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The draft decision notice selected [ldquo]the Proposed Action[rdquo] which is described in the DN:

* Regeneration harvest, site preparation, and reforestation and animal damage control of approximately 1,510 acres;
* Salvage (intermediate) harvest on approximately 180 acres along Forest Roads 2116, 464, 464-A, 356, and 2013 that are located on borders of the O[rsquo]Hara-Falls Creek and West Meadow Creek roadless areas to remove dead and dying trees;
* Landscape prescribed burning on approximately 570 acres;
* Road reconditioning on approximately 26 miles and road reconstruction on approximately 19 miles of system roads;
* Approximately 2.3 miles of temporary road construction that would be obliterated after use; and
* Mitigation measures.

We incorporate the FOC comments dated March 20, 2020, the Harry Jagemon comments dated March 5, 2020, and the March 17, 2021 objection by Harry Jagemon within this objection.

We incorporate the April 20, 2020 FOC et al. comments on the Draft Revised Forest

Plan Revised Land Management Plan for the Nez Perce-Clearwater National Forests and Draft Environmental Impact Statement Land Management Plan Revision for the Nez Perce-Clearwater National Forests, within this objection. The critique of draft forest plan components don[rsquo]t necessarily apply here, but the scientific discussions and references, plus the broader critique of FS management policies and activities are relevant to the issues discussed in this objection.

FLIMSY PURPOSE AND NEED

This issue is discussed on page 4 of FOC[rsquo]s PA comments.

As usual, the Forest Service (FS) justifies a timber sale by describing a problem that doesn[rsquo]t exist to portray its management (logging) as a solution to the fake problem.

The EA states, [ldquo]The Green Horse project area is within an area on the Nez Perce-Clearwater National Forest that has been affected by the western hemlock looper.[rdquo] The EA describes the FS[rsquo]s first sounding of the alarm: [ldquo]Public outreach about the western hemlock looper began during late summer and into the fall of 2019.[rdquo] Lo and behold, the looper refused to participate in the scam: [ldquo][hellip] As project development continued, site visits determined that the amount of defoliation from the western hemlock looper was less than originally estimated from the aerial detection surveys. On-going monitoring showed levels of hemlock looper in decline across the Forest (Malesky et al. 2020).[rdquo]

Having lost its first choice of villains, the FS retreats to a generic FS purpose and need in the EA:

[hellip]there is a need to:

* Improve forest health and provide a sustained yield of resource outputs as directed in the Forest Plan by:

* Reducing the extent of insect and disease infection and
* Altering species composition to include more early seral species that are less susceptible to disease infection.

* Reduce hazard trees, hazardous fuels, and wildfire risk:

* Along roads for public and firefighter safety, including ingress/egress;
* To protect timber resources; and
* To maintain recreational opportunities within the area.

This alleged [ldquo]need[rdquo] echoes similar statements justifying almost every other timber sale proposed by the FS in the western U.S. Everyone in the agency knows the FS must justify timber sales as something ecologically beneficial because what they really represent[mdash] welfare for the timber industry in the form of ecological damage[mdash]is distasteful to the large majority of national forest owners. It[rsquo]s alarming that government employees go along with such fraud.

The FS has added some actions not related to the Purpose and Need: [ldquo]Although not in the O[rsquo]Hara subwatershed, additional road maintenance was added to the proposed action in partnership with the Nez Perce Tribe to improve road conditions for resource concerns.[rdquo] So by including that action, the FS effectively neutralizes every protest it could make regarding other actions we[rsquo]ve advocated for or identified as carrying out genuine restoration, which the FS has rejected as outside the scope ([ldquo]Watershed restoration activities are encouraged and can be authorized under a separate decision[rdquo][mdash]???); or alternately, what the FS will reject as far as proposed remedies this Objection identifies, such as[mdash]watershed restoration without logging.

Remedy: For the above reasons, the FS has violated NEPA. We request the FS:

1. Choose the no-action alternative;
2. Withdraw the proposal;
3. Prepare an EIS if the FS can come up with a rational Purpose and Need for its proposal.

[ldquo]PROJECT[rdquo] IS REALLY PART OF LARGER PROGRAM(S), OF WHICH THE FOREST SERVICE FAILS TO ANALYZE AND DISCLOSE THE ENVIRONMENTAL AND ECONOMIC IMPACTS

This issue is discussed on pages 2-3 of FOC[rsquo]s PA comments. The EA describes the scope of proposed activities:

The timber harvest activities described below may begin during the summer of 2022 and occur over approximately the next 12 years; landscape burning would follow and would occur over approximately the next 20 years; with subsequent maintenance burning occurring every five to ten years. [hellip]Prescribed burning would reoccur as needed (approximately every five to ten years) or as needed to keep a current and functional fuel break for the safety of public and firefighters in the project area.

However, despite the DN[rsquo]s approval of these long-term actions, the EA fails to properly disclose the location and intensity of such activities, and fails to analyze and disclose the environmental

impacts plus the social and economic implications of these never-ending Green (Trojan) Horse alleged fire suppression and public safety efforts.

Even the EA[rsquo]s disclosure of benefits are overblown due to the fact that some activities may not happen anyway: [ldquo]Not all landscape burning acres identified would be treated either due to the fuels available during the burning conditions or at the discretion of the prescribed fire manager.[rdquo]

Further, in implementing the Green Horse timber sale and associated mitigations, the agency is taking direction from multiple other programs[mdash]the environmental impacts and social and economic implications of which have not been subject to proper analyses (emphases added):

The Green Horse project is part of the larger Selway-Middle Fork Clearwater Collaborative Forest Landscape Restoration Proposal. In 2010, the Clearwater Basin Collaborative (CBC) in partnership with the Nez Perce[ndash]Clearwater National Forests produced a comprehensive restoration strategy that was submitted for funding through the Collaborative Forest Landscape Restoration Program. This science-based proposal was designed to restore and maintain ecological conditions within the 1.4-million-acre Selway[ndash]Middle Fork ecosystem in Idaho.

[hellip]the Green Horse project was developed to be consistent with the goals of the proposal as well the desired conditions in the Selway-Middle Fork Clearwater River Subbasin Assessment (USDA 2001) and the Nez Perce National Forest Land and Resource Management Plan. The project was also developed using the goals and objectives of the Idaho County Natural Resources Plan that include hazardous fuel reduction, forest health, timber production, firefighter safety, and economic stability (ICNRP 2016).

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 based on programs (e.g., Collaborative Forest Landscape Restoration Program), 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 [ldquo]balance[rdquo] 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.

Remedy: As the above reasons explain, the FS has violated NEPA. We request the FS:

1. Choose the no-action alternative;
2. Withdraw the proposal;
3. Prepare an EIS if the FS can create a discrete project proposal.

INADEQUATE OPPORTUNITY TO COMMENT ON ENVIRONMENTAL ASSESSMENT.

The FS[rsquo]s legal notice states that objections will be accepted only from those who have previously submitted specific written comments. However, the FS never provided formal notice and comment for its draft EA. Instead, the agency jumped straight to an objection period that cuts the public voice out of its decision-making process. This, despite the ongoing COVID pandemic that has further hampered the public[rsquo]s ability to participate.

The public[rsquo]s only review opportunity for the NEPA document for this large timber sale is now, during the Objection phase. The Objection regulations do not require the FS to prepare written responses to the issues the public raises at this stage, which is the only opportunity for the public to actually read the EA and ask questions and raise issues. The only mandate in this regard would arise when a lawsuit is initiated and Complaint is filed. The FS[rsquo]s chosen process is discretionary; what they[rsquo]ve chosen fails to promote good participation and dialogue with the public in management decisionmaking, subverts NEPA, and potentially results in inefficient and unnecessary use of the judiciary.

Because the draft EA was not circulated with the public as part of a formal notice and comment period, much of the objection is based on information that is new to us. In light of the 20-year timeframe for this proposed project, we strongly urge the FS to accept the concerns outlined herein as both comments and objection to the Green Horse timber sale.

Remedy: To ensure meaningful and informed public comment in accordance with NEPA, the FS must prepare an EIS, since under NEPA that is the only mandated process obligating the FS to provide written responses to comments. This is particularly important given just the scale and intensity of proposed activities. It[rsquo]s clear that the FS concludes [ldquo]no significant impacts[rdquo] and then fits its analysis to justify its conclusion, instead of considering for even a single second that all the impacts might individually, indirectly, or cumulatively arise to a level of significance. The existence of the USDA Forest Service, 2019b Regional Memo all but confirms this; the agency is not concerned with doing quality NEPA so that its decisions are good for the environment, rather what matters is getting things done quickly to subsidize the FS[rsquo]s [ldquo]communities[rdquo] (timber purchasers).

CLIMATE CHANGE AND CARBON SEQUESTRATION

Next, we explain how the FS is willfully participating in the destruction of the Earth[rsquo]s atmosphere. All of the scientific conclusions we cite are common knowledge by now, so it takes active denial to ignore it.

FOC comments on the PA include a section on climate change (pp. 15-16).

Final Guidance for Federal Departments and Agencies on Consideration of GreenhouseGas Emissions and the Effects of Climate Change in National Environmental Policy ActReviews.

Issued on August 1, 2016 and subsequently blocked by the Trump administration, this directive from Executive Office of the President, Council on Environmental Quality has been re- implemented as national direction. [See 86 Fed Reg. 10252 (Feb. 19, 2021).]

The 2016 CEQ guidance acknowledges, [ldquo]changes in our climate caused by elevated concentrations of greenhouse gases in the atmosphere are reasonably anticipated to endanger the public health and public welfare of current and future generations.[rdquo] It directs federal agencies to consider the extent to which a proposed action such as the Green Horse timber sale would contribute to climate change. It rejects as inappropriate any notion that this timber sale is of too small a scale for such consideration:

Climate change results from the incremental addition of GHG emissions from millions of individual sources, which collectively have a large impact on a global scale. CEQ recognizes that the totality of climate change impacts is not attributable to any single action, but are exacerbated by a series of actions including actions taken pursuant to decisions of the Federal Government. Therefore, a statement that emissions from a proposed Federal action represent only a small fraction of global emissions is essentially a statement about

the nature of the climate change challenge, and is not an appropriate basis for deciding whether or to what extent to consider climate change impacts under NEPA. Moreover, these comparisons are also not an appropriate method for characterizing the potential impacts associated with a proposed action and its alternatives and mitigations because this approach does not reveal anything beyond the nature of the climate change challenge itself: the fact that diverse individual sources of emissions each make a relatively small addition to global atmospheric GHG concentrations that collectively have a large impact.

The EPA has also rejected that same kind of analysis because cumulative effects would always dilute individual timber sale effects. (USDA Forest Service, 2016d at pp. 818-19).

So the FS must quantify GHG emissions. The agency can only use a qualitative method if tools, methodologies, or data inputs are not reasonably available, and if that is the case, there need be rationale as to why a quantitative analysis is not warranted. There are plenty of quantitative tools for this analysis. See https://ceq.doe.gov/guidance/ghg-accounting-tools.html; USDA 2014. We seen nothing in the EA or supporting documents to indicate the FS is acting in consistency with this guidance.

Ongoing climate catastrophe

In the recent revised Forest Plan Draft EIS for the Custer-Gallatin National Forest, the FS[rsquo]s words are, [ldquo]Climate change is expected to continue and have profound effects on the Earth[rsquo]s ecosystems in the coming decades (IPCC 2007).[rdquo] Yet judging by its actions, the Forest Service is a huge climate denier.

The EA includes absolutely no analysis of climate change whatsoever. On March 3, 2021 during the objection period, the FS placed several documents on the project website, including this one:

That document, entitled [ldquo]Green Horse project Carbon Cycling and Storage Analysis[rdquo] is undated, no author is identified, and has absolutely no data or analysis pertaining to the Green Horse project area. It[rsquo]s basic template text, perfunctorily placed into the project file. It contains cherry- picked cites of other documents, fails to provide any quantitative analysis, and denies that the timber sale will harm the ability of the project are to sequester carbon over any time frame[mdash]all without considering a genuine examination of the science. So we still see no project specific report or analysis on climate change.

