming that the proposed actions will forever mitigate the problems they now exhibit would be obfuscation.

The FS relies heavily upon BMPs to address the issues associated with logging roads, but only implemented within the context of a project such as Black Ram. However, comprehensive monitoring of the effectiveness of logging road BMPs in achieving water quality standards does not demonstrate the BMPs are protecting water quality, nor does it undermine the abundant evidence that stormwater infrastructure along logging roads continues to deposit large quantities of sediment into rivers and streams (Endicott, 2008). Even as new information becomes available about BMP effectiveness, many states do not update their logging road BMPs, and some states have retained BMPs that have been discredited for some time, such as using fords when they are known to have greater water quality impacts than other types of stream crossings. (Id.) If the

measure of success is whether a nonpoint source control program has achieved compliance with state water quality standards, the state forest practices programs have failed.

Again, these programs are only triggered when active logging operations occur. The lack of a requirement in most states to bring existing, inactive logging roads and other forest roads up to some consistent standard results in many forest roads that are not currently being used for logging falling through the regulatory cracks and continuing to have a negative impact on our water quality. Currently, only the State of Washington requires that old roads be upgraded to comply with today's standard BMPs. Across most of the country, the oldest, most harmful logging roads have been grandfathered and continue to deliver sediment into streams and rivers. (Id.)

BMPs are "largely procedural, describing the steps to be taken in determining how a site will be managed," but they lack "practical in-stream criteria for regulation of sedimentation from forestry activities." (Id.) The selection and implementation of BMPs are often "defined as what is practicable in view of 'technological, economic, and institutional consideration." (Id.) The ultimate effectiveness of the BMPs are therefore impacted by the individual land manager's "value system" and the perceived benefit of protecting the resource values as opposed to the costs of operations. (Id.)

Ziemer and Lisle (1993) note a lack of reliable data showing that BMPs are cumulatively effective in protecting aquatic resources from damage. Espinosa et al., 1997 noted that the mere reliance on BMPs in lieu of limiting or avoiding activities that cause aquatic damages serves to increase aquatic damage. Even activities implemented with somewhat effective BMPs still often contribute negative cumulative effects (Ziemer et al. 1991b, Rhodes et al. 1994, Espinosa et al. 1997, Beschta et al. 2004).

In analyses of case histories of resource degradation by typical land management (logging, grazing, mining, roads) several researchers have concluded that BMPs actually increase watershed and stream damage because they encourage heavy levels of resource extraction under the false premise that resources can be protected by BMPs (Stanford and Ward, 1993; Rhodes et al., 1994; Espinosa et al., 1997). termed this phenomenon the "illusion of technique."

The extreme contrast between streams in roaded areas vs. unroaded areas found on the Lolo NF (Riggers, et al. 1998) is a testament to the failures of the agency's BMP approach.

The EA fails to provide sufficient evidence or monitoring data demonstrating BMP effectiveness.

When considering how effective BMPs are at controlling non-point pollution on roads, both the rate of implementation of the practice, and the effectiveness of the practice should both be considered. The FS tracks the rate of implementation and the relative effectiveness of BMPs from in-house audits. This information is summarized in the *National BMP Monitoring Summary Report* with the most recent data being the fiscal years 2013-2014 (Carlson et al. 2015). The rating categories for implementation are "fully implemented," "mostly implemented," "marginally implemented," "not implemented," and "no BMPs." "No BMPs" represents a failure to consider BMPs in the planning process. More than a hundred evaluation on roads were conducted in FY2014. Of these evaluations, only about one third of the road BMPs were found to be "fully implemented" (*Id*., p. 12).

The monitoring audit also rated the relative effectiveness of the BMP. The rating categories for effectiveness are "effective," "mostly effective," "marginally effective," and "not effective." "Effective" indicates no adverse impacts to water from project or activities were evident. When treated roads were evaluated for effectiveness, almost half of the road BMPs were scored as either “marginally effective” or “not effective” (*Id*, p. 13).

A recent technical report by the FS entitled, *Effectiveness of Best Management Practices that Have Application to Forest Roads: A Literature Synthesis* summarized research and monitoring on the effectiveness of different BMP treatments (Edwards et al., 2016). They found that while several studies have found some road BMPs are effective at reducing delivery of sediment to streams, the degree of each treatment has not been rigorously evaluated (*Id*). Few road BMPS have been evaluated under a variety of conditions, and much more research is needed to determine the site-specific suitability of different BMPs (*Id*., also see Anderson et al., 2011).

Edwards et al., 2016 cites several reasons for why BMPs may not be as effective as commonly represented. Most watershed-scale studies are short-term and do not account for variation over time, sediment measurements taken at the mouth of a watershed do not account for in-channel sediment storage and lag times, and it is impossible to measure the impact of individual BMPs when taken at the watershed scale. When individual BMPs are examined there is rarely broad- scale testing in different geologic, topographic, physiological, and climatic conditions. Finally, in some instances, a single study is used to justify the use of a BMP across multiple states without adequate testing.

Climate change will further put into question the effectiveness of many road BMPs (Edwards et al., 2016). While the impacts of climate will vary from region to region (Furniss et al. 2010), more extreme weather is expected across the country which will increase the frequency of flooding, soil erosion, stream channel erosion, and variability of streamflow (*Id*). BMPs designed to limit erosion and stream sediment for current weather conditions may not be effective in the future. Edwards et al., 2016 state, “More-intense events, more frequent events, and longer duration events that accompany climate change may demonstrate that BMPs perform even more poorly in these situations. Research is urgently needed to identify BMP weaknesses under extreme events so that refinements, modifications, and development of BMPs do not lag behind the need."

Climate change is also expected to lead to more extreme weather events, resulting in increased flood severity, more frequent landslides, altered hydrographs, and changes in erosion and sedimentation rates and delivery processes. (Halofsky et al., 2011.) Many National Forest roads are poorly located and designed to be temporarily on the landscape, making them particularly vulnerable to these climate alterations. (*Id*.) Even those designed for storms and water flows typical of past decades may fail under future weather scenarios, further exacerbating adverse ecological impacts, public safety concerns, and maintenance needs. (Strauch et al., 2015.) At bottom, climate change predictions affect all aspects of road management, including planning and prioritization, operations and maintenance, and design. (Halofsky et al., 2011.)

The FS fails to analyze in detail the impact of climate change on forest roads and forest resources. It should start with a vulnerability assessment, to determine the analysis area's exposure and sensitive to climate change, as well as its adaptive capacity. For example, the agency should consider the risk of increased disturbance due to climate change when analyzing this proposal. It should include existing and reasonably foreseeable climate change impacts as part of the affected environment, assess them as part of the agency's hard look at impacts, and integrate them into each of the alternatives, including the no action alternative. The agency should also consider the cumulative impacts likely to result from the proposal, proposed road activities, and climate change. In planning for climate change impacts and the proposed road activities, the Forest Service should consider: (1) protecting large, intact, natural landscapes and ecological processes; (2) identifying and protecting climate refugia that will provide for climate adaptation; and (3) maintaining and establishing ecological connectivity. Schmitz and Trainor, 2014.)

The EA refers to the Yaak River Watershed Sediment TMDL and the East Fork Yaak River nutrient TMDL. It mentions some "recommendations" but doesn't comprehensively disclose the requirements of the TMDLs. Therefore it is impossible to determine from the EA if the project isconsistent with the TMDL.

The EA doesn't disclose the intensity or thoroughness of surveys for inventorying sediment sources in the project area. See Fly et al. 2011, which describes a thorough survey in the Boise National Forest. The EA doesn't disclose the metrics you are using to estimate elevated, unnatural sources of sediment yield into streams.

Log hauling itself adds sediment to streams. From an investigation of the Bitterroot Burned Area Recovery Project, hydrologist Rhodes (2002) notes, "On all haul roads evaluated, haul traffic has created a copious amounts of mobile, non-cohesive sediment on the road surfaces that will elevate erosion and consequent sedimentation, during rain and snowmelt events." USDA Forest Service, 2001a also presents an analysis of increased sedimentation because of log hauling, reporting "Increased traffic over these roads would be expected to increase sediment delivery from a predicted 6.30 tons per year to 7.96 tons per year."

The EA doesn't disclose the existing conditions of site specific stream reaches and project effects on water quality, fish and other aquatic resources. The EA doesn't disclose information regarding the existence and effects of bedload and accumulated sediment. The EA doesn't analyze and disclose channel stability for specific stream reaches. The EA doesn't disclose the amount of existing accumulated fine and bedload sediment that remains from the previous logging and road construction.

Kappesser, 2002 discusses an assessment procedure used on the IPNF: The RSI [Riffle Stability Index] addresses situations in which increases in gravel bedload from headwaters activities is depositing material on riffles and filling pools, and it reflects qualitative differences between reference and managed watersheds...it can be used as an indicator of stream reach and watershed condition and also of aquatic habitat quality.

Peak flows can be altered by forest harvest activities after removal of canopy through less interception, which results in more snow accumulation and snowmelt available for runoff (Troendle and King 1985). Please disclose the potential for the project to damage channel morphology and aquatic habitat.

Please conduct an analysis of water flow alteration effects on stream bank erosion and channel scouring during spring runoff and/or rain-on-snow (ROS) events. Most segment altering and channel forming events occur during instantaneous flows.

Openings accumulate much more snow than in a forested areas that are not as "open," thus provide a significant contribution to water yield especially during ROS and spring runoff events. The number, mileage and proximity of the roads to the proposed logging units and streams are important because they will also have a significant effect on peak flows and the resultant impact on fish, steam channels and possible flooding.

According to Kappesser, 1992:
The stability condition of a watershed may be broadly determined by evaluating the level of harvest activity (ECA), its spatial distribution with regard to headwater harvest and rain on snow risk and the density of roading in the watershed with consideration of road location relative to geology and slope. Each of these four factors may [be] evaluated against "threshold" levels of activity characteristic of watersheds on the IPNF that are known to be stable, unstable, or on a threshold of stability.

ROS events can be the most channel changing, sediment producing events and can have a significant adverse effect on fish and their habitat (Kappesser, 1991b):

Filling of pools by bedload sediment is seen as a significant factor in the reduction of rearing and overwintering habitat for fish such as West Slope Cutthroat Trout (Rieman and Apperson, 1989). Bedload increases have traditionally been interpreted as the result of channel scour in response to increased peak flows created by timber harvest.

(Also see Kappesser, 1991a.) The Inland Northwest frequently gets at least one mid-winter chinook which is often accompanied by windy and rainy conditions. The warm wind blowing across the snow, especially in relatively open areas on south and southwestern facing slopes between 2,500 to 4,500 feet elevation results in rapid snow melt and high levels of instantaneous water flows.

King, 1994 explains that small headwaters areas are particularly sensitive to the increased water yields due to removal of tree canopy:

Timber removal on 25-37% of the area of small headwater watersheds increased annual water yield by an average of 14.1 inches, prorated to the area in harvest units and roads. Increases in streamflow occurred during the spring snowmelt period, especially during the rising portion of the snowmelt hydrograph. These forest practices also resulted in large increases in short duration peakflows, greatly increasing the sediment transport capacity of these small streams. The cumulative effects of these activities on streamflow in the Main Fork, with only 6.3% of its area in roads and harvest units, were not detectable.

Ziemer, 1998 observed the same phenomenon in his study on flooding and stormflows. Also, King, 1989 observed that "Current procedures for estimating the hydrologic responses to timber removal of third to fifth order streams often ignore what may be hydrologically important modifications in the low-order streams."

USDA Forest Service 1994b states:
It is important to recognize that the Equivalent Clearcut Area model uses tree growth (canopy density) to estimate Spring peak flows and that

channels do not recover immediately in response to tree growth. There is a lag time between hilltop recovery (growth) and channel recovery. The length of the lag time is difficult to predict and is likely to be influenced by factors other than simply canopy density (e.g. the role of culvert failures, in-stream activities, geology, etc.).

USDA Forest Service 1994b states "It is important to realize that all models greatly simplify complex processes and that the numbers generated by these models should be interpreted in light of field observations and professional judgement." (III-77.) Harr, 1987 states:

Perhaps the most basic of the erroneous beliefs is the idea that simplicity can be willed on the forest hydrologic system. This belief encourages the implementation of simplistic guidelines, the adoption of arbitrary thresholds of concern, and the search for all- encompassing methodologies to predict consequences of forest activities on water resources. These actions occur sometimes with the blessings of hydrologists or soil scientists but other times over their objections. The belief in simplicity has been nurtured by the rapid increase in the use of computer simulation models in forest planning and the desire to accept the output from such models. Another reason for pursuit of simplicity is the current emphasis on planning called for by NFMA; such planning is often conducted under strict time and budgetary constraints.

I must point out that, on the average, the simplistic methodologies may have resulted in fairly prudent forest management. But rather than being viewed as merely a first attempt at solving a problem, they often seem to inhibit further investigation and development. Also, they tend to lead forest managers and some specialists to believe that hydrologic systems really do function in the manner described by the simplistic methodologies.

Forest hydrologic systems are more complex than one would believe after reading some of the methodologies and procedures that have been proposed to predict cumulative effects of logging on water resources.

For example, many of these procedures state that a threshold of harvest activity or intensity will be determined, without specifying how it will be determined or whether it really exists or can be measured. Similarly, implementing a methodology for estimating cumulative effects of harvest operations on water resources does not mean that such cumulative effects either exist or can be measured.

(I)n our desire to simplify, to create a methodology that will predict consequences of harvest activities everywhere or in the average situation, we usually expend considerable

energy creating a methodology that predicts reasonably accurately virtually nowhere. We may implement procedures without providing for testing or monitoring the results to see whether the procedures are, in fact, working. In the process, we may even develop a false sense of security that our methodology can really protect soil and water resources.

U.S. Fish and Wildlife Service, 2015 states:
Culverts that remain in the road behind gates and berms that are not properly sized, positioned, and inspected ...have an increased risk for failure by reducing awareness of potential maintenance needs. The accumulation of debris has the potential to obstruct culverts and other road drainage structures. Without maintenance and periodic cleaning, these structures can fail, resulting in sediment production from the road surface, ditch, and fill slopes. The design criteria to address drainage structures left behind gates and berms require annual monitoring of these structures.

Log hauling adds sediment to streams. USDA Forest Service, 2016b states, "Increased heavy- truck traffic related to log hauling can increase rutting and displacement of road-bed material, creating conditions conducive to higher sediment delivery rates (Reid and Dunne, 1984)." The abstract from Reid and Dunne, 1984 states:

Erosion on roads is an important source of fine-grained sediment in streams draining logged basins of the Pacific Northwest. Runoff rates and sediment concentrations from 10 road segments subject to a variety of traffic levels were monitored to produce sediment rating curves and unit hydrographs for different use levels and types of surfaces. These relationships are combined with a continuous rainfall record to calculate mean annual sediment yields from road segments of each use level. A heavily used road segment in the field area contributes 130 times as much sediment as an abandoned road. A paved road segment, along which cut slopes and ditches are the only sources of sediment, yields less than 1% as much sediment as a heavily used road with a gravel surface.

