December 24, 2021

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

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

Re: Wildfire Adapted Missoula project objection

Pursuant to 36 CFR 218, this is an objection to the "Updated" Wildfire Adapted Missoula (WAM) project Environmental Assessment (EA) and draft Decision Notice (DN), on the Missoula Ranger District, Lolo National Forest (Lolo NF). The Responsible Official is District Ranger Jennifer Hensiek. This objection is filed on behalf of Friends of the Clearwater, WildEarth Guardians, and Alliance for the Wild Rockies ("Objectors"). The DN doesn't say which alternative from the EA it is selecting, instead stating: "I have decided to authorize activities described in the Wildfire Adapted Missoula Environmental Assessment (WAM EA) with one modification in response to a request from area residents to add a shaded fuelbreak on the Larch Camp Loop Road." (P. 46.)

Where this objection does not specify the source from where it is quoting, that means we are citing from the 11/9/2021 updated EA/DN. (Be aware that the 11/9/2021 "Updated" Wildfire Adapted Missoula project Environmental Assessment and draft Decision Notice appear as a single pdf on the project website, with continuous page numbers.)

Objectors request the Appeal Deciding Officer schedule an objection resolution meeting for sometime after January 1, 2022.

SUMMARY OF CHOSEN ALTERNATIVE

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*From the District Ranger's signature on the October 2020 WAM scoping letter.

The following are some of the activities the Wildfire Adapted Missoula (WAM) DN authorizes, taking from a description of "Alternative B – Modified Proposed Action" (pp. 8-9):

Non-mechanized Wildfire Risk Reduction Fuel Treatments (could occur on up to 93,842 acres). This includes a suite of 7 different treatments which are described in detail in Appendices A and C. The WAM Implementation Guide (Appendix D) provides a strategy which would allow these predetermined treatments to be aligned, prior to implementation, with current conditions on the ground.

1. Young Forest – Small Tree Thinning and Prescribed Burning
2. Hand Thinning and Piling and Prescribed Burning (Cut, Pile, Burn)
3. Hand Thinning and Prescribed Burning
4. Prescribed Fire (>300 acres)
5. Restoration of Acquired Lands
6. Meadow Restoration
7. Managed Wildfire

Mechanized Wildfire Risk Reduction Fuel Treatments:

8. Hand thinning and Prescribed Burning with Incidental Mechanized Fuel Treatments (Blue Mountain area only)
9. Mechanized Thinning and Prescribed Burning (Blue Mountain area only)
10. Shaded Fuelbreaks (108 miles/ max. 9,244 acres)
11. Biomass Removal (max. 5,396 acres)

Table 2. Alternative B Blue Mountain Area Vegetation Treatments

Wildfire Risk Reduction Fuel Treatments	**Acres**
Non-mechanized	
Young Forest – Small Tree Thinning and Prescribed Burning	655
Hand Thinning and Piling and Prescribed Burning (Cut, Pile, Burn)	125
Hand Thinning and Prescribed Burning	829
Meadow Restoration	349
Mechanized	
Hand thinning and Prescribed Burning with Incidental Mechanized Fuel Treatments	856
Mechanized Thinning and Prescribed Burning	1,651
Total	**4,465**

Table 3. Alternative B Road/Trail Management

Activity	Blue Mountain FTA Total (miles)	All other WAM (miles)	WAM Total (miles)
Add NFSR	13	162	175
Construct NFSR	6	0	6
Decommission	8	0	8
Level 3-DN	7.4		
Level 3-D	0.5		
Construct Temporary Road	4	0	4
Add non-motorized trail to trail system	0.4	0	0.4

Implementation Timing

The proposed activities within the WAM project area would occur over a 20-year implementation timeframe. Implementation would consist of multiple projects with different completion spans of days or years; therefore, at any given time over the next 20 years, several activities could be occurring in different steps of implementation and monitoring. The Implementation Guide (Appendix D) would be utilized throughout the implementation timeframe to review treatment locations and design on an annual basis.

The WAM EA fails to define "incidental" in the context of its description of "Hand thinning and Prescribed Burning with Incidental Mechanized Fuel Treatments," so clearly the FS will not be constrained from implementing Mechanized Thinning and Prescribed Burning on any of those 856 acres.[1] So added to the 9,244 acres of heavy logging of the "Shaded Fuelbreaks" along 108 miles of road, plus the 1,651 acres of "Mechanized Fuel Treatments and Prescribed Burning" the Forest Service (FS) is authorizing heavy logging of 11,751 acres (more than 18 square miles) of national forest under the Selected Alternative.

We say "heavy logging" because of how the EA displays the FS's target example:

Pattee Canyon Post Treatment

This forest area has been heavily modified, and to the average person it resembles a clearcut with a few trees left behind.

INTRODUCTION

Objectors previously submitted comments on the project, including a June 3, 2021 comment letter on the EA. The DN Appendix E Response to Comments states: "None of the comments necessitated reanalysis of alternative." And as far as we can tell, nothing about the project has been changed as a result of our comments. Therefore we fully incorporate our previous

[1] The closest the EA comes to any specificity with this definition is in Appendix C: "…mechanized treatment is listed as incidental as overstory tree density is typically low to moderate over most of the fuel treatment area. These are predominately ponderosa and Douglas- fir forests that are two- storied or have multiple tree layers. Pockets of high overstory tree density (i.e., interlocking crowns or low crown spacing) or heavy crown fuels (i.e., dwarf mistletoe) are present." As explained later in this objection, the FS cannot provide even an estimate of the acreage with such characteristics because it lacks reliable quantitative data.

comments into this objection, and herein we refrain from extensive repetition of those comments because it's not necessary. We also incorporate each of the submissions of Claudia Narcisco, including her June 3, 2021 comments on the EA.

To summarize the situation, the FS plans to "treat" around 94,000 acres without mechanization (around 147 square miles) plus log up to 11,751 more acres (over 18 square miles) of national forest, land, construct 10 miles of new road (but in actuality likely much more, as explained below) while doing next to nothing resembling a genuine National Environmental Policy Act (NEPA) process—and simply declare "No Significant Impacts."

Our EA comments and this objection go into detail how extremely deficient the FS's analysis is. It is fake NEPA exemplified. Much of the problem is with the FS's decide-now analyze-later conditions based analysis methodology, whereby even current conditions are not disclosed. Still more of the problem is the fact that the FS fails to conduct cumulative effects analyses in at least two ways. For one, the EA includes no cumulative effects analysis. In addition, the FS has attempted to effectively erase its history of management in the project area by failing to take a hard look (or any look at all) at the results of past management activities. This is perhaps best demonstrated with FS specialists' apparent ignorance of a project the FS implemented within the past few years within part of the WAM project area—Marshall Woods.

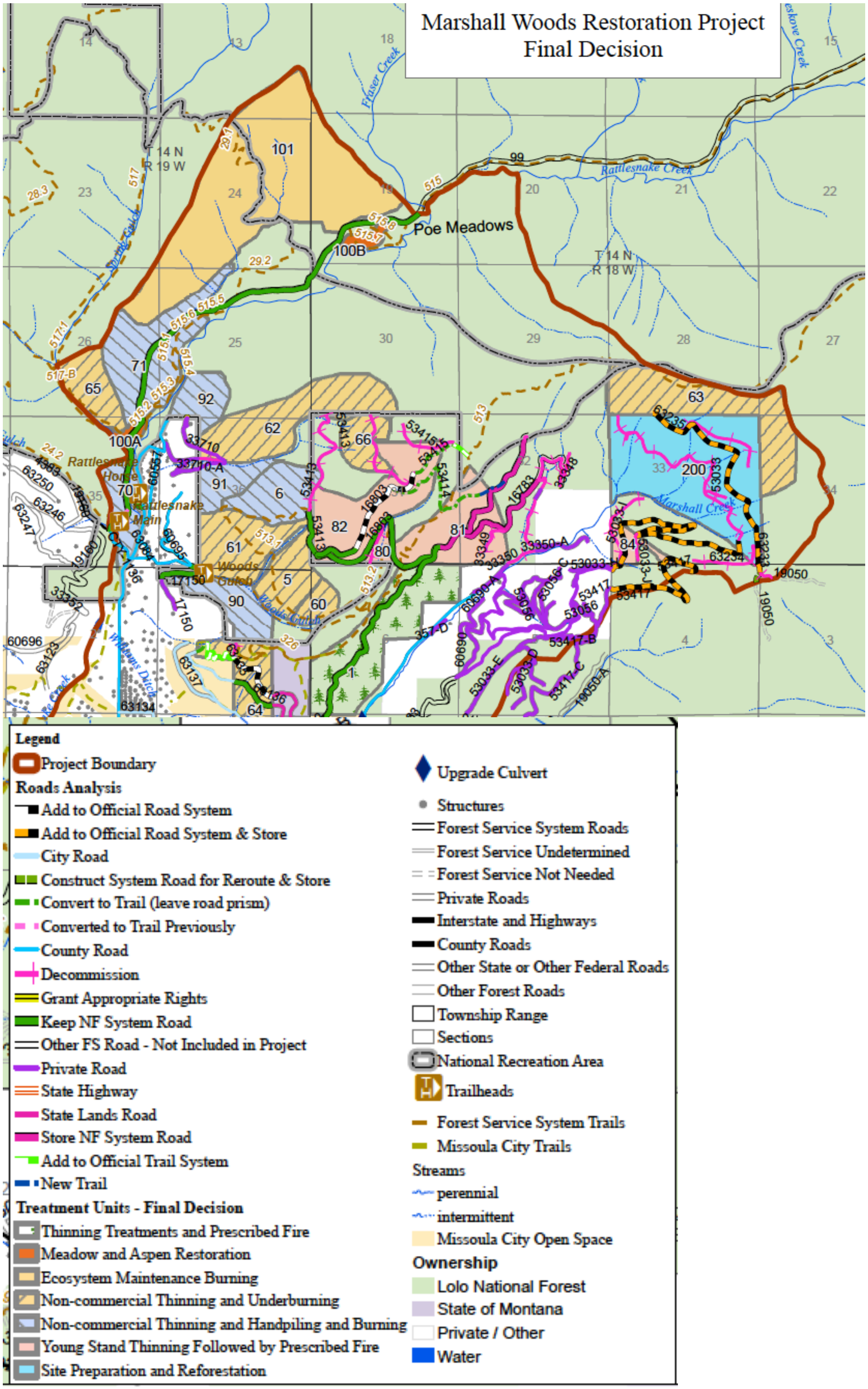
Part of the Marshall Woods Restoration Project's Purpose and Need was to "Integrate project objectives with the Missoula County Wildfire Protection Plan" and to "Decrease high intensity wildfire potential; enhance firefighter efficiency and safety within the WUI." (Marshall Woods Decision Notice.) If that sounds familiar, it's because that is most of the WAM Purpose and Need.

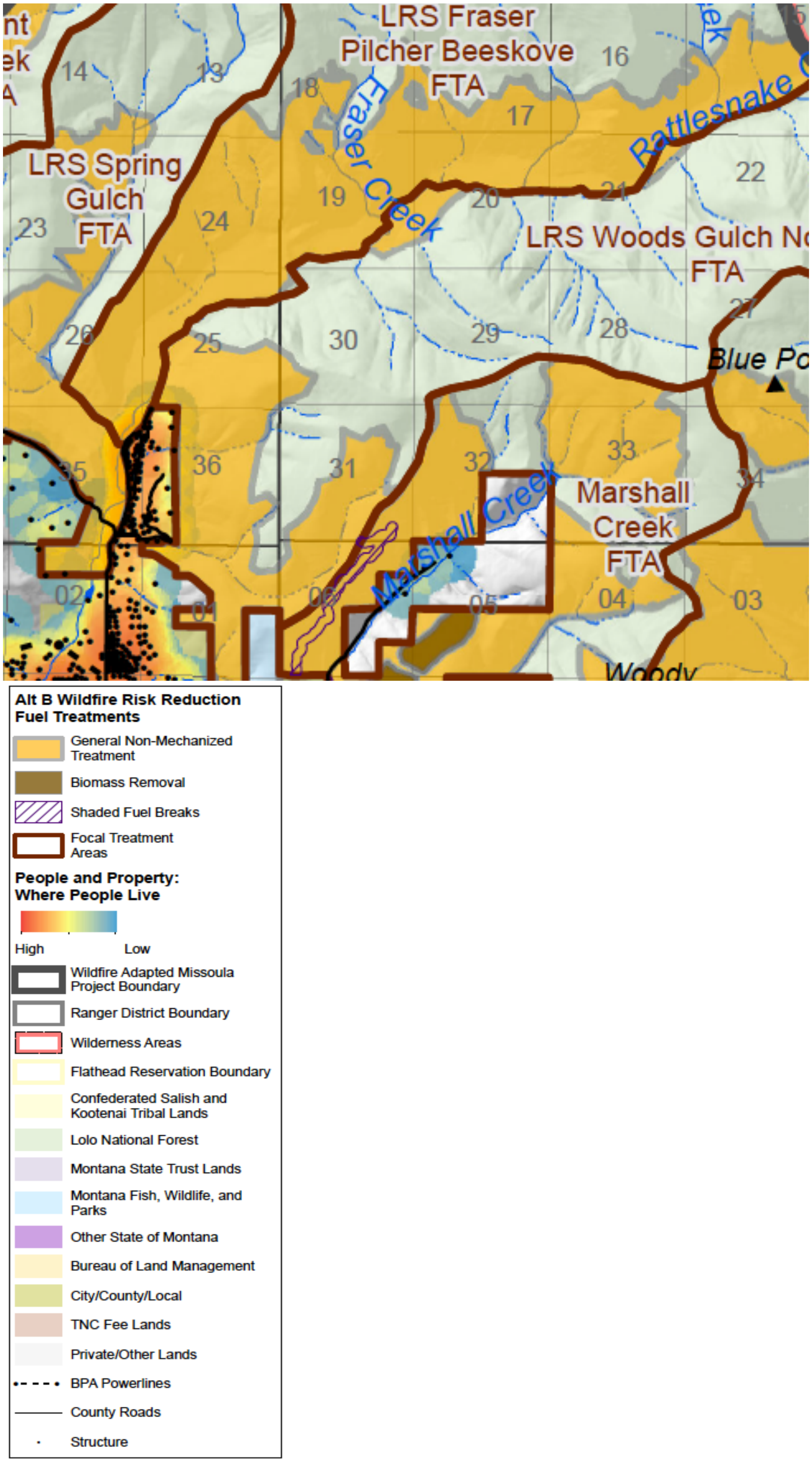
On the following page is a screenshot of part of the map from the Marshall Woods Decision Notice (January 2016) along with that map's key. The page after that is a screenshot display of the corresponding part of the map from the WAM EA, along with its key.