And as alarming as the words in the FS[rsquo]s cited IPCC 2007 are, more recent reports from the Intergovernmental Panel on Climate Change (IPCC) makes that 2007 report seem optimistic. See e.g., IPCC Special Report, 2014 for starters.

There is extremely urgent scientific concern expressed over the imminent effects of climate change on the earth[rsquo]s ecosystems, and therefore on civilization itself. The IPCC[rsquo]s 2018 report states that if greenhouse gas emissions continue at the current rate, the atmosphere will warm up by as much as 2.7 degrees Fahrenheit (1.5 degrees Celsius) above preindustrial levels by 2040, inundating coastlines and intensifying droughts and poverty. The report paints a much darker picture of the immediate consequences of climate change than previously described, and says that avoiding the damage requires transforming the world economy at a speed and scale that has [ldquo]no documented historic precedent.[rdquo]

The 2018 IPCC report describes a world of worsening food shortages and wildfires, and a mass die-off of coral reefs as soon as 2040[mdash]a period well within the lifetime of much of the global population. The report [ldquo]is quite a shock, and quite concerning,[rdquo] said Bill Hare, an author of previous IPCC reports and a physicist with Climate Analytics, a nonprofit organization. [ldquo]We were not aware of this just a few years ago.[rdquo] The report was the first to be commissioned by world leaders under the Paris agreement, the 2015 pact by nations to fight global warming.

The authors of the 2018 IPCC report project that if greenhouse gas emissions continue at the current rate, the atmosphere will warm by as much as 2.7 degrees Fahrenheit (1.5 degrees Celsius) above preindustrial levels by 2040, inundating coastlines and intensifying droughts and poverty. Previous work had focused on estimating the damage if average temperatures were to rise by a larger number, 3.6 degrees Fahrenheit (2 degrees Celsius), because that was the threshold scientists previously considered for the most severe effects of climate change. The 2018 IPCC report, however, shows that many of those effects will come much sooner, at the 2.7- degree mark.

The 2014 National Climate Assessment chapter for the Northwest is prefaced by four [ldquo]key messages[rdquo] including this one: [ldquo]The combined impacts of increasing wildfire, insect outbreaks, and tree diseases are already causing widespread tree die-off and are virtually certain to cause additional forest mortality by the 2040s and long-term transformation of forest landscapes.

Under higher emissions scenarios, extensive conversion of subalpine forests to other forest types is projected by the 2080s.[rdquo] (Mote et al. 2014.)

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

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

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

Some FS scientists recognize this changing situation, for instance Johnson, 2016:

Forests are changing in ways they[rsquo]ve never experienced before because today[rsquo]s growing conditions are different from anything in the past. The climate is changing at an unprecedented rate, exotic diseases and pests are present, and landscapes are fragmented by human activity often occurring at the same time and place.

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

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

[ldquo]This may no longer be the case.[rdquo]

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

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

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

[hellip]We also present a set of global vulnerability drivers that are known with high confidence: (1) droughts eventually occur everywhere; (2) warming produces hotter droughts; (3) atmospheric moisture demand increases nonlinearly with temperature during drought; (4) mortality can occur faster in hotter drought, consistent with fundamental physiology; (5) shorter droughts occur more frequently than longer droughts and can become lethal under warming, increasing the frequency of lethal drought nonlinearly; and

(6) mortality happens rapidly relative to growth intervals needed for forest recovery.

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

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

In 2012 FS scientists reported, [ldquo]Climate change will alter ecosystem services, perceptions of value, and decisions regarding land uses.[rdquo] (Vose et al. 2012.)

Moomaw and Smith, 2017 conclude:

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

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

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

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

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

Respected experts say that the atmosphere might be able to safely hold 350 ppm of CO2.1 So when the atmosphere was at pre-industrial levels of about 280 ppm, there was a cushion of about 70 ppm which represents millions of tons of greenhouse gas emissions. Well, now that cushion is completely gone. The atmosphere is now over 400 ppm CO2 and rising. Therefore the safe level of additional emissions (from logging or any other activity) is negative. There is no safe level of additional emissions that our earth systems can tolerate. We need to be removing carbon from

the atmosphere[mdash]not adding to it.2 How? By allowing forest to grow. Logging moves us away from our objective while conservation moves us toward our objective.

Pecl, et al. 2017 [ldquo]review the consequences of climate-driven species redistribution for economic development and the provision of ecosystem services, including livelihoods, food security, and culture, as well as for feedbacks on the climate itself.[rdquo] They state, [ldquo]Despite mounting evidence for the pervasive and substantial impacts of a climate-driven redistribution of Earth[rsquo]s species, current global goals, policies, and international agreements fail to account for these effects. [hellip] To date, all key international discussions and agreements regarding climate change have focused on the direct socioeconomic implications of emissions reduction and on funding mechanisms; shifting natural ecosystems have not yet been considered in detail.[rdquo] (Emphasis added.)

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

The caption under Funk et al.[rsquo]s Figure 5 and Table 1 states:

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

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

Pecl, et al. 2017 conclude:

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

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

Global climate change is caused by excess CO_2 and other greenhouse gases transferred to the atmosphere from other pools. Human activities, including combustion of fossil fuels

and bioenergy, forest loss and degradation, other land use changes, and industrial processes, have contributed to increasing atmospheric CO_2, the largest contributor to global warming, which will cause temperatures to rise and stay high into the next millennium or longer.

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

Meeting the goals of the Paris Agreement now requires the implementation of strategies that result in negative emissions, i.e., extraction of carbon dioxide from the atmosphere. In other words, we need to annually remove more carbon dioxide from the atmosphere than

we are emitting and store it long-term. Forests and soils are the only proven techniques that can pull vast amounts of carbon dioxide out of the atmosphere and store it at the scale necessary to meet the Paris goal. Failure to reduce biospheric emissions and to restore Earth[rsquo]s natural climate stabilization systems will doom any attempt to meet the Paris (COP21) global temperature stabilization goals.

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

The actual carbon stored long-term in harvested wood products represents less than 10 percent of that originally stored in the standing trees and other forest biomass. If the trees had been left to grow, the amount of carbon stored would have been even greater than it was 100 years prior. Therefore, from a climate perspective, the atmosphere would be better off if the forest had not been harvested at all. In addition, when wood losses and fossil fuels for processing and transportation are accounted for, carbon emissions can actually exceed carbon stored in wood products.

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

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

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

NEPA requires disclosure of impact on [ldquo]the human environment.[rdquo] Climate risk presents overarching adverse impacts on cultural, economic, environmental, and social aspects of the human environment[mdash]people, jobs, and the economy[mdash]adjacent to and near the Forests.

Challenges in predicting responses of individual tree species to climate are a result of species competing under a never-before-seen climate regime that we have not seen before[mdash]one forests may not have experienced before either.

Global warming and its consequences are effectively irreversible which implicates certain legal consequences under NEPA and NFMA and ESA (e.g., 40 CFR [sect] 1502.16; 16 USC [sect]1604(g); 36

CFR [sect]219.12; ESA Section 7; 50 CFR [sect][sect]402.9, 402.14). All net carbon emissions from logging represent [ldquo]irretrievable and irreversible commitments of resources.[rdquo]

Logging harms potential of forest ecosystems to sequester carbon and mitigate effects ofclimate change
The 2012 Planning Rule recognizes, in its definition of Ecosystem services, the [ldquo]Benefits people obtain from ecosystems, including: (2) Regulating services, such as long term storage of carbon; climate regulation[hellip][rdquo] The Committee of Scientists, 1999 recognize the importance of forests for their contribution to global climate regulation. Logging, especially large trees as proposed for the Green Horse timber sale, would exacerbate climate change. Mildrexler, et al., 2020 state:

* Large-diameter trees store disproportionally massive amounts of carbon and are a major driver of carbon cycle dynamics in forests worldwide.
* We examined the proportion of large-diameter trees on National Forest lands east of the Cascade Mountains crest in Oregon and Washington, their contribution to overall aboveground carbon (AGC) storage, and the potential reduction in carbon stocks resulting from widespread harvest. We analyzed forest inventory data collected on 3,335 plots and found that large trees play a major role in the accumulated carbon stock of these forests. Tree AGC (kg) increases sharply with tree diameter at breast height (DBH; cm) among five dominant tree species. Large trees accounted for 2.0 to 3.7% of all stems (DBH [ge] 1[rdquo] or 2.54 cm) among five tree species; but held 33 to 46% of the total AGC stored by each species. Pooled across the five dominant species, large trees accounted for 3% of the 636,520 trees occurring on the inventory plots but stored 42% of the total AGC. A recently proposed large-scale vegetation management project that involved widespread harvest of large trees, mostly grand fir, would have removed ~44% of the AGC stored in these large-diameter trees, and released a large amount of carbon dioxide into the atmosphere.
* Given the urgency of keeping additional carbon out of the atmosphere and continuing carbon accumulation from the atmosphere to protect the climate system, it would be prudent to continue protecting ecosystems with large trees for their carbon stores, and also for their co-benefits of habitat for biodiversity, resilience to drought and fire, and microclimate buffering under future climate extremes.

See also DeLuca, 2009. Also, Lutz et al., 2018 (co-authored by dozens of scientists) [ldquo]recommend managing forests for conservation of existing large-diameter trees or those that can soon reach large diameters as a simple way to conserve and potentially enhance ecosystem services.[rdquo] DeLuca, 2009 points to research that [ldquo]showed that if the objective of management is carbon storage, old-growth forests are better left standing. [hellip]Old growth, rather than being thought of as stagnant with respect to carbon fixation, can sequester atmospheric carbon dioxide long past the achievement of old-growth conditions.[rdquo]

Old growth also helps to mitigate the effects of climate change on wildlife habitat. Frey et al., 2016 find: [ldquo]Vegetation characteristics associated with older forest stands appeared to confer a strong, thermally insulating effect. Older forests with tall canopies, high biomass, and vertical

complexity provided cooler microclimates compared with simplified stands. This resulted in differences as large as 2.5[deg]C between plantation sites and old-growth sites, a temperature range equivalent to predicted global temperature increases over the next 50 years.[rdquo] They hypothesize older, more complex forests may help to [ldquo]buffer organisms from the impacts of regional warming and/or slow the rate at which organisms must adapt to a changing climate[hellip][rdquo] Large trees serve as important carbon capture and storage (Stephenson et al. 2014). Also see DellaSala and Baker, 2020 and Scientists Letter, 2020. Additionally, forest canopies can buffer climate extremes and promote microclimates that in turn provide refugia for species in the understory[mdash] on a daily basis, buffering is most strongly related to forest cover. (Davis et al. 2019b.)

Given the urgency of preventing additional greenhouse gas emissions to the atmosphere and continuing carbon sequestration to protect the climate system, it would be best to protect large trees for their carbon stores, and also for their co-benefits of habitat for biodiversity, resilience to drought and fire, and microclimate buffering under future climate extremes.

We incorporate the Law and Moomaw (2021) article, entitled: [ldquo]Keeping trees in the ground where they are already growing is an effective low-tech way to slow climate change.[rdquo]

The Draft EIS for the NPCNF[rsquo]s revised forest plan admits, [ldquo]The current 1987 Forest Plans do not address climate change.[rdquo] The Draft EIS includes the following definitions:

Carbon Pool: an area that contains an accumulation of carbon or carbon-bearing compounds or having the potential to accumulate such substances. May include live and dead material, soil material, and harvested wood products.

Carbon Stock: the amount or quantity contained in the inventory of a carbon pool.

Also, [ldquo]Forests store large amounts of carbon in their live and dead wood and soil and are an important carbon sink, removing more carbon from the atmosphere than they are emitting (Pan, 2011).[rdquo] (Id.) Yet the FS ignores scientific information strongly implicating logging as increasing net carbon emissions to the atmosphere for many decades. Scientists know that forests more generally[mdash]not only old growth[mdash]play a critical role in sequestering carbon and also moderate the effects of climate change.