The Watershed Disturbance Rating strongly suggests forestwide direction to attain watershed restoration. Yet, there are no forestwide standards for those parameters, which is needed to provide much stronger prioritization towards meeting forestwide Watershed and Water Quality Desired Conditions.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

FIRE POLICY AND FIRE ECOLOGY

Fire policy and fire ecology were raised in PA comments at pp. 4-8, 14, 15. Also see EA comments at pp. 7, 57, 66, and 90-94. Issues regarding cumulative effects of fire suppression were also raised in our Objection to the revised forest plan (OBJECTION STATEMENT: FEIS analysis of fire suppression).

Scientific information concerning fire suppression became a major theme of the Interior Columbia Basin Ecosystem Management Project (ICBEMP) in the 1990s: "Aggressive fire suppression policies of Federal land-managing agencies have been increasingly criticized as more has been learned about natural fire cycles." (USDA FS & USDI BLM 1996, p. 22.)

Also, “Substantial changes in disturbance regimes—especially changes resulting from fire suppression, timber management practices, and livestock grazing over the past 100 years—have resulted in moderate to high departure of vegetation composition and structure and landscape mosaic patterns from historical ranges.” (USDA FS & USDI BLM 2000, Ch. 4. P. 18.)

Such effects of fire suppression are not unique to this project area—similar language has been included in NEPA documents for all logging projects on the KNF for over two decades. If fire suppression effects as described in the EA are occurring, it means that, as forestwide fire suppression continues, the results of this management include continuing **increases in these adverse effects across the entire forest.** So multiply the above list of effects times the extent of the entire forest, and what the agency tacitly admits is, forestwide fire suppression is leading to stand-replacing fires outside what is natural, and that alternation of fire regimes results in wide- scale disruption of habitats for wildlife, rare plants, tree insect and disease patterns and increases the occurrence of noxious weeds. Such analyses and disclosures are not found in the Forest Plan FEIS.

Even if there is scientific legitimacy to the claims that fuel reductions reduce ecological damage from subsequent fire—a claim that is scientifically controversial and unproven for the long term, and unquantified for any defined short term—the area affected by such projects in recent years is miniscule compared to the entire, fire-suppressed Forest.

It may be that fire suppression in the project area has not, in reality, caused a significantly elevated risk of abnormal fire in the project area. We believe the agency is playing this fire-scare card in the EA largely to justify logging as “restoration.” However, playing the fire scare card is not just a project area issue—it's forestwide. The agency puts the joker in the deck, changing the whole game—not just one hand as the FS pretends.

The no-action alternative contemplated under the ICBEMP EIS is the management direction found in the Forest Plan: "Alternative S1 (no action) continues management specified under each existing Forest Service and BLM land use plan, as amended or modified by interim direction—known as Eastside Screens (national forests in eastern Oregon and Washington only), PACFISH, and INFISH—as the long-term strategy for lands managed by the Forest Service or BLM." (USDA FS & USDI BLM 2000. Ch. 5, pp 5-6.)

The philosophy driving the FS strategy to replicate historic vegetative conditions (i.e. desired conditions) is that emulation of the results of disturbance processes would conserve biological diversity. McRae et al. 2001 provide a scientific review summarizing empirical evidence that illustrates several significant differences between logging and wildfire—differences which the EA fails to address. Also, Naficy et al. 2010 found a significant distinction between fire- excluded ponderosa pine forests of the northern Rocky Mountains logged prior to 1960 and paired fire-excluded, unlogged counterparts:

We document that fire-excluded ponderosa pine forests of the northern Rocky Mountains logged prior to 1960 have much higher average stand density, greater homogeneity of stand

structure, more standing dead trees and increased abundance of fire-intolerant trees than paired fire-excluded, unlogged counterparts. Notably, the magnitude of the interactive effect of fire exclusion and historical logging substantially exceeds the effects of fire exclusion alone. These differences suggest that historically logged sites are more prone to severe wildfires and insect outbreaks than unlogged, fire-excluded forests and should be considered a high priority for fuels reduction treatments. Furthermore, we propose that ponderosa pine forests with these distinct management histories likely require distinct restoration approaches. We also highlight potential long-term risks of mechanical stand manipulation in unlogged forests and emphasize the need for a long-term view of fuels management.

Typically, attempts to control or resist the natural process of fire have been a contributor to deviations from Desired Conditions. The EA analyses skew toward considering fire as well as native insects and other natural pathogens as threats to the ecosystem rather than rejuvenating natural processes. It seems to need the obsolete viewpoint in order to justify and prioritize the proposed vegetation manipulations, tacitly for replacing natural processes with "treatments" and "prescriptions." However the scientific support for assuming that ecosystems can be restored or continuously maintained by such manipulative actions is entirely lacking.

Biologist Roger Payne has the following to say about the same kind of hubris represented by the FS's view that it can manipulate and control its way to a restored forest by more intensive management:

One often hears that because humanity's impact has become so great, the rest of life on this planet now relies on us for its succession and that we are going to have to get used to managing natural systems in the future—the idea being that since we now threaten everything on earth we must take responsibility for holding the fate of everything in our hands. This bespeaks a form of unreality that takes my breath away... The cost of just finding out enough about the environment to become proper stewards of it—to say nothing of the costs of acting in such a way as to ameliorate serious problems we already understand, as well as problems about which we haven't a clue—is utterly prohibitive. And the fact that monitoring must proceed indefinitely means that on economic grounds alone the only possible way to proceed is to face the fact that by far the cheapest means of continuing life on earth as we know it is to **curb ourselves instead of trying to take on the proper management of the ecosystems we have so entirely disrupted.**

(Payne 1995, emphasis added.) Karr (1991) cites a definition of ecological integrity as “the ability to support and maintain "a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region.” Karr (1991) also cites a definition of ecological health: “a biological system ... can be considered healthy when its inherent potential is realized, its condition is stable, its capacity for self-repair when perturbed is preserved, and **minimal external support for management is needed**.” (Emphasis added.) The EA definition of resilience misses that last aspect of ecological health—specifically that it doesn’t need management meddling.

Likewise Angermeier and Karr (1994) describe biological integrity as referring to “conditions under little or no influence from human actions; a biota with high integrity reflects natural evolutionary and biogeographic processes.”

In their conclusion, Hessburg and Agee, 2003 state “Desired future conditions will only be realized by planning for and creating the desired ecosystem dynamics represented by ranges of conditions, set initially in strategic locations with minimal risks to species and processes.”

Forest Plan FEIS: “The function and process of ecological systems has changed and fire suppression and some management activities have altered fuel loadings. As documented in Keane et al. (2002), the changes include an increase in shade-tolerant species, decrease in fire- tolerant species, increased vertical stand structure, increased canopy closure, increased vertical fuel ladders, greater biomass, greater fire intensities and severities, and increased insect and disease epidemics.” The Black Ram EA doesn’t present the kind of data that would validate that Forest Plan assumption for the KNF or project area.

The FS’s foreseeable budget for the KNF would not allow enough vegetation management under the agency’s paradigm to “fix” the problems the FS says would be perpetuated by fire suppression. The Forest Plan

DEIS discloses that, with the likely scenario of a constrained budget as reflected by the 5-year average of funding allocated to the KNF from 2006 to 2010, the preferred alternative would be able to "move towards" vegetation Desired Conditions 546,119 acres—**only 25%** of the KNF over the next **250 years.** Even the Forest Plan DEIS's most optimistic (though unrealistic) scenario using an unconstrained budget shows that only 43% of the KNF could be treated over the next 250 years. The FS did not conduct any analysis that faces up to any **likely** budget scenario, in regards to the overall management emphasis to "Move towards" vegetation Desired Conditions using active management—mostly logging. The implication is clear: logging and fire suppression is intended to continually dominate, except in those weather situations when and where suppression actions are ineffective, in which case fires of high severity will occur across relatively wide areas. No cumulative effects analysis at any landscape scale exists to disclose the environmental impacts.

Also in describing what it claims to be landscape departures from the HRV, the EA does not provide a spatial analysis, either for the true reference conditions or of current project area conditions. The EA has no scientifically defensible analysis of the project area **landscape pattern** departure from HRV.

The EA assumes that natural fire regimes operating here would maintain practically all the low and mid-elevation forests in open conditions with widely spaced mature and old trees. The FS fails to acknowledge that mixed-severity and even low-severity fire regimes result in much more variable stand conditions across the landscape through time. Assumptions that drier forests did not experience stand-replacing fires, that fire regimes were frequent and nonlethal, that these stands were open and dominated by large well-spaced trees, and that fuel amounts determine fire severity (the false thinning hypothesis that fails to recognize climate as the overwhelming main driver of fire intensity) are not supported by science (see for example Baker and Williams 2015, Williams and Baker 2014, Baker et al. 2006, Pierce et al. 2004, Baker and Ehle 2001, Sherriff et al. 2014). Even research that has uncritically accepted the questionable ponderosa pine model that may only apply to the Mogollon Rim of Arizona and New Mexico (and perhaps in similar dry-forest types in California), notes the inappropriateness of applying that model to elsewhere (see Schoennagel et al. 2004). The EA's assertion that the proposed treatments will result in likely or predictable later wildland fire effects is of considerable scientific doubt (Rhodes and Baker, 2008).

Despite the fact that the EA makes many statements to the effect that without the proposed treatments there is a high likelihood of highly adverse effects on various resources due to wildfire (especially in describing effects of the No Action alternative) the EA discloses little about such effects from recent fires in the area. For example, the EA fails to discuss in much detail the effects the 2018 Davis Fire (which burned about 4,000 acres on the KNF, including within the Black Ram project area). When comments asked about the significance of the Davis Fire, the FS dodged the question, stating "The effects of the Davis Fire have been incorporated into the existing condition of the project area..."

Large fires are weather-driven events, not fuels-driven. When the conditions exist for a major fire—which includes drought, high temperatures, low humidity and high winds—nothing, including past logging, halts blazes. Such fires typically self-extinguish or are stopped only when less favorable conditions occur for fire spread. As noted in Graham, 2003:

The prescriptions and techniques appropriate for accomplishing a treatment require understanding the fuel changes that result from different techniques and the fire behavior responses to fuel structure**. Fuel treatments, like all vegetation changes, have temporary effects and require repeated measures, such as prescribed burning, to maintain desired fuel structure.**

Fire Regime Condition Class is a metric that estimates the departure of the forest from historic fire processes and vegetation conditions. Fire regime condition class is derived by comparing current conditions to an estimate of the historical conditions that existed before significant Euro-American settlement. The EA does not disclose the limitations of this methodology. This method likely has very limited accuracy and tends to overestimate the risk of higher-severity fire posed by fuel loads, as documented by studies of recent fires (Odion and Hanson, 2006). Those researchers state:

Condition Class, was not effective in identifying locations of high-severity fire. ... In short, Condition Class identified nearly all forests as being at high risk of burning with a dramatic increase in fire severity compared to past fires. Instead, we found that the forests under investigation were at low risk for burning at high-severity, especially when both spatial and temporal patterns of fire are considered.

Another critique is found in Rhodes (2007) who states:
Several of the biases ...are embodied in the Fire Regime Condition Class (FRCC) approach (Hann and Bunell, 2001), which is widely used to provide an index of the potential for uncharacteristically severe fire and fire regime alteration. The FRCC relies on of estimates of mean fire intervals, but does not require that they be estimated on the basis of site-specific historical data. It emphasizes fire scar data, but does not require its collection and analysis on a site-specific basis. The FRCC's analysis of departure from natural fire regimes also relies on estimates of how many estimated mean fire intervals may have been

skipped. The method does not require identification and consideration of fire-free intervals in site-specific historic record. Notably, a recent study that examined the correlation of FRCC estimates of likely fire behavior with actual fire behavior in several large fires recently burning the Sierra Nevada in California concluded: "[Fire Regime] Condition Class was not able to predict patterns of high-severity fire. . . . Condition Class identified nearly all forests as being at high risk of burning with a dramatic increase in fire severity compared to past fires. Instead, we found that the forests under investigation were at low risk for burning at high-severity, especially when both spatial and temporal patterns of fire are considered." (Odion and Hanson, 2006.) These results corroborate that FRCC is biased toward overestimating the alteration of fire regimes and the likelihood of areas burning at uncharacteristically high severity if affected by fire. Therefore, in aggregate there is medium degree of certainty that the FRCC is biased toward overestimating departures from natural fire regimes and the propensity of forests to burn at higher severity when affected by fire.

If the predictions of uncharacteristically severe fire attributed to the No-action alternative were accurate, one might think that the results of scientific validation of such assumptions would have been conducted in the KNF by now, and cited in the EA. We find no data or scientific analysis of those fires' effects validating the EA's predictions of uncharacteristically severe fire effects if the logging is not conducted.

The EA fails to explain the fire implications of no treatment applied to most of the project area under the action alternatives.

"(M)any units would not receive fuel abatement until 1-3 years following harvest operation..." The fire risk implications for forest resources from this delay is not analyzed or disclosed.

The EA did not provide a genuine analysis and disclosure of the varying amounts and levels of effectiveness of fuel changes attributable to: the varying ages of the past cuts, the varying forest types, the varying slash treatments, etc.

See: "'Blatant manipulation': Trump administration exploited wildfire science to promote logging" as just one more reason the executive branch cannot be trusted in regards to scientific issues, especially fire.

We incorporate "A New Direction for California Wildfire Policy—Working from the Home Outward" dated February 11, 2019 from the Leonard DiCaprio Foundation. It criticizes policies from the state of California, which are essentially the same Forest Service fire policies on display in the KNF. From the Executive Summary: “These policies try to alter vast areas of forest in problematic ways through logging, when instead they should be focusing on helping communities safely co-exist with California’s naturally fire-dependent ecosystems by prioritizing effective fire-safety actions for homes and the zone right around them. This new direction— working from the home outward—can save lives and homes, save money, and produce jobs in a strategy that is better for natural ecosystems and the climate.” It also presents an eye-opening analysis of the Camp Fire, which destroyed the town of Paradise.

We also incorporate the John Muir Project document “Forest Thinning to Prevent Wildland Fire ...vigorously contradicted by current Science” (Attachment 2).

We likewise incorporate “Open Letter to Decision Makers Concerning Wildfires in the West” signed by over 200 scientists (Attachment 3).

And also see “Land Use Planning More Effective Than Logging to Reduce Wildfire Risk” (Attachment 4).