It doesn't take a lot of comparison between these two maps to notice extensive overlap in vegetation treatments of both projects.[2] In other words, the FS's WAM proposal would "treat" many of the very same areas the FS supposedly treated less than six years ago (probably much more recently, given implementation logistics).

Since the FS was claiming it was saving the public from fire with Marshall Woods, surely they would be obligated to disclose—in the context of this new WAM saving-the-world-from-fire project—that it failed to do so in certain Marshall Woods project locations, hence the need to overlap. Not informing the public about this would constitute an obvious breach of commitments made to the public, and a NEPA violation.

[2] Objectors did not attempt to determine how extensive is the overlap of the two projects. But it didn't take much looking to find the phenomenon in this particular location.


Marshall Woods Restoration Project
Final Decision
Poe Meadows
Legend
Project Boundary
Roads Analysis
Add to Official Road System
Add to Official Road System & Store
City Road
Construct System Road for Reroute & Store
Convert to Trail (leave road prism)
Converted to Trail Previously
County Road
Decommission
Grant Appropriate Rights
Keep NF System Road
Other FS Road - Not Included in Project
Private Road
State Highway
State Lands Road
Store NF System Road
Add to Official Trail System
New Trail
Treatment Units - Final Decision
Thinning Treatments and Prescribed Fire
Meadow and Aspen Restoration
Ecosystem Maintenance Burning
Non-commercial Thinning and Underburning
Non-commercial Thinning and Handpiling and Burning
Young Stand Thinning Followed by Prescribed Fire
Site Preparation and Reforestation
Upgrade Culvert
Structures
Forest Service System Roads
Forest Service Undetermined
Forest Service Not Needed
Private Roads
Interstate and Highways
County Roads
Other State or Other Federal Roads
Other Forest Roads
Township Range
Sections
National Recreation Area
Trailheads
Forest Service System Trails
Missoula City Trails
Streams
perennial
intermittent
Missoula City Open Space
Ownership
Lolo National Forest
State of Montana
Private / Other
Water


LRS Fraser Pilcher Beeskove FTA
Fraser Creek
Rattlesnake
LRS Spring Gulch FTA
LRS Woods Gulch N
FTA
Blue Po
Marshall Creek
Marshall Creek FTA
Woody
14
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02
01
06
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04
03
Alt B Wildfire Risk Reduction Fuel Treatments
General Non-Mechanized Treatment
Biomass Removal
Shaded Fuel Breaks
Focal Treatment Areas
People and Property: Where People Live
High
Low
Wildfire Adapted Missoula Project Boundary
Ranger District Boundary
Wilderness Areas
Flathead Reservation Boundary
Confederated Salish and Kootenai Tribal Lands
Lolo National Forest
Montana State Trust Lands
Montana Fish, Wildlife, and Parks
Other State of Montana
Bureau of Land Management
City/County/Local
TNC Fee Lands
Private/Other Lands
BPA Powerlines
County Roads
Structure

If we give the FS the benefit of the doubt and assume they actually did implement Marshall Woods as they said they would, this means the FS's ID Team isn't really aware of the Marshall Woods treatments, their location, and/or their effectiveness, etc. Consistent with this analysis-free WAM decisionmaking, they're just making stuff up along the way, having yet to discover they've already treated some of those areas quite recently.

But since the EA is claiming they did in fact do the analysis, that indicates their data is old and out-of-date, or otherwise flat-out wrong. Yet this is the very same vegetation data upon which their modeling exercises and analyses—concluding a significant fire risk exists—are based. And which is alleged to justify the "FIRE! FIRE! FIRE!" fear inducement driving this project, by the way.

It turns out the FS's roads data is similarly flawed, but we won't get into that just yet—except to say that, given the well-known adverse impacts of roads, it also indicates a very significant failure of analysis.

In examining the EA and specialist reports, we conclude that **data-free** defines this WAM analysis, because the FS cannot show how any of the data it input into models or described in general terms was ever gathered by ID Team members actually going out onto the ground in the project area to document existing conditions. What the FS uses seems to be at best database information based on outdated or nonexistent field data, or remotely gathered information with little to no ground trothing to validate or verify.

Objectors have no problem with the FS finally and genuinely integrating its management with the realities of fire and climate change, finding ways to prescribe burn and even lightly alter vegetation in strategic locations in the project area, based upon good sense and good scientific information. We would even support use of taxpayer funding to create educational programs to teach Missoula County residents about the importance of their taking action in the Home Ignition Zone to minimize the chance of property loss. This would have the added benefit of helping to transform the dysfunctional cultural obeisance to false solutions such as "hazardous fuel reduction" where it doesn't work—which is most of the areas WAM would "treat". Obviously this current iteration of WAM does not exemplify such ideals, and it isn't even close.

At this point it appears the only way for the FS to **Remedy** this situation is for it to withdraw its EA/DN and start over, preparing an Environmental Impact Statement (EIS) if any parts of its WAM proposal can pass scientific, economic and logical muster. We look forward to discussing reasonable options at the upcoming objection resolution meeting.

NEPA REGULATIONS

This is a heading of a section of our comments on the EA, which we fully incorporate into this objection.

Based upon the FS's stance on this issue, including responses to comments, it's clear the Lolo National Forest is putting a whole lot of degraded NEPA eggs in its WAM basket. We draw your attention to the Council on Environmental Quality's rulemaking notice and draft rule concerning the NEPA regulations, published at 86 Fed Reg 55757 et seq. on October 7, 2021—well after the

EA comment period. Despite this ongoing rulemaking, it seems the FS remains hell bent on avoiding analysis of cumulative effects and conducting overall lousy NEPA just to test what it believes is its discretion under the Trump NEPA rulemaking that is in the process of being removed.

to public process!

CUMULATIVE EFFECTS

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

In its response to comments on the EA, the FS **finally** informs the public:

> Implementation of the Pattee Canyon Maintenance DM, which was authorized in 2018, will continue. This includes the maintenance of treatments including hand thinning, girdling, hand piling, pile burning, and underburning on 1,725 acres within the Pattee Canyon Recreation Area. These treatments are similar to the non-mechanized wildfire risk reduction treatments proposed in the WAM project. The Pattee Canyon Maintenance project serves as a demonstration of non-mechanized wildfire risk reduction treatments proposed in the WAM project . The WAM project proposes additional biomass removal and shaded fuelbreak treatments within the Pattee Canyon Maintenance project area that were not included in that decision (Appendix C - Wildfire Risk Reduction Fuel Treatment Guide).

This statement begins an analysis of cumulative effects. But it fails to follow through by explaining what the FS finds inadequate about the ongoing fuel reduction in the Pattee Canyon Maintenance project area such that it needs more WAMming. This is an obvious NEPA violation.

The taxpayers already have invested how much $ in Pattee Canyon to “treat” fuels? And it’s not enough?

Our comments on the EA quote from the EA:

> In coming years, the Missoula RD will work with local communities in the next highest priority treatment areas to plan and implement similar mechanical treatments. When FTAs are ranked high for hazard and risk, and the communities demonstrate readiness to move forward with risk reduction efforts on private land, **those FTAs will then be analyzed via a public environmental review process like this one.** (Emphasis added.)

Our comments then asked, “This raises more questions than it answers. Is the FS proposing to prepare more EAs in the future, for the other WAM FTAs?” **The FS refused to answer this simple question.**

ECONOMICS

Our comments on the EA included brief text under this heading. We stated in part, “The WAM EA lacks any economic analysis.” The FS’s response was: “An Economics Report was completed and posted on the Lolo NF’s website with the other reports.”

The public has a right to know the true bottom line for this action. The Timber and Economics Analysis report mentioned in the FS response is grossly inadequate, revealing little quantitative analysis. It does little beyond determining the likelihood of receiving bids on the proposed sale of timber WAM activities would yield. It fails to provide any sort of itemized analysis of all WAM project costs and expenses.

However it does indicate the project would be a money loser to U.S. taxpayers, a subsidy to timber interests, and therefore a questionable investment of taxpayer dollars. The report’s Table 1 estimates “Total Revenue (Thousands of $)” to be $118,681. This makes little sense, because that would total over $118 million dollars. So if we make an educated guess that “Thousands of $” is wrong, and its real total revenue estimate is actually $118,681, that would make more sense. Still, there is no math that can be done with Table 1 numbers to arrive at that figure, so again we can only guess.

Then the report estimates that if “Required Design Criteria” were factored in, the revenue converts to a loss: -$131,209. Which design criteria are being factored in—and their effects on costs—is not disclosed in this report. We do however see that this report does nothing to estimate most project activity costs, such as funding the fuel reduction which happens to be the main purpose and need of this WAM project. Road costs are not disclosed here either, although we find the following table in the Transportation Report:

Table 11 – Estimate Road costs related to project activities

Activity	Miles	Cost Est	Anticipated funding source
Maintenance on haul routes	21	$ 156,200	Timber Sale and Appropriated
Construct NFSR	5.7	$ 350,000	Timber Sale and Appropriated
Temporary Road – New (Includes obliteration)	0.9	$ 10,800	Timber Sale
Temporary road –on previously disturbed area (Includes obliteration)	3.6	$ 28,800	Timber Sale
Storage associated with Blue Mountain vegetation project	4.2	$ 14,700	Timber Sale

Decommissioning not associated with Blue Mountain vegetation project	7.9	$ 15,000	Appropriated
Maintenance for Biomass removal (approximate)	40 (approximate)	$ 115,300	Fuels project and Appropriated
Grand Total		**$ 725,600**	

However the figures here are gibberish when considering the above-mentioned estimates from the Timber and Economics Analysis report. With that report estimating the timber sale ***losing*** $131,209, clearly there's nothing available to pay for, e.g. Transportation Report Table 11's $28,800 costs to build and obliterate 3.6 miles of "temporary road" assumed to be paid for by the sale of timber. Other costs from Table 11 are in the same category of nonsense. And we haven't even begun to try to figure out where the money would come from for other project actions, except that the FS implies it may come from "appropriated" funds. But how much has/is/would be "appropriated" for this project? From the above table, it would easily need to be over a half million dollars—**just to deal with roads alone**. But what about the total costs of the WAM fuel reduction ***not associated*** with timber removal? It appears the FS has not really looked into this question at all.

This is more evidence that the FS believes NEPA does not apply to its WAM project.

It's typical of FS timber projects that don't have identified sources of funding (i.e. for the actions that don't generate profits for the timber industry) to result in many project activities remaining in fiscal limbo awaiting future Congressional appropriations, possibly never to be done.

So after all the smoke from the burning of the slash piles has cleared from Missoula's airshed, it's likely that the other "hazardous fuels" will remain—indefinitely. So much for serving the WAM Purpose and Need.

to the taxpayers!

"FIRE! FIRE! FIRE!"

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

Missoula CURRENT
Missoula's News Journal

Missoula County to Forest Service: More emphasis on home ignition zones

By Martin Kidston
December 23, 2021

https://missoulacurrent.com/outdoors/2021/12/missoula-ignition-zones/

In a letter to the Forest Service, Missoula County is asking the local agency to make greater emphasis of home ignition zones and the role they can play in preventing the devastating fires that have plagued other Western communities in recent years.

Relying on forest management alone may leave some with a false sense of security, the county said.

“There might be good reason to do those forest treatments, for landscape ecology or restoration purposes,” said Commissioner Dave Strohmaier. “But nobody’s hope should be elevated to think that’s going to appreciably do anything to save your home in a fire.”

The county’s letter, addressed to the Missoula Ranger District, relates to the Wildfire Adapted Missoula plan being developed by the Lolo National Forest. Among other things, the plan calls for a number of forest treatment projects across more than 455,000 acres, including 177,000 acres on Forest Service lands.

Several demonstration projects have already taken place, such as the Grant Creek Fuels Reduction project, the Marshall Woods Forest Restoration Project and maintenance work in Pattee Canyon.

The plan’s environmental assessment was recently released and the county has commented throughout the process. The Forest Service recently issued its Record of

Decision, though the county believes it doesn't give adequate play to home ignition zones.

"There's 100 years of institutional inertia focused on fire control and some fundamental lack of awareness," Strohmaier said. "The sort of community destruction we've seen, whether it's those abutting forest lands or in Denton, where there's not a tree in site, has much more to do with what you do in your home ignition zone than some of the forest treatments that are sometimes promised as a means to protect your community."

The county believes the agency's Wildfire Adapted Missoula plan must parallel efforts to restore the role that fire plays on the landscape. The county also acknowledged that new tools are needed as climate change unfolds.

That may challenge the "institutional culture" of the Forest Service, the county wrote.

"Largely, we commented on the importance of home ignition zones relative to community wildfire resiliency," said county planner Chet Crowser. "It's fair to say we haven't felt like those concerns have been heard as well as we'd like, but the conversations have moved forward."

Strohmaier and Jack Cohen, a retired fire scientist with the Fire Sciences Laboratory in Missoula, have been vocal in recent years in asking the Forest Service and the public to abandon their expectations that 100% of all wildland fires can be doused 100% of the time.

Rather, they've worked to shift the conversation to the role home ignition zones play in the equation. In Cohen's research, he's seen houses burn to the ground while nearby trees are still green and wooden fences still stand.