Forests are carbon sinks[mdash]they store carbon in both the soils and the vegetation. Carbon sinks are important for mitigating the impacts of climate change. The U.S. has many publicly owned forests, most managed by the FS. Harvesting wood [ldquo]represents the majority of [carbon] losses from US forest [rdquo] Harris et al., 2016. Additionally, Achat et al., 2015 has estimated that

intensive biomass harvests would constitute a significant source of carbon transfer from forests to the atmosphere. Pacific Northwest forests hold live tree biomass equivalent or larger than tropical forests (Law and Waring, 2015). [ldquo]Alterations in forest management can contribute to increasing the land sink and decreasing emissions by keeping carbon in high biomass forests, extending harvest cycles, reforestation, and afforestation.[rdquo] Law et al., 2018. The FS omits an honest carbon accounting of the carbon outputs of this timber sale.

McKinley et al. 2011 state:

[I]f the starting point is a mature forest with large carbon stocks (Cooper 1983, Harmon et al. 1990), then harvesting this forest and converting it to a young forest will reduce carbon stocks and result in a net increase in atmospheric [CO2] for some time (Fig. 8B; Harmon and Marks 2002). Even if the mature forest is converted to a very productive young forest, it could take several harvest intervals to equal the amount of carbon that was stored in the mature forest, even with 100% utilization efficiency, biomass for energy and substitution (Harmon et al. 1990; Fig. 8A).

This timber sale would convert mature forest to a young forest in ways not considered with an environmental baseline or a project-level analysis. This failure to disclose, consider, and analyze violates the requirements of NEPA.

There is simply no more room for increasing carbon emissions while decreasing the capability of forests to sequester carbon. As pointed out by Moomaw et al. 2019, two of our most pressing challenges are [ldquo]1) mitigating and adapting to climate change[rdquo] and [ldquo]2) preventing the loss of biodiversity.[rdquo] And [ldquo][g]rowing existing forests to their biological carbon sequestration potential optimizes [carbon dioxide removal] while limiting climate change and protecting biodiversity, air, land, and water. Natural forests are by far the most effective.[rdquo] Moomaw et al. 2019 (internal citations omitted). And trees that already exist will sequester more carbon than newly planted trees. Proforestation[mdash]growing forests as intact ecosystems[mdash]works towards both of these challenges. Not only is it a low-cost approach to sequestering carbon[mdash]a natural solution, but it can contribute towards diversity. Large trees and intact forests provide habitat that younger forests lack and thus provide more biodiversity, in species such as lichens, bryophytes, salamanders, and birds. Proforestation increases carbon sequestration and storage, protects habitat for species that need it, and preserves biodiversity. See Moomaw et al. 2019.

From Moomaw et al., 2019:

In 1905 Gifford Pinchot, Chief of the U.S. Forest Service, summarized his approach to the nation[rsquo]s forests when he wrote [ldquo]...where conflicting interests must be reconciled, the question will always be decided from the standpoint of the greatest good of the greatest number in the long run.[rdquo]...Remarkably, however, even in 2018 the five major priorities of the US Forest Service do not mention biodiversity, carbon storage, or climate change as major aspects of its work.

Here, the greatest good for the greatest number is to mitigate climate emissions for our region, our country, and our Earth, to minimize carbon emissions, and to preserve biodiversity instead of selling these trees to one company who will make a fleeting profit off of eliminating ecosystem benefits that can make a difference now. The greatest good for the greatest number in the long run is proforestation, and this project inexplicably proposes the exact opposite.

Buotte et al., 2019 is an article prioritizing forest lands for preservation based on [ldquo]carbon priority ranking with measures of biodiversity.[rdquo] This is important information that the FS is ignoring.

The researchers mapped [ldquo]high carbon priority forests in the western US exhibit features of older,

intact forest with high structural diversity[], including carbon density and tree species richness.[rdquo] Here is the map from that article:

As one can see, the Nez Perce-Clearwater National Forests are ranked [ldquo]medium[rdquo] with pockets of high rankings. The NPCNF is worth preserving as is, as a vitally important carbon pool. The NPCNF has an excellent ability to sequester carbon. Profita (Jan. 1, 2020).

Harmon, 2009 is the written record of [ldquo]Testimony Before the Subcommittee on National Parks, Forests, and Public Lands of the Committee of Natural Resources for an oversight hearing on The Role of Federal Lands in Combating Climate Change.[rdquo] The author [ldquo]reviews, in terms as simple as possible, how the forest system stores carbon, the issues that need to be addressed

when assessing any proposed action, and some common misconceptions that need to be avoided.[rdquo]

His testimony begins, [ldquo]I am here to [hellip]offer my expertise to the subcommittee. I am a professional scientist, having worked in the area of forest carbon for nearly three decades. During that time I have conducted numerous studies on many aspects of this problem, have published extensively, and provided instruction to numerous students, forest managers, and the general public.[rdquo]

Climate change science suggests that logging for sequestration of carbon, logging to reduce wild fire, and other manipulation of forest stands does not offer benefits to climate. Rather, increases in carbon emissions from soil disturbance and drying out of forest floors are the result. The FS can best address climate change through minimizing development of forest stands, especially stands that have not been previously logged, by allowing natural processes to function.

Furthermore, any supposedly carbon sequestration from logging are usually more than offset by carbon release from ground disturbing activities and from the burning of fossil fuels to accomplish the timber sale, even when couched in the language of restoration. Reducing fossil fuel use is vital. Everything from travel planning to monitoring would have an important impact in that realm.

The project website document (Future of America[rsquo]s Forests and Rangelands, Update to the Forest Service 2010 Resources Planning Act Assessment) depicts carbon accumulation (storage) rates based on disturbance (Chapter 8, p. 5):

At Chapter 8, p. 4 it states: [ldquo]Note that in all cases, except weather disturbances in the South Region, the net carbon accumulation is positive. Also note that the influence of these disturbances is substantially different from forest cutting, in which decreased carbon accumulation is seen in the live tree pool, the dead tree pool, and net carbon accumulation.[rdquo] Logging eliminates carbon sequestration, and the FS needs to account for the timber sale[rsquo]s reduction of carbon sequestration capacity in the project area and how that contributes to cumulative effects forest wide.

Also see Scientists and Economists Letter, 2021 Regarding Use of Forests for Bioenergy, addressed to President Biden and other world leaders, signed by hundreds of scientists and economists. Among other points, they state:

As numerous studies have shown, this burning of wood will increase warming for decades to centuries. That is true even when the wood replaces coal, oil or natural gas.

The reasons are fundamental. Forests store carbon[mdash]approximately half the weight of dry wood is carbon. When wood is harvested and burned, much and often more than half of the

live wood in trees harvested is typically lost in harvesting and processing before it can supply energy, adding carbon to the atmosphere without replacing fossil fuels. Burning wood is also carbon-inefficient, so the wood burned for energy emits more carbon up smokestacks than using fossil fuels. Overall, for each kilowatt hour of heat or electricity produced, using wood initially is likely to add two to three times as much carbon to the air as using fossil fuels.

Also see: [ldquo]We can't plant or log our way out of climate Change[rdquo] and [ldquo]Scientists Letter to the

Senate on carbon neutrality of forest biomass[rdquo] (2016).

Stockmann, et al., 2014 placed on the project website indicate the emissions of carbon from decay of harvested wood products exceeds forest accumulation attributed to forest regrowth following logging only:

Since 1996, emissions from HWP3 at solid waste disposal sites exceeded additions from harvesting, resulting in a decline in the total amount of carbon stored in the HWP pool. The Northern Region[rsquo]s HWP pool is now in a period of negative net annual stock change because the decay of products harvested between 1906 and 2012 exceeds additions of carbon to the HWP pool through harvest.

The FS completely omits performing a cumulative effects analysis of NPCNF carbon sequestration over time.

Achat et al. 2015 state, [ldquo]Compared with other terrestrial ecosystems, forests store some of the largest quantities of carbon per surface area of land.[rdquo] Much of the carbon stored is within the soils, with a smaller part in the vegetation. Id. Forest management can modify soil organic carbon stocks, losing soil organic carbon when comparing conventional harvests like clearcutting or shelterwood cutting with unharvested forests. Id. Not only does it lose the carbon stored in the soils, but cutting trees eliminates the trees[rsquo] potential to continue to sequester carbon. Id.

Logging also doesn[rsquo]t increase carbon storage in the US by reducing future fire emissions. Research has found high carbon losses associated with [ldquo]fuel treatment[rdquo] and only modest differences associated with the high-severity fire and low severity fire that fuel treatment is meant to encourage. Campbell et al. 2012. And where some disturbances like insects, disease, and fire kill trees and lower carbon sequestration, logging has the greater impact--up to ten times the carbon from forest fires and bark beetles together. See Harris et al. 2016.

Logging does not somehow reduce carbon emissions into the atmosphere. The below graphic is from the Josephine County Democrats Webpage, Forest Defense is Climate Defense (https://josephinedemocrats.org/forest-defense-is-climate-defense/), where the illustrator used the information in Gower et al. 2003 and Smith et al. 2006 to create the following illustration of how carbon is emitted into the atmosphere from logging.

Logging does not serve to increase carbon sequestration in the future. McKinley et al. 2011 states, [ldquo]Because forest carbon loss contributes to increasing climate risk and because climate change may impede regeneration following disturbance, avoiding deforestation and promoting regeneration after disturbance should receive high priority as policy considerations.[rdquo] Also, [ldquo]Generally, harvesting forests with high biomass and planting a new forest will reduce overall carbon stocks more than if the forest were retained, even counting the carbon storage in harvested wood products.[rdquo] (Id.) Avoiding deforestation, afforestation, and reducing logging are the first three strategies listed in McKinley et al. 2011.

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

Best available science supports the proposition that forest policies must shift away from logging if carbon sequestration is prioritized.4 Forests must be preserved indefinitely for their carbon

storage value. Forests that have been logged should allowed to mature. This type of management has the potential to double the current level of carbon storage in some regions. (See Harmon and Marks, 2002; Harmon, 2001; Harmon et al., 1990; Homann et al., 2005; Law, 2014; Solomon et al., 2008; Turner et al., 1995; Turner et al., 1997; Woodbury et al., 2007.)

Moomaw and Smith, 2017 state:

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

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

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

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

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

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

Keith et al., 2009 state:

Both net primary production and net ecosystem production in many old forest stands have been found to be positive; they were lower than the carbon fluxes in young and mature stands, but not significantly different from them. Northern Hemisphere forests up to 800 years old have been found to still function as a carbon sink. Carbon stocks can continue to

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

Hanson, 2010 addresses some of the false notions often misrepresented as [ldquo]best science[rdquo] by agencies, extractive industries and the politicians they[rsquo]ve bought:

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

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

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

Campbell et al., 2012 also refutes the notion that fuel-reduction treatments increase forest carbon storage in the western US:

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

Although fuel-reduction treatments may be necessary to restore historical functionality to fire-suppressed ecosystems, we found little credible evidence that such efforts have the added benefit of increasing terrestrial C stocks.

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

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

In a literature review, Simons (2008) states, [ldquo]Restoration efforts aimed at the maintenance of historic ecosystem structures of the pre-settlement era would most likely reduce the resilient characteristics of ecosystems facing climate change (Millar 1999).[rdquo]

Logging and associated activities emit vast amounts of greenhouse gases
Our comments on the Draft Forest Plan and Draft EIS also discuss climate change impacts on the NPCNF, and the effects of land management on greenhouse gas emissions.

Law and Harmon, 2011 conducted a literature review and concluded:

Thinning forests to reduce potential carbon losses due to wildfire is in direct conflict with carbon sequestration goals, and, if implemented, would result in a net emission of CO_2 to the atmosphere because the amount of carbon removed to change fire behavior is often far larger than that saved by changing fire behavior, and more area has to be harvested than will ultimately burn over the period of effectiveness of the thinning treatment.