Baker, 2015, states: “Programs to generally reduce fire severity in dry forests are not supported and have significant adverse ecological impacts, including reducing habitat for native species dependent on early-successional burned patches and decreasing landscape heterogeneity that confers resilience to climatic change.”

Baker, 2015 concluded: “Dry forests were historically renewed, and will continue to be renewed, by sudden, dramatic, high-intensity fires after centuries of stability and lower-intensity fires.”

Baker, 2015 writes: “**Management issues...** The evidence presented here shows that efforts to generally lower fire severity in dry forests for ecological restoration are not supported.”

In his book, “Fire Ecology in Rocky Mountain Landscapes” William Baker writes on page 435, “...a prescribed fire regime that is too frequent can reduce species diversity (Laughlin and Grace 2006) and favor invasive species (M.A. Moritz and Odion 2004). Fire that is entirely low severity in ecosystems that historically experience some high-severity fire may not favor germination of fire-dependent species (M.A. Moritiz and Odion 2004) or provide habitat key animals (Smucker, Hutto, and Steele 2005).” And on page 436: “Fire rotations equal the average mean fire interval across a landscape and are appropriate intervals at which individual points or the whole landscape is burned. Composite fire intervals underestimate mean fire interval and fire rotation (chap 5) and should not be used as prescribed burning intervals as this would lead to too much fire and would likely lead to adversely affect biological diversity (Laughlin and Grace 2006).”

Baker estimates the high severity fire rotation to be 135 - 280 years for lodgepole pine forests. (See page 162.). And on pp. 457-458: “Fire rotation has been estimated as about 275 years in the Rockies as a whole since 1980 and about 247 years in the northern Rockies over the last century, and both figures are near the middle between the low (140 years) and high (328 years) estimates for fire rotation for the Rockies under the HRV (chap. 10). These estimates suggest that since Euro-American settlement, fire control and other activities may have reduced fire somewhat in particular places, but a general syndrome of fire exclusion is lacking. Fire exclusion also does not accurately characterize the effects of land users on fire or match the pattern of change in area burned at the state level over the last century (fig. 10.9). In contrast, fluctuation in drought linked to atmospheric conditions appear to match many state-level patterns in burned area over the last century. Land uses that also match fluctuations include logging, livestock grazing, roads and development, which have generally increased flammability and ignition at a time when the climate is warming and more fire is coming.”

Schoennagel et al., 2004 state: “High-elevation subalpine forests in the Rocky Mountains typify ecosystems that experience infrequent, high-severity crown fires []. . . The most extensive subalpine forest types are composed of Engelmann spruce (Picea engelmannii), subalpine fir (Abies lasiocarpa), and lodgepole pine (Pinus contorta), all thin-barked trees easily killed by fire.

Extensive stand-replacing fires occurred historically at long intervals (i.e., one to many centuries) in subalpine forests, typically in association with infrequent high-pressure blocking systems that promote extremely dry regional climate patterns.”

Schoennagel et al., 2004 state:

(I)t is unlikely that the short period of fire exclusion has significantly altered the long fire intervals in subalpine forests. Furthermore, large, intense fires burning under dry conditions

are very difficult, if not impossible, to suppress, and such fires account for the majority of area burned in subalpine forests.

Moreover, there is no consistent relationship between time elapsed since the last fire and fuel abundance in subalpine forests, further undermining the idea that years of fire suppression have caused unnatural fuel buildup in this forest zone.

No evidence suggests that spruce–fir or lodgepole pine forests have experienced substantial shifts in stand structure over recent decades as a result of fire suppression. Overall, variation in cli-mate rather than in fuels appears to exert the largest influence on the size, timing, and se-verity of fires in subalpine forests []. We conclude that large, infrequent stand replacing fires are ‘business as usual’ in this forest type, not an artifact of fire suppression.

Contrary to popular opinion, previous fire suppression, which was consistently effective from about 1950 through 1972, had only a minimal effect on the large fire event in 1988 [].

Reconstruction of historical fires indicates that similar large, high-severity fires also occurred in the early 1700s []. Given the historical range of variability of fire regimes in high- elevation subalpine forests, fire behavior in Yellowstone during 1988, although severe, was neither unusual nor surprising.

Mechanical fuel reduction in subalpine forests would not represent a restoration treatment but rather a departure from the natural range of variability in stand structure.

Given the behavior of fire in Yellowstone in 1988, fuel reduction projects probably will not substantially reduce the frequency, size, or severity of wildfires under extreme weather conditions.

The Yellowstone fires in 1988 revealed that variation in fuel conditions, as measured by stand age and density, had only minimal influence on fire behavior. Therefore, we expect fuel- reduction treatments in high-elevation forests to be generally unsuccessful in reducing fire frequency, severity, and size, given the overriding importance of extreme climate in controlling fire regimes in this zone. Thinning also will not re-store subalpine forests, because they were dense historically and have not changed significantly in response to fire suppression. Thus, fuel-reduction efforts in most Rocky Mountain sub probably would not effectively mitigate the fire hazard, and these efforts may create new ecological problems by moving the forest structure out-side the historic range of variability.

Whereas the EA claims to be reducing risk of wildfire by reducing forest canopy density— particularly (but not exclusively) in old growth—the proposed action will result in increased fire severity and more rapid fire spread. This common sense is recognized in a news media discussion of the 2017 Eagle Creek fire in Oregon:

Old growth not so easy to burn:

Officials said the fire spread so rapidly on the third and fourth days because it was traveling across lower elevations.

The forests there aren't as thick and as dense as the older growth the fire's edge is encountering now - much of it in the Mark O. Hatfield Wilderness, Whittington said.

Whittington said because **there's more cover from the tree canopy, the ground is moister -- and that's caused the fire to slow. Also, bigger trees don't catch fire as easily**, he said.

(Emphasis added.) The FS also likes to trot out the premise that tree mortality from native insect activity and other agents of tree mortality increase risk of wildfire. Again, this is not supported by science. Meigs, et al., 2016 found "that insects generally reduce the severity of subsequent wildfires. ... By dampening subsequent burn severity, native insects could buffer rather than exacerbate fire regime changes expected due to land use and climate change. In light of these findings, we recommend a precautionary approach when designing and implementing forest management policies intended to reduce wildfire hazard and increase resilience to global change."

Also *see* Black, S.H. 2005 (Logging to Control Insects: The Science and Myths Behind Managing Forest Insect "Pests." A Synthesis of Independently Reviewed Research) and Black, et al., 2010 (Insects and Roadless Forests: A Scientific Review of Causes, Consequences and Management Alternatives) as well as DellaSala (undated), Kulakowski (2013), Hanson et al., 2010, and Hart et al., 2015. And for an ecological perspective from the FS itself, see Rhoades et al., 2012, who state: "While much remains to be learned about the current outbreak of mountain pine beetles, researchers are already finding that **beetles may impart a characteristic**

critically lacking in many pine forests today: structural complexity and species diversity." (Emphasis added.)

McClelland (undated) criticizes the aim to achieve desired conditions by the use of mitigation measures calling for retention of specific numbers of certain habitat structures:

The snags per acre approach is not a long-term answer because it **concentrates on the products of ecosystem processes rather than the processes themselves**. It does not address the most critical issue—long-term perpetuation of diverse forest habitats, a mosaic pattern which includes stands of old-growth larch. **The processes that produce suitable habitat must be retained or reinstated by managers. Snags are the result of these processes** (fire, insects, disease, flooding, lightning, etc.).

The FS seems institutionally incapable of recognizing the highly restorative and beneficial effects of wildland fire, managing to prevent the effects of severe fire and irrationally maintaining a position that management alone restores forests.

Implicit in the EA is an assumption that fire risk can be mitigated to a significant degree by reacting in opposition to natural processes—namely the growth of various species of native vegetation (misleadingly referred to as "fuels). We believe the FS oversells the ability of land managers to make conditions safe for landowners and firefighters. This could lead to landowner complacency—thereby increasing rather that decreasing risk. Many likely fire scenarios involve weather conditions when firefighters can't react quickly enough, or when it's too unsafe to attempt suppression. With climate change, this is likely to occur more frequently. Other likely scenarios include situations where firefighting might be feasible but resources are stretched thin because of priorities elsewhere.

We strongly support government actions which facilitate cultural change towards private landowners taking the primary responsibility for mitigating the safety and property risks from fire, by implementing firewise activities on their property. Indeed, the best available science supports such a prioritization. (Kulakowski, 2013; Cohen, 1999a) Also, see Firewise Landscaping[11] as recommended by Utah State University, and the Firewise USA website by the National Fire Protection Association[12] for examples of educational materials.

The forest plan definition of WUI has allowed entities other than the general public to set WUI boundaries outside of NEPA and NFMA processes, and defines it so vaguely as to expand the delineation of the WUI greatly—again outside NFMA and NEPA processes.

We want the FS and the public to be comfortable with unplanned wildland fires under some weather conditions in sensible locations, so that the ecosystem benefits can be realized. Simply stated, at the time that response to any given fire is contemplated, we want decision makers to have publicly vetted documentation—for that specific fire area—of the benefits of the process that helps create habitat conditions for wildlife, restores forest composition, recycles soil nutrients, creates large dead logs that fall into streams forming native fish habitat, as well as many others. That will provide the public, the news media, and politicians with a fully vetted set of justifications for managing with—rather than against—the native ecosystem process of fire. We believe that such planning can and must be undertaken for sustainable forest management to evolve away from the unacceptable present situation. If the FS is unwilling to perform such an analysis for projects such as Black Ram, then it must undergo programmatic analysis of its fire suppression policies, disclosing the impacts and ecological harm that the agency will subsequently claim must be later addressed by vegetation management and fuel treatment

[11] https://extension.usu.edu/ueden/ou-files/Firewise-Landscaping-for-Utah.pdf
[12] http://www.nfpa.org/Public-Education/By-topic/Wildfire/Firewise-USA/The-ember-threat-and-the- home-ignition-zone

projects across the landscape. Not to mention the enormous financial costs—also never analyzed or disclosed at any planning level.

The Forest Plan FEIS analysis of fire suppression fails to address the constrained budget scenario which implies the FS will not be allocated enough funding to address the problems it states are perpetuated by fire suppression.

Where may we find an analysis of the Forestwide cumulative effects of your fire management policies, including fire suppression policies? The Forest Plan and its EIS did not include a programmatic analysis of the cumulative effects of fire suppression. Part of the agency's mantra for more management includes mitigating the impacts of fire suppression. So to comply with NEPA, the FS must conduct a programmatic analysis of the cumulative effects of its fire suppression policies. Until it does so, the FS cannot assure viability of the black-backed woodpecker, a species that depends upon the direct effects of natural wildland fire.

The FS must disclose that most wildland fire ignitions are human-caused, and occur near roads.

DellaSala, et al. (1995) state:
Scientific evidence does not support the hypothesis that intensive salvage, thinning, and other logging activities reduce the risk of catastrophic fires if applied at landscape scales ... At very local scales, the removal of fuels through salvage and thinning may hinder some fires. However, applying such measures at landscape scales removes natural

fire breaks such as moist pockets of late-seral and riparian forests that dampen the spread and intensity of fire and has little effect on controlling fire spread, particularly during regional droughts. ... Bessie and Johnson (1995) found that surface fire intensity and crown fire initiation were strongly related to weather conditions and only weakly related to fuel loads in subalpine forest in the southern Canadian Rockies. . . . Observations of large forest fires during regional droughts such as the Yellowstone fires in 1988 (Turner, et al. 1994) and the inland northwest fires of 1994 . . . raise serious doubts about the effectiveness of intensive fuel reductions as "fire-proofing" measures.

Veblen (2003) states:
The premise behind many projects aimed at wildfire hazard reduction and ecological restoration in forests of the western United States is the idea that unnatural fuel buildup has resulted from suppression of formerly frequent fires. This premise and its implications need to be critically evaluated by conducting area-specific research in the forest ecosystems targeted for fuels or ecological restoration projects. Fire regime researchers need to acknowledge the limitations of fire history methodology and avoid over-reliance on summary fire statistics such as mean fire interval and rotation period. While fire regime research is vitally important for informing decisions in the areas of wildfire hazard mitigation and ecological restoration, there is much need for improving the way researchers communicate their results to managers and the way managers use this information.

Odion and DellaSala, 2011 describe this situation: "...fire suppression continues unabated, creating a self-reinforcing relationship with fuel treatments which are done in the name of fire

suppression. Self-reinforcing relationships create runaway processes and federal funding to stop wildfires now amounts to billions of tax dollars each year."

Also see DellaSala et al., 2018 who summarize some of the latest science around top-line wildfire issues, including areas of scientific agreement, disagreement, and ways to coexist with wildfire. It is a synopsis of current literature written for a lay audience and focused on six major fire topics:

1. Are wildfires ecological catastrophes?
2. Are acres burning increasing in forested areas?
3. Is high severity fire within large fire complexes (so called "megafires") increasing? 4. What's driving the recent increase in burned acres?
5. Does "active management" reduce wildfire occurrence or intensity?
6. Will more wildfire suppression spending make us safer?

The premise that thinning and other mechanical treatments replicate natural fire is contradicted by science (for example see Rhodes and Baker 2008, McRae et al 2001, and Rhodes 2007).

Zald and Dunne, 2018 state, "intensive plantation forestry characterized by young forests and spatially homogenized fuels, rather than pre-fire biomass, were significant drivers of wildfire severity."

In his testimony before Congress, DellaSala, 2017 discusses "...how proposals that call for increased logging and decreased environmental review in response to wildfires and insect outbreaks are not science driven, in many cases may make problems worse, and will not stem rising wildfire suppression costs" and "what we know about forest fires and beetle outbreaks in relation to climate change, limitations of thinning and other forms of logging in relation to wildfire and insect management" and makes "recommendations for moving forward based on best available science."

Please analyze and disclose the varying amounts and levels of effectiveness of fuel changes attributable to: the varying ages of the past cuts, the varying forest types, the varying slash treatments, etc. This is true for land of other ownerships also. The FS must disclose how the vegetation patterns that have resulted from past logging and other management actions would influence future fire behavior.

Hutto (2008) states:
(C)onsider the question of whether forests outside the dry ponderosa pine system are really in need of "restoration." While stem densities and fuel loads may be much greater today than a century ago, those patterns are perhaps as much of a reflection of human activity in the recent past (e.g., timber harvesting) as they are a reflection of historical conditions (Shinneman and Baker 1997). Without embracing and evolutionary perspective, we run the risk of creating restoration targets that do not mimic evolutionarily meaningful historical conditions, and that bear little resemblance to the conditions needed to maintain populations of native species, as mandated by law (e.g., National Forest Management Act of 1976).