Lofted embers can spark new fires outside the burn and neglecting the home ignition zones can lead to disaster. Keeping fires outside the urban interface may rely more heavily on preparation than on large scale forest treatment plans, Strohmaier said.

"There's still an opportunity to have some of that language included in a modified record of decision," Strohmaier said of the Forest Service plan. "There's also some other things on our end we can start working on, like updating our Community Wildfire Protection Plan, which admittedly might need to have the dust blown off it a little bit."

We conclude this section by reminding the FS that its "hazardous fuel reduction" techniques have been scientifically demonstrated to increase the severity of subsequent fire, including increase the rate of fire spread—as our comments on the EA state. And in failing to inform readers of these important factors, the FS violates NEPA.

FAILURE TO ADEQUATELY ASSESS AND DISCLOSE DIRECT, INDIRECT, AND CUMULATIVE IMPACTS, INCLUDING DETAILED, SITE-SPECIFIC INFORMATION.

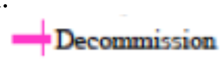
This is a heading of a section of our comments on the EA, which we fully incorporate into this objection. (Alternatively, that section could also have accurately been headed: "NATIONAL ENVIRONMENTAL POLICY ACT VOLATIONS".) That comment section includes sub-headings as follows:

A. Disclose site-specific information
B. Consider climate change.
C. Consider impacts from roads and motorized recreational use.
D. Consider impacts to wildlife and habitat.
E. Consider impacts to water quality.
F. Impacts to, and impacts from, the Wildland Urban Interface.
G. Travel Analysis: Identify the minimum road system and identify more road miles to decommission.

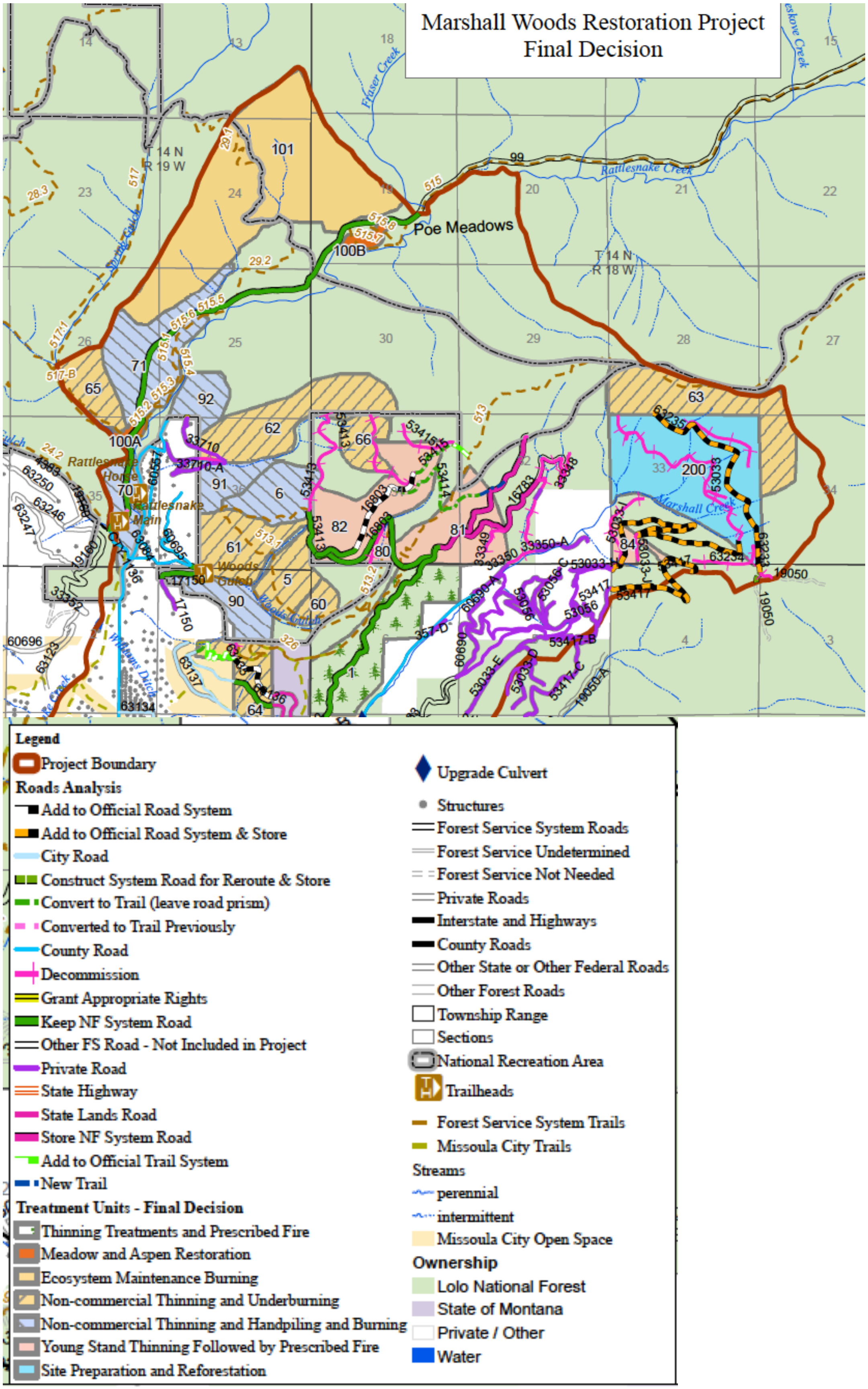
We incorporate into this objection the Friends of the Wild Swan and WildEarth Guardians letters to the Lolo NF during the Forest's Travel Analysis Process.

On the following page is that same screenshot we presented above, displaying a map from the Marshall Woods DN (January 2016) along with that map's key. This time, we zero in on the roads issue. On the page after that is a screenshot of the corresponding part of a road management map from the WAM EA, along with its key.

As with the vegetation treatments, the FS is once again forgetting or distorting its management history, in violation of NEPA.

First we draw attention to the 

roads on the Marshall Woods map, indicating those were determined to be unneeded for the foreseeable future and—under the Marshall Woods DN—slated to be decommissioned. In other words, no longer a road. Yet mostly, those are described as "other roads" on the WAM roads map. The Transportation Report does not explain that term, using those words only once: "…these roads in conjunction with the existing NFSR, undetermined roads, and other roads…" We have no problem with the FS keeping track of old road templates on such databases as INFRA as long as their conditions and intentions of management are also made clear. We interpret the plain language of the FS's own words to mean these locations are no longer functioning as roads. So now we find it highly suspicious that the WAM EA now calls them "roads" without disclosing that a previous Decision made a commitment to decommission them.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Missoula City Open Space
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State of Montana
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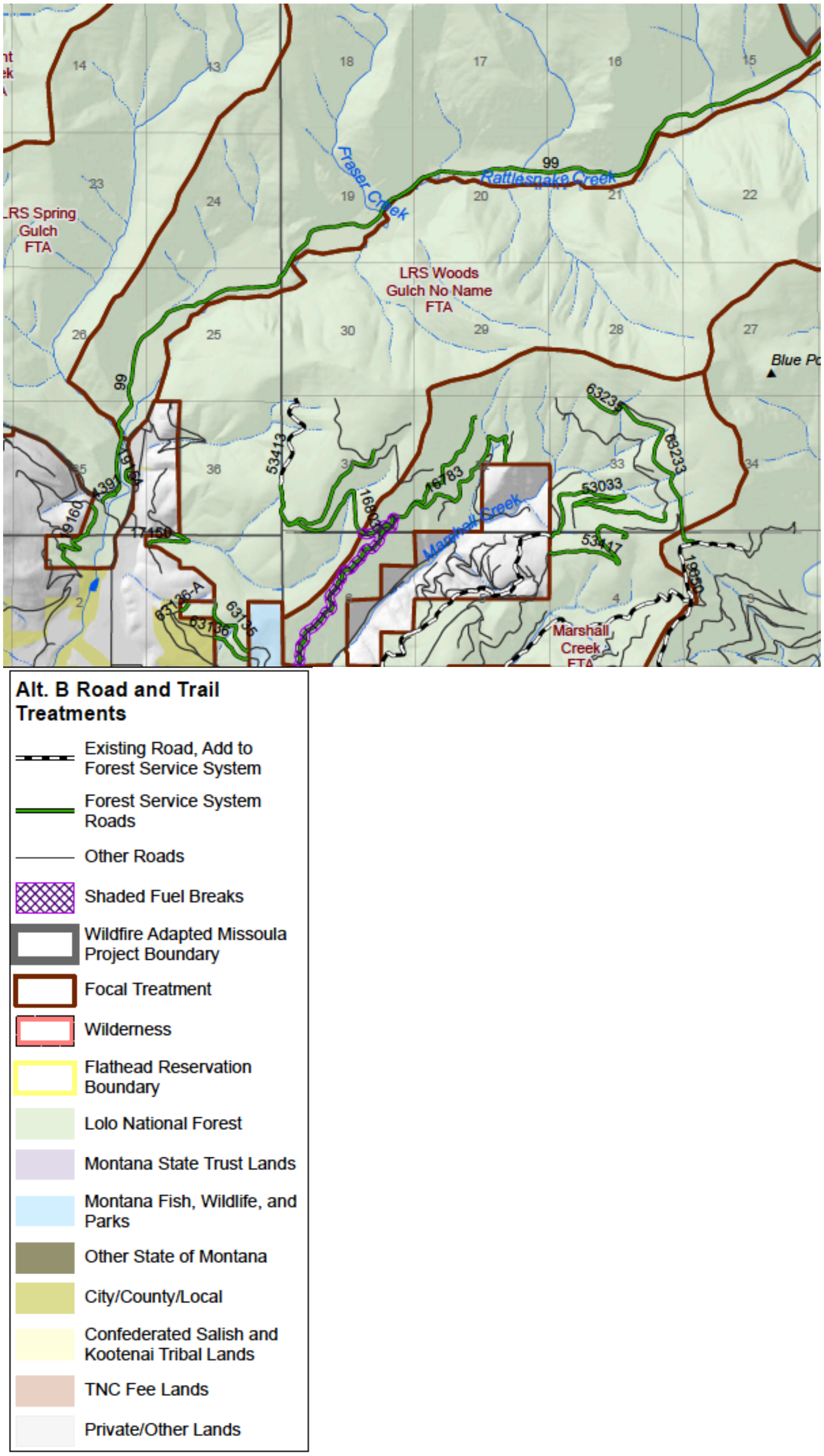
Water


Fraser Creek
Rattlesnake Creek
99
LRS Spring Gulch FTA
LRS Woods Gulch No Name FTA
Marshall Creek
Marshall Creek FTA
Blue Pc
53413
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53033
53417
63233
63735
63736
63736-A
17150
Alt. B Road and Trail Treatments
Existing Road, Add to Forest Service System
Forest Service System Roads
Other Roads
Shaded Fuel Breaks
Wildfire Adapted Missoula Project Boundary
Focal Treatment
Wilderness
Flathead Reservation Boundary
Lolo National Forest
Montana State Trust Lands
Montana Fish, Wildlife, and Parks
Other State of Montana
City/County/Local
Confederated Salish and Kootenai Tribal Lands
TNC Fee Lands
Private/Other Lands

And there's more to this fishy FS road accounting. On the WAM map, the outermost extent of Road 53413 is keyed as "Existing Road, add to Forest Service System." Yet once again, this was a road determined under Marshall Woods to be unneeded, therefore already decommissioned under that Decision. But instead of calling this "new road construction" the FS is merely changing categories to another. This lack of transparency has implications for impacts analyses.

At any given site that was once a national forest road but was decommissioned, the FS's objective is that it be no longer accessible to motor vehicles, be fully re-vegetated with soils recovering, and any culverts and other stream crossing features removed so that riparian area contours resemble natural and no maintenance is necessary. Road 53413, in the portion that was decommissioned under the Marshall Woods decision, had two small stream crossings where we are justified in assuming they were eliminated—culverts pulled, recontouring, etc. Now the FS under WAM is calling this an existing road, plans to use it to access proposed vegetation treatments, and isn't telling anyone they are planning to remove all vegetation and newly gouge a road surface including major road work in a Riparian Habitat Management Area including new culvert installation, increase soil compaction and erosion, increase motorized access and its associated impacts, set up the site for increased noxious weed infestation—without ever disclosing or accounting for those impacts.

We have not conducted a further analysis to determine how many more of the total 175 miles of "existing" non-system roads the WAM project would "add to the national forest system" were previously decommissioned or have similar stories reflecting FS data-keeping failures, non-transparency, incompetence, or even deceit. But there is a strong possibility that the FS has not analyzed and disclosed the impacts of what would essentially be **many miles of new road building** on other forest resource values.

Clearly the Lolo NF has not learned its lesson from the recent Soldier-Butler case in the U.S. District Court, resulting in a Judge calling out the FS for similar fishy road accounting.

The Transportation Report states, "Resource specialists analyzed the effects of adding 162 miles of Undetermined roads to the National Forest System. …The effects to aquatics and fisheries of adding these roads added to the NFS were analyzed and considered insignificant (Hydrology Report, page 16 and Fisheries Report, page 19)." However, neither of those reports makes such a conclusion!

As part of the long-delayed forest plan revision, a finding for the Lolo NF was made in the February 2004 WMZ Analysis of the Management Situation. Therein the "Annual Budget for Maintenance and Backlog" for the Lolo NF was estimated at 4.2 million dollars for a backlog of 5,909 miles of road. The situation remains unresolved. The Lolo NF 2014 Travel Analysis Report states:

> The estimated funding needed to maintain roads to standard is approximately $2,400,000 annually. The Lolo NF currently receives approximately 29 percent of the funds needed to maintain the road system to standard. This includes resurfacing all surfaced roads (gravel and asphalt), replacing all culverts past their useful lives, eliminating fish barriers to meet objectives, brushing all roads to the edges of the clearing limits, ensuring all surface drainage is appropriately installed, and having all regulatory and warning signs replaced

within their life cycle.