Van der Werf, et al. 2009 discuss the effects of land-management practices and state: (T)he maximum reduction in CO_2 emissions from avoiding deforestation and forest

degradation is probably about 12% of current total anthropogenic emissions (or 15% if peat degradation is included) - and that is assuming, unrealistically, that emissions from deforestation, forest degradation and peat degradation can be completely eliminated.

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

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

No analysis of interaction of management actions and climate change
Vegetation management efforts that attempt to replicate how the FS thinks things looked pre- European influence ignores the larger pattern of climate, ignores climate change, and ignores natural succession. See Millar and Wolfenden 1999 for a discussion on why patterns within the context of climate change are important.

The FS (in USDA Forest Service, 2017b) discusses some effects of climate change on forests, including the following statement [ldquo]In many areas, it will no longer be possible to maintain vegetation within the historical range of variability. Land management approaches based on current or historical conditions will need to be adjusted.[rdquo] Yet, the EA indicates that part of the Purpose and Needs is to change the forested vegetation[mdash]lacking any acknowledgement, awareness or analysis that achieving the desired conditions is very much climate dependent. The EA has no scientific basis to support its assumption that proposed [ldquo]treatments[rdquo] will result in sustainable vegetation conditions under increasing temperatures. Browne et al., 2019 discussed that adaptational lag to temperature in valley oak (Quercus lobata) can be mitigated by genome- informed assisted gene flow. Even using seed source from local species may not hold for management practices because trees can lag in adapting to temperature. The FS doesn[rsquo]t account for such circumstances.

Millar et al. 2007 state:

Over the last several decades, forest managers in North America have used concepts of historical range of variability, natural range of variability, and ecological sustainability to set goals and inform management decisions. An underlying premise in these approaches is that by maintaining forest conditions within the range of presettlement conditions, managers are most likely to sustainably maintain forests into the future. We argue that although we have important lessons to learn from the past, we cannot rely on past forest conditions to provide us with adequate targets for current and future management. This reality must be considered in policy, planning, and management. Climate variability, both naturally caused and anthropogenic, as well as modern land-use practices and stressors, create novel environmental conditions never before experienced by ecosystems. Under such conditions, historical ecology suggests that we manage for species persistence within large ecoregions.

The EA fails to consider that the effects of climate change on the project area, including that FS target [ldquo]historical[rdquo] or desired vegetation conditions will likely not be achievable or sustainable. The FS is obligated to conduct an analysis as to how realistic and achievable its objectives are in the context of a rapidly changing climate, along an unpredictable but definitely changing trajectory.

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

We add this observation from Frissell and Bayles (1996):

Most philosophies and approaches for ecosystem management put forward to date are limited (perhaps doomed) by a failure to acknowledge and rationally address the overriding problems of uncertainty and ignorance about the mechanisms by which complex ecosystems respond to human actions. They lack humility and historical perspective about

science and about our past failures in management. They still implicitly subscribe to the scientifically discredited illusion that humans are fully in control of an ecosystemic machine and can foresee and manipulate all the possible consequences of particular actions while deliberately altering the ecosystem to produce only predictable, optimized and socially desirable outputs. Moreover, despite our well-demonstrated inability to prescribe and forge institutional arrangements capable of successfully implementing the principles and practice of integrated ecosystem management over a sustained time frame an at sufficiently large spatial scales, would-be ecosystem managers have neglected to acknowledge and critically analyze past institutional and policy failures. They say we need ecosystem management because public opinion has changed, neglecting the obvious point that public opinion has been shaped by the glowing promises of past managers and by their clear and spectacular failure to deliver on such promises.

And as the FS explains in an EIS prepared for another timber sale (USDA Forest Service, 2017g):

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

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

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

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

[hellip]The greatest increases occurred in mid-elevation, Northern Rockies forests, where land-use histories have relatively little effect on fire risks, and are strongly associated with increased spring and summer temperatures and an earlier spring snowmelt.

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

(S)even general circulation models have run future climate simulations for several different carbon emissions scenarios. These simulations unanimously project June to August temperature increases of 2[deg] to 5[deg]C by 2040 to 2069 for western North America. The simulations also project precipitation decreases of up to 15% for that time period (11).

Even assuming the most optimistic result of no change in precipitation, a June to August temperature increase of

3[deg]C would be roughly three times the spring-summer temperature increase that Westerling et al. have linked to the current trends. Wildfire burn areas in Canada are expected to increase by 74 to 118% in the next century (12), and similar increases seem likely for the western United States.

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

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

In March 2019, U.S. District Judge Rudolph Contreras in Washington, D.C., ruled that when the

U.S. Bureau of Land Management (BLM) auctions public lands for oil and gas leasing, officials must consider emissions from past, present and foreseeable future oil and gas leases nationwide.

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

The EA fails to acknowledge the likelihood that [ldquo][hellip]high seedling and sapling mortality rates due to water stress, competing vegetation, and repeat fires that burn young stands,[rdquo] which will likely lead to a dramatic increase in non-forest land acres. (Johnson, 2016.)

We incorporate the following article from the Missoulian ([ldquo]Fire study shows landscapes such as Bitterroot's Sapphire Range too hot, dry to restore trees[rdquo]) written by Rob Chaney (March 11, 2019):

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

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

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

Other vegetation like grasses are re-sprouting. It[rsquo]s too warm. There[rsquo]s not enough moisture for the trees.[rdquo]

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

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

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

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

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

[ldquo]There used to be enough variability in seasonal conditions that seedlings could make it across these fixed thresholds,[rdquo] Dobrowski said. [ldquo]After the mid-[lsquo]90s, those windows have been closing more often. We[rsquo]re worried we[rsquo]ll lose these low-elevation forests to shrubs or grasslands. That[rsquo]s what the evidence points to.[rdquo]

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

[ldquo]The six sites we looked at in the Bitterroots haven[rsquo]t been above the summer humidity threshold since 1997,[rdquo] Higuera said. [ldquo]Soil moisture hasn[rsquo]t crossed the threshold since 2009.[rdquo]

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

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

The study also found that soil sterilization wasn[rsquo]t a factor in tree regrowth, even in the most severely burned areas. For example, the 2000 Sula Complex of fires stripped forest cover in the southern end of the Bitterroot Valley. While the lodgepole pine stands near Lost Trail Pass have recovered, the lower- elevation Ponderosa pine and Douglas firs haven[rsquo]t.

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

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

That scientific article is Davis et al., 2019. The researchers found, [ldquo]Annual rates of tree regeneration exhibited strongly nonlinear relationships with annual climate conditions, with distinct threshold responses to summer VPD, soil moisture, and maximum surface temperatures []. Across the study region, seasonal to annual climate conditions from the early 1990s through 2015 have crossed these climate thresholds at the majority of sites [], indicating conditions that are increasingly unsuitable for tree regeneration, particularly for ponderosa pine.[rdquo] The study region includes the Northern Rockies, and spans areas within the Clearwater Basin and close to and within the Nez Perce-Clearwater National Forests.

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

The Resources Planning Act of 1974 (RPA) and National Forest Management Act of 1976 (NFMA) mandate long-range planning which impose numerous limitations on timber extraction practices and the amount of timber sold annually. These long range plans are based on assumptions, which are based on data, expert opinion, public participation and other factors which mostly view from a historical perspective. So it[rsquo]s time to peer into the future to examine closely (NEPA: [ldquo]take a hard look at[rdquo]) those assumptions. Clearly, the FS is not considering best available science on this topic.

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

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

Assumptions of the EA relating to achieving its desired conditions are not supported scientifically. NEPA requires a [ldquo]hard look[rdquo] at the best available science relating to future concentrations of greenhouse gases and gathering climate risk as we move forward into an increasingly uncertain and uncharted climate future. This has not been done. The Green Horse EA does not include any sort of legitimate climate-risk analysis, much less one based on the best available science.

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

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

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

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

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

No amount of logging, thinning and prescribes burning will cure the cumulative effects (irretrievable loss) already baked into the foreseeably impending climate chaos. [ldquo]Treatments[rdquo] must be acknowledged for what they are: adverse cumulative environmental effects. Logging disturb forests to states that potentially cannot be restored or retrieved.

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

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

Davis et al., 2019 state:

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

There[rsquo]s been increasing evidence of climate triggering forest cover loss at significant scales (Breshears et al. 2005), forcing tree species into new distributions [ldquo]unfamiliar to modern civilization[rdquo] (Williams et al. 2012), and raising a question of forest decline across the 48 United States (Cohen et al. 2016).

The EA does not disclose restocking monitoring data and analysis.

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

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

Off-road vehicles in California currently emit more than 230,000 metric tons [mdash] or

5000 million pounds [mdash] of carbon dioxide into the atmosphere each year. This is equivalent to the emissions created by burning 500,000 barrels of oil. The 26 million gallons of gasoline consumed by off-road vehicles each year in California is equivalent to the amount of gasoline used by 1.5 million car trips from San Francisco to Los Angeles.

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

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

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

Can we really afford this?

Gerber, et al., 2013 state, [ldquo]Livestock producers, which include meat and dairy farming, account for about 15 percent of greenhouse gas emissions around the world. That[rsquo]s more than all the world[rsquo]s exhaust-belching cars, buses, boats, and trains combined.[rdquo]

Saunois et al., 2016a note [ldquo]the recent rapid rise in global methane concentrations is predominantly biogenic[mdash]most likely from agriculture[mdash]with smaller contributions from fossil fuel use and possibly wetlands. [hellip]Methane mitigation offers rapid climate benefits and economic, health and agricultural co-benefits that are highly complementary to CO2 mitigation.[rdquo] (Also see Saunois et al., 2016b; Gerber et al., 2013; and the Grist articles [ldquo]Why isn[rsquo]t the U.S. countingmeat producers[rsquo] climate emissions?[rdquo] and [ldquo]Cattle grazing is a climate disaster, and you[rsquo]re payingfor it[rdquo] and Stanford News article [ldquo]Methane from food production could be wildcard in

combating climate change, Stanford scientist says[rdquo].)

Ripple et al. 2014 provide some data and point out the opportunities available for greenhouse gas reductions via change in livestock policy.

Beschta et al., 2012 provide a scientific basis for expecting significant environmental damage from livestock grazing with the changing climate:

* Climate impacts are compounded from heavy use by livestock and other grazing ungulates, which cause soil erosion, compaction, and dust generation; stream degradation; higher water temperatures and pollution; loss of habitat for fish, birds and amphibians; and desertification.
* Encroachment of woody shrubs at the expense of native grasses and other plants can occur in grazed areas, affecting pollinators, birds, small mammals and other native wildlife.
* Livestock grazing and trampling degrades soil fertility, stability and hydrology, and makes it vulnerable to wind erosion. This in turn adds sediments, nutrients and pathogens to western streams.
* Water developments and diversion for livestock can reduce streamflows and increase water temperatures, degrading habitat for fish and aquatic invertebrates.
* The advent of climate change has significantly added to historic and contemporary problems that result from cattle and sheep ranching.