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Kauffman (2004) suggests that current FS fire suppression policies are what is catastrophic, and that fires are beneficial:

Large wild fires occurring in forests, grasslands and chaparral in the last few years have aroused much public concern. Many have described these events as "catastrophes" that must be prevented through aggressive increases in forest thinning. **Yet the real catastrophes are not the fires themselves but those land uses, in concert with fire suppression policies that have resulted in dramatic alterations to ecosystem structure and composition**. The first step in the restoration of biological diversity (forest health) of western landscapes must be to implement changes in those factors that have resulted in the current state of wildland ecosystems. Restoration entails much more than simple structural modifications achieved through mechanical means. **Restoration should be undertaken at landscape scales and must allow for the occurrence of dominant ecosystem processes, such as the natural fire regimes**

achieved through natural and/or prescribed fires at appropriate temporal and spatial scales. (Emphases added.)

Riggers et al., 2001 state:
(T)he real risk to fisheries is not the direct effects of fire itself, but rather the existing condition of our watersheds, fish communities, and stream networks, and the impacts we impart as a result of fighting fires. Therefore, attempting to reduce fire risk as a way to reduce risks to native fish populations is really subverting the issue. If we are sincere about wanting to reduce risks to fisheries associated with future fires, we ought to be removing barriers, reducing road densities, reducing exotic fish populations, and re-assessing how we fight fires. At the same time, we should recognize the vital role that fires play in stream systems, and attempt to get to a point where we can let fire play a more natural role in these ecosystems.

Those fisheries biologists emphasize, "the importance of wildfire, including large-scale, intense wildfire, in creating and maintaining stream systems and stream habitat. ... (I)n most cases, proposed projects that involve large-scale thinning, construction of large fuel breaks, or salvage logging as tools to reduce fuel loading with the intent of reducing negative effects to watersheds and the aquatic system are largely unsubstantiated." They point out that logging, thinning and fire suppression can have harmful effects on watersheds (Id.).

Noss et al. (2006) state:
Forest landscapes that have been affected by a major natural disturbance, such as a severe wildfire or wind storm, are commonly viewed as devastated. Such perspectives are usually far from ecological reality. Overall species diversity, measured as number of species–at least of higher plants and vertebrates – is often highest following a natural stand replacement disturbance and before redevelopment of closed-canopy forest (Lindenmayer and Franklin 2002). Important reasons for this include an abundance of biological legacies, such as living organisms and dead tree structures, the migration and establishment of additional organisms

adapted to the disturbed, early-successional environment, availability of nutrients, and temporary release of other plants from dominance by trees. Currently, early-successional forests (naturally disturbed areas with a full array of legacies, i.e. not subject to post-fire logging) and forests experiencing natural regeneration (i.e. not seeded or planted), are among the most scarce habitat conditions in many regions.

Baker et al., 2006 state:
Because multiple explanations exist for the presence and abundance of young, shade- tolerant trees, these trees need to be dated and linked definitively to a particular land use (e.g. livestock grazing, logging, fire exclusion) before their removal is ecologically appropriate in restoration, and so that the correct land use, as discussed later, can be modified.

...Identification of which land uses affected a stand proposed for restoration is essential. Fire exclusion, logging and livestock grazing do not have the same effects on these forests, their effects vary with environment, and they require different restoration actions. Before restoration begins, it makes sense to modify or minimize the particular land uses that led to the need for restoration, to avoid repeating degradation and ongoing, periodic subsidies that merely maintain land uses at non-sustainable levels (Hobbs & Norton, 1996). For example, thinning an overgrazed forest, without restoring native bunchgrasses lost to grazing, may simply lead to a new pulse of tree regeneration that will have to be thinned again.

To us, this means making a firm commitment to allowing wildland fire to play its natural role on the landscape, avoiding the knee-jerk firefighting and fire suppression actions that are all too commonly applied as soon as a fire is detected.

There has been extensive research in forests about the ecological benefits of mixed-severity (which includes high-severity) fire over the past two decades, so much so that in 2015 science and academic publishing giant Elsevier published a four hundred page book, *The Ecological Im-*

portance of Mixed-Severity Fires: Nature' s Phoenix which synthesizes published, peer- reviewed science investigating the value of mixed- and high-severity fires for biodiversity (DellaSala and Hanson, 2015). This book includes research documenting the benefits of high- intensity wildfire patches for wildlife species, as well as a discussion of mechanical "thinning" logging, approved here, and its inability to reduce the chances of a fire burning in a given area, or alter the intensity of a fire, should one begin under high fire weather conditions, because overwhelmingly weather, not vegetation, drives fire behavior (DellaSala and Hanson, 2015, Ch. 13, pp. 382-384).

Mixed-severity fires, and in particular patches of high-severity fire, benefit grizzly bears by increasing cover of berry producing shrubs (such as huckleberry) that the bears rely upon to get fat before winter, and promoting regeneration of whitebark pine— the seeds of which are an important food source for the bears (DellaSala and Hanson, 2015, Ch. 4, pp. 89, 101).

Tingley et al., 2016 note the diversity of habitats following a fire is related to the diversity of burn severities: "(W)ithin the decade following fire, different burn severities represent unique habitats whose bird communities show differentiation over time... Snags are also critical resources for many bird species after fire. Increasing densities of many bird species after fire—

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primarily wood excavators, aerial insectivores, and secondary cavity nesters—can be directly tied to snag densities..."

Similarly, Hutto and Patterson, 2016 state, "the variety of burned-forest conditions required by fire-dependent bird species cannot be created through the application of relatively uniform low- severity prescribed fires, through land management practices that serve to reduce fire severity or through post-fire salvage logging, which removes the dead trees required by most disturbance- dependent bird species."

Hutto et al., 2016 urge "a more ecologically informed view of severe forest fires":
Public land managers face significant challenges balancing the threats posed by severe fire with legal mandates to conserve wildlife habitat for plant and animal species that are positively associated with recently burned forests. Nevertheless, land managers who wish to maintain biodiversity must find a way to embrace a fire-use plan that allows for the presence of all fire severities in places where a historical mixed-severity fire regime creates conditions needed by native species while protecting homes and lives at the same time. This balancing act can be best performed by managing fire along a continuum that spans from aggressive prevention and suppression near designated human settlement areas to active "ecological fire management" (Ingalsbee 2015) in places farther removed from such areas. This could not only save considerable dollars in fire-fighting by restricting such activity to near settlements (Ingalsbee and Raja 2015), but it would serve to retain (in the absence of salvage logging, of course) the ecologically important disturbance process over most of our public land while at the same time reducing the potential for firefighter fatalities (Moritz et al. 2014). Severe fire is not ecologically appropriate everywhere, of course, but the potential ecological costs associated with prefire fuels reduction, fire suppression, and postfire harvest activity in forests born of mixed-severity fire need to considered much more seriously if we want to maintain those species and processes that occur only where dense, mature forests are periodically allowed to burn severely, as they have for millennia.

Bradley et al., 2016 found that areas of more intensive management tend to burn more severely than unmanaged forests:

There is a widespread view among land managers and others that the protected status of many forestlands in the western United States corresponds with higher fire severity levels due to historical restrictions on logging that contribute to greater amounts of biomass and fuel loading in less intensively managed areas, particularly after decades of fire suppression.

... On the contrary, using over three decades of fire severity data from relatively frequent- fire pine and mixed-conifer forests throughout the western United States, we found support for the opposite conclusion—burn severity tended to be higher in areas with lower levels of protection status (more intense management)... Our results suggest a need to reconsider current overly simplistic assumptions about the relationship between forest protection and fire severity in fire management and policy.

The NEPA analysis fails to reconcile this scientific perspective with the FS's own. 120

The EA primarily discusses fuel conditions only in the areas proposed for treatment, yet wildland fire operates beyond artificial ownership or other boundaries. In regards to the proper cumulative effects analysis area for fire risk, Finney and Cohen (2003) discuss the concept of a "fireshed involving a wide area around the community (for many miles that include areas that fires can come from)." In other words, for any given entity that would apparently have its risk of fire reduced by the proposed project (or affected cumulatively from past, ongoing, or foreseeable actions on land of all ownerships within this "fireshed")—just how effective would fuel reduction be? The EA fails to include a thorough discussion and detailed disclosure of the current fuel situation within the fireshed within and outside the proposed treatment units, making it impossible to make scientifically supportable and reasonable conclusions about the manner and degree to which fire behavior would be changed by the project.

The EA also fails to deal with the fuels issue on the appropriate temporal scale. How landscape- level fire behavior at any period except for very shortly after treatment would be changed or improved is ignored.

Rhodes (2007) states: "The transient effects of treatments on forest, coupled with the relatively low probability of higher-severity fire, makes it unlikely that fire will affect treated areas while fuel levels are reduced." (Internal citations omitted.) And Rhodes also points out that using mechanical fuel treatments (MFT) to restore natural fire regimes must take into consideration the root causes of the alleged problem:

In order to be ultimately effective at helping to restore natural fire regimes, fuel treatments must be part of wider efforts to address the root causes of the alteration in fire behavior. At best, MFT can only address symptoms of fire regime alteration. Evidence indicates that primary causes of altered fire regimes in some forests include changes in fuel character caused by the ongoing effects and legacy of land management activities. These activities include logging, post-disturbance tree planting, livestock grazing, and fire suppression. Many of these activities remain in operation over large areas. Therefore, unless treatments are accompanied by the elimination of or sharp reduction in these activities and their impacts in forests where the fire regime has been altered, MFT alone will not restore fire regimes. (Internal citations omitted.)

Cohen, 1999 recognizes "the imperative to separate the problem of the wildland fire threat to homes from the problem of ecosystem sustainability due to changes in wildland fuels" (Id.). In regards to the latter—ecosystem sustainability—Cohen and Butler (2005) state:

Realizing that wildland fires are inevitable should urge us to recognize that excluding wildfire does not eliminate fire, it unintentionally selects for only those occurrences that defy our suppression capability—the extreme wildfires that are continuous over extensive areas. If we wish to avoid these extensive wildfires and restore fire to a more normal ecological condition, **our only choice is to allow fire occurrence under conditions other than extremes. Our choices become ones of compatibility with the inevitable fire occurrences rather than ones of attempted exclusion.** (Emphasis added.)

In support of focusing on manipulating limited areas near homes, Finney and Cohen, 2003, state: Research findings indicate that a home's characteristics and the characteristics of a home's

immediate surroundings within 30 meters principally determine the potential for wildland- urban fire destruction. This area, which includes the home and its immediate surroundings, is termed the home ignition zone. The home ignition zone implies that activities to reduce the potential for wildland-urban fire destruction can address the necessary factors that determine ignitions and can be done sufficiently to reduce the likelihood of ignition. Wildland fuel reduction outside and adjacent to a home ignition zone might reduce the potential flame and firebrand exposure to the home ignition zone (i.e., within 30 m of the home). However, the factors contributing to home ignition within this zone have not been mitigated. Given a wildfire, wildland fuel management alone (i.e., outside the home ignition zone) is not sufficient nor does it substitute for mitigations within the home ignition zone. ...(I)t is questionable whether wildland fuel reduction activities are necessary and sufficient for mitigating structure loss in wildland urban fires.

...(W)ildland fuel management changes the ... probability of a fire reaching a given location. It also changes the distribution of fire behaviors and ecological effects experienced at each location because of the way fuel treatments alter local and spatial fire behaviors (Finney 2001). **The probability that a structure burns, however, has been shown to depend exclusively on the properties of the structure and its immediate surroundings (Cohen 2000a).** (Emphasis added.)

Our take from Finney and Cohen (2003) is that there is much uncertainty over effects of fuel reduction. The authors point out:

Although the conceptual basis of fuel management is well supported by ecological and fire behavior research in some vegetation types, the promise of fuel management has lately become loaded with the expectation of a diffuse array of benefits. Presumed benefits range from restoring forest structure and function, bringing fire behavior closer to ecological precedents, reducing suppression costs and acres burned, and preventing losses of ecological and urban values. For any of these benefits to be realized from fuel management, a supporting analysis must be developed to physically relate cause and effect, essentially evaluating how the benefit is physically derived from the management action (i.e. fuel management). Without such an analysis, the results of fuel management can fail to yield the expected return, potentially leading to recriminations and abandonment of a legitimate and generally useful approach to wildland fire management.

In their conclusion, Graham, et al., 1999a state:
Depending on intensity, thinning from below and possibly free thinning can most effectively alter fire behavior by reducing crown bulk density, increasing crown base height, and changing species composition to lighter crowned and fire-adapted species. Such intermediate treatments can reduce the severity and intensity of wildfires for a given set of physical and weather variables. **But crown and selection thinnings would not reduce crown fire potential.** (Emphasis added.)

Then there are logging impacts affecting the rate of fire spread. Graham, et al., 1999a point out that fire modeling indicates:

For example, the 20-foot wind speed[13] must exceed 50 miles per hour for midflame wind speeds to reach 5 miles per hour within a dense Stand (0.1 adjustment factor). In contrast, in an open stand (0.3 adjustment factor), the same midflame wind speeds would occur at only a 16-mile-per-hour wind at 20 feet.

The EA doesn't disclose the implications of how the fire regime is changing due to climate change.

Many direct and indirect effects of fire suppression are must be analyzed and disclosed at the project level and as well as in the programmatic context. For example, Ingalsbee, 2004 describes the direct, indirect, and cumulative environmental impacts of firefighting:

Constructing firelines by handcrews or heavy equipment results in a number of direct environmental impacts: it kills and removes vegetation; displaces, compacts, and erodes soil; and degrades water quality. When dozerlines are cut into roadless areas they also create long-term visual scars that can ruin the wilderness experience of roadless area recreationists. Site-specific impacts of firelines may be highly significant, especially for interior-dwelling wildlife species sensitive to fragmentation and edge effects.

...Another component of fire suppression involves tree cutting and vegetation removal. Both small-diameter understory and large-diameter overstory trees are felled to construct firelines, helispots, and safety zones.

...A host of different toxic chemical fire retardants are used during fire suppression operations. Concentrated doses of retardant in aquatic habitats can immediately kill fish, or lead to algae blooms that kill fish over time. Some retardants degrade into cyanide at levels deadly to amphibians. When dumped on the ground, the fertilizer in retardant can stimulate the growth of invasive weeds that can enter remote sites from seeds transported inadvertently by suppression crews and their equipment.

...One of the many paradoxes of fire suppression is that it involves a considerable amount of human-caused fire reintroduction under the philosophy of "fighting fire with fire." The most routine form of suppression firing, "burnout," occurs along nearly every linear foot of perimeter fireline. Another form of suppression firing, "backfiring," occurs when firefighters ignite a high-intensity fire near a wildfire's flaming edge, with or without a secured containment line. In the "kill zone" between a burnout/backfire and the wildfire edge, radiant heat intensity can reach peak levels, causing extreme severity effects and high mortality of wildlife by entrapping them between two high-intensity flame fronts.