Clearly, Congress cannot allocate enough funding to adequately maintain the Lolo NF's system roads.[3] However instead of analyzing and disclosing the implications for project area roads and other resources as NEPA requires, with WAM the FS instead tries to sweep the magnitude of the problem under the rug.

In a report prepared for the Environmental Protection Agency, Endicott, 2008 notes the "physical impacts of forest roads on streams, rivers, downstream water bodies and watershed integrity can be dramatic and have been well documented." According to Endicott, 2008, "forestry-related sediment is a leading source of water quality impairment to rivers and streams nationwide." Remarkably, EPA indicates that "up to 90% of the total sediment production from forestry operations" comes from logging roads and steam crossings. (Environmental Protection Agency, 1993. *See also* Endicott 2008.) A significant portion of this sediment is collected and discharged directly into rivers and streams through ditches, channels, and culverts. (Endicott, 2008.)

The EPA states, "[s]tormwater discharges from logging roads, especially improperly constructed or maintained roads, may introduce significant amounts of sediment and other pollutants into surface waters and, consequently, cause a variety of water quality impacts."4

Endicott, 2008 states:

> There is no question that stormwater pollution from industrial logging roads and forest roads is harming and has the potential to harm beneficial uses, including spawning and rearing habitat for salmon and steelhead and drinking water supplies. Important ecological, economic, and social consequences stem from the sediment discharged from ditches, channels, and culverts along forest roads. Ecologically, fine and coarse-grained sediment loading degrades water quality and detrimentally affects fish and other aquatic species' habitat. (Endicott, 2008.) Sedimentation affects streams by reducing pool depth, altering substrate composition, reducing interstitial space, and causing braiding of channels (Rieman and McIntyre 1993), which reduce carrying capacity. The effects of road construction and associated maintenance account for a majority of sediment loads to streams in forested areas;
>
> Sedimentation negatively affects bull trout embryo survival and juvenile bull trout rearing densities. (Shepard et al. 1984 at 6; Pratt 1992 at 6.) An assessment of the interior Columbia Basin ecosystem revealed that increasing road densities were associated with declines in four nonanadromous salmonid species (bull trout, Yellowstone cutthroat trout (*Oncorhyncus clarkii bouvieri*), westslope cutthroat trout (*O. c. lewisi*), and redband trout (*O. mykiss spp.*)) within the Columbia River basin, likely through a variety of factors associated with roads. Bull trout were less likely to use highly roaded basins for spawning

[3] And all these backlog statistics don't even address non-system roads which—by regulation—the FS cannot use allocated funding to repair.
[4] 77 Fed. Reg. 30473 (May 23, 2012).

> and rearing and, if present in such areas, were likely to be at lower population levels. (Quigley and Arbelbide 1997 at 1183.) These activities can directly and immediately threaten the integrity of the essential physical or biological features necessary for bull trout survival.
>
> The physical impacts of roads have detrimental effects on fish and fish habitat. Mechanisms through which roads exert these deleterious impacts include fine sediment effects, changes in streamflow, changes in water temperature caused by loss of riparian cover or conversion of groundwater to surface water, and migration barriers. The physical impacts of roads discussed above have widespread and profound effect on fish habitat and fish communities in populations across a wide range of environments and conditions (Lee at al., 1997).

The FS does not demonstrate it is managing the project area and forest consistent with the Travel Management Regulations (36 CFR 212) Subpart A which requires the FS to involve the public while conducting a science-based analysis to identify the minimum road system needed to manage the Forest ecologically sustainably and within expected budgets.

The FS does not disclose the degree of other nonsystem roads ("other roads" or "unauthorized roads" etc.) existing in the project area that will NOT be used as timber haul routes, and will remain in conditions which to us means a potentially chronic source of sediment and/or mass wasting, soil erosion, illegal travel, etc. The WAM Transportation Report's Table 3 displays a total of 982 miles of "undetermined" roads in the project area. The FS fails to analyze and disclose ongoing ecological impacts or economic implications of these legacy road templates that will remain in their existing condition. Their present conditions are not discussed, analyzed, or disclosed anywhere.

Lacking a proper travel analysis, there is no way for the public to expect the post-project road and trail network would be affordable and maintenance needs could be addressed by expected budgets—or if the erosive forces of nature will still be the main manager of the transportation network instead.

The FS must perform an economic analysis that identifies sources of funds needed to maintain the road system. When the project mitigation stops in a year or two, the trajectory for fish habitat conditions will be downward. Beschta et al., 2004 state:

> (R)oad and landing construction is expensive and can siphon limited funds away from effective restoration measures, such as obliteration and maintenance. The backlog in maintenance of U.S Forest Service roads has been estimated to be several billion dollars (U.S. Department of Agriculture Forest Service 2000), and road construction inevitably adds to this seemingly insurmountable backlog. For these reasons**, the construction and reconstruction of roads and landings is not consistent with postfire ecosystem restoration.** (Emphasis added.)

Johnson (1995) states, "For the roads we no longer actively use, our dwindling road maintenance budget will make it difficult to maintain the culvert crossings. When these fail during storm and runoff events, tremendous amounts of sediment can be delivered directly to the channel and from there down to lower streams with significant beneficial uses such as sensitive fish habitat." Again, the FS fails to analyze the significance of this foreseeable lack of maintenance in the project area—the direct, indirect and cumulative effects poorly maintained roads have on water quality, soil productivity, weed prevalence, etc.

The FS fails to disclose the implications of project area system roads not maintained in conformance to BMPs or in compliance with standards. Nonsystem roads are addressed by the annual road maintenance budget.

As exemplified with the WAM fishy road accounting, we cannot trust that "temporary roads and their ecological impacts are really temporary. Beschta et al., 2004 explain that, whatever "temporary" means in this project's context, the newly disturbed sites have most of the hydrological and soil impacts of new road construction over the short- and long-term:

> Accelerated surface erosion from roads is typically greatest within the first years following construction, although in most situations sediment production remains elevated over the life of a road (Furniss et al. 1991; Ketcheson & Megahan 1996). Thus even "temporary" roads can have enduring effects on aquatic systems. Similarly, major reconstruction of unused roads can increase erosion for several years and potentially reverse reductions in sediment yields that occurred with disuse. (Potyondy et al. 1991). Where roads are unpaved or insufficiently surfaced with erosion-resistant aggregate, sediment production typically increases with increased vehicular usage (Reid & Dunne 1984).

Reid & Dunne, 1984 state:

> 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 FS must incorporate the science-based transportation analysis required under 36 CFR § 212 Subpart A, and prepare an assessment that identifies the unneeded roads. The FS must also discuss how the Lolo NF's Travel Plan is being implemented in the project/cumulative effects area.

The Transportation Report states, "Several existing roads were identified as "likely not needed" because they are inappropriately placed on the landscape, or duplicative." This demonstrates the inadequacy of the Lolo NF's 2015 Travel Analysis Process, which identified only one mile of road.

The Transportation Report indicates, "The Travel Analysis Process (TAP) for the Wildfire

Adapted Missoula project followed the six step interdisciplinary process outlined in the Forest Service Roads Analysis Handbook **to provide recommended actions to the decision maker**. (Emphasis added.) It further states, "There are other mapped Undetermined roads on both National Forest and recently acquired lands within the project area which warrant future consideration, but a detailed transportation analysis across the landscape is outside the scope and scale of the Wildfire Adapted Missoula Environmental Assessment." (Recommendations? Who needs recommendations?) Even if the District's bloated and decaying road network is outside the overly narrow scope of the WAM project, NEPA still requires analysis and disclosure of the impacts of those roads.

The regulations at 36 CFR § 212 Subpart A require the FS to identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of national forest lands. The analysis process must be demonstrably consistent with the Travel Management Regulations at 36 CFR § 212 Subpart A.

On March 3, 2000, the FS set a course to revise 36 CFR Part 212 to shift emphasis from transportation development to managing administrative and public access within the capability of the lands. The proposal was to shift the focus of National Forest System road management from development and construction of new roads to maintaining and restoring needed roads and decommissioning unneeded roads within the context of restoring healthy ecosystems.

On January 12, 2001, the FS issued the final National Forest System Road Management Rule. The rule revised regulations concerning the management, use, and maintenance of the National Forest Transportation System. Consistent with changes in public demands and use of National Forest System resources and the need to better manage funds available for road construction, reconstruction, maintenance, and decommissioning, the final rule removed the emphasis on transportation development and **added a requirement for science-based transportation analysis**. The final rule is to help ensure that additions to the National Forest System road network are those deemed essential for resource management and use; that construction, reconstruction, and maintenance of roads minimize adverse environmental impacts; and that **unneeded roads are decommissioned** and restoration of ecological processes are initiated. (Emphases added.)

Wisdom, et al. (2000) state:

> 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 density 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.

> ...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.

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

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

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

The December 17, 2013 Washington Office memorandum (USDA Forest Service, 2013b) clarifies that by the September 30, 2015 deadline each forest must:

- Produce a Travel Analysis Report summarizing the travel analysis;
- Produce a list of roads *likely not needed for future use*; and
- Synthesize the results in a map displaying roads that are *likely needed* and *likely not needed in the future* that conforms to the provided template.

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

The Travel Management Regulations at 36 CFR § 212.5 state:

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

reconstruction, decommissioning, and maintenance.

Although the FS has never analyzed or disclosed the forest-wide ecological impacts of its road maintenance funding shortfalls, projecting from discussion in Gucinski et al. 2001 helps one begin to imagine the scale of the impacts.

It is vital to recognize and consider 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)

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. 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, also 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 density 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.)

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.

The FS assumes the project will adequately mitigate the problems chronically posed by the road network by project roadwork and BMP implementation. Such problems were acknowledged by the FS 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 Lolo NF 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."

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 this one. 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).

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 FS does not analyze and disclose the actual effectiveness of proposed BMPs in preventing sediment from reaching streams in fire-affected areas. What BMP failures have been noted for past projects with similar landtypes? Which segments of roads in the watersheds to be affected by this proposal would not meet BMPs following project activities?

The FS has not conducted on-the-ground surveys for inventorying sediment sources in the project area. Fly et al., 2011 describes a thorough survey in the Boise National Forest.

Roads influence many processes that affect aquatic ecosystems and fish: human behavior (poaching, debris removal, efficiency of access for logging, mining, or grazing, illegal species introductions), sediment delivery, and flow alterations. We incorporate The Wilderness Society (2014), which discusses some of the best available science on the ecological impacts of roads. We also incorporate the WildEarth Guardians, 2020 report, "The Environmental Consequences of Forest Roads and Achieving a Sustainable Road System."

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 (Edwards et al., 2016) summarizes research and monitoring on the effectiveness of different BMP treatments. Researchers 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. 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., 2012).

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 must 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 FS 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 FS does not demonstrate that project area Road Management Objectives have been developed consistent with the Travel Management Regulations and the Forest Plan.

When designating off-road vehicle trails and areas, federal agencies are required to minimize damage to forest resources, disruption of wildlife, and user conflicts. Exec. Order No. 11,644 § 3(a), 37 Fed. Reg. 2877 (Feb. 8, 1972), as amended by Exec. Order No. 11,989, 42 Fed. Reg. 26,959 (May 24, 1977). The FS must locate designated trails and areas in order to minimize the following criteria: (1) damage to soil, watershed, vegetation, and other public lands resources; (2) harassment of wildlife or significant disruption of wildlife habitat; and (3) conflicts between off-road vehicle use and other existing or proposed recreational uses. 36 C.F.R. § 212.55(b)(1)-(3).

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 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, 2016b (NPCNF's Johnson Bar Draft 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)." 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 Fisheries Biological Evaluation/Assessment states, "Increased road use would likely increase the production of sediment from those road segments accessing Biomass units or Fuelbreak areas. Sediment delivery would be mitigated with installation and maintenance of road BMPs." Although here the FS acknowledges the problem, it provides no quantitative analysis. The FS acts as if BMPs will zero out the log hauling sediment, despite plenty of scientific and empirical evidence to the contrary.

US Fish and Wildlife Service, 1998 indicates that bull trout are absent when road densities exceed 1.71 mi./mi^2., depressed when the road density = 1.36 mi/mi^2 and strong when road density equals or is less than .45 mi/mi^2. (P. 67.)

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.

Members of the ID Team for the NPCNF's Clear Creek Project fully expressed concerns in project files for that project. From 110606TransportationNFMAQuestions.docx:

> 2. What is broke or at risk?
>
> The existing size of the transportation system is in excess of what is needed for current uses of the National Forest land. Newer technologies require a less invasive road system structure. A history of skid road or jammer road use, and not properly stabilizing roads has lead to a higher risk of failure by landslides and culvert washouts. These risks are even higher in landslide prone landscapes.
>
> Another concern with the large transportation system is that it is cost prohibitive to maintain. The Forest cannot currently maintain all of the transportation system. Currently higher priority roads are being maintained to minimal standards, while other roads are not being maintained and have deferred maintenance. Roads with reduced maintenance or no maintenance are at a higher risk of failures and road closures.
>
> More than 50 percent of the Nez Perce National Forest roads were built between 1960 and 1979. Road standards used during construction of these roads employed current BMPs. The life span of BMPs range anywhere from 10 to 50 years with repeated maintenance, so it is likely that many BMPs installed during original construction are at the end of their life span. BMPs productivity and life spans are reduced if maintenance has not occurred. Roads with BMPs near or at the end of their life span have a higher risk of failure.
>
> 4. How do you fix it?
>
> Analyze all the system and non-system roads in the area and determine a minimum road system required based on needs and risks. Maintain roads needed for public and administrative use. Prioritize the repair of the needed roads based on risk and needs. Update all needed roads to ensure existing standards are met. Updates may include reconstruction, relocation or maintenance of roadways so they are in a stable condition. During the updates, use BMPs for minimal impact on the watershed.
>
> Decommissioning roads no longer needed for access, that are temporary in nature, that are causing environmental damage or that are redundant.
>
> 9. What are the social / resource implications of no actions?