Beschta et al., 2012 believe the burden of proof should be shifted. Those using public lands for livestock production should have to justify the continuation of ungulate grazing. Some other key points the authors make include:

* If livestock use on public lands continues at current levels, its interaction with anticipated changes in climate will likely worsen soil erosion, dust generation, and stream pollution. Soils whose moisture retention capacity has been reduced will undergo further drying by warming temperatures and/or drought and become even more susceptible to wind erosion (Sankey and others 2009).
* (I)n 1994 the BLM and FS reported that western riparian areas were in their worst condition in history, and livestock use[mdash]typically concentrated in these areas[mdash]was the chief cause (BLM and FS 1994).
* Ohmart and Anderson (1986) suggested that livestock grazing may be the major factor negatively affecting wildlife in eleven western states. Such effects will compound the problems of adaptation of these ecosystems to

the dynamics of climate change (Joyce and others 2008, 2009). Currently, the widespread and ongoing declines of many North American bird populations that use grassland and grass[ndash]shrub habitats affected by grazing are [lsquo][lsquo]on track to become a prominent wildlife conservation crisis of the 21st century[rsquo][rsquo] (Brennan and Kuvlesky 2005, p. 1)
* Climate change and ungulates, singly and in concert, influence ecosystems at the most fundamental levels by affecting soils and hydrologic processes. These effects, in turn, influence many other ecosystem components and processes[mdash]nutrient and energy cycles; reproduction, survival, and abundance of terrestrial and aquatic species; and community structure and composition. Moreover, by altering so many factors crucial to ecosystem functioning, the combined effects of a changing climate and ungulate use can affect biodiversity at scales ranging from species to ecosystems (FS 2007) and limit the capability of large areas to supply ecosystem services (Christensen and others 1996; MEA 2005b).
* The site-specific impacts of livestock use vary as a function of many factors (e.g., livestock species and density, periods of rest or non-use, local plant communities, soil conditions). Nevertheless, extensive reviews of published research generally indicate that livestock have had numerous and widespread negative effects to western ecosystems (Love 1959; Blackburn 1984; Fleischner 1994; Belsky and others 1999; Kauffman and Pyke 2001; Asner and others 2004; Steinfeld and others 2006; Thornton and Herrero 2010). Moreover, public-land range conditions have generally worsened in recent decades (CWWR 1996, Donahue 2007), perhaps due to the reduced productivity of these lands caused by past grazing in conjunction with a changing climate (FWS 2010, p. 13,941, citing Knick and Hanser 2011).
* Livestock use effects, exacerbated by climate change, often have severe impacts on upland plant communities. For example, [hellip] areas severely affected include the northern Great Basin and interior Columbia River Basin (Middleton and Thomas 1997).
* Livestock grazing has numerous consequences for hydrologic processes and water resources. Livestock can have profound effects on soils, including their productivity, infiltration, and water storage, and these properties drive many other ecosystem changes. Soil compaction from livestock has been identified as an extensive problem on public lands (CWWR 1996; FS and BLM 1997). Such compaction is inevitable because the hoof

of a 450-kg cow exerts more than five times the pressure of heavy earthmoving machinery (Cowley 2002). Soil compaction significantly reduces infiltration rates and the ability of soils to store water, both of which affect runoff processes (Branson and others 1981; Blackburn 1984). Compaction of wet meadow soils by livestock can significantly decrease soil water storage (Kauffman and others 2004), thus contributing to reduced summer base flows. Concomitantly, decreases in infiltration and soil water storage of compacted soils during periods of high-intensity rainfall contribute to increased surface runoff and soil erosion (Branson and others 1981). These fundamental alterations in hydrologic processes from livestock use are likely to be exacerbated by climate change.

* The combined effects of elevated soil loss and compaction caused by grazing reduce soil productivity, further compromising the capability of grazed areas to support native plant communities (CWWR 1996; FS and BLM 1997). Erosion triggered by livestock use continues to represent a major source of sediment, nutrients, and pathogens in western streams (WSWC 1989; EPA 2009).
* Historical and contemporary effects of livestock grazing and trampling along stream channels can destabilize streambanks, thus contributing to widened and/or incised channels (NRC 2002). Accelerated streambank erosion and channel incision are pervasive on western public lands used by livestock (Fig. 4). Stream incision contributes to desiccation of floodplains and wet meadows, loss of floodwater detention storage, and reductions in baseflow (Ponce and Lindquist 1990; Trimble and Mendel 1995). Grazing and trampling of riparian plant communities also contribute to elevated water temperatures[mdash]directly, by reducing stream shading and, indirectly, by damaging streambanks and increasing channel widths (NRC 2002). Livestock use of riparian plant communities can also decrease the availability of food and construction materials for keystone species such as beaver (Castor canadensis).
* Livestock production impacts energy and carbon cycles and globally contributes an estimated 18% to the total anthropogenic greenhouse gas (GHG) emissions (Steinfeld and others 2006). How public-land livestock

contribute to these effects has received little study. Nevertheless, livestock grazing and trampling can reduce the capacity of rangeland vegetation and soils to sequester carbon and contribute to the loss of above- and below-ground carbon pools (e.g., Lal 2001b; Bowker and others 2012). Lal (2001a) indicated that heavy grazing over the long-term may have adverse impacts on soil organic carbon content, especially for soils of low inherent fertility. Although Gill (2007) found that grazing over 100 years or longer in subalpine areas on the Wasatch Plateau in central Utah had no significant impacts on total soil carbon, results of the study suggest that [lsquo][lsquo]if temperatures warm and summer precipitation increases as is anticipated, [soils in grazed areas] may become net sources of CO2 to the atmosphere[rsquo][rsquo] (Gill 2007, p. 88). Furthermore, limited soil aeration in soils compacted by livestock can stimulate production of methane, and emissions of nitrous oxide under shrub canopies may be twice the levels in nearby grasslands (Asner and others 2004). Both of these are potent GHGs.
* Managing livestock on public lands also involves extensive fence systems. Between 1962 and 1997, over 51,000 km of fence were constructed on BLM lands with resident sage- grouse populations (FWS 2010). Such fences can significantly impact this wildlife species. For example, 146 sage-grouse died in less than three years from collisions with fences along a 7.6-km BLM range fence in Wyoming (FWS 2010). Fences can alsorestrict the movements of wild ungulates and increase the risk of injury and death by entanglement or impalement (Harrington and Conover 2006; FWS 2010). Fences and roads for livestock access can fragment and isolate segments of natural ecological mosaics thus influencing the capability of wildlife to adapt to a changing climate.
* (L)ivestock use (particularly cattle) on these lands exert disturbances without evolutionary parallel (Milchunas and Lauenroth 1993; MEA 2005a). [hellip]The combined effects of ungulates (domestic, wild, and feral) and a changing climate present a pervasive set of stressors on public lands, which are significantly different from those encountered during the evolutionary history of the region[rsquo]s native species. The intersection of these stressors is setting the stage for fundamental and unprecedented changes to forest, arid, and semi-arid landscapes in the western US (Table 1) and increasing the likelihood of alternative states. Thus, public-land management needs to focus on restoring and maintaining structure, function, and integrity of ecosystems to improve their resilience to climate change (Rieman and Isaak 2010).
* Natural floods provide another illustration of how ungulates can alter the ecological role of disturbances. High flows are normally important for maintaining riparian plant communities through the deposition of nutrients, organic matter, and sediment on streambanks and floodplains, and for enhancing habitat diversity of aquatic and riparian ecosystems (CWWR 1996). Ungulate effects on the structure and composition of riparian plant communities (e.g., Platts 1991; Chadde and Kay 1996), however, can drastically alter the outcome of these hydrologic disturbances by diminishing streambank stability and severing linkages between high flows and the maintenance of streamside plant communities. As a result, accelerated erosion of streambanks and floodplains, channel incision, and the occurrence of high instream sediment loads may become increasingly common during periods of high flows (Trimble and Mendel 1995). Similar effects have been found in systems where large predators have been displaced or extirpated (Beschta and Ripple 2012). In general, high levels of ungulate use can essentially uncouple typical ecosystem responses to chronic or acute disturbances, thus greatly limiting the capacity of these systems to provide a full array of ecosystem services during a changing climate.
* (F)ederal grazing fees on BLM and FS lands cover only about one-sixth of the agencies[rsquo] administration costs (Vincent 2012).

Remedy: For the above reasons, the FS has violated NEPA, among which includes its duty to disclose high-quality information, its duty to meaningfully respond to the public[rsquo]s comments, its duty to honestly analyze the adverse impacts of the project, its duty to engage in any analysis on the project and regional level, its duty not to misrepresent the science it relies upon, and its duty to take a hard look at the consequences of its actions. We request the FS:

1. Choose the no-action alternative;
2. Withdraw the proposal;
3. Do a climate change/carbon sequestration analysis that addresses the issues raised above.

OLD GROWTH

FOC[rsquo]s comments on the PA at pp. 8 - 13 discuss old growth and old-growth associated wildlife. Please see our comments on the Draft Forest Plan and its Draft EIS, for a discussion of old- growth issues and best available science. That letter is incorporated into this objection.

Old growth is important for several reasons. For one, citizens enjoy visiting these groves, for the mystery it invokes:

The birth of [ldquo]old growth[rdquo] as the iconic forest can be encapsulated in a few words describing social meanings, time and space: re-enchantment trumped rationality; the eternal present absorbed the chronology of forest growth; mystical places colonized the choreography of sustained yield operations.

(Lee, 2009.) Such an opportunity doesn[rsquo]t exist in logged plantations, even if some of the larger, older trees are retained. We find nothing in the project ID Team[rsquo]s perspective on old growth that recognizes these societal values.

Another reason old growth is important is for its rare habitat contribution for wildlife, plants, fungi and other life forms which are not well-represented in younger or managed forests. Simply put, they are reserves of biological diversity that are typically depleted by intensive management activities.

The Forest Plan requires:

Viable populations of old-growth-dependent species will be maintained. At least 10 percent

of the forested acres across the Forest that are suitable old-growth habitat will be managed as old-growth habitat. This acreage will be distributed across the Forest in a way which assures that at least 5 percent of the forested acres within major prescription watersheds of 6,000 to 10,000 acres will be managed as old-growth habitat.

Provide management for minimum viable populations of old-growth and snag-dependent species by adhering to the standards stated in Appendix N.

Similarly, the Forest Plan FEIS states:

In order to provide for minimum viable populations of the old-growth dependent wildlife species, at least 10 percent of the forested acres must provide old-growth habitat and half of this or 5 percent of the total forested acres must provide for old-growth habitat that is dispersed evenly across the Forest. All alternatives were constrained to meet these minimum management requirements.

The Forest Plan FEIS also acknowledges the high risk to wildlife species invoked by implementing the Forest Plan, even considering the plan[rsquo]s old-growth retention requirements:

As the quantity of old-growth habitat is reduced and as its distribution patterns and quality are altered, we expect to see significant decreases in the total number of wildlife species and significant changes in species composition of wildlife communities that are associated with these habitats. In effect, an entire ecosystem will drastically change over time as old-growth forests are reduced to a minimum. (Emphases added.)

Since that casts much doubt on the efficacy of Forest Plan standards for assuring viability for many Sensitive, ESA-listed, and Management Indicator Species (MIS) on the Nez Perce NF, it elevates the importance of both population trend monitoring (required by the Forest Plan) and maintaining an accurate forestwide old-growth inventory. Yet the FS has failed to monitor population trends, and it has no comprehensive inventory of old growth forestwide.

The Forest Plan Management Area 20 [ldquo]Description[rdquo] includes:

Management Area 20 is equally distributed across the nonclassified portion of the Forest. It is made up of forested lands in timber productivity classes 3, 4, 5, 6, and 7 and occurs on a variety of landtypes. Approximately half of the area has a timber condition class of overmature sawtimber (150 years or older). The remainder of the area is comprised of immature stands (40-80 years) that will provide for replacement old-growth habitat. These lands provide critical habitat for wildlife species dependent on old-growth forest conditions such as the pileated woodpecker, the pine marten, and the fisher.

Management Area 20 Goals include: [ldquo]Provide [lsquo]suitable[rsquo] habitat (existing and replacement) for old-growth-dependent wildlife species.[rdquo]

Management Area 20 Standards include:

Schedule no timber harvest in existing old-growth stands until decade 10. Schedule no timber harvest in replacement stands until decade 16.

Select, locate, and administer old-growth areas to protect them from firewood cutting.

Restrict or close all secondary collector and local roads after management activities cease in adjacent areas.