...Firelines, especially dozerlines, can become new "ghost" roads that enable unauthorized or illegal OHV users to drive into roadless areas. These OHVs create further soil and noise disturbance, can spread garbage and invasive weeds, and increase the risk of accidental human-caused fires.

...Roads that have been blockaded, decommissioned, or obliterated in order to protect wildlife or other natural resource values are often re-opened for firefighter vehicle access or

[13] Velocity of the wind 20 feet above the vegetation, in this case tree tops.

use as firelines.

...Both vegetation removal and soil disturbance by wildfire and suppression activities can create ideal conditions for the spread of invasive weeds, which can significantly alter the native species composition of ecosystems, and in some cases can change the natural fire regime to a more fire-prone condition. Firefighters and their vehicles can be vectors for transporting invasive weed seeds deep into previously uninfested wildlands.

...Natural meadows are attractive sites for locating firelines, helispots, safety zones, and fire camps, but these suppression activities can cause significant, long-term damage to meadow habitats.

The vast majority of acres burn under weather conditions that make control impossible, and that result in fires burning through treated areas as well as untreated. The FS must recognize the temporal gradients in vegetative recovery following treatments, which are the natural processes acting to regrow the components of natural vegetation the FS calls “fuel.”

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above, including conducting a comprehensive analysis of the forestwide impacts of foreseeable ongoing fire suppression.

SOIL PRODUCTIVITY

Soil productivity was discussed in our PA comments at p. 14. Also see our EA comments at pp. 4, 8-13, 86. Also, AWR's issues regarding soil were raised in our Objection to the revised forest plan (pp. 19-23).

Two major issues are, the EA does not adequately demonstrate project consistency with the Region 1 Soil Quality Standards (R-1 SQS) and the EA does not provide sufficient disclosure of the limitations of its detrimental soil disturbance (DSD) methodology.

The EA states, "The Regional Soil Quality Standards (U.S. Department of Agriculture 2014) provide soil quality standards to assure the statutory requirements of NFMA are met." The EA doesn't indicate if the FS considers the R-1 SQS to be nondiscretionary as Forest Plan standards. Apparent from the EA, it does not: "Manual (R-1 SQS) direction **recommends**..." (Emphasis added.)

The EA doesn't provide enough detail to indicate the thoroughness of the surveys, including whether all sources of DSD were inventoried.

"Assumptions" for "potential DSD numbers for each proposed harvest unit are based on coefficients..." and are "are limited to the harvest and slash disposal methods for which coefficients have been determined." The EA fails to indicate which treatment units are analyzed without accurate coefficients.

Soil compaction in one unit can lead to overland flow into another unit, causing erosion that causes DSD in the latter. Yet the FS assumes loss of soil productivity in one treatment unit will not lead to a loss in soil productivity in an adjacent stand. (EA at 116.) The FS prefers to pretend impacts in one place have no indirect impacts elsewhere, which is illogical.

The EA does not disclose that DSD areal extent percentage limits are based on feasibility of timber sale implementation rather than concerns over soil productivity. The EA also does not disclose that the bulk density increase limit is based upon the limitations of detection by bulk density measuring methods—again, not concerns over soil productivity. DSD is merely a proxy for soil productivity. The EA also fails to scientifically validate the R-1 SQS for utilization as a soil productivity proxy.

In defining soil productivity the EA cites Brady and Weil, 1999: "the capacity of a soil for producing a specific plant or sequence of plants under a specific system of management." The EA fails to cite any instance where the KNF has measured this "capacity."

The KNF's Purple Marten EA states, "(M)ycorrhiza ...must be present for a site to be productive." Resource fluxes though ectomycorrhizal (EM) networks are sufficiently large in some cases to facilitate plant establishment and growth. Resource fluxes through EM networks may thus serve as a method for interactions and cross-scale feedbacks for development of communities, consistent with complex adaptive system theory." (Simard et al., 2015.) The FS has never considered how management-induced damage to EM networks causes site productivity reductions.

The KNF's Purple Marten EA states, "Observation of past fire behavior shows that small woody material, less than 3" in diameter, has the most substantial influence on fire behavior (such as spread rates and fire intensity)..." Yet this is not reconciled with the Black Ram EA's claims that unmanaged timber stands in the project may increase the intensity potential of a wildfire."

The EA does not disclose that DSD percent limit is based upon the amount of damage that is operationally feasible, not scientific data that measures land and soil productivity losses caused by DSD. The R-1 SQS were developed internally by the FS without the use of any public process such as Forest Planning, NEPA, or independent scientific peer review.

DSD is merely a proxy for soil productivity. The FS lacks science to validate the R-1-SQS methodology for use as a soil productivity proxy.

Deficiencies of the EA's soil analyes include:

- Failure to fully analyze and disclose cumulative impacts on soil productivity.

- Failure to analyze how much soil compaction and surface erosion has occurred in the project area because of past actions and estimate the increases for this project.

- Failure to provide an analysis of soil conditions in the analysis area, noting any detrimental soil disturbance and its consequences for diminishing soil and land productivity.

- Failure to disclose the extent of soils in the analysis area that are already hydrologically impacted, and analyze and disclose their watershed impacts.

The Forest Plan includes no soil quality standards. By adopting the Region 1 Soil Quality Standards the FS does not avoid irreversible soil damage on the KNF.

There is no Forest Plan requirement to quantify, minimize, or even consider the total amount of detrimentally disturbed soils on the KNF or in a watershed.

Region 1 Soil Quality Standards adopt a proxy—detrimental soil disturbance—rather than more direct measures of management-induced losses or reductions of soil productivity. We are aware of no scientific information based upon KNF data that correlates the proxy (areal extent of detrimental soil disturbance in activity areas) to metrics of long-term reductions in soil productivity in activity areas, in order to validate the use of the proxy as a scientifically meaningful estimate of changes in soil productivity.

The proxy results in some levels of observable or measurable soil damage to be completely discounted because it falls below an arbitrary threshold—even though it may cumulatively affect the productivity of the soil.

The EA doesn't indicate the thoroughness of soil surveys, including whether all sources of DSD were inventoried in all activity areas, and the methods of surveys for each activity area.

Craigg and Howes (in Page-Dumroese, et al. 2007) state:
Meaningful soil disturbance standards or objectives must be based on measured and documented relationships between the degree of soil disturbance and subsequent tree growth, forage yield, or sediment production. Studies designed to determine these relationships are commonly carried out as part of controlled and replicated research projects. The paucity of such information has caused problems in determining threshold levels for, or defining when, detrimental soil disturbance exists; and in determining how much disturbance can be tolerated on a given area of

land before unacceptable changes in soil function (productive potential or hydrologic response) occur. Given natural variability of soil properties across the landscape, a single set of standards for assessing detrimental disturbance seems inappropriate.

Craigg and Howes (in Page-Dumroese, et al. 2007) state:
Each soil has inherent physical, chemical, and biological properties that affect its ability to *function* as a medium for plant growth, to regulate and partition water flow, or to serve as an effective environmental filter. When any or a combination of these inherent factors is altered to a point where a soil can no longer *function* at its maximum *potential* for any of these purposes, then its quality or health is said to be reduced or impaired (Larson and Pierce 1991).

Page-Dumroese, et al., 2007 discuss wildly variable results of different soil compaction instruments, which indicates the FS must explain the limitations of the compaction survey methodology. Relying upon "visual()" surveys and/or surveying using a "tile spade" test for determining compaction, without providing a scientific basis for its accuracy or validity, is arbitrary and capricious.

The proxy results in some levels of observable or measurable soil damage to be completely discounted because it falls below an arbitrary threshold—even though it may cumulatively affect the productivity of the soil.

Lacy, 2001 examines the importance of soils for ecosystem functioning and points out the failure of most regulatory mechanisms to adequately address the soils issue. From the Abstract:

Soil is a critical component to nearly every ecosystem in the world, sustaining life in a variety of ways—from production of biomass to filtering, buffering and transformation of water and nutrients. While there are dozens of federal environmental laws protecting and addressing a wide range of natural resources and issues of environmental quality, there is a significant gap in the protection of the soil resource. Despite the critical importance of maintaining healthy and sustaining soils, conservation of the soil resource on public lands is generally relegated to a diminished land management priority. Countless activities, including livestock grazing, recreation, road building, logging, and mining, degrade soils on public lands. This article examines the roots of soil law in the United States and the handful of soil-related provisions buried in various public land and natural resource laws, finding that the lack of a public lands soil law leaves the soil resource under protected and exposed to significant harm. To remedy this regulatory gap, this article sketches the framework for a positive public lands soil protection law. This article concludes that because soils are critically important building blocks for nearly every ecosystem on earth, a holistic approach to natural resources protection requires that soils be protected to avoid undermining much of the legal protection afforded to other natural resources.

Lacy, 2001 goes on:
Countless activities, including livestock grazing, recreation, road building, logging, mining, and irrigation degrade soils on public lands. Because there are no laws that directly address and protect soils on the public lands, consideration of soils in land use planning is usually only in the form of vaguely conceived or discretionary guidelines and monitoring requirements. This is a major gap in the effort to provide ecosystem-level protection for natural resources.

The rise of an "ecosystem approach" in environmental and natural resources law is one of the most significant aspects of the continuing evolution of this area of law and policy. One writer has observed that there is a

fundamental change occurring in the field of environmental protection, from a narrow focus on individual sources of harm to a more holistic focus on entire ecosystems, including the multiple human sources of harm within ecosystems, and the complex social context of laws, political boundaries, and economic institutions in which those sources exist.

As federal agencies focus increasingly on addressing environmental protection from a holistic perspective under the current regime of environmental laws, a significant gap remains in the federal statutory scheme: protection of soils as a discrete and important natural resource. **Because soils are essential building blocks at the core of nearly every ecosystem on earth, and because soils are critical to the health of so many other**

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natural resources—including, at the broadest level, water, air, and vegetation—they should be protected at a level at least as significant as other natural resources. Federal soil law (such as it is) is woefully inadequate as it currently stands. It is a missing link in the effort to protect the natural world at a meaningful and effective ecosystem level.

... This analysis concludes that the lack of a public lands soil law leaves the soil resource under-protected and exposed to significant harm, and emasculates the environmental protections afforded to other natural resources.

The R-1 SQS are the only directives limiting damage to soil during industrial extraction on the KNF, and even they are full of loopholes. Furthermore, they basically boil down to a mitigation of soil productivity losses with an entirely uncertain outcome, as explained below.

The Jam Cracker Environmental Assessment, Lolo National Forest, 2016 states:
The Forest Service Soils Manual (FSM 2550; November 2010) and Region 1 Soil Quality Standards provide guidelines and methods to show compliance with the National Forest Management Act (NFMA). The objectives of the Region 1 Soil Quality Standards (R1 SQS) include man-

aging National Forest System lands "without permanent impairment of land productivity and to maintain or improve soil quality", similar to the NFMA. Region 1 Soil Quality Standards are based on the use of six physical and one biological attribute to assess current soil quality and project effects. These attributes include compaction, rutting, displacement, severely-burned soils, surface erosion, soil mass movement, and organic matter.

The EA doesn't disclose soil conditions in the project area that are outside the project treatment units. The cumulative amount of existing soil damage over the entire project area has implications for every other resource including water quality and the development of old-growth forests and even sustained yield of timber. The public deserves to know the scale of total area needing soil restoration in this project area.

The FS generally provides no idea of the degree of soil impacts in a project area—except for an estimate of a limited category (detrimental soil disturbance or "DSD")—but only if a site happens to occur in a unit proposed for logging or burning under the project. Such a narrow view of the cumulative impacts on soils contradicts other FS policy and best available science.

The Soil and Water Conservation Practices Handbook (FSH 2509.22) states: Practice 11.01 – Determination of Cumulative Watershed Effects

OBJECTIVE: To determine the cumulative effects or impact on beneficial water uses by multiple land management activities. Past, present, or reasonably foreseeable future actions in a watershed are evaluated relative to natural or undisturbed conditions. Cumulative impacts are a change in beneficial water uses caused by the accumulation of individual impacts over time and space. Recovery does not occur before the next individual practice has begun.

EXPLANATION: The Northern and Intermountain Regions will manage watersheds to avoid irreversible effects on the soil resource and to produce water of quality and quantity

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sufficient to maintain beneficial uses in compliance with State Water Quality Standards. Examples of potential cumulative effects are: 2) excess sediment production that may reduce fish habitat and other beneficial uses; 3) water temperature and nutrient increases that may affect beneficial uses; 4) compacted or disturbed soils that may cause site productivity loss and increased soil erosion; an 5) increased water yields and peak flows that may destabilize stream channel equilibrium.

IMPLEMENTATION: As part of the NEPA process, the Forest Service will consider the potential cumulative effects of multiple land management activities in a watershed which may force the soil resource's capacity or the stream's physical or biological system beyond the ability to recover to near-natural conditions. A watershed cumulative effects feasibility analysis will be required of projects involving significant vegetation removal, prior to including them on implementation schedules, to ensure that the project, considered with other activities, will not increase sediment or water yields beyond or fishery habitat below acceptable limits. The Forest Plan will define these acceptable limits. The Forest Service will also coordinate and cooperate with States and private landowners in assessing cumulative effects in multiple ownership watersheds.

Booth, 1991 explains how soil quality conditions translate to watershed hydrology and thus, water quality and quantity:

Drainage systems consist of all of the elements of the landscape through which or over which water travels. These elements include the soil and the vegetation that grows on it, the geologic materials underlying that soil, the stream channels that carry water on the surface, and the zones where water is held in the soil and moves beneath the surface. Also included are any constructed elements including pipes and culverts, cleared and compacted land surfaces, and pavement and other impervious surfaces that are not able to absorb water at all.

...The collection, movement, and storage of water through drainage basins characterize the hydrology of a region. Related systems, particularly the ever-changing shape of stream channels and the viability of plants and animals that live in those channels, can be very sensitive to the hydrologic processes occurring over these basins. Typically, these systems have evolved over hundreds of thousands of years under the prevailing hydrologic conditions; in turn, their stability often depends on the continued stability of those hydrologic conditions.

Alteration of a natural drainage basin, either by the impact of forestry, agriculture, or urbanization, can impose dramatic changes in the movement and storage of water. ...Flooding, channel erosion, landsliding, and destruction of aquatic habitat are some of the unanticipated changes that ...result from these alterations.

...Human activities accompanying development can have irreversible effects on drainage- basin hydrology, particularly where subsurface flow once predominated. Vegetation is cleared and the soil is stripped and compacted. Roads are installed, collecting surface and shallow subsurface water in continuous channels. ...These changes produce measurable effects in the hydrologic response of a drainage basin.