> With only limited road maintenance and no decommissioning, roads will fail causing irreparable resource damage. Road fill and culvert failures will have an impact on stream quality. Public safety is also a concern with no action. To protect individuals from failing roads, road closures would be a common occurrence. Limited to no maintenance leads to structure failures of culverts, bridges and road fills. As road densities in the assessment area are considered high, by no action, there will be a continued adverse affects on the wildlife.
>
> 10. What are some of the foundational elements used in shaping your responses?
> Nez Perce National Forest Plan
> Selway Middle Fork Subbasin Assessment
> **CFR 36, Part 212, Travel Management Rule - Subpart A**
> Interior Columbia Basin Assessment

(Emphasis added.) From 111017WildlifeClearCreekNFMAComments.docx:

> What's broke / at risk (threats) (this is all based on roads which are likely the largest cumulative effects out there. I believe we need to manage motorized uses in identified "sacrifice areas" and restrict motorized use in high quality habitats. I believe there is demand for a restricted roaded setting for hunters to use roads in a non-motorized setting.

From 110606NFMAQuestionsKaren.docx:

> What's broke / at risk
> Roads are the major contributor of sediment to streams, especially at stream crossings. Ditchlines can direct flow and road surface sediment into perennial streams at crossings. These can be a chronic (ongoing) source of sediment to streams. Culverts at crossings are mostly undersized which greatly increases the risk of plugging and failure. Crossing failures can contribute large amounts of sediment to streams. They can be costly to fix and the sediment delivered to streams can take decades to flush out of the system. Road failures also disturb existing vegetation and expose bare soil to potential erosion until the site heals.

The FS does not demonstrate compliance with all relevant forest plan standards, in violation of the Forest Plan and NFMA.

OLD GROWTH AND ASSOCIATED SPECIES

This is a heading of a large section of our comments on the EA, which—as is the case with all EA comment sections—is fully incorporated into this objection.

As our comments expressed, we are alarmed the EA's failure to analyze and disclose information about this resource, given the FS's well-known addiction to timber sales as a way to accomplish "restoration" or "fuel reduction" or "fire risk reduction" etc. etc. etc. In this case we do quote our EA comments:

> The EA contains no analysis for old growth. It fails to disclose how much logging would occur in old growth. It fails to disclose how much old growth would be destroyed. It fails to disclose how much old growth still persists on the WAM Plan landscape, and how that amount might or might not be consistent with the forest plan. The EA contains no analysis of old growth whatsoever. On the other hand, to comply with forest plan and NFMA diversity mandates, the Lolo NF persists in implementing old-growth policies (Daniels, 1994) and inventory methodology (Green et al., 1992) not considered in any forestwide NEPA or NFMA planning process.

Ignoring much of this comment, the FS's response was, "The project's effects analysis for old growth is documented in 'Project Effects on Large Trees and Old Growth' (Project File section K2)." The FS's responses to comments cite this same document at least four more times—a document not cited in the EA's analyses nor posted on the project website as of the week this objection was due:

Project Documents

Please click on the tabs below to navigate to additional documents.

Scoping | Analysis | Decision

Analysis	Date Uploaded
WAM Appendix A Glossary Treatment Narr and Table (PDF 3947kb)	04-30-2021
WAM Appendx A Maps (PDF 36366kb)	04-30-2021
WAM Appendix B RPMs (PDF 261kb)	04-30-2021
WAM Appendix C WFRR Fuel Trmt Guide (PDF 5540kb)	04-30-2021
WAM Appendix D Implementation Guide (PDF 160kb)	04-30-2021
WAM Environmental Assessment (PDF 3755kb)	04-30-2021
Economics Report (PDF 139kb)	04-30-2021
Air Quality Report (PDF 652kb)	04-30-2021
Botany Report (PDF 964kb)	04-30-2021
Forested Vegetation Regulatory Framework (PDF 277kb)	04-30-2021
Fire and Fuels Report (PDF 3346kb)	04-30-2021
Fisheries Report (PDF 3099kb)	04-30-2021
Noxious Weeds Report (PDF 272kb)	04-30-2021
Forested Vegetation Report (PDF 1453kb)	04-30-2021
Hydrology Report (PDF 814kb)	04-30-2021
Recreation Report (PDF 172kb)	04-30-2021
Soils Report (PDF 1179kb)	04-30-2021
Scenery Report (PDF 1527kb)	04-30-2021
Transportation Report (PDF 23599kb)	04-30-2021
Wildlife Report (PDF 13789kb)	04-30-2021
Heritage Report (PDF 200kb)	04-30-2021
WAM EA comment period letter (4/30/2021) (PDF 158kb)	04-30-2021
WAM EA - 30-day Opportunity to Comment - Legal Notice - Missoulian (PDF 70kb)	05-04-2021
Updated Forested Vegetation Regulatory Framework (PDF 278kb)	11-09-2021
Updated Fire and Fuels Report (PDF 3345kb)	11-09-2021
Updated Wildlife Report (PDF 21590kb)	11-09-2021

"The purpose and need of the project may not be able to be met without the removal of large sawlog-sized material." (Timber & Economics Effects Analysis Report.) This FS viewpoint does not surprise us, given the aforementioned FS addiction.

EA Appendix A includes a design feature to: "**Favor** the healthiest ponderosa pine and western larch trees; retain large diameter, old ponderosa pine and western larch trees, and create stand conditions that could provide large trees in the future. Healthy ponderosa pine and western larch in each canopy layer would be featured and retained over, less disease and fire-resistant Douglas-fir." (Emphasis added.) In other words, any other large old tree (e.g., 50" dbh 300-year old Douglas-fir) is fair game for logging.

And what does "favor" ponderosa pine and western larch mean, anyway? It is not an outright prohibition of logging many of the largest, oldest of those species—within old-growth stands or not.

So "removal of large sawlog-sized material" means degrading and destroying old growth and other large and/or old trees, risking viability of old-growth associated indicator and other species along the way.

to the old growth!

We incorporate Juel, 2021 into this objection.

<u>Pileated woodpecker</u>

The pileated woodpecker is a Lolo NF management indicator species (MIS) for old-growth forest and relies heavily upon large tree and snag habitat. The Wildlife Specialist Report states, "Snag abundance on the Forest exceed Plan requirements and Lolo NF Dead and Down Guidelines (U.S. Department of Agriculture 1997)…" We notice that cites from some source that is nearly a quarter-century old, and who knows how old the data that source relied upon is by now (the U.S. Department of Agriculture 1997 cite is not included in the Report's list of literature cited). The report goes on to state, "No comprehensive exam of snag distribution and availability within the project area was completed."

Forest Plan Standard 25 requires: "In the portion of the Forest more than 200 feet from all system roads, sufficient snags and dead material will be provided to maintain 80 percent of the population of snag-using species normally found in an unmanaged Forest. (See Appendix N, Procedures to Implement the Forest Snag Standard.)" The EA and Wildlife Specialist Report cite no data on FS compliance with Forest Plan Standard 25/Appendix N requirements.

The FS fails to discuss the concept of MIS in a manner that relates how population trend monitoring is the best mechanism with which the FS can assure viability of native wildlife species. MIS are used to monitor the effects of planned management activities on viable populations of wildlife and fish. Yet the FS has not monitored the population trends of its MIS as required by the Forest Plan, thus neglecting to follow basic adaptive management principles as well as Forest Plan requirements. The Forest Plan requires the FS to monitor population trends of MIS.

The NPCNF's Lolo Insect & Disease FEIS describes pileated woodpecker habitat:

> Pileated woodpeckers are large, cavity-nesting birds associated with late successional stage forests, but also may use younger forests that have scattered, large, dead trees (Bull and Jackson, 1995). The woodpecker appears to seek out microhabitats with a higher diversity of tree species and higher densities of decadent trees and snags than are available across a landscape (Savignac et al, 2000; Aubry and Raley, 2002). Through their selection of large dead and damaged trees, the bird may serve as a good indicator of ecological function rather than just the age of a stand or forest (Bonar, 2001).

Those habitat components are what the WAP project would destroy.

The FS's overall timber management strategy (basically tree farming) attempts to suppress the natural processes creating decadent trees and snags the pileated woodpecker relies upon. There is no reliable, up-to-date forestwide analysis of habitat, and forestwide population trends have not been monitored.

The Ninth Circuit has stated 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*).

The cumulative effects analysis does not analyze or disclose how much project area pileated woodpecker habitat has already been destroyed or degraded by logging, road building, and other management.

Bull et al. 2007 represents over 30 years of investigation into the effects of logging on the pileated woodpecker and is research information on such effects, and contrast the effects of natural disturbance with large-scale logging on pileated woodpeckers. 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 other cavity nesting wildlife.

The Idaho Panhandle NF's original Forest Plan old-growth standards (USDA Forest Service, 1987c) were largely created around the habitat needs of the pileated woodpecker as an MIS. Bull and Holthausen 1993, recommend management guidelines, including that approximately 25% of the home range be old growth and 50% be mature forest.

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
- Average diameter of potential feeding sites

USDA Forest Service, 1990 states, “To provide suitable pileated woodpecker habitat, strips should be at least 300 feet in width…”

This preferred diameter of nesting trees for the pileated woodpecker is notable. McClelland and McClelland (1999) found similar results 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 very large diameter is not adequately considered in the Forest Plan. The Forest Plan has inadequate direction for retaining specific numbers and sizes of largest trees favored by so many wildlife species.

B.R. McClelland extensively studied pileated woodpecker habitat needs. McClelland, 1985 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)
>
> 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.

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."

On the same subject, 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)."

Spiering and Knight (2005) 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. They 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."

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.

The FS has not quantified the cumulative snag loss in previously and foreseeably logged areas or subject to other management-caused snag loss such as road accessed firewood cutting.

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. Other literature has also indicated the potential for reduced snag abundance along roads (Wisdom et al. 2000).

The FS must also quantify expected snag loss due to safety concerns, which vary with different methods of log removal.

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 FS failed to apply the best available science to describe the quantity and quality of habitat that is necessary to sustain the viability of the pileated woodpecker.

Northern goshawk

The northern goshawk is a Lolo NF MIS for old-growth forest habitat.

The FS does not utilize goshawk survey methodology consistent with the best available science. For example the 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.)

Logging and road building destroy nesting and foraging habitat. The FS must analyze and disclose how much goshawk habitat has already been destroyed or degraded by logging, road building, and other management including "fuel reduction."

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 PFAs 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 did not apply the best available science to describe the quantity and quality of habitat necessary to sustain the viability of the northern goshawk.

<u>Fisher</u>

The FS did not take a hard look at impacts on fisher, including disclosing the current status of this species. There is potential for significant impacts, regardless of the Region 1 memo *(*USDA Forest Service, 2019b).

"(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.

Research heavily associates fishers with older forests throughout the year. (Aubry et al. 2013, Olsen et al. 2014, Raley et al. 2012, Sauder 2014, Sauder and Rachlow 2014, Wier and Corbould 2010). Fine spatial scales of habitat that fisher need is well-studied. Fishers need dense overhead cover, abundant coarse woody debris, and large trees. (Aubry et al. 2013, Sauder and Rachlow 2014). The FS recognizes that "[f]ishers are associated with areas of high cover and structural complexity in large tracts of mature and old-growth forests." Revised Forest Plan DEIS Ch. 1 p. 15; *see also* DEIS 3.2.3.2-83. Female fishers use cavities in large-diameter live trees and snags because tree cavities regulate temperatures and protect kits from predators; "[H]eartwood decay and cavity development is more important to fishers for denning than is the tree species." Raley et al. 2012. Research has found that females more often use dens in live trees with decay. Live trees have more regulated thermal properties and stable microclimates, so the temperature fluctuates less and kits are protected from weather extremes. Fishers rest primarily in deformed or deteriorating live trees. Raley et al. 2012.

Forest patterns are divided into forest composition and forest configuration, and fishers need both. Forest composition is a patch area or proportion of landscape specific to a habitat type. Habitat loss is mostly a change in forest composition. Forest configuration, on the other hand, is spatial and accounts for how patches are arranged across the landscape, like average patch shape, distances between patches of the same type, and the cluster of patches across the landscape. Sauder and Rachlow 2014.

Forest configuration figures just as much into the type of habitat that fisher need, specifically the proximity of mature forest patches. Sauder and Rachlow 2014 found that fishers in the Clearwater used landscapes with large patches of mature forest arranged in connected patterns. The proximity among mature forest patches was a stronger predictor of fisher use than the mere abundance of mature forest. 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, 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). "[R]relatively small changes in the amount of open area in a landscape can have large effects on the probability of occupation by fishers." Sauder and Rachlow 2014. Indeed, Weir and Corbould (2010) states that the abundance of open areas within a landscape was the most important variable in predicting landscape occupancy by fishers. *See also* Sauder and Rachlow 2014.

The NPCNF's Lolo Insects and Disease FEIS states, "Availability of large diameter logs (greater than 21 inches dbh) **appeared to be particularly important in winter habitat selection**." (Emphasis added.)

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)." (Emphasis added.) Yet the WAM proposal indicates the FS believes grand fir is a species that can be sacrificed in the project area.

The whole point of the logging portion of this proposal is to minimize the loss of commercial value—preventing dead trees and down logs from serving as fisher habitat. The FS has failed to conduct a cumulative effects analysis that discloses what such actions across the Forest will mean for fisher.

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).

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).

Also Jones, (undated) recognizes the following:

> 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 stated,

> 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.

In Washington, Hayes and Lewis, 2006 noted, "Trapping reduced populations quickly. Despite decades of protection from harvest, fisher populations never recovered in Washington. …The fisher was listed as endangered in Washington in 1998 by the Washington Fish and Wildlife Commission and is now considered likely extirpated from the state."

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).

When compared to the above description of the habitat in which fishers thrive, one can see the FS's management of tree stands for logging is not compatible with science that recognizes tree death as a natural process and the process that leads to the kind of habitat relied upon by species that need older, unlogged forests.

We are concerned that the FS is not aware of the existing numbers of the fisher in this area or anywhere on the Forest. Isolating habitat by fragmenting it negatively impacts species. *See* Laurance 2008. Pulsford et al. 2015 describes the importance of habitat connectivity.