The Forest Plan Management Area 21 [ldquo]Description[rdquo] includes:

Management Area 21 consists of timber stands in timber productivity classes 3 and 4 that are old-growth, grand fir-Pacific yew vegetative communities that have been identified as moose winter range. These stands are generally located between the elevations of 4,000 to 6,000 feet on a variety of landtypes. These areas occur across the entire nonclassified portion of the Forest. These areas are key winter habitat for moose.

Management Area 21 Goals include:

Manage the grand fir-Pacific yew plant communities to provide for a continuing presence of Pacific yew [ldquo]suitable" for moose winter habitat.

The goal for summer elk habitat in this management area is to manage 12,785 acres to achieve at least 75 percent of habitat potential; 31,425 acres to achieve at least 50 percent of habitat potential; and 518 acres to achieve at least 25 percent of habitat potential.

Specific methods of how to achieve this will be determined on a site-specific basis during project planning (see Appendix B).

Management Area 21 Standards include:

Close all but specifically-identified roads during the fall and winter.

Restrict range improvements to areas where conifer and Pacific yew regeneration has been established.

The steep lands, greater than 35 percent slope, are "unsuitable" for timber management.

Schedule timber harvest only on the "suitable" lands, less than 35 percent slope, that do not require broadcast slash burning.

For those lands that are scheduled for harvest, harvest a maximum of 5 percent of Pacific yew stand per decade on a 210-year rotation.

Maintain at least 50 percent of the live Pacific yew components scattered throughout the unit in patches 1/4 to 1/2 acre in size.

The preferred harvest type includes patch clearcuts, individual tree selection, group selection, or shelterwood. Patch clearcuts should be no larger than 20 acres in size (5-10 acres preferred).

Maintain leave-strips between yew stands sufficient to provide travel corridors for moose.

Reforest to desired stocking levels either through planting or through natural regeneration to achieve 30 percent crown closure over 20 years for conifers, and 30 percent crown closure over 20-30 years for Pacific yew.

Meet established fishery/water quality objectives for all prescription watersheds as shown in Appendix A.

Planned ignitions, when within prescription, will be allowed to burn to enhance resource values. Generally, broadcast burning will not be prescribed. Do not slash Pacific yew except to provide room to machine pile. Slash piles should not be placed within patches of yew.

The EA fails to demonstrate consistency with the above Forest Plan requirements.

The FS fails to perform a qualitative analysis of old growth in response to Forest Plan Appendix N Standards. These include:

Where available, stands should be at least 300 acres. Next best would be a core block of 150 acres with the remaining blocks of no less than 50 acres and no more than 1/2 mile away. If existing old-growth blocks are less than 100 acres, the stands between the old- growth blocks should be designated old-growth replacement. The entire unit consisting of old-growth blocks and replacement old growth should be managed as an old-growth complex. If the old-growth component is less than 50 percent of the complex, the complex should be considered replacement old growth. Within the old-growth complex, only the stands that meet old-growth criteria will be counted toward meeting the allocation for existing old growth. The replacement stands will be counted toward meeting the allocation for replacement old growth.

Ideally the perimeter to area ratio of old-growth blocks should be minimized. Linear strips at least 300 feet wide along streams are acceptable if more suitable sites are not available.

Where possible, roads should not be located through or adjacent to old-growth stands in order to reduce human disturbance, loss of snags to firewood cutters, windthrow, and micro-climate changes.

To increase the probability of species immigration and colonization of old-growth islands and to facilitate genetic interchange between isolated population demes, a system of corridors interconnecting old-growth islands is required. Because of Forest direction to manage riparian areas to enhance riparian-dependent species and because the dendritic pattern of stream-side riparian zones readily facilitates connecting old-growth islands,

riparian zones will serve as the principal means to provide interconnecting corridors. Corridors should be extensions of closed or nearly closed canopy of forest of sufficient width to resist blow-down.

The EA and DN both state, [ldquo]There would be no harvest in [hellip] verified old growth.[rdquo] It is unclear if this means there may be logging proposed in old growth that hasn[rsquo]t been [ldquo]verified[rdquo].

Biologically, there is no distinction so the FS must clarify this situation.

The EA states, [ldquo]Currently, the project meets Forest Plan requirements for 5% old growth and 5% replacement in each prescription watershed within the project area. Areas that do not have 5% old growth have greater than 5% replacement old growth so that total forested prescription watershed acreage being managed for old growth is 10% or greater.[rdquo] Based on the FS[rsquo]s own map posted on the project website (7-003_191107GreenHorseCurrentOGandPotentialOG_Map), that statement is blatantly false. For example, looking at the Old Growth Analysis Area (OGAA) labeled OGAA03020112, no category of old growth (existing, replacement, step-down) is displayed. EA Table 19 numbers for that OGAA are entirely inconsistent with the map.

The OGAAs are the forest plan prescription watershed analysis areas for old growth. And zero acres means 0%, which is less than 5% FYI. And yet the FS is proposing clearcutting in OGAA03020112.

And we can[rsquo]t help but notice that Table 19 of the EA shows OGAA03020113 has zero acres of existing old growth and 4% [ldquo]replacement.[rdquo] 4% is also less than 5%, FYI.

There is no indication that the FS has done any analysis of quality of the [ldquo]replacement[rdquo] or [ldquo]step- down[rdquo] old growth it has designated. Retaining forest of old-growth quality or of quality near old- growth conditions poses a direct conflict with the view and use of forests as subsidized logs to the timber industry. For all we can tell with the FS[rsquo]s maps, the agency could easily have designated the [ldquo]replacement[rdquo] or [ldquo]step-down[rdquo] old growth in areas of least quality for the associated wildlife because it also has the least timber value.

Furthermore it is clear that the FS is proposing to clearcut right next to existing old growth in several locations. One must compare the old growth map to one of the FS[rsquo]s maps of the proposed logging, because the old growth map neglects to display the proposed logging. The FS has obviously not considered the proposed fragmentation of old growth vis-[agrave]-vis the old-growth size block needs of old-growth associated wildlife, as expressed in the Forest Plan and science cited herein.

Thomas et al., 1988 emphasized values pertaining to wildlife and diversity in the context of laws and regulations. From a perspective recognizing that meaningful implementation of regulatory requirements must include a concomitant awareness of the limits of scientific knowledge, they advocate for preserving all old growth that remains:

The lack of quantitative information about functional attributes of old growth and habitat associations of potentially dependent plants and animals and the rapidly declining old- growth resource indicates that purposely conservative management plans should be

developed and adopted. Our knowledge and understanding of old-growth communities is not adequate to support management of remaining old growth on criteria that provide minimum habitat areas to sustain minimum viable populations of one or several species. The potential consequences and the distinct probability of being wrong are too great to make such strategies defensible in the ecological sense.

[hellip]The answer to[mdash] [ldquo]How much?[rdquo][mdash]must be predicated on the relatively small amount of unevenly distributed remaining old growth and the current, inconclusive scientific knowledge of old-growth ecosystems. Therefore, the best probability of success is to preserve all remaining old growth and, if possible,

produce more.

A major biological issue regarding old-growth is the essential habitat it provides for many wildlife, such as management indicator species (MIS) and several Sensitive species which rely on these types of habitats. Marcot, et al., 1991 state:

Old growth provides optimal habitat for some management indicator species, including spotted owl, pileated woodpecker, and marten, and for many other species of plants, fish, amphibians, reptiles, birds, and small mammals. It also provides thermal and hiding cover for ungulates, especially in winter. [hellip]Some wildlife species may have co-evolved with, and depend on, specific amounts and conditions of old-growth forests. Specific kinds, sizes, and patterns of old-growth environments are, therefore, keys to the long-term survival of these species. (Internal cites omitted.)

USDA Forest Service, 1990 states:

The greater vertical and horizontal diversity found within an old-growth stand allows for niche specialization by wildlife. Although the individual wildlife species occurring may not be unique to old-growth stands, the assemblage of wildlife species and the complexity of interactions between them are different than in earlier successional stages.

The 1987 Forest Plan for the Kootenai National Forest (USDA Forest Service, 1987a) states, [ldquo]With respect to wildlife (old growth) represents a distinct successional stage that is an important component of wildlife habitat.[rdquo] That forest plan also explains:

Richness in habitat translates into richness in wildlife. Roughly 58 wildlife species on the Kootenai (about 20 percent of the total) find optimum breeding or feeding conditions in the [ldquo]old[rdquo] successional stage, while other species select old growth stands to meet specific needs (e.g., thermal cover). Of this total, five species are believed to have a strong preference for old growth and may even be dependent upon it for their long-term survival (see Appendix I).

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

NPCNF old growth direction and analysis is not based on the best available science. The Forest Plan requires the FS to [ldquo]Inventory, Survey and Delineate[rdquo] old-growth habitat by 1990. Over thirty years post-deadline, the FS still cannot produce a reliable forestwide old-growth inventory for the Nez Perce National Forest. Instead, the FS relies upon Forest Inventory and Analysis (FIA) data in an attempt to bolster its claim it is meeting its forestwide 10% minimum. As your Hungry Ridge FEIS states: [ldquo]The most recent Forest Inventory and Analysis (FIA) data (Bush et al. 2010) indicate that ...approximately 13.6 percent of the Nez Perce National Forest meets the Forest Plan definition of old growth[hellip] . Based on this information, the Nez Perce National Forest is above the Forest Plan minimum standard of 10 percent old growth forest-wide[rdquo].

But the FIA methodology cannot specify the location and extent of old-growth stands within a national forest. In discussing such methodology, a Northern Region report (Bollenbacher, et al., 2009) states, [ldquo]All northern Idaho plots utilized a primary sample unit (PSU) composed of four fixed radius plots with trees 5 [ndash] 20.9 inches tallied on a 1/24th acre plot and trees 21.0 inches DBH and larger tallied on a [frac14] acre plot.[rdquo] And, the FS[rsquo]s Czaplewski, 2004 states, [ldquo]Each FIA sample location is currently a cluster of field sub-plots that collectively cover an area that is nominally one acre in size and FIA measures a probability sub-sample of trees at each sub-plot within this cluster.[rdquo]

Sample design for FIA plots is semi-systematic; a sample taken randomly within a systematically placed grid. As stated above, at most each plot samples a maximum of one acre[mdash]far smaller than an old-growth stand[mdash]and thus resulting estimates cannot indicate the capability to meet biological needs of the associated wildlife. Moreover, the location of plots is confidential, and for good reasons[mdash]managers are not allowed to know the location of FIA plots within national forests, to prevent the skewing of data which would result from intentionally managing differently at plot locations. As a result, conclusions such as the 13% claimed by the Nez Perce National Forest cannot be verified by independent investigators. This prevents independent peer review[mdash]a hallmark of the scientific method.

FIA statistics thus have no correlation to forest plan minimum old-growth stand sizes, nor to spatial habitat requirements of wildlife species. Mapping of existing old growth is impossible using FIA data alone. The location of existing old-growth stands cannot be specified using FIA. There has been no systematic scientific study conducted to correlate any FIA estimate with the results from field data of old-growth habitat.

Furthermore, one out of every 10 FIA plots are sampled each year, which means that every year, reports such as Bush et al. 2010 can be updated. Which also means that by now, every plot the Bush et al. 2010 report bases its analysis on would have been re-sampled, yielding new and updated data, since that 2010 report.

Bush et al., 2007 ([ldquo]Estimates of Old Growth for the Northern Region and National Forests[rdquo]) states, [ldquo]To remain current, FIA has started to re-measure 10% of its plots every year. As these re- measured plots accumulate, we will periodically update our FIA old-growth analysis and report.[rdquo]

So the FS is capable[mdash]but apparently unwilling[mdash]to update FIA-based analyses such as the one the agency uses to claim consistency with the NPNF forest plan 10% old-growth standard.