Elsewhere the FS recognizes that amounts of soil compaction and other measures of DSD across a watershed accumulates over space and time to harm watersheds. From USDA Forest Service, 2008f:

Many indirect effects are possible if soils are detrimentally-disturbed... Compaction can indirectly lead to decreased water infiltration rates, leading to increased overland flow and associated erosion and sediment delivery to stream. Increased overland flow also increases intensity of spring flooding, degrading stream morphological integrity and low summer flows.

USDA Forest Service, 2009c states:
Compaction can decrease water infiltration rates, leading to increased overland flow and associated erosion and sediment delivery to streams. Compaction decreases gas exchange, which in turn degrades sub-surface biological activity and above-ground forest vitality. Rutting and displacement cause the same indirect effects as compaction and also channel water in an inappropriate fashion, increasing erosion potential.

Subwatersheds which have high levels of existing soil damage could indicate a potential for hydrologic and silviculture concerns. (USDA Forest Service, 2005b, p. 3.5-11, 12.) The FS (USDA Forest Service, 2007c) acknowledges that soil conditions affect the overall hydrology of a watershed:

Alteration of soil physical properties can result in loss of soil capacity to sustain native plant communities and reductions in storage and transmission of soil moisture that may affect water yield and stream sediment regimes. (P. 4-76, emphasis added.)

USDA Forest Service, 2009c states:
Compaction can decrease water infiltration rates, leading to increased overland flow and associated erosion and sediment delivery to streams. Compaction decreases gas exchange, which in turn degrades sub-surface biological activity and above-ground forest vitality. Rutting and displacement cause the same indirect effects as compaction and also channel water in an inappropriate fashion, increasing erosion potential.

Kuennen et al. 2000 (a collection of Forest Service soil scientists) state:
An emerging soils issue is the cumulative effects of past logging on soil quality. Pre-project monitoring of existing soil conditions in western Montana is revealing that, where ground- based skidding and/or dozer-piling have occurred on the logged units, soil compaction and displace-

ment still are evident in the upper soil horizons several decades after logging. Transecting these units documents that the degree of compaction is high enough to be considered detrimental, i.e., the soils now have a greater than 15% increase in bulk density compared with undisturbed soils. Associated tests of infiltration of water into the soil confirm negative soil impacts; **the infiltration** rates on these compacted soils are several- fold slower than rates on undisturbed soil.

...**The effects of extensive areas of compacted and/or displaced soil in watersheds along with impacts from roads, fire, and other activities are cumulative.** A rapid assessment technique to evaluate soil conditions related to past logging in a watershed is

based on a step-wise process of aerial photo interpretation, field verification of subsamples, development of a predictive model of expected soil conditions by timber stand, application of this model to each timber stand through GIS, and finally a GIS **summarization of the predicted soil conditions in the watershed.** This information can then be combined with an assessment of road and bank erosion conditions in the watershed to give a holistic description of watershed conditions and to help understand cause/effect relationships. **The information can be related to Region 1 Soil Quality Standards to determine if, on a watershed basis, soil conditions depart from these standards.** Watersheds that do depart from Soil Quality Standards can be flagged for more accurate and intensive field study during landscape level and project level assessments. **This process is essentially the application of Soil Quality Standards at the watershed scale with the intent of maintaining healthy watershed conditions**. (Emphases added.)

The EA doesn't provide an analysis of the hydrological implications of the cumulative soil damage caused by past management added to timber sale-induced damage in project area watersheds. Kootenai NF hydrologist Johnson, 1995 noted this effect from reading the scientific literature:

"Studies by Dennis Harr have consistently pointed out the effects compacted surfaces (roads, skid trails, landings, and firelines) on peak flows." Elevated peak flows harm streams and rivers by increasing both bedload and suspended sediment are effects to be analyzed in a watershed analysis.

Harr, 1987 rejects absolute thresholds for making determinations of significant vs nonsignificant levels of soil compaction in watersheds, but nevertheless he does refer to his experience as noted above by Johnson, 1995. Harr, 1987 states:

...a curvilinear relation between amount of compaction and increased flow is shown.

Numerous plans, guidelines, and environmental impact statements have related the predicted amount of soil compaction to a defined threshold of compaction totalling 12 percent of watershed area. ...The 12 percent figure is arbitrary. Flow changes at lesser amounts of compaction may also cause adverse impacts. ...Without reference to the stream channels in question, we cannot arbitrarily say nothing will happen until the mythical 12 percent figure is surpassed.

In some watersheds, compaction was determined from postlogging surveys, but in others, compaction was taken as the area in roads (including cut and fill surfaces), landings, and skid trails.

The FS has at times even quantified past DSD across watersheds of various sizes. USDA Forest Service 2005d states:

Cumulative effects may also occur at the landscape level, where large areas of compacted and displaced soil affect vegetation dynamics, runoff, and water yield regimes in a subwatershed. About 4,849 acres are currently estimated to have sustained detrimental compaction or displacement in the American River watershed due to logging, mining, or road construction. ... About 4,526 acres are currently estimated to have sustained detrimental compaction or displacement in the Crooked River watershed due to logging, mining, and road or trail construction.

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...An estimated 73 percent (208) of past activity areas on FS lands in American River (and an estimated 69 percent (166) of past activity areas on FS lands in Crooked River) today would show detrimental soil disturbance in excess of 20 percent. (Emphasis added.)

A recent IPNF forest plan monitoring report (USDA Forest Service 2013a) revealed the relatively high frequency of violating the 15% standard. Other units of the national forest system have monitored DSD with very mixed results (e.g., Reeves et al., 2011). The point is—as weak as the standards are—FS pledges to meet the standards must be taken with a grain of salt.

There is also an issue of reliability and validity of the FS's soil survey methods. USDA Forest Service, 2012a states:

The U.S. Forest Service Soil Disturbance Field Guide (Page-Dumroese et al., 2009) was used to establish the sampling protocol.

...Field soil survey methodology based on visual observations, such as the Region 1 Soil Monitoring Guide used here, can produce variable results among observers, and the confidence of results is dependent on the number of observations made in an area (Page- Dumroese et al., 2006). **The existing and estimated values for detrimental soil disturbance (DSD) are not absolute** and best used to describe the existing soil condition. The calculation of the percent of additional DSD from a given activity is an estimate since DSD is a combination of such factors as existing groundcover, soil texture, timing of operations, equipment used, skill of the equipment operator, the amount of wood to be removed, and sale administration. (Emphasis added.)

Note that USDA Forest Service, 2012a admits that DSD estimates are "not absolute."

One set of cumulative soil impacts ignored by the R-1 SQS is associated with permanent, or "system" roads. Although every square foot of road is, of course compacted, this compaction is in no way limited by the application of the R-1 SQS. The same goes for existing or ongoing erosion—no amount of soil erosion on these road templates would violate the R-1 SQS. Also, the DSD type "displacement" (organic matter layer(s) displaced due to management actions)— practically 100% on permanent/system roads—is not limited in any way by the R-1 SQS.

Another cumulative impact the R-1 SQS ignores is the existing or prior management-induced DSD on old log landings kept on the land for future use. They are typically flattened areas which had been compacted and/or had organic layers displaced to use as temporary log storage and log truck loading and often were not recontoured to original slope or decompacted following use. Unless they are being used by the current project (and thus within an activity area), they are not limited in extent by the R-1 SQS. Much like system roads, there are no limits to total DSD from landings set by the R-1 SQS, and there is no requirement that their extent in a project area be disclosed. Roads and log landings might be limited by other resource considerations such as road densities in sensitive wildlife habitat, but they are not limited by the R-1 SQS.

Still more cumulative soil damages the R-1 SQS ignore involve existing DSD on areas the FS maintains as part of the "suitable" or productive land base such as timber stands, grazing

allotments and riparian zones that are not within the boundaries of any current project activity areas. The R-1 SQS do not limit or require disclosure of the existing/prior DSD in such areas, possibly caused by past management activities such as log skidding, partially reclaimed log landings and temporary roads, firelines, burning of slash piles or other prescribed burns, compaction due to the hooves of livestock in springs, wetlands, or other riparian areas or simply in upland pasture areas. Furthermore, R-1 SQS do not compel the FS to take actions that might restore the soil productivity in such areas because their existing DSD does not matter for determining consistency with the R-1 SQS —until the day arrives when another project is proposed and the damaged site in question is included within an "activity area" because it is proposed for a new round of logging and soil damage.

USDA Forest Service, 2016a explains another major cumulative effect ignored by the R-1 SQS, which is the indirect effect of soil damage, or DSD, on sustained yield. It states that the R-1 SQS "created the concept of 'Detrimental Soil Disturbance' (DSD) for National Forests in Region One as a measure to be used in assessing potential loss of soil productivity resulting from management activities." USDA Forest Service, 2016a further explains (emphases added):

Without maintaining land productivity, neither multiple use nor sustained (yield) can be supported by our National Forests. Direct references to maintaining productivity are made in the Sustained Yield Act "...coordinated management of resources without impairment of the productivity of the land" and in the Forest and Rangeland Renewable Resources Act "...substantial and permanent impairment of productivity must be avoided".

Soil quality is a more recent addition to Forest Service Standards. The Forest and Rangeland Renewable Resources Act (1974) appears to be the first legal reference made to protecting the "quality of the soil" in Forest Service directives. **Although the fundamental laws that directly govern policies of the U.S. Forest Service clearly indicate that land productivity must be preserved, increasingly references to land or soil productivity in Forest Service directives were being replaced by references to soil quality as though soil quality was a surrogate for maintaining land productivity. This was unfortunate, since al-**

though the two concepts are certainly related, they are not synonymous.

Our understanding of the relationship between soil productivity and soil quality has continued to evolve since 1974. Amendments to the Forest Service Manual, Chapter 2550 – Soil Management in 2009 and again to 2010 have helped provide some degree of clarity on this issue and acknowledged that **the relationship is not as simple as originally thought**. The 2009 (2500-2009-1) amendment to Chapter 2550 of the Forest Service Manual states in section 2550.43-5, directs the Washington Office Director of Watershed, Fish, Wildlife, Air and Rare plants to "Coordinate validation studies of soil quality criteria and indicators with Forest Service Research and Development staff to ensure soil quality measurements are appropriate to protect soil productivity" (USFS-FSM 2009). **Inadvertently this directive concedes that the relationship between soil productivity and soil quality is not completely understood.** In the end, the primary objective provided by National Laws and Directives relative to the management of Forest Service Lands continues to be to maintain and where possible potentially improve soil productivity. (Emphases added.)

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USDA Forest Service, 2009c admits, in regards to project area sites where DSD soils were not to be restored by active management: "For the ...severely disturbed sites,... "no action" ...would **create indirect negative impacts by missing an opportunity to actively restore damaged soils**. (Emphasis added.)

In order to meet NFMA and NFMA regulations' mandates to protect soil productivity, the KNF adopted the R-1 SQS. Again, the R-1 SQS requires the FS to delineate specific geographic areas called "activity areas" for the purpose of predicting, measuring, monitoring, and analyzing impacts on soil productivity from management activities. FSM 2500-99-

1 includes a mandate to maintain 85% of an activity area in a satisfactory, non-DSD soil condition.

We question the validity of DSD estimation and other analysis methodology, and therefore compliance with the FS's proxy for soil productivity. The EA doesn't adequately explain how the FS arrives at current DSD estimates, and provide sufficient detail to indicate the intensity of soil surveys or monitoring of past projects.

The EA doesn't disclose that the R-1 SQS methodology for "activity areas" inherently encourages gerrymandering areas not previously logged into project "activity areas", helping to artificially dilute the amount of effective DSD from previously logged units by creating a more favorable average.

The EA doesn't disclose that DSD percent limit is based upon the amount of damage that is operationally feasible, not scientific data that measures land and soil productivity losses caused by DSD. The R-1 SQS were developed internally by the FS without the use of any public process such as Forest Planning, NEPA, or independent scientific peer review.

DSD is merely a proxy for soil productivity. The FS lacks science to validate the R-1 SQS methodology for use as a soil productivity proxy.

Discussing the R-1 SQS, USDA Forest Service, 2008a states:
Powers (1990) cites that the rationale bulk density is largely based on collective judgment. The FS estimates that a true productivity decline would need to be as great as 15% to detect change using current monitoring methods. Thus the soil-quality standards are set to detect a decline in potential productivity of at least 15%. This does not mean that the FS tolerates productivity declines of up to 15%, **but merely that it recognizes problems with detection limits.** (Emphasis added.)

It is important to point out, however, that Powers refers to separate and distinct thresholds when he talks about 15% increases in bulk density, which is a threshold of when soil compaction is considered to be detectable, and 15% areal limit for detrimental disturbance, which is the soil quality standard threshold for how much of an activity area can be detrimentally disturbed (including compaction from temporary roads and heavy equipment, erosion resulting from increased runoff, puddling, displacement from skid trails, rutting, etc.). With that caveat, what Powers has to say in relation to the soil quality standard is quite revealing (as quoted in Nesser, 2002):

(T)he 15% standard for increases in bulk density originated as the point at which we could reliably measure significant changes, considering natural variability in bulk density... (A)pplying the *15% areal limit* for detrimental damage is not correct... (T)hat was never the intent of the 15% limit... and *NFMA does not say that we can create up* **to 15%** *detrimental conditions*, it says basically that we cannot create significant or permanent impairment, period... (Emphases added.)

USDA Forest Service 2008b stated, "The 15% change in aerial extent realizes that timber harvest and other uses of the land result in some impacts and impairment that are unavoidable. **This limit is based largely on what is physically possible**, while achieving other resource management objectives" (emphasis added). So the R-1 SQS limits are based on feasibility of timber sale implementation rather than concerns over soil productivity; and additionally we have the bulk density increase limit is based upon the limitations of detection by FS bulk density measuring methods—again, not concerns over soil productivity.

The FS's soil proxy—its R-1 SQS assumption that up to 15% of an activity area having long- term damage is consistent with NMFA and regulations—is arbitrary. The FS does not cite any scientific basis for adopting its numerical limits. Page-Dumroese et al. 2000 emphasize the importance of validating soil quality standards using the results of monitoring:

Research information from short- or long-term research studies supporting the applicability of disturbance criteria is often lacking, or is available from a limited number of sites which have relative narrow climatic and soil ranges. ...Application of selected USDA Forest Service standards indicate that **blanket threshold variables applied over disparate soils do not adequately account for nutrient distribution within the profile or forest floor depth. These types of guidelines should be continually refined to reflect pre- disturbance conditions and site-specific information.** (Emphasis added.)