By degrading habitat connectivity, the WAM project would have significant impacts on the fisher. The FS must also take a hard look at the impacts of logging and the cumulative effects from other nearby human activities.

The fisher is a Sensitive species in Region 1 and the threats to this species have increased, if anything. The best available information—the existing information—we have for this species suggests it may very well be in trouble.

The FS has not done a cumulative effects analysis that considers the impacts of other management actions with the impacts from this timber sale as it pertains to fisher, both in terms of number of acres of habitat altered and how the spatial aspect of altered habitat exacerbates habitat fragmentation.

"[S]pecies at the brink have been pushed to a critical conservation status because of human activities…" Ceballos et al. 2020. Habitat fragmentation is among these reasons, including simplifying the complex structure of old growth. Trapping is another reason. The FS must account the actual population of fisher or validate some confident modeling, and there seems to be none of that.

<u>Canada lynx</u>

The FS must analyze and disclose how well Forest Plan direction is working to maintain lynx viability. The FS must also analyze and disclose habitat connectivity and linkages, and to quantify cumulative impacts from other activities on lynx habitat.

The FS must satisfy NEPA's requirements to "take a hard look" at cumulative effects, including acknowledging impacts of other ongoing management actions, such as authorization of motorized activity and expansion of the road network in the project area. The analysis area for cumulative impacts on lynx is properly much larger than the project area.

The FS must disclose how many acres of forest have been, and would be, made uninhabitable for and avoided by lynx especially in winter due to virtual openings created by "fuel reduction" which would resemble modified clearcuts or shelterwood logging. 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). 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). The average width of openings crossed by lynx in the winter was 383 feet, while the maximum width of crossed openings was 1240 feet (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. (*Id*.) The FS must analyze habitat fragmentation and connectivity within LAUs and between adjacent LAUs.

The FS must analyze cumulative impacts of past fire suppression on lynx habitat. The FS must conduct an analysis comparing current conditions with the historic, pre-management conditions of lynx habitat.

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.

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.

Lynx winter habitat in older, multi-storied forests, is critical for lynx preservation. (Squires et al. 2010.) The also reported that lynx winter habitat should be "abundant and spatially well-distributed across the landscape" (Squires et al. 2010; Squires 2009) and in heavily managed landscapes, retention and recruitment of lynx habitat should be a priority.

Prey availability for lynx is highest in the summer. (Squires et al., 2013.)

The Lynx Conservation Assessment and Strategy (LCAS 2000) noted that lynx 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.

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 Forest Plan/NRLMD assumption in 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.

Other recent science also undermines the adequacy of the Forest Plan/NRLMD. 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 contradict FS assumptions that clearcuts/regeneration can be considered useful lynx habitat within 25 years post-logging.

Vanbianchi et al., 2017, found, "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."

Kosterman, 2014, Vanbianchi et al., 2017 and Holbrook, et al., 2018 each demonstrate that Forest Plan direction is not adequate for lynx viability and recovery, as the FS assumes.

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. Lynx linkage zones for landscape habitat connectivity are necessary to allow for movement and dispersal of lynx. Lynx avoid forest openings at small scales, so effects on connectivity from project-created or cumulative openings must be analyzed in terms of this smaller landscape scale. And connectivity between project area LAUs and adjacent LAUs must also be analyzed and disclosed.

The FS must analyze and disclose how much lynx habitat is affected by snowmobiles and other recreational activities. *See* Ruediger, et al., 2000.

Western (boreal) toad

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.

Wolverine

With logging and road building, wolverine habitat will be disrupted, prey species habitat will be destroyed, access for trappers will increase, connectivity habitat will be fragmented.

The FS must satisfy NEPA's requirements to "take a hard look" at cumulative effects. It must acknowledge impacts of other ongoing management actions, such as authorization of motorized activity and expansion of the road network in the project area. The Lolo NF is not geographically large enough to have the minimum number of reproductive wolverines to meet viability criteria, and the FS lacks any larger landscape direction to assure viability.

Wolverines use habitat 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."

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. Disturbances that could affect 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).

Copeland et al. 2010 state, "Available evidence …indicates that connectivity among wolverine populations is essential for maintaining viability in fragmented portions of their range (Flagstad et al. 2004; Cegelski et al. 2003, 2006; Schwartz et al. 2007)."

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*.

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."

Nowhere in the Forest Plan or project proposal is there a description of the quantity and quality of habitat that is necessary to sustain the viability of the wolverine.

The FS has failed to adequately analyze and disclose cumulative impacts of recreational activities on wolverine.

The Analysis of the Management Situation Technical Report for Revision of the Kootenai and Idaho Panhandle Forest Plans (USDA Forest Service, 2003c) 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.

We note that the Regional Office (USDA Forest Service, 2013c) directs FS district level specialists to not arrive at effects conclusions based upon their own expertise and judgment.

<u>Black-backed woodpecker</u>

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).

Hutto and Gallo, 2006 state:

> Every timber-drilling and timber-gleaning species was less abundant in the salvage-logged plots, including two of the most fire-dependent species in the northern Rocky Mountains—American Three-toed (Picoides dorsalis) and Black-backed (P. arcticus) Woodpeckers. Lower abundances in salvage-logged plots occurred despite the fact that there were still more potential nest snags per hectare than the recommended minimum number needed to support maximum densities of primary cavity-nesters, which suggests that reduced woodpecker densities are more related to a reduction in food (wood-boring beetle larvae) than to nest-site availability.

Hutto, 2006 states:

> 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 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." And Hutto, 2008 notes the importance of analyzing past actions contributing to cumulative impacts:

> 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 Abstract of Hutto, 2008 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 fails 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.

The viability of the black-backed woodpecker is threatened by fire suppression, "fuel reduction" and other "forest health" policies that 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 is 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.

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."

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 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).

FS biologists Hillis et al., 2002 note, "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).

The Boise National Forest (USDA Forest Service, 2010d) adopted the black-backed woodpecker 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.)

The Lolo NF Forest Plan and EIS cite no best available science for insuring viable populations of the black-backed woodpecker.

Current forest management policies pose serious implications for the black-backed woodpecker. Forestwide suppression of habitat conditions would eliminate population viability. The Wildlife Specialist Report for the NPCNF's End of the World timber sale states, "By reducing the potential for stand-replacing wildfire and beetle outbreaks in the project area, project implementation would reduce the potential for black-backed woodpecker occupancy in the future in the project area." The FS wants to avoid high quality black-backed woodpecker habitat developing; and when a fire does burn, the FS callously proposes to destroy the high quality black-backed woodpecker habitat that was created by "salvaging" it.

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.

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 post-fire 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 burned forest – as well as appropriate management of 'green' forests that have not burned recently.

In the nearby Blue Mountains of Eastern Oregon (Bull et al. 1986, Nielsen-Pincus 2005), it was found that grand fir cover types were used approximately 27% of the time for nesting in Bull's 1970s study and 14% of the time in Nielsen-Pincus's study of the same general area in 2003-2004. And yet, the FS proposes to replace grand fir in the project area.

The emphasis on stand thinning and suppression of natural agents of tree mortality is of a concern for the black-backed woodpecker (Hutto 2008, Dudley et al. 2012, and Tingley et al. 2014).

The viability of the black-backed woodpecker is threatened by fire suppression, "restoration" logging and "forest resilience" policies that 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 agency's management strategies 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.

ROADLESS EXPANSE

EA maps indicate the WAM project would involve vegetation treatments immediately adjacent to and in the vicinity of the Welcome Creek Wilderness and the Rattlesnake Wilderness—as well as within the Rattlesnake Recreation Area. Our comments stated, "The EA also fails to analyze potential impacts on inventoried roadless areas and other unroaded areas." The FS completely ignored this comment.

The FS Northern Region explains the concept of "Roadless Expanse" in a document entitled "Our Approach to Roadless Area Analysis of Unroaded Lands Contiguous to Roadless Areas" (12/2/10). This FS memo is based on some judicial history regarding the Roadless Area Conservation Rule. It 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.) We agree.

The FS must "consider the effects to the entire roadless expanse" by taking a hard look at project impacts on the Roadless Characteristics and Wilderness Attributes of the uninventoried roadless areas, comprising 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 this Roadless Expanse for future consideration for Recommended Wilderness or for Wilderness designation under forest planning.

Most roadless areas, particularly in the interior western U.S., are at middle to high elevations (Henjum et al. 1994). Higher elevations are cooler, receive more moisture, and have a shorter summer dry season than lower elevations. They are typically characterized by a regime of low-frequency, high-intensity fires. Roadless areas are therefore less likely to have fire regimes significantly different from historical conditions (Beschta et al. 2004). Roadless areas have a lower potential for high-intensity fires than roaded areas partly because they are less prone to human caused ignitions (DellaSala et al. 1995, USDA Forest Service, 2000g). Riggers, et al. 1998 compare stream and water quality conditions in roadless areas vs. roaded, developed areas on the Lolo NF, pointing out the former display significantly better ecological integrity. The FS must consider scientific information that recognizes the high ecological integrity of unmanaged 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 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 nonnative species, and many other significant values. (See USDA Forest Service, 2000g.)

The FS must consider the 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 watersheds of the project vicinity.

Scientific literature emphasizes the importance of unroaded areas as small as 1,000 acres as strongholds for the production of fish and other aquatic and terrestrial species, as well as sources of high quality water. (Henjum et al., 1994.) A growing number of scientific studies indicate the significant value of roadless areas smaller than 5,000 acres. (Strittholt and DellaSala, 2001; DeVelice and Martin, 2001; Loucks et al, 2003; Crist et al., 2005; Nott et al., 2005.) In a Nov. 14, 1997 letter to President Clinton urging the protection of roadless areas, 136 scientists noted:

> There is a growing consensus among academic and agency scientists that existing roadless areas–**irrespective of size**–contribute substantially to maintaining biodiversity and ecological integrity on the national forests. The Eastside Forests Scientific Societies Panel, including representatives from the American Fisheries Society, American Ornithologists' Union, Ecological Society of America, Society for Conservation Biology, and The Wildlife Society, recommended a prohibition on the construction of new roads and logging within existing (1) roadless regions larger than 1,000 acres, and (2) **roadless regions smaller than 1,000 acres that are biologically significant**…. Other scientists have also recommended protection of all roadless areas greater than 1,000 acres, at least until landscapes degraded by past management have recovered…. As you have acknowledged, a national policy prohibiting road building and other forms of development in roadless areas represents a major step towards balancing sustainable forest management with conserving environmental values on federal lands. In our view, a scientifically based policy for roadless areas on public lands should, at a minimum, protect from development all roadless areas larger than 1,000 acres and **those smaller areas that have special ecological significance because of their contributions to regional landscapes**.

(Emphases added.) Anderson et al., 2012 compared watershed health in Wilderness, roadless, and roaded forest lands:

> The Watershed Condition Framework data identifies 54 percent of all NFS land in properly functioning watersheds, 43 percent in watersheds functioning at risk, and just 3 percent in impaired watersheds. However, these proportions are not evenly distributed across the three land designation categories.
>
> Designated Wilderness areas are most frequently spatially coincident with healthy watershed conditions. Eighty percent of the land within designated Wilderness is located in properly functioning watersheds, while 18 percent is in at-risk watersheds and just 1 percent is in impaired watersheds. Watershed conditions in Inventoried Roadless Areas are not as healthy as in designated Wilderness, but almost two-thirds of their area is still in properly functioning condition. Sixty-four percent of the IRA acreage is in properly functioning watersheds, 34 percent is in at-risk watersheds, and 2 percent is in impaired watersheds. Finally, other Forest Service lands—which make up slightly more than half of the National Forest System—tend to have the least healthy watershed conditions. While 38 percent of the managed landscape is in properly functioning watersheds, most of the roaded lands are in watersheds that are either functioning-at-risk (58 percent) or impaired (5 percent).

The FS has a legal obligation pursuant to NEPA to accurately, scientifically, and objectively describe the environmental consequences of logging and road building in these ecologically significant areas. NEPA also requires that the agency disclose all pertinent science, including ongoing scientific research and controversy. And NEPA requires the agency to develop scientifically sound environmentally protective action alternatives.

See also, Friends of the Clearwater, 2020 for an examination of the way roadless rules are being exploited to downgrade the wilderness values and roadless characteristics of IRAs.

The FS failed to provide sufficient analysis demonstrating WAM project consistency with the act of Congress that established the Rattlesnake Wilderness and Recreation Area. The FS refuses to learn from its Marshall Woods lesson.

AN ENVIRONMENTAL IMPACT STATEMENT (EIS) IS REQUIRED

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

The FS acknowledges the WAM project would adversely affect grizzly bears, Canada lynx and their critical habitat, and bull trout and their critical habitat yet the FS concludes none of those facts means there would be significant impacts on species listed under the Endangered Species Act (ESA). Since the FS is undergoing ESA Section 7 consultation with the U.S. Fish and Wildlife Service (FWS), a Biological Opinion (BO) on the WAM project is required from FWS. We fail to see how the FWS can reasonably conclude WAM would not jeopardize listed species in its BO, since the FS's fake NEPA cannot allow it to arrive at such a determination. Soldier-Butler redux, anyone?

WAM APPROACH VIOLATES NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) AND NATIONAL FOREST MANAGEMENT ACT (NFMA)

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

Wildlife species that have already experienced severe habitat loss in the WAM project vicinity. Native species that would experience further habitat loss and fragmentation include Threatened, Endangered, Sensitive, management indicator species, and other species of concern. These include fisher, marten, wolverine, gray wolf, moose, northern goshawk, pileated and black-backed woodpeckers, elk, flammulated owls, native trout and other fish, boreal toads and other amphibians and reptiles, bat species including Townsend's big-eared bats and the Threatened Canada lynx. Industrial treatment of this Forest harms the process of recovery for the grizzly bear population.