The draft EIS for the forest plan revision recognizes that the mixed-severity fire regime is the most prevalent one on the NPCNF. Lesmeister et al. (2019) state, [ldquo]Because of the spatiotemporal variability across the landscape, mixed-severity fire regimes are the most complex and least understood fire regimes, unique in terms of patch metrics and the life history attributes of native species (Schoennagel et al. 2004, Agee 2005, Halofsky et al. 2011). Fire histories in mixed- severity regimes, in particular, are difficult to determine because most fire history techniques have been developed to study either the low- or high-severity extremes in fire regimes (Agee 2005).[rdquo] Lesmeister et al. (2019) recognize some beneficial effects of fire, a natural process that is demonized5 in Green Horse analyses:

Short-interval severe fires are an important characteristic of mixed-severity fire regimes and are typically considered extreme events and expected to be deleterious to forest succession and diversity (Donato et al. 2009). However, many native plants within these forests possess functional traits (e.g., persistent seed banks, vegetative sprouting, rapid maturation) lending to resilience to short-interval severe fires that result in distinct vegetation assemblages that enhance landscape heterogeneity inherent to mixed-severity fire regimes (Donato et al. 2009). Furthermore, high diversity of vegetation types, driven by short-interval repeat fires in a mixed-severity fire regime landscapes, plays an important role in conservation and the structure of avian communities (Fontaine et al. 2009).

Lesmeister et al., 2019 discuss the positive role that old-growth ([ldquo]untreated[rdquo] old growth) plays in countering impacts from high-severity fires[mdash]protecting these areas are a part of the climate solution, not a problem to be logged. If there is any increase in the frequency of fire-severity on the landscape, it is likely due to the FS[rsquo]s management practices. Regarding the logging of old growth, best available science indicates it isn[rsquo]t justified.

There is no science supporting the FS[rsquo]s position that vegetation manipulation can help to maintain old growth over time, or foster development of non-old growth into old growth. As stated by Thomas et al., 1988:

The ecological complexity of old growth makes it unlikely that forest managers can create functional old growth through silvicultural manipulations of younger-aged, second-growth forests. Certainly, such knowledge does not now exist. [hellip]If silviculture is used to expedite this process, it should be done with the understanding that such action is experimental, and results lie many decades or centuries in the future. Accordingly, management options that include retention of existing old growth must be given priority.

Hunter, 1989 cites the Society of American Foresters (1984, p. 17):

With present knowledge, it is not possible to create old-growth stands or markedly hasten the process by which nature creates them. Certain attributes, such as species composition and structural elements, could perhaps be developed or enhanced through silviculture, but we are not aware of any successful attempts. Old growth is a complex ecosystem, and lack of information makes the risk of failure high. In view of the time required, errors could be very costly. At least until substantial research can be completed, the best way to manage for old growth is to conserve an adequate supply of present stands and leave them alone.

Discussing old growth, Franklin and Spies, 1991 ask, [ldquo]How can we presume to maintain or re- create what we do not understand?[rdquo]

Thomas et al., 1988 state:

[hellip]Management plans for providing old growth must be based on existing stands because replacement stands cannot be produced by silvicultural practices; they must come from stands that are allowed to develop naturally into old growth.

USDA Forest Service, 1990 states:

In devising a conservation strategy, Forman and Godron (1981:738) emphasize the importance of recognizing that [ldquo]no patch stands alone[rdquo], but is influenced by surrounding patches. Harris (1984) recommended surrounding old-growth habitat islands with a long- rotation management area, and interconnecting these with riparian corridors and other linkages. Similarly, Noss and Harris (1986) suggest that a regional landscape level be used, wherein high-quality nodes, such as an old-growth patch, be integrated with interconnected [ldquo]multiple use modules[rdquo] where management activities are scheduled to maintain the integrity of the nodes.

[hellip]Natural disturbance regimes such as fire often occur on a spatial scale larger than a landscape patch (Urban et al. 1987). Providing for well-distributed habitat patches with interconnections between habitat patches thus are necessary to maintain species diversity of the long term.

[hellip]A complex, multi-storied structure and a mosaic of both early and late successional stages often are important attributes (Bormann and Likens 1979).

Foster et al., 1996 state:

The maintenance of many natural ecosystems requires the protection not only of current old-growth areas, but also of naturally disturbed forests that represent future old-growth. To ensure the continued presence of old growth, these areas must be maintained within a landscape that is adequate in size to allow for the continuing mosaic of disturbance and for the dispersal of organisms and processes among patches.

USDA Forest Service, 1990: [ldquo]Roads are generally undesirable within and old-growth habitat patch. The road corridor fragments the habitat by creating edge, and access may result in loss of snags to woodcutting.[rdquo]

Marcot, et al., 1991 discuss landscape perspectives while melding in biological needs of wildlife:

What attributes of old growth affect the perpetuation of these old-growth wildlife species? Attributes may be characterized at stand and landscape scales.

[hellip]Landscape attributes affecting the perpetuation of old-growth dependent and associated wildlife include the spatial distribution of old growth; the size of stands; the presence of habitat corridors between old-growth or old-forest stands; proximity to other stands of various successional stages and especially for well-developed mature-forest stages and species with different seasonal uses of habitats; and the susceptibility of the old-growth habitat to catastrophic loss (such as wildfire, insects, disease, wind and ice storms, and volcanic eruptions.

Stand size, in combination with its landscape context (the condition, activities, or both on the adjacent landscape that affect the stand), is of major significance in perpetuating old- growth resources and can have a major effect on their use by wildlife. Wide-ranging species may be able to use stands of various structural-, size-, and age-classes. If such stands are separated by unsuitable habitat or disruptive activities, however, the remaining old-growth stands become smaller in effective (interior) size, more fragmented, and possibly not suitable for occupancy or for successful reproduction. An old-growth inventory that quantifies such stand and landscape attributes is a prerequisite for evaluating possible context and landscape effects on species[rsquo] presence.

The FS has failed to properly analyze and consider that forests, especially old growth, exhibit natural resiliency to wildland fire and climate change, provide climate refugia for associated wildlife and other organisms, and are significant stores of above-ground and below-ground carbon stores that would be harmed by logging. DeLuca, 2009 states, [ldquo]Old growth forests, having survived the fires, droughts, and insect and disease outbreaks of the past, have shown themselves to be resilient elements of the forest ecosystem. The diversity of species and tree sizes in old-growth forests makes them inherently resistant to dramatic change.[rdquo]

Many forests of this bioregion have locations with fire return intervals longer than the time it takes for forests to develop old-growth character. However, in landscapes where fire intervals may be shorter, [ldquo]fire refugia[rdquo] is a term referring to locations disturbed less frequently or less severely by wildfire than the surrounding landscape matrix. (Krawchuk et al., 2016; Camp et al., 1997; Meddens et al., 2018.

Fire refugia are more likely than the surrounding matrix to exhibit old-growth habitat characteristics. Camp et al. 1997 say [ldquo]Before Euro-American settlement, late-successional species and compositions were found within fire refugia-stands that burned less frequently than the surrounding matrix [hellip]by virtue of topographic position, soil type, or a combination of environmental conditions and vegetation attributes.[rdquo] The latter [ldquo]include areas adjacent to stream

confluences, on perched water tables, and within valley bottoms and headwalls, especially at higher elevations (higher total precipitation) and on northerly aspects (more terrain shading, less insolation and thus reduced evapotranspiration).[rdquo]

Ecologically, fire refugia [ldquo]provide habitat for individuals or populations in which they can survive fire, in which they can persist in the postfire environment, and from which they can disperse into the higher-severity landscape.[rdquo] (Meddens et al. 2018.)

The NPCNF has no management strategy to recognize[mdash]let alone conserve[mdash]fire refugia. This is a problem during wildfire suppression operations, when burnouts might even target these locations (Id., also see Zimmer, 2018).

The FS has failed to maintain a forestwide old-growth inventory consistent with its Forest Plan and has not conducted a landscape-scale analysis of these old-growth ecosystems, including cumulative effects from past, present, and foreseeable management actions in the project area and surrounding landscapes, considering cumulative effects on wildlife. We urge you to address these issues before making a final decision on Green Horse.

As of March 9, 2021 there was no wildlife specialist[rsquo]s report on the project website. There is an undated document entitled [ldquo]Green Horse EA: Wildlife Descriptions[rdquo] with no author identified, containing only generic non-analysis text. Here[rsquo]s a screenshot from the project website from March 9:

The FS has not conducted a genuine analysis of cumulative effects on old growth or old-growth associated wildlife. The agency has been increasing the pace of issuing timber sales in recent years. On October 23, 2019, on Facebook, the FS posted the following:

The following chart is based off of Region One annual timber sale numbers for the NPCNF:

Despite doubling timber production from 2010 to 2020, the FS still uses Bush et al. 2010 FIA analysis as its forestwide estimate of old growth. Since 2010, however, old-growth has been targeted for logging on the Nez Perce National Forest. Also the FS has determined the 2010 figures include areas that don[rsquo]t meet forest-plan old growth standards. Field visits in at least one project[mdash]Dutch Oven Vegetation Management Project[mdash]demonstrated inaccuracies with this number. The 2010 data are stale, as supported by the following projects that post-date Bush et al. 2010:

* Center Johnson: Approved logging in forest plan OG (final EA p. 46).
* Dutch Oven Vegetation Management Project: Also used the Bush et al. 2010 analysis to identify old growth, but upon field visits to only some of what Bush et al. 2010 identified, the Forest Service found on-the-ground that the area did not in fact have old- growth characteristics, and even that one unit had been harvested. (Final EA May 2017 pdf p.168).
* Windy Shingle: Used the Bush et al. 2010 analysis as a starting point and approved logging in areas the Forest Service identified as old growth. (Windy Shingle wildlife report, pdf pp. 7, 119).
* Iron Mountain: Cited same 12.9% figure from 2010 (EA pdf p. 76), and likely approved logging in old growth (EA pdf p. 79 and DN-FONSI).
* End of the World: Used the Bush et al. 2010 analysis and proposed logging in [ldquo]mature or overmature trees.[rdquo] (See USDA Forest Service 2019, Nez Perce-Clearwater National Forest End of the World Environmental Assessment and draft Finding of No Significant Impact and accompanying Wildlife Report); [ldquo]754 acres [hellip]converted through regeneration harvest[rdquo] (EA)
* Hungry Ridge: Proposed action to log in MA20 with a forest plan amendment, with up to 826 acres of forest-plan old growth (DEIS pdf p. 29).

Furthermore, each of the FIA plots have been re-visited since the 2010 report, as standard FIA procedure. The FS has not done analysis of updated FIA information.

The project website document, [ldquo]Old Growth Summary[rdquo] includes a [ldquo]measurement date[rdquo] for each stand it lists. Each date falls within August, 2016. The document does not explain the kind of [ldquo]measurement[rdquo] or survey conducted, nor its intensity if the sampling occurred within the stands. It seems to suggest that for most stands, there were only three plots. The reliability of the conclusion of whether or not the stand is old growth is probably low if only three plots are used for a 21-acre stand, for example. It is also not clear if the stands listed are only those proposed for logging at any point of the project design process, or if it represents an inventory of old growth considering the conditions of each and every stand in the project area.

The above timber sales represent cumulative effects on old growth that the agency has ignored and failed to consider or discuss under its duties under NEPA. As such, this is a failure to disclose high quality information to the public and a failure to take a hard look at cumulative impacts. Failing to address this issue is also a failure to demonstrate that the FS is complying with the forest-plan minimums for old growth, in violation of NFMA.

Even if logging retains some large-diameter trees, other old-growth characteristics are reduced by logging, including snags and large downed woody debris. Old growth is an ecological

community resulting from decades of natural processes, and the legacies from fire and insects remain in the form of dead and dying trees that create habitat for species.

Appendix N of the Forest Plan requires the FS to identify old growth stands by using three strategies in tandem: stand exam information, aerial photos, and field reconnaissance. Without verifying this old growth with on-the-ground surveys, there is no guarantee that the old growth the agency assumes is there is really there.

The FS has not evaluated and ranked the old growth or has considered scientific information on the importance of patch size needed by the wildlife that depends upon old growth. There is no evidence that this agency has evaluated and ranked all project area old growth as required by Appendix N of the Forest Plan. We incorporate the Declaration provided by Gary Macfarlane that includes examples where the FS has followed these forest plan procedures in the past.