Soil productivity can only be protected if it turns out that the soil standards work. To determine if they work, the FS would have to undertake objective, scientifically sound measurements of what the soil produces (grows) following management activities. But the FS has never done this on the KNF.

There are more direct indices of losses in soil productivity due to management activities. A FS report by Grier et al., 1989 adopted as a measure of soil productivity: "the total amount of plant material produced by a forest per unit area per year." They cite a study finding "a 43-percent reduction in seedling height growth in the Pacific Northwest on primary skid trails relative to uncompacted areas" for example. And in another FS report, Adams and Froehlich (1981) state:

Measurements of reduced tree and seedling growth on compacted soils show that significant impacts can and do occur. Seedling height growth has been most often studied, with reported growth reductions on compacted soils from throughout the U.S. ranging from about 5 to 50 per cent.

Detrimental soil compaction cannot be determined by mere visual observations. Kuennen, et al., 1979 discovered that although "the most significant increase in compaction occurred at a depth of 4 inches... some sites showed that maximum compaction occurred at a depth of 8 inches...

Furthermore, ... subsurface compaction occurred in glacial deposits to a depth of at least 16 inches.”

Cullen et al. (1991) concluded: (M)ost compaction occurs during the first and second passage of equipment.” Page-Dumroese (1993), investigating logging impacts on volcanic ash-influenced soil in the IPNF, stated: “Moderate compaction was achieved by driving a Grappler log carrier over the plots twice.” Page-Dumroese (1993) also cited other studies that indicated “Large increases in bulk density have been reported to a depth of about 5 cm with the first vehicle pass over the soil.” Williamson and Neilsen (2000) assessed change in soil bulk density with number of passes and found 62% of the compaction to the surface 10cm came with the first pass of a logging machine. In fine textured soils, Brais and Camire (1997) demonstrated that the first pass creates 80 percent of the total disturbance to the site. Adams and Froehlich (1981) state, “(L)ittle research has yet been done to compare the compaction and related impacts caused by low- pressure and by conventional logging vehicles.”

We note that it doesn’t matter how sensitive the soils, how steep the land, how poor the site is for growing trees, the R-1 SQS standard is the same arbitrary 15%.

USDA Forest Service 2014a states:
Management activities can result in both direct and indirect effects on soil resources. Direct and indirect effects may include alterations to physical, chemical, and/or biological properties. Physical properties of concern include structure, density, porosity, infiltration, permeability, water holding capacity, depth to water table, surface horizon thickness, and organic matter size, quantity, and distribution. Chemical properties

include changes in nutrient cycling and availability. Biological concerns commonly include abundance, distribution, and productivity of the many plants, animals, microorganisms that live in and on the soil and organic detritus. (P. 3-279.)

However the R-1 SQS definition of DSD considers only alterations to physical properties, but not chemical or biological properties. The R-1 SQS is not consistent with best available science.

One of these biological properties is represented by naturally occurring organic debris from dead trees. The R-1 SQS recognize the importance of limiting the ecological damage that logging causes due to retaining inadequate amounts of large woody debris, but set no quantitative limits on such losses caused by logging and slash burning. Please disclose the levels of large woody debris in the project area following past management activities, in addressing your obligations to consider cumulative effects.

Some chemical properties are discussed in Harvey et al., 1994, including:
The ...descriptions of microbial structures and processes suggest that they are likely to provide highly critical conduits for the input and movement of materials within soil and between the soil and the plant. Nitrogen and carbon have been mentioned and are probably the most important. Although the movement and cycling of many others are mediated by microbes, sulfur phosphorus, and iron compounds are important examples.

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The relation between forest soil microbes and N is striking. Virtually all N in eastside forest ecosystems is biologically fixed by microbes... Most forests, particularly in the inland West, are likely to be limited at some time during their development by supplies of plant-available N. Thus, to manage forest growth, we must manage the microbes that add most of the N and that make N available for subsequent plant uptake. (Internal citations omitted.)

"The big trees were subsidizing the young ones through the fungal networks. Without this helping hand, most of the seedlings wouldn't make it." (Suzanne Simard: http://www.ecology.com/2012/10/08/trees-communicate/) "Disrupting network links by reducing diversity of mycorrhizal fungi... can reduce tree seedling survivorship or growth (Simard et al, 1997a; Teste et al., 2009), ultimately affecting recruitment of old-growth trees that provide habitat for cavity nesting birds and mammals and thus dispersed seed for future generations of trees." (Simard et al., 2013.) (Also see the YouTube video "Mother Tree" embedded within the Suzanne Simard "Trees Communicate" webpage at: https://www.youtube.com/watch?v=- 8SORM4dYG8&feature=youtu.be) and also this one on the "Wood Wide Web" on Facebook: https://www.facebook.com/BBCRadio4/videos/2037295016289614/.) If the KNF has ever determined if management activities have reduced the diversity of mycorrhizal fungi in any treatment area, please cite the study.

Gorzelak et al., 2015:
...found that the behavioural changes in ectomycorrhizal plants depend on environmental cues, the identity of the plant neighbour and the characteristics of the (mycorrhizal network). The hierarchical integration of this phenomenon with other biological networks at broader scales in forest ecosystems, and the consequences we have observed when it is interrupted, indicate that underground "tree talk" is a foundational process in the complex adaptive nature of forest ecosystems.

The scientists involved in research on ectomycorrhizal networks have discovered connectedness, communication, and cooperation between what we traditionally consider to be separate organisms. Such a phenomenon is usually studied within single organisms, such as the interconnections in humans among neurons, sense organs, glands, muscles, other organs, etc. so necessary for individual survival. The FS must consider the ecosystem impacts from industrial management activities on this mycorrhizal network. The industrial forestry management paradigm is unfortunately destroying what it fails to recognize.

The EA doesn't disclose if and how the KNF has determined if management activities have reduced the diversity of mycorrhizal fungi in any treatment area.

USDA Forest Service, 2007 states:
Sustained yield was defined in the ...Forest Plan ...as "the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without permanent impairment of the productivity of the land." Sustained yield is based on the capacity of the lands ability to produce resources.

That statement is on point: Since the FS has no idea how much soil has been permanently impaired either within the project area or forestwide, "sustained yield" is an empty promise. There continues to be a lack of adequate regulatory mechanisms for protecting soil productivity on the KNF and Northern Region, as advocated for by Lacy (2001). Since the FS has no idea how much soil has been permanently impaired either within the project area or forestwide, the agency's "sustained yield" is an empty promise. The FS lacks adequate measures for protecting soil productivity on the Forest.

NEPA requires that the FS specify the effectiveness of its mitigations. (40 C.F.R. 1502.16.) Please disclose the effectiveness of DSD mitigation. There is no quantitative monitoring data that demonstrates DSD remediation activities have taken an activity area with DSD amounts over the 15% limit to an amount that no longer violates the standard.

USDA Forest Service 2005d states:
Decompaction can at least **partly restore** soil porosity and productivity.

Soil displacement that mixes or removes the volcanic ash surface layer reduces soil moisture holding capacity, which may be **irreversible and irretrievable**. (Emphases added.)

Of decompaction as a mitigation, USDA Forest Service, 2015a admits:
Anticipated Effectiveness: Low to high. Many soil characteristics and operating decisions affect the outcomes of this feature. Forest plan monitoring has shown a 30-60 percent reduction in compaction as measured by bulk density of the soil.

The FS reports, "It is acknowledged that the effectiveness of soil restoration treatments may be low, often less than 50 percent." (USDA Forest Service, 2005b at p.3.5-20.)

Please provide an analysis of the noxious weeds situation in the analysis area. Please disclose the degree to which the productivity of the land and soil has been affected in the project area and forestwide due to noxious weed infestations, and how that situation is expected to change in the coming years and decades. The KNF's noxious weed treatment program is mitigation for management activities which exacerbate the spread of noxious weeds. Please disclose the effectiveness of this mitigation.

USDA Forest Service, 2015a indicates:
Infestations of weeds can have wide-ranging effects. They can impact soil properties such as erosion rate, soil chemistry, organic matter content, and water infiltration. Noxious weed invasions can alter native plant communities and nutrient cycles, reduce wildlife and livestock forage, modify fire regimes, alter the effects of flood events, and influence other disturbance processes (S-16). As a result, values such as soil productivity, wildlife habitat, watershed stability, and water quality often deteriorate.

So the project will worsen the noxious weed spread in the project area, and even if post- disturbance treatments are implemented, their uncertain efficacy means that the project will significantly increase noxious weed occurrence.

The FS often proposes winter logging as mitigation. Evidence that logging can affect vegetative production in the absence of significant ground disturbance was collected by Sexton (1994) and summarized by USDA Forest Service (2000a) in a study in central Oregon in postfire ponderosa pine stands, logged over snow. Sexton found that biomass of vegetation produced 1 and 2 years after postfire logging was 38 percent and 27 percent of that produced in postfire unlogged stands. He also found that postfire logging decreased canopy cover, increased exotic plant species, increased graminoid cover, and reduced overall plant species richness. Pine seedlings grew 17 percent taller on unlogged sites in this short-term study. Ground based winter logging may not be effective mitigation for soil impacts and may impede recovery of the burned area.

USDA Forest Service, 2005b states, "Monitoring of winter-logging soil effects conducted by the Forest Soil Scientist on the Bitterroot National Forest over the past 14 years has shown that 58% of the ground-based, winter-logged units failed to meet the R-1 SQS. Winter-logging resulted in an average of 16% detrimentally damaged soil." (P. 3.5-21.)

FS Timber Sales Specialist Flatten, 2003 examines the practice of wintertime ground based logging and discusses what winter conditions provide the best protection for the soil resource. He points out the complexities and uncertainties of pulling off successful winter logging that effectively avoids of soil damage. He concludes:

The conditions necessary to provide protection of the soil resource during winter logging can be both complex and dynamic. Guidelines that take a simplified approach, though well understood during project planning, will likely become problematic once operations begin. The result may be inadequate soil protection or unnecessary constraints on operations. Winter logging guidelines should be developed that incorporate the latest research on snowpack strength and frozen soil and provide measurable criteria for determining when appropriate conditions exist.

In certain cases, the FS admits that soil displacement is essentially permanent regardless of restoration efforts:

Surface soil loss from roads through displacement and mixing with infertile substrata also has long lasting consequences for soil productivity because of the superiority of the volcanic ash surface layer over subsoils and substrata. (USDA Forest Service, 2007c, Page 4-76.)

This is affirmed in the EA: "In areas where soil displacement mixes or moves the volcanic ash surface layer, it reduces moisture holding capacity and productivity resulting in impacted soils far beyond the 70-year timeframe, referred to as long-term soil recovery."

The EA fails to give any indication that DSD caused by this displacement effect on volcanic ash soils can be measured by the "visual" or "tile spade" methods the FS used for Black Ram.

The EA states, "The most productive part of the soil surface occurs near the contact between the forest litter and the mineral soil. In this location the litter material becomes decomposed into an organic rich layer containing **most of the soil nitrogen, potassium and mycorrhizae that must be present for a site to be productive**. However, this is also the part of the soil that is easiest to disturb by management activities." (Emphasis added.) The EA fails to give any indication that

this "easiest" disturbance of "the soil surface ...near the contact between the forest litter and the mineral soil" can be measured by the "visual" or "tile spade" methods the FS used for Black Ram.

The EA says twelve Black Ram project units would be monitored "where post-harvest and post- fuel abatement activities are anticipated to be close to 15 percent DSD. If soil monitoring results exceed 15 percent DSD, soil restoration efforts would be conducted to the extent necessary to meet soil quality standards." Given that some kinds of DSD cannot be mitigated, e.g., as disclosed in the EA for volcanic ash soils, some areas exceeding 15% according to post-logging monitoring would not be restored. Since the EA does not disclose the types of DSD by activity area—indeed it presents no numbers at all for DSD to demostrate R-1 SQS compliance at the unit level—the EA does not comply with NEPA and cannot assure compliance with NFMA.

And that doesn't include all the units with soil stability, large wood availability, or other concerns—not being DSD metric, yet affecting soil productivity.

The FS has no quantitative data on the resulting continuous deficits in soil and land productivity. To the U.S. Department of Agriculture, such soil damage in national forests hardly matters.

The EA doesn't disclose the how the amounts of snags, recruitment snags, and down woody debris left after previous logging operations compare to current forest plan standards and objectives. The EA doesn't disclose if those levels of soil organic matter and down woody debris support healthy mycorrhizal populations.

The EA doesn't disclose the effects of noxious weed infestations on soil productivity.

The EA doesn't provide documentation of monitoring of soil conditions conducted in the project area.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

NOXIOUS WEEDS

Noxious weeds were raised in several places in EA comments (e.g., 4, 10, 70) and in PA comments (pp. 13, 14).

Despite the legacy of heavy-handed management and other anthropogenic activities—actions known to cause the spread of noxious weeds and other invasive plants—the EA fails to disclose the amount of noxious weed infestation in the project area. This is consistent with the its overall failure to analyze cumulative effects of noxious weeds and the factors contributing to their spread in the project area.

Unfortunately, there are no Standards or Forest Plan monitoring items related to noxious weeds. To this day, the behavior of the KNF still seems to be constant denial. The KNF seems to believe that it can disturb all the land it wants and still deal with the consequential noxious weed

invasion with later control actions. The EA fails to cite any science or KNF monitoring data that demonstrates the FS can significantly reduce noxious weed occurrence.

The FS is unable to prevent, contain, or control noxious weeds without the use of herbicides as routine practice. The problem only gets worse with each large-scale soil disturbance, such as what is proposed for the Black Ram project.

The EA does not disclose the degree to which the productivity of the land been affected in the project area and forestwide due to noxious weed infestations, and how that situation is expected to change in the coming years and decades. The KNF's noxious weed treatment program is mitigation for management activities which exacerbate the spread of noxious weeds. The EA fails to disclose the effectiveness of this mitigation.

Again, the agency had no response showing it can competently get a handle on noxious weed infestations its management actions have caused.

Noxious weeds are the proverbial Pandora's Box loosed on the forest ecosystem—no amount of herbicide use reverses their spread for long. The financial costs of noxious weeds are another part of this elephant in the room. The agency does not account for the economic impacts of increased weed treatments due to projects such as this one, nor of the loss of ecosystem services attributed to noxious weeds being cultivated by project activities.

The impacts of noxious weeds are exacerbated by every action that disturbs soil or otherwise upsets the balance of native vegetation. Weed spread from management activities such as logging and burning and use of mechanized vehicles or equipment are a constant symptom of resource extraction management.

Remedy: Select the No-Action alternative. Alternately, prepare an EIS that corrects the errors noted, including correcting the noted errors of analysis (including cumulative effects) and failure to use best available science.