FAILURE TO ACKNOWLEDGE SIGNIFICANT CONTROVERSY AND UNCERTAINTY FOR VEGETATION TREATMENTS

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

DEMONSTRATE COMPLIANCE WITH THE CLEAN WATER ACT

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

NOXIOUS WEEDS

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

FIRE POLICY AND FIRE ECOLOGY

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

VIABILITY

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

FOREST SERVICE IS DECEIVINGLY AND DELIBERATELY EXACERBATING CLIMATE CHANGE, ALREADY ON AN EXTREMELY DANGEROUS TRAJECTORY

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

WAM PLAN WILL HARM RECOVERY OF GRIZZLY BEAR POPULATION

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection, as well as the EA comments of Claudia Narcisco.

We've already discussed the FS's non-transparent and misleading disclosures and analysis on roads. Since roads lead to the most adverse of all human impacts on grizzly bears, the EA and other analyses clearly fail to meet the requirements of NEPA, NFMA, and ESA.

Just this month, the online news journal Missoula Current wrote an article reporting on a government meeting, including an account of a grizzly bear with cubs in the lower Rattlesnake Mountains in the project area adjacent to Missoula.

Formal consultation on the forest plan is out of date. Updated consultation with the U.S. Fish and

Wildlife Service (USFWS) for the grizzly bear is ongoing, so the WAM project final EA and draft DN is quite premature.

Habitat conditions outside of official recovery areas are investigated in Bader and Sieracki, 2021—a report evaluating grizzly bear denning habitat and demographic connectivity in northern Idaho and western Montana.

The FS is aware of the best programmatic agency direction it has adopted to date, that established in Flathead Forest Plan Amendment 19.[5] 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.

The project analysis did not consider the cumulative impacts on grizzly bears from human activities and habitat conditions on nearby and surrounding lands.

Reducing roads and therefore habitat impacts would benefit not only grizzly bears, but most other natural aspects of the ecosystem, as the FS's Access Amendment Draft SEIS for the Cabinet-Yaak Recovery Area 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.)

[5] AWR and WildEarth Guardians were some of the groups who prevailed in litigation against the Flathead NF on this issue.

- 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.)

AQUATIC SPECIES, RIPARIAN AREAS, AND WATER QUALITY

Our comments on the EA included discussion under the heading, **"AQUATICS"**
We incorporate that discussion into this objection.

The rivers and streams in the vicinity of the WAM project potentially support special status aquatic species such as bull trout (listed as a threatened species under the Endangered Species Act) and Region 1 Sensitive species Westslope cutthroat trout. The FS's analyses do not describe the abundance, demographics, and trends of populations in the streams in the project/cumulative effects area.

All management activities must be designed to have no adverse effect to the designated Riparian Management Objectives (RMOs), which are large instream woody material, stream temperature, width-to-depth ratios, bank stability, and pool frequency. P The FS's analyses do not disclose the changes or trends in measures of RMOs, to comply with Forest Plan requirements.

There are potentially streams within the analysis area on the 303(d) list and/or have a Total Maximum Daily Load (TMDL) in place. The EA does not explain how project impacts would be consistent the TMDL(s).
The FS failed to analyze and disclose cumulative impacts from all past management actions, consistent with NEPA's purpose for taking a "hard look."
The FS failed to demonstrate timber sale consistency with all the Forest Plan Standards.

USDA Forest Service, 2006c states:

> Increasing sediment production is generally associated with ground based harvest systems and particularly road construction. Sediment decreases habitat diversity, degrades spawning and rearing habitat and consequently fish reproduction and survival. It also reduces aquatic insect production. The density of salmonids in rearing habitat has been shown to be inversely proportional to the level of fine sediment (Bjornn and Reiser 1991). Fine sediment can greatly reduce the capability of winter and summer rearing habitats and when levels reach 30% or more, survival to emergence is significantly reduced (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 (Muhlfeld 2001). Fine sediment has also been shown to cause alterations in macroinvertebrate abundance and diversity.

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 FS fails to disclose the existing conditions of site-specific stream reaches and project effects on water quality, fish and other aquatic resources. The FS fails to disclose information regarding the existence and effects of bedload and accumulated sediment. The FS fails to analyze and disclose channel stability for specific stream reaches. The FS must disclose the amount of existing accumulated fine and bedload sediment that remains from the previous logging and road construction.

The FS does not 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 FS does not disclose populations of fish species in the project area, comparing the numbers to minimum viable populations.

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." This is recognized in Gerhardt, 2000: "Research results have suggested that additional emphasis should be placed on scheduling and location of harvest in 1st and 2nd order tributaries to minimize impacts in these headwater areas (King, 1989)."

The Clearwater NF's recent Dead Laundry Water Report states: "Sediment inputs to stream channels occur as a complex series of pulses that are delivered and stored within low-order, high-gradient stream channels (Benda & Dunne, 1997). Sediment accumulates for centuries within these channels before being transported or "flushed" downstream by episodic events with large increases in water yield (Kirchner et al., 2001)."

The FS fails to analyze water yield increases within watersheds of all scales, in accord with the scientific information indicating significant impacts can occur in smaller watersheds experiencing high Equivalent Clearcut Area (ECAs) from logging.

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 aforementioned Dead Laundry report discusses cobble embeddedness data:

> Cobble embeddedness (CE) is an indicator of habitat health. As the CE percentage increases in a stream, the ability of fish to use the stream for spawning or rearing decreases. The fine sediments will settle to the substrate and will cause a lack of gravel sorting in the stream beds. Another issue with high CE is it limits and reduces macro invertebrate development which can have implication on nutrient cycling and the food web. There are three levels of habitat functionality based on CE. High functioning systems are below 20% CE, moderately functioning systems are between 20-30%, and low functioning systems have a CE of over 30%.

After over 30 years of Forest Plan implementation, and 25 years after the Forest Plan was amended by INFISH—many streams are still not functioning near naturally or properly. The FS must conduct a cumulative effects analyses to examine this situation.

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.

INFISH buffers cannot stop the sedimentation once it inters the stream, and skid trails, landings, and temporary roads link to existing roads and ditches, where runoff goes down the ditch to a culvert and is conducted into small streams, which carry sediment into larger streams. Below is an illustration of this; the hillside ditch of the road is filled with fine sediment. It was taken on the Clearwater National Forest in the Lowell WUI project in 2018 (before the road in this exact same area was blown out from a landslide).

At center-top-third of this picture is a culvert, which you can't see because of the sediment. Below is a detail shot of the above picture where the culvert is.

FS hydrologist Johnson (1995) points out older roads feature ditches on the inside of the road which greatly increases drainage efficiency, causing peak flows to exceed modeled predictions.

The sediment surrounding the culvert is abundant. If one were to walk to what is depicted on at the top of the above picture and turn around to take a picture of the culvert, the picture that follows is that angle.

Below is a second culvert in that same area, transporting sediment-laden waters:

This is one way management-induced sediment ends up in streams, which is not addressed by refraining from logging in RHCAs. Yet, the FS often concludes that there won't be sedimentation because INFISH buffers or BMPs will prevent it.

The following photos also illustrate a few of the problems associated with inadequate road maintenance. On July 7, 2019 an intense thunderstorm dropped rain and hail on portions of the Bitterroot National Forest. These photos are of an open Forest Service Road just south of Lake Como, probably FSR #550. All three were taken a few feet from one another. The first photo shows a stream of stormwater flowing down the road, where water flows off the surface into a draw in the landscape. The length of this stream of water on the road surface was over a quartermile—even around curves—essentially cutting a gully instead of flowing off the road within a short distance.

The second photo (above) shows this "stream" at the beginning of its flow off of the road at the location of the discharge of a small culvert (the culvert is not visible in the photo).

The third photo (below) shows the inlet of the culvert—empty of water despite the storm because of the tempering effect of the native forest vegetation in the draw above the road. We point out that, despite the cloudburst, no flow occurs here, because there's no road effect in the vicinity, above this culvert. (This also shows the culvert has begun to plug up since the time of installation or previous maintenance, meaning it is becoming vulnerable to a blowout during if a subsequent storm event or snowmelt does cause flow here.)

These three photos are not meant to illustrate water quality problems of any specific stream, because the flow was not followed downslope to any water body destination, which it may or may not have reached before soaking into the soil. Instead, the photos show typical problems of roads without proper drainage features and/or lacking frequent enough maintenance, leading to accelerated erosion during storm or spring runoff events and necessitating more imminent maintenance steps needed to keep the road usable by the public. Still, in specific instances such events can indeed lead to direct sediment flow into water bodies.

The FS must consider the "lag time between hilltop recovery (growth) and channel recovery" (USDA Forest Service 1994b):

> 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.).

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). The FS must disclose the potential for the project to damage channel morphology and aquatic habitat, with its overly simplistic ECA methodology.

The analysis of the effects of roads fail to take into account the increases of extreme peak flows due to the high density of roads. Forest Service hydrologist Steve Johnson, states, "Impacts from roads basically fall into three areas: introduced sediment into streams; snowmelt re-direction and concentration; and surface flow production." (Johnson, 1995.)

Johnson (1995) discusses how "snowmelt re-direction and concentration and surface flow production" increase peak flow amounts multiplicatively by the presence of roads in a drainage.

USDA Forest Service, 2017c explains that native westslope cutthroat trout have declined due to habitat degradation and competition with nonnative brook trout:

> 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).

Also *see* USDA Forest Service, 2017c for discussion on bull trout.

The INFISH Forest Plan Amendment was adopted in 1995. It includes direction such as Standards and Guidelines as well as Riparian Management Objectives (RMOs). The FS fails to include an analysis of trends or measures for RMOs for bank stability, width to depth ratio, instream large woody debris, temperature and pool frequency. Apparently it is the FS's position that never achieving RMOs is consistent with the Forest Plan and NFMA.

The FS did not determine if RMOs would be retarded by project and cumulative impacts. The FS must conduct a proper 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.

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.

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.

Similar to its failure to downplay sediment impacts by avoiding genuine analysis, the FS minimizes the fact some of these stream channels already show signs of significant management-induced damage so further increasing peak flow is, by definition, significant.

Logging and burning will have effects on water temperature. Even though relatively little vegetation disturbance would be carried out within default riparian buffers, those upland burned and/or thinned areas would lead to increasing water temperatures in streams. Guenther et al. (2014) 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.

US Fish and Wildlife Service (1998) recognizes, upland forest canopy removal raises stream temperatures. The FS must address best available science indicating 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:

> 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).

The FS must conduct an analysis of fish population trends. The Forest Plan requires such monitoring, but this is part of the failure of the FS to monitor as the plan requires. This goes for MIS, Sensitive, and ESA-listed species. The FS simply does not know population trends of native fish species.

Table 3 of the Fisheries Biological Evaluation/Assessment (BE/BA):

> …describes the outcome ratings for the 29 rated 12th Level HUCs by the 19 Habitat Indicators and its Integrated determination. Twenty-five of these HUCs are Functioning at Unacceptable Risk, two are Functioning at Risk, and two are Functioning Appropriately for their Integrated determinations.

This is stark acknowledgement that over 30 years of implementing forest plan direction has failed to protect, restore and recover streams and rivers affected by logging, road building and other management. The BE/BA goes on to say, "This method is good at describing overall watershed risk but is limited in describing actual functioning conditions of habitat parameters." That would be a good reason to actually go out and gather quantitative field data on the project area streams. However, the only field data cited the BE/BA for project area streams is fish surveys, and abundance of fish isn't even disclosed. Furthermore, the vast majority of those surveys are at least 10 years old. It does state, "Field visits were conducted by the project fish biologist in 2019 and 2020 to collect coarse scale information about existing road condition and locations, past vegetative actions, and to gain familiarity with the project area." We notice it says nothing about gathering fish habitat data.

The BE/BA states, "INFISH RMOs in this section can be directly compared to the actual PIBO data measures taken at the five sites within the project area. Four sites are considered Managed data sites and one is a Reference site. These sites have been revisited three to four times over the last 15 years. The summarized data from these sites is available in the Project File…" So not only does the EA fail to disclose monitored habitat conditions—so fails the BE/BA.

The Fisheries BE/BA states:

> "To ensure that water yield is fully considered, a more comprehensive water yield and/or ECA assessment should be done in any of the drainages that have a potential increase of 10% or more. These drainages include: Butler Creek, Donovan Creek-Clark Fork, Gilbert Creek, Johnson Gulch-Blackfoot River, Lower Lolo Creek, Lower Rattlesnake Creek, O'Brien Creek, O'Keefe Creek, Swartz Creek, and Wallace Creek-Clark Creek. **There may be the need to have mitigative measures in any of these drainages to meet forest plan standards**. (Emphasis added.)

This is a good reason why Forest Plan Standard 17 requires, "A watershed cumulative effects analysis will be made of all projects involving significant vegetation removal prior to these projects being scheduled for implementation" and that "analyses will also identify existing opportunities to mitigate adverse effects on water-related beneficial uses…" The EA fails to include any watershed cumulative effects analysis, and sweeps under the rug most problems of the existing road network—system or nonsystem.

The BE/BA points out that "Hayes HUC has the most activity within as it includes both the extensive and intensive activities." Still, the report discloses practically nothing about actual recent field surveys of habitat conditions or trends in Hayes Creek.

SOIL PRODUCTIVITY

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection.

The Lolo Forest Plan includes direction for the purpose of insuring that soil productivity is maintained and no irreversible damage occurs to soil and water resources from management activities. The EA fails to demonstrate consistency with that forest plan direction.

Geist et al., 1990 describe a methodology using a sampling grid, and they demonstrate that taking bulk soil density samples is quite feasible. This is necessary because deep, not necessarily visible subsurface compaction has been detected long after logging activities (e.g. Page-Dumroese, 1993).

Also, the FS has not reconciled forest plan direction with the Region 1 Soil Quality Standards (SQS) proxy (limitations on DSD).

The R1 SQS definition of DSD includes:

> Severely-burned Soil. Physical and biological changes to soil resulting from high-intensity burns of long duration are detrimental. This standard is used when evaluating prescribed fire. Guidelines for assessing burn intensity are contained in the Burned-Area Emergency Rehabilitation Handbook (FSH 2509.13).