Without evaluating and ranking, the agency has no way of knowing whether it is saving the best quality habitat for the species dependent upon this habitat. Without evaluating and ranking all

old growth in the project area, the FS cannot demonstrate it is complying with its own forest plan. Because the agency has not followed its own forest plan, it cannot conclude whether it is eliminating the highest quality old-growth habitat, which is a failure to take a hard look at a project.

Lesica (1996) believes that the Forest Plan[rsquo]s reliance upon a 10% old-growth Standard could result in extirpation (i.e., loss of viability) of some species. This is based on an estimate of 20- 50% of low and many mid-elevation forests being in old-growth condition prior to European settlement: [ldquo][ldquo]Results of this study and numerous fire-history studies suggest that old growth occupied 20-50% of many pre-settlement forest ecosystems in the Northern Rockies.[rdquo] (Emphasis added.) This should be considered some of the best science on historic range of old growth necessary for insuring viability of old-growth associated species.

The Forest Plan and its FEIS cite no scientific basis for the forestwide 10% standard[mdash]an assumption that maintaining 10% would accomplish the task of meeting NFMA requirements for viability while the Forest is simultaneously being managed for high rates of timber production.

One might assume the 10% minimum would resemble historic amounts in this Forest, prior to EuroAmerican exploitation, so that maintaining the minimum would safeguard wildlife populations so they wouldn[rsquo]t vanish from the Forest or need listing under the ESA. But estimates of the amount of existing old growth prior to EuroAmerican management are not reliable, because so much forest had been logged long before adoption of old-growth definitions. This is demonstrated in Forest Service statements responding to requests for data on presettlement amounts of old growth. For example, the December 2019 Environmental Assessment (EA) for the Black Ram timber sale, Kootenai National Forest states:

Regarding the historic range of variability of old growth in the analysis area, there is no way to accurately determine how much of the Forest may have met the Green definitions of old growth (Green et al., 1992). To determine whether a forest stand meets those definitions, it requires detailed information on how many trees per acre exist in the stand over a certain diameter and age, the total stand density, the forest type and lastly, the

habitat type group that the stand occupies. No historical information exists that can provide that level of detail. Therefore, a numeric desired condition or an HRV estimate for old growth is not included in this analysis. (Emphases added.)

Similarly, the Northern Region[rsquo]s Bollenbacher and Hahn, 2008g state, [ldquo]actual estimates for the amount of OG are constrained by the limited field inventory data collected before the 1930s, and inconsistent[mdash]or absent[mdash]OG definitions.[rdquo]

Gautreaux, 1999 states:

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

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

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

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

Lesica found an estimated 18% of the cool lodgepole pine sites was in an old growth structural stage (>200 years) prior to European settlement, approximately the mid 1800's.

[hellip] This same research in Fire Group 8 in drier, lower subalpine types of Montana had over 25% of the stands in an old growth structural stage during the same historical period.

Bollenbacher and Hahn, 2008 under [ldquo]Defining Old Growth[rdquo] state: [ldquo]There are no specific criteria for minimum patch size for OG in the Northern Region definitions[rdquo] but recognize [ldquo]There are, however, some Forest Land Management Plans that may include guidance for a minimum map unit for OG stands.[rdquo] As Forest Plan Appendix N indicates, the Nez Perce NF has one of those Plans with minimum old-growth stand size requirements. Despite that, Bollenbacher and Hahn, 2008 try to make a case for smaller minimum stand sizes, saying [ldquo]The regional vegetation minimum map unit of 5 acres for a stand polygon would be a reasonable lower limit for all vegetation classes of forest vegetation including OG stands.[rdquo] No biological science is cited in support. Clearly, whether the FS is using a [frac14]-acre, one-acre, or five-acre minimum, none conform to the Forest Plan old-growth minimum stand size criteria. Furthermore, it would be ludicrous to propose that any old-growth associated MIS, Sensitive, or ESA-listed species could survive on even a five-acre old-growth stand[mdash]there is no scientific evidence to support such a premise.

Appendix N states:

Old-growth stand refers to a stand of timber that, generally, meets the following criteria:

1.

1. At least 15 trees per acre > 21 inches diameter at breast height (DBH). Providing trees of this size in the lodgepole pine and sub-alpine fir stands may not be possible.
2. Two or more canopy layers.
3. At least .5 snags per acre > 21 inches DBH and at least 40 feet tall.
4. Signs of rot and decadence present.
5. Overstory canopy closure of 10-40 percent; understory canopy closure of at least 40 percent; total canopy closure at least 70 percent.
6. Logs on the ground.

Forest Plan Appendix N recognizes:

Where available, stands should be at least 300 acres. Next best would be a core block of 150 acres with the remaining blocks of no less than 50 acres and no more than 1/2 mile away. If existing old-growth blocks are less than 100 acres, the stands between the old- growth blocks should be designated old growth replacement. The entire unit consisting of old-growth blocks and replacement old growth should be managed as an old-growth complex. If the old-growth component is less than 50 percent of the complex, the complex should be considered replacement old growth. Within the old-growth complex, only the stands that meet old-growth criteria will be counted toward meeting the allocation for existing old growth. The replacement stands will be counted toward meeting the allocation for replacement old growth.

Since the designation of replacement old growth carries no administrative weight and encompasses stands with dubious old-growth characteristics, there is no reason to presume that such designation will actually lead to these stands evolving into old growth. It is clear that the replacement designation is merely a bookkeeping device, and has little relevance to Forest Plan viability requirements except to indicate that these stands may be good candidates for old growth at some undefined point in the future. It is entirely conceivable that the FS could come out with another timber sale in the same area with an entirely different set of replacement old growth designations, and propose to cut within the current replacement old growth. Such a situation clearly does not provide for the habitat needs of old-growth dependent species as required by the Forest Plan.

Furthermore, the FS lacks any established way of maintaining a publicly accessible inventory of old growth, let alone [ldquo]recruitment[rdquo] old growth. The latter category need only meet very lax criteria, and as far as we[rsquo]re aware, in the three-plus decades of Forest Plan implementation there[rsquo]s no documentation of the FS ever designating [ldquo]recruitment[rdquo] old growth which has eventually/later fully met existing old growth criteria. The recruitment category is an empty promise to the public, to associated wildlife, and other old-growth values.

Harris, 1984 discusses habitat effectiveness of fragmented old growth:

(A) 200-acre (80 ha) circular old-growth stand would consist of nearly 75% buffer area and only 25% equilibrium area. [hellip]A circular stand would need to be about 7,000 acres (2,850 ha) in order to reduce the 600-foot buffer strip to 10% of the total area. It is important to note, however, that the surrounding buffer stand does not have to be old growth, but only tall enough and dense enough to prevent wind and light from entering below the canopy of the old-growth stand.

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

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

USDA Forest Service, 2004a states:

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

Effects of disturbance also vary at the landscape level. Conversion from one stand condition to another can be detrimental to some old growth associated species if amounts of their preferred habitat are at or near threshold levels or dominated by linear patch shapes and limited interconnectedness (Keller and Anderson 1992). Reducing the block sizes of many later-seral/structural stage patches can further fragment existing and future old growth habitat (Richards et al. 2002). Depending on landscape position and extent, harvest or fire can remove forested cover that provides habitat linkages that appear to be [ldquo]key components in metapopulation functioning[rdquo] for numerous species (Lidicker and Koenig 1996, Witmer et al. 1998).

The EA does not disclose the historical range of variability (HRV) for old-growth habitat on the Forest and in its failure to analyze cumulative effects it fails to disclose how much old growth has been destroyed or degraded in the Forest or Project Area. How much of the project area has been previously logged in the past? Even old regeneration units growing back for some decades contain less available standing snags and large down wood. And early-seral habitats represent conditions that are not suitable for use by some wildlife species due to the decrease of canopy cover.

The FS has not analyzed the wildlife viability implications of managing the Forest well outside the HRV for old growth, based upon the best available scientific information.

The FS doesn[rsquo]t disclose how the designated [ldquo]replacement[rdquo] old growth was determined to meet Forest Plan criteria. In any case, [ldquo]replacement old growth[rdquo] is pretty meaningless. The Forest Plan allows a very liberal interpretation that for such stands, they must be old growth within 100 years but includes no other species habitat component requirements.

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

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

The EA states, [ldquo]In Region 1, Old-growth Forest Types of the Northern Region (Green et al. 2007) is used as the best-available science for old growth in the region.[rdquo] However Jahn, 2012, who assists the FS in understanding the intention of Forest Plan Appendix N direction, notes that Thomas, et al., 1979 [ldquo]was considered the best science on the subject.[rdquo] The Thomas et al., 1979 definition of an old-growth stand is:

[hellip]a stand that is past full maturity and showing decadence; the last stage in forest succession; the USDA Forest Service[rsquo]s working definition for old-growth stands in the Blue Mountains is 37 live trees or more per hectare (15/acre) over 53-centimeter (21-in) d.b.h., 1.2 or more snags per hectare (0.5 snag/acre) over 53-centimeter (21-in) d.b.h., two or more canopy levels, heart rot and other signs of stand decadence present and obvious, overstory canopy closure of 10-40 percent, usually with a definite shrub-sapling layer with a canopy closure of over 40 percent, with understory and overstory canopy combined exceeding 70 percent, and logs obvious on the ground.

We note that definition is much more consistent with Appendix N criteria than is Green et al., 1992. The FS ignores an important difference between the Forest Plan Appendix N standards and the Green et al., 1992 criteria. Forest Plan Appendix N standards require [ldquo](a)t least 15 trees per acre greater than or equal to 21 inches diameter at breast height (DBH).[rdquo] For every forest type of the Green et al., 1992 criteria) the required minimum number of trees/acre is less, or the required

minimum diameter of large trees is lower[mdash]or both. Without disclosure or analysis, the FS is attempting brush off this significant difference.

To be sure, there are problems with Forest Plan Appendix N standards that ought to be dealt with by a forest plan amendment. But the problems are with the very foundation of the quantitative habitat standard. Forest Plan Appendix N standards state:

Minimum Requirements for Amount and Distribution of Old Growth. Current information indicates that, in order to maintain a viable population of old-growth- dependent species, it is necessary to maintain 10 percent of the total forested acres as old growth with no less than 5 percent of the forested acres maintained as old growth within each prescription watershed or combination of watersheds totalling 5,000 to 10,000 acres.

There is no scientific basis or cite for the [ldquo]Current information[rdquo] the Forest Plan is referring to. On the other hand, much scientific information indicates that 10% old growth forestwide is outside the range of reference conditions. For example, the NPCNF[rsquo]s Clear Creek FEIS Appendix G states:

The Nez Perce Clearwater Forest Plan Revision, Planning Set of Documents (2010) and the Analysis of the Management Situation (2003) summarize the following needs to maintain terrestrial sustainability and desired conditions.

*
* Increase the amount of [hellip]old growth forests;
* Increase patch size in the large size class and also old growth, decreasing fragmentation of these forests;

In the NPCNF[rsquo]s Clear Creek Project File document 111017WildlifeNFMACommentsMR.docx, the question, [ldquo]What do you want it to be? (Desired Conditions)...[rdquo] is answered, in part:

Management Indicator Species (MIS)

Fisher: In VRUs 7 and 17, assure 40+% of the landscape is available as contiguous forest patches large standing and down dead trees, connected by forested riparian habitats.

The availability of mature and older forest habitats, well-distributed within desired patch sizes and occupying 40%+ ...of upland landscape, would assure opportunities for full habitat occupancy for American marten, fisher, and breeding pairs of northern goshawk, pileated and black-backed woodpeckers.

The FS avoids designing a long-term strategy for old-growth associated wildlife species viability.

If the FS was interested in making its old-growth standards consistent with the best available science, it would undertake an amendment process that would increase its [ldquo]minimum7[rdquo