ECONOMIC ANALYSIS

Economics were discussed in our EA comments at page 13 and our PA comments at page 14.

We object to the fact that the economic analysis in the EA fails to account for many of the significant restoration activities. The analysis is inaccurate, flawed, and misleading.

We object to the fact that the economic analysis in the EA fails to provide a robust basis for the assumed project revenues.

We object to the fact that the economic analysis in the EA obfuscates the taxpayer subsidization required to pull off this logging operation.

The EA does not disclose a reasonably itemized monetary costs of the project activities. Along with the costs of those specific project actions, the costs of road maintenance proportionately

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attributable to this project area, and the cumulative financial impacts of carrying out fire suppression policy were not analyzed and disclosed.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

CUMULATIVE EFFECTS

Cumulative impacts of the proposed Black Ram project, in conjunction of past, ongoing, and foreseeable future management actions was an issue raised throughout our comment letters. This includes a section of PA comments starting on p. 14.

The EA discloses that "Previous Regeneration Harvest" affected 21,507 acres in the project area since the 1940s and "Previous Intermediate Harvests" affected 16,595 acres. However, the EA doesn't analyze how this past logging—which affected somewhere near 40% of the project area KNF acreage—might have adversely affected wildlife.

The EA does not disclose if the FS has performed all of the monitoring and mitigation required or recommended in those NEPA documents, and the results of the monitoring. The FS would be unable to properly analyze and disclose cumulative effects of management plan implementation if it is not adequately informed by past project monitoring and plan-mandated monitoring.

The EA does not provide a description of any monitoring, specified in past project NEPA documents or the original forest plan for proposed project area, which has yet to be gathered and/or reported.

A proper cumulative effects analysis would include:

- A list of all past projects (completed or ongoing) implemented in the proposed project area watersheds.

- A list of the monitoring commitments made in all previous NEPA documents covering the project area.

- The results of all that monitoring.

- A description of any monitoring, specified in those past project NEPA documents or the Forest Plan for proposed project area, which has yet to be gathered and/or reported.

- A summary of all monitoring done in the project area as a part of the Forest Plan monitoring and evaluation effort.

- A cumulative effects analysis which includes the results from the monitoring required by the Forest Plan.

  The EA does not include an analysis of how well past projects met the goals, objectives, desired conditions, etc. stated in their respective NEPA documents, how well the projects conformed to forest plan standards and guidelines. It is informative for the public to know, in the NEPA process, if the impacts of past projects were correctly anticipated by their respective NEPA documents, and how well the statements of Purpose and Need in those NEPA documents were served.

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Without such items being a part of the NEPA analysis, the validity of analysis statements and assumptions would lack support. If predictions and analyses made in previous NEPA processes were inaccurate, and the agency is making similar decisions, then the process will fail. Also, if there have been problems with meeting past monitoring commitments, the FS must disclose them at this time.

The EA does not disclose results of Forest Plan Chapter 5 Monitoring and Evaluation Requirements related to diversity and wildlife. Such a discussion would properly be integrated into an analysis of the cumulative effects of past management.

The failure of Congress to allocate sufficient funding is a subversion of Forest Planning and results in programs, as exemplified by this Black Ram "increasing resiliency" Project, which subvert NFMA. This is explained by Roger Sedjo, member of the Committee of Scientists, who expresses his concerns in Appendix A of their 1999 Report about the discrepancy between forest plans and Congressional allocations, leading to issues not considered in forest plans:

(A)s currently structured there are essentially two independent planning processes in operation for the management of the National Forest System: forest planning as called for in the legislation; and the Congressional budgeting process, which budgets on a project basis. The major problem is that there are essentially two independent planning processes occurring simultaneously: one involving the creation of individual forest plans and a second that involves congressionally authorized appropriations for the Forest Service. Congressional funding for the Forest Service is on the basis of programs, rather than plans, which bear little or no relation to the forest plans generated by the planning process. There is little evidence that forest plans have been seriously considered in recent years when the budget is being formulated. Also, the total budget appropriated by the Congress is typically less than what is required to finance forest plans. Furthermore, the Forest Service is limited in its ability to reallocate funds within the budget to activities not specifically designated. Thus, the budget process commonly provides fewer resources than anticipated by the forest plan and often also negates the "balance" across activities that have carefully been crafted into forest plans. Balance is a requisite part of any meaningful plan. Finally, as noted by the GAO Report (1997), fundamental problems abound in the implementation of the planning process as an effective decision making instrument. Plans without corresponding budgets cannot be implemented. Thus forest plans are poorly and weakly implemented at best. Major reforms need to be implemented to coordinate and unify the budget process.

The EA does not disclose the impacts of fire suppression on each of the stands in the project area. The EA does not disclose the benefits of wildland fire, which presumably will continue to be forsaken in favor of protecting your tree farms.

Remedy: Select the No Action alternative. Alternatively, withdraw the draft DN and prepare written responses to all of our comments, so we may be informed as NEPA requires the FS to assist the public in becoming. And address the analytical and scientific issues identified above.

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SCIENTIFIC INTEGRITY

The EA does not disclose the limitations of all models the FS relies upon for the Black Ram project analyses.

The EA does not disclose the statistical reliability of all data the FS relies upon for the Black Ram project analysis. Since "an instrument's data must be reliable if they are valid" (Huck, 2000) this means data input to a model must accurately measure that aspect of the world it is claimed to measure, or else the data is invalid for use by that model. Also, Beck and Suring, 2011 “remind practitioners that if available data are poor quality or fail to adequately describe variables critical to the habitat requirements of a species, then only poor quality outputs will result. Thus, obtaining quality input data is paramount in modeling activities.” And Larson et al. 2011 state: “Although the presence of sampling error in habitat attribute data gathered in the field is well known, the measurement error associated with remotely sensed data and other GIS databases may not be as widely appreciated.”

The KNF Forest Plan and its wildlife viability methodology rely heavily upon the assumption that the FS knows the Historic Range of Variability (HRV) of a wide enough set of vegetation/habitat parameters, upon which “Desired Conditions” are constructed, and toward which “movement” is most of what’s necessary for determining Forest Plan/NFMA compliance. Yet the reliability of the data sources used to construct the HRV is not disclosed. The data sources themselves are not identified or obscure.

Huck, 2000 states:
The basic idea of reliability is summed up by the word consistency. Researchers can and do evaluate the reliability of their instruments from different perspectives, but the basic question that cuts across these various perspectives (and techniques) is always the same: “To what extent can we say the data are consistent?” ...(T)he notion of consistency is at the heart of the matter in each case.

...(R)eliability is conceptually and computationally connected to the data produced by the use of a measuring instrument, not to the measuring instrument as it sits on the shelf.

During litigation of a timber sale on the Kootenai NF (CV-02-200-M-LBE, Federal Defendants Response to Motion for Preliminary Injunction), the FS criticized a report provided by plaintiffs, stating “(Its) purported 'statistical analysis' reports no confidence intervals, standard deviations or standard errors in association with its conclusions."

As Huck (2000) states, the issue of "standard deviations or standard errors" that the FS raised in the context of that litigation relates to the reliability of the data, which in turn depends upon how well-trained the data-gatherers are with their measuring tools and measuring methodology. In other words, different measurements of the same phenomenon must result in numbers that are very similar to result in small "standard deviations or standard errors" and thus high reliability coefficients, which in turn provide the public and decisionmakers with an idea of how confident they can be in the conclusions drawn from the data.

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Also, the document, "USDA-Objectivity of Statistical and Financial Information" is instructional on this topic.

The next level of scientific integrity is the notion of "validity." So even if FS data input to its models are reliable, a question remains of the models' validity. In other words, are the models scientifically appropriate for the uses for which the FS is utilizing them? As Huck, (2000) explains, the degree of "content validity," or accuracy of the model or methodology is established by utilizing other experts. This, in turn, demonstrates the necessity for utilizing the peer review process.

Model results can be no better than as the data fed into them, which is why data reliability is discussed above. The Ninth Circuit Court of Appeals has declared that the FS must disclose the limitations of its models in order to comply with NEPA. The EA has failed to disclose these limitations. Unfortunately, the FS uses models without any real indication as to how much they truly reflect reality.

In the NPCNF's Clear Creek Integrated Restoration Project FEIS, the FS defines "model" as "a theoretical projection in detail of a possible system of natural resource relationships. A simulation based on an empirical calculation to set potential or outputs of a proposed action or actions." (G-14.) From www.thefreedictionary.com:

Empirical – 1. a. Relying on or **derived from observation or experiment**: empirical results that supported the hypothesis. b. Verifiable or provable by means of observation or experiment: empirical laws. 2. Guided by practical experience and not theory, especially in medicine. (Emphasis added.)

So models are "theoretical" in nature and the agency implies that they are somehow based in observation or experiment that support the hypotheses of the models. That would be required, because as Verbyla and Litaitis (1989) assert, "Any approach to ecological modelling has little merit if the predictions cannot be, or are not, assessed for their accuracy using independent data." This corresponds directly to the concept of "validity" as discussed by Huck, 2000: "(A) measuring instrument is valid to the extent that it measures what it purports to measure."

However, there is no evidence that the FS has performed validation of any the models for the way they were used to support the EA's analyses. There is no documentation of someone using observation or experiment to support the model hypotheses.

As Huck, (2000) explains, the degree of "content validity," or accuracy of the model or methodology is established by utilizing other experts. This, in turn, demonstrates the necessity for utilizing the peer review process. The validity of the various models utilized in the EA's analyses have, by and large, not been established for how agency utilizes them. No studies are cited which establishes their content validity, and no independent expert peer review process of the models has occurred.

Larson et al. 2011 state:
Habitat models are developed to satisfy a variety of objectives. ...A basic objective of most habitat models is to predict some aspect of a wildlife population (e.g., presence, density,

survival), so assessing predictive ability is a critical component of model validation. **This requires wildlife-use data that are independent of those from which the model was developed.** ...It is informative not only to evaluate model predictions with new observations from the original study site but also to evaluate predictions in new geographic areas. (Internal citations omitted, emphasis added.)

USDA Forest Service, 2000c (a FS forest plan monitoring and evaluation report) provides an example of the agency acknowledging the problems of data that are old and incomplete, leading to the limitation of models the FS typically uses for wildlife analyses for old-growth wildlife habitats:

Habitat modeling based on the timber stand database has its limitations: the data are, on average, 15 years old; canopy closure estimates are inaccurate; and data do not exist for the abundance or distribution of snags or down woody material... .

In the above case, the FS expert believed the data were unreliable, limiting the usefulness and applicability (validity) of the model. In other places in this objection—particularly regarding old growth—we discuss this staleness of data.

Ruggiero, 2007 (a scientist from the research branch of the FS) recognizes a fundamental need to demonstrate the proper use of scientific information, in order to overcome issues of decisionmaking integrity that arise from bureaucratic inertia and political influence. Ruggiero, 2007 and Sullivan et al., 2006 provide a commentary on the scientific integrity and agency use and misuse of science. And the Committee of Scientists (1999) recommend "independent scientific review of proposed conservation strategies..."

The EA violates NEPA because the FS has not insured the reliability of data input to the models, the FS has not validated the models for the way the EA utilizes them, and the FS has overly narrowed the information it considers to be best available science.

The documents, "USDA-Objectivity of Regulatory Information" and "USDA-Objectivity of Scientific Research Information" are instructional on this topic.

Beck and Suring, 2011 state:
Developers of frameworks have consistently attained scientific credibility through published manuscripts describing the development or applications of models developed within their frameworks, but a major weakness for many frameworks continues to be a lack of validation. Model validation is critical so that models developed within any framework can be used with confidence. Therefore, we recommend that models be validated through independent field study or by reserving some data used in model development.

Beck and Suring, 2011 developed several criteria for rating modeling frameworks—that is, evaluating their validity. Three of their criteria are especially relevant to this discussion:

Habitat–population linkage	Does the modeling framework incorporate vital rates (e.g., production, survival), other demographic parameters (e.g., density, population size); surrogates (e.g., quality of home ranges, habitat conditions in critical reproductive habitats, presence/absence) of population demographic parameters; or does the modeling framework model habitat conditions without specific consideration of wildlife population parameters?	0 = does not rely on population demographics or surrogates of modeled species 1 = relies on surrogates for population demographic parameters or framework; can utilize population demographics if desired, but is not dependent on them 2 = specifically relies on population demographics of modeled species
Output definition	Is the output well defined and will it translate to something that can be measured?	1 = difficult 2 = moderate 3 = easy
Scientific credibility	Has the framework gained credibility through publication of results, application of results, or other mechanisms to suggest acceptance by an array of professionals?	0 = limited credibility 1 = at least 1 publication of results using this framework, or other application of the modeling framework

A Science Consistency Review is long overdue for the revised Forest Plan (See Guldin et al., 2003, 2003b). The FS prepared Guldin et al. (2003) which:

...outlines a process called the science consistency review, which can be used to evaluate the use of scientific information in land management decisions. Developed with specific reference to land management decisions in the U.S. Department of Agriculture Forest Service, the process involves assembling a team of reviewers under a review administrator to constructively criticize draft analysis and decision documents. Reviews are then forwarded to the responsible official, whose team of technical experts may revise the draft documents in response to reviewer concerns. The process is designed to proceed iteratively until reviewers are satisfied that key elements are **consistent with available scientific information.**

Darimont, et al., 2018 advocate for more transparency in the context of government conclusions about wildlife populations, stating:

Increased scrutiny could pressure governments to present wildlife data and policies crafted by incorporating key components of science: transparent methods, reliable estimates (and their associated uncertainties), and intelligible decisions emerging from both of them. Minimally, **if it is**

accepted that governments may always draw on politics, new oversight by scientists would allow clearer demarcation between where the population data begin and end in policy formation (Creel et al. 2016*b*; Mitchell et al. 2016). Undeniably, social dimensions of management (i.e., impacts on livelihoods and human– wildlife conflict) will remain important. (Emphasis added.)

In a news release accompanying the release of that paper, the lead author states:
In a post-truth world, **qualified scientists are arm's length now have the opportunity and responsibility to scrutinize government wildlife policies and the data underlying them.** Such scrutiny could support transparent, adaptive, and ultimately trustworthy policy that could be generated and defended by governments. (Emphasis added.)

The Committee of Scientists (1999) state:
To ensure the development of scientifically credible conservation strategies, the Committee recommends a process that includes (1) scientific involvement in the selection of focal species, in the development of measures of species viability and ecological integrity, and in the definition of key elements of conservation strategies; (2) independent scientific review of proposed conservation strategies before plans are published; (3) scientific involvement in designing monitoring protocols and adaptive management; and (4) a national scientific committee to advise the Chief of the Forest Service on scientific issues in assessment and planning.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical and scientific issues identified above.

Submitted sincerely, /s/

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