The FS must account for all soil damage in the project area, including the cumulative effects of fire and past management.

The FS must properly account for all the long-term DSD in the project area, including locations outside current "activity areas." The NPCNF's recent Lolo Insects and Disease FEIS discloses:

> The limited soil productivity recovery in the areas impacted by roads and skid trails, even after 50 years of natural recovery, mirrors the results of recent research showing that abandoned roads, even well vegetated abandoned roads with 50 or more years of trees and shrubs, have levels of soil compaction, nutrients, and infiltration capacity similar to open and driveable roads (Lloyd et al, 2013; Foltz et al, 2007).
>
> …Although soil recovery could still occur in remaining subsurface soils, the exceptionally high porosity and water-holding properties of the Mazama ash cap would likely be irrecoverable.

The FS does not disclose the efficacy of particular soil BMPs for insuring post-project DSD levels are consistent with estimates or soil standards.

FS estimates DSD only inside units proposed for logging. This narrow view of the cumulative impacts on soils contradicts NEPA, FS policy, and best available science. This policy includes Soil and Water Conservation Practices Handbook (FSH 2509.22) which states:

> Practice <u>11.01 – Determination of Cumulative Watershed Effects</u>
> 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 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**; and 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. (Emphases added.)

The FS does not provide an analysis of soil conditions in the analysis area, noting all detrimental soil disturbance and its consequences for diminishing soil and land productivity. The FS does not disclose the extent of soils in the analysis area that are already hydrologically impacted, nor did it analyze and disclose the watershed integrity implications.

Booth, 1991 explains how soil quality conditions translate to watershed hydrology and therefore 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.

The FS analysis area for conducting DSD analysis is limited to the individual timber sale units and associated skid trails, landings, and temporary roads within the project area ("activity areas"). This means that the analysis area for soils varies from alternative to alternative, depending upon each specific alternative's proposed action sites. <u>And this means that there is no analysis area whatsoever for the no action alternative.</u> The agency's logic goes something like this: soil effects are only site-specific, and impacts only occur within the proposed individual treatment units and associated skid trails, landings, and temporary roads. They argue that there are no indirect effects of damaged soils, outside those specific locations. And therefore the FS dons blinders to damaged soils outside those project activity areas.

The FS has admitted that amounts of soil compaction and other measures of DSD across a watershed accumulate 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.

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.
>
> …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.)

The FS states that subwatersheds which have high levels of existing soil damage exhibit potential hydrologic and silvicultural 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.)

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 displacement 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 FS has failed to analyze and disclose the hydrological implications of the cumulative soil damage caused by past management added to timber sale-induced damage in project area watersheds. FS 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, which are effects that must be analyzed.

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 Johnson 1995 (above) noted. 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 must not improperly attribute DSD improvements to mitigation. 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**. (Emphasis 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.

USDA Forest Service, 2005b reports, "It is acknowledged that the effectiveness of soil restoration treatments may be low, often less than 50 percent." (P.3.5-20.)

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 R1 SQS. Winter-logging resulted in an average of 16% detrimentally damaged soil." (P. 3.5-21.)

Forest Service 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, which the FS must consider. 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.

USDA Forest Service, 2007c admits that soil displacement is essentially permanent anyway, despite restoration:

> 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. (P. 4-76.)

Various national forests have monitored DSD with mixed results. For example, a recent forest plan monitoring report (USDA Forest Service 2013a) revealed the relatively high frequency of violating the 15% standard. And in a report examining soil monitoring in national forests of the Northern Region, Reeves et al., 2011 also found mixed results on compliance with the R-1 15% standard, with average DSD for activity areas for some Forests over 15%. Our point is, FS pledges to meet standards must be backed up monitoring results based upon reliable data.

Then there is the issue of the reliability and validity of the soil survey methods used by the FS. 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[6]) 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.)

So USDA Forest Service, 2012a admits that DSD estimates are “not absolute.”

Page-Dumroese, et al., 2007 discuss wildly variable results of different soil compaction instruments, which is why the FS must explain the limitations of the compaction survey methodology. Determining compaction without providing a scientific basis for its accuracy or validity, is arbitrary and capricious.

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.
>
> …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

[6] Detrimental Soil Disturbance (DSD) is equivalent to exceeding soil property thresholds.

> 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).

Horn et al., 2007 state:

> Generally, the data obtained for the measured soil stresses and the natural bearing capacity **prove that sustainable wheeling is impossible, irrespective of the vehicle type and the working process.** Top and subsoil compaction, an increase in precompression stress values in the various soil horizons, deep rut depth and vertical and horizontal soil displacement associated with shearing effects take place and affect the mechanical strength of forest soils...
>
> For future forest use, deformed [compacted] areas must be classified as long-term irreversibly degraded (if we compare the nearly non-existing plant growth in traffic lanes more than 20 years old, not shown in this publication, but derived from in situ observations). They require, with respect to regaining pore functioning, many decades, if swelling and shrinkage, as well as biological strengthening, processes occur.

One set of cumulative soil impacts ignored by the 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 SQS. The same goes for existing or ongoing erosion—no amount of soil erosion on these road templates would violate the 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 SQS.

The Soil Report fails to adequately quantify the DSD attributable to either decommissioned road templates in the project area or the "undetermined roads" or "other roads" in the project area.

Another cumulative impact the SQS ignore 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 or had organic layers displaced to use as temporary log storage and log truck loading, and in many cases 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 SQS. Much like system roads, there are no limits to total DSD from landings set by the SQS, and there are 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 SQS.

As stated above the SQS ignores 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 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, 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 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 Soil Standards, which is the indirect effect of soil damage, or DSD, on sustained yield. It states that the R-1 Soil Standards "**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**." (Emphasis added.) USDA Forest Service, 2016a further explains:

> **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 although 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.)

The FS's R-1 Soil Quality Standards (SQS) are merely a mitigation of soil damage, and have little basis in sustained yield or sustaining soil and land productivity. And when the FS attempts to demonstrate consistency with the SQS, it uses numbers without providing a proper basis for believing their accuracy or reliability.

Continual and repeated implementation of management actions, hardly limited by the R1 SQS, results in soils maintained at a damaged condition in perpetuity. The FS has no quantitative data or inventory of the continuous deficit of soil or land productivity. It seems that the U.S. Department of Agriculture prefers to totally avoid accountability for losses of soil productivity on national forests.

The analysis must include the impacts of past logging. Reduced water infiltration of hydrologically damaged soils contributes to increased water yield and erosion during storm events. And previous logging in those locations has resulted less legacy wood that, if present, would be incorporated into the soil and hold water and transmit nutrients for the next generation's timber stand.

And previously disturbed areas outside the activity areas have become prime growing sites for noxious weeds. Some of those invasive species are well-adapted to damaged, disturbed sites and some actively inhibit native vegetation from recovering and therefore the sites exhibit reduced productivity.

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.)

The EA provides no analysis of the degree of noxious weed proliferation in the analysis area.

The 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 DSD percent limit is based upon the amount of damage that is operationally feasible, instead of limits on actual land and soil productivity losses caused by DSD. The 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 presents no science to validate the SQS methodology for use as a soil productivity proxy.

Discussing the 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... (Emphasis 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 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 Forest Service's soil proxy—its SQS assumption that up to 15% of an activity area having long-term damage is consistent with NMFA and regulations—is arbitrary. The FS must cite its scientific basis for adopting the numerical DSD 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 Lolo NF.

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 SQS standard is, illogically, the same—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.)

The SQS definition of DSD considers only alterations to physical properties, but not chemical or biological properties. Again, this is not consistent with best available science.

One of these biological properties is represented by naturally occurring organic debris from dead trees. The 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. And nowhere does the FS disclose or analyze the levels of large woody debris in the project area following past management activities, unfortunately consistent with its refusal to examine 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.
>
> 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.)

Amaranthus, Trappe, and Molina (in Perry, et al., 1989a) recognize "mycorrhizal fungus populations may serve as indicators of the health and vigor of other associated beneficial organisms. Mycorrhizae provide a biological substrate for other microbial processes."

"(R)esource 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 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). 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 entities traditionally viewed as separate organisms. Such connectedness is usually studied within single organisms, such as the interconnections in humans among neurons, sense organs, glands, muscles, other organs, etc. necessary for individual survival. The FS must consider the ecosystem impacts from industrial management activities on this mycorrhizal network—or even acknowledge they exist. The industrial forestry management paradigm destroys what it refuses to see.

The FS must demonstrate consistency with all of the goals, objectives, and standards for soil resources set forth in the Forest Plan. USDA Forest Service, 2007 states:

> Sustained yield was defined in the Kootenai 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 Lolo NF and Northern Region, as advocated for by Lacy (2001). The FS has no idea how much soil has been permanently impaired either within the project area or forestwide. The FS lacks adequate regulatory mechanisms for protecting soil productivity on the Forest.

NEPA requires that the FS specify the effectiveness of its mitigations. (40 C.F.R. 1502.16.) The FS must specify the effectiveness of its mitigation of DSD. There is no quantitative monitoring data that demonstrates DSD remediation activities have taken a Lolo NF activity area with DSD amounts over the 15% limit to an amount that no longer violates the standard.

The FS must consider 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 Forest's noxious weed treatments are mitigation for management actions that exacerbate the spread of noxious weeds. And the effectiveness of the mitigation is doubtful. USDA Forest Service, 2016g states:

> Any activity that exposes soil has the potential to accelerate weed spread. Factors limiting weed spread are shade from tree canopies, higher soil moisture, needle and grass litter that provides a mulch-like covering of the ground, lack of exposed soil, and native plant competition.

The WAM project will worsen the noxious weed spread, and even if post-disturbance treatments are implemented, their long-term lackluster efficacy means that the project will significantly increase noxious weed occurrence.

The FS must account for long-term losses in site or land productivity due to noxious weed infestations caused by management actions. The Sheep Creek Salvage FEIS (USDA Forest Service, 2005a) states at p. 173:

> Noxious weed presence may lead to physical and biological changes in soil. Organic matter distribution and nutrient flux may change dramatically with noxious weed invasion. Spotted knapweed (*Centaurea biebersteinii D.C.*) impacts phosphorus levels at sites (LeJeune and Seastedt, 2001) and can hinder growth of other species with allelopathic mechanism. Specific to spotted knapweed, these traits can ultimately limit native species' ability to compete and can have direct impacts on species diversity (Tyser and Key 1988, Ridenour and Callaway 2001).

USDA Forest Service, 2016a states, "Soil erosion or weed infestations are adverse indirect effects that can occur as a result any the above direct impacts. In both instances, serious land degradation can occur." The Soil Standards do not set any limitations on the total area that is infested by invasive plants in a project area at any given time, nor do they require disclosure of the extent of such weed invasions in a project area and the impacts such losses may have cumulatively on the Forest Service's ability to adequately restock the area within five years of harvest, as required by NFMA.

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.

USDA Forest Service, 2005c states:

> Weed infestations are known to reduce productivity and that is why it is important to prevent new infestation sand to control known infestations. …Where infestations occur off the roads, we know that the **productivity of the land has been affected from the obvious vegetation changes**, and from the literature. The degree of change is not generally known. …(S)tudies show that productivity can be regained through weed control measures…

The FS cites no data regarding trends of invasive species, causes, and cumulative effects.

If there exists some study that quantifies Lolo NF changes in soil productivity due to past management activities, the FS has not cited it environmental analysis.

ELK AND OTHER BIG GAME

Our comments on the EA included discussion under this heading. We incorporate that discussion into this objection. The EA fails to demonstrate consistency with forest plan direction for elk and other big game species.

SCIENTIFIC INTEGRITY

We submitted dozens of scientific research articles and other references as part of our comments on the WAM EA. There is no indication the FS has done anything but completely ignore them.

to best available science!

Our comments on the EA stated, "The EA repeatedly invokes such terms as fire hazard, fire risk, risk to communities, hazard (or risk) reduction, fire behavior, risk of fire spreading, fire intensity, etc. without properly explaining their relevance to anyone not profiting in some way by this WAM Plan. They can't be objectively measured now, so no metrics can be designed to later validate project goals." In another place we stated, "The (FS) reports rely upon the databases of outdated, unreliable information as its quantitative source. The FS does not address the age and reliability of the data."

The FS failed to disclose the statistical reliability of the data it relies upon for the WAM 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."

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.

The U.S. Department of Agriculture 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 analysis and modeling methodology 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. The FS must disclose the limitations of all models the FS relies upon for the WAM project analyses, in order to address model validity.

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 FS must disclose these limitations. Unfortunately, the FS generally uses models without any real indication as to how much they truly reflect reality.

In its Clear Creek Integrated Restoration Project FEIS, the NPCNF 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." (FEIS at 5-14.) 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."

The FS fails to validate the models for the way they are being used to support the WAM project analyses. This would require documentation of someone using observation or experiment to support the models' 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.

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). A FS forest plan monitoring and evaluation report provides an example of the agency itself acknowledging the problems of data that is 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… .

(USDA Forest Service, 2000c.) In that case, the FS expert believed the data were unreliable, so the usefulness or applicability of the model—its validity—is limited.

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.)

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.

Larson et al. 2011 state:

> (T)he scale at which land management objectives are most relevant, often the landscape, is also the most relevant scale at which to evaluate model performance. Model validity, however, is currently limited by a lack of information about the spatial components of wildlife habitat (e.g., minimum patch size) and relationships between habitat quality and landscape indices (Li et al. 2000).

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
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
Output definition	Is the output well defined and will it translate to something that can be measured?	1 = difficult 2 = moderate 3 = easy

The documents, "USDA-Objectivity of Regulatory Information" and "USDA-Objectivity of Scientific Research Information" are instructional on this topic.

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 interpretation of scientific information the analyses do cite is problematic as we discuss throughout this objection.

Roger Sedjo, member of the Committee of Scientists, 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.

A Science Consistency Review is long overdue (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.

Sincerely submitted,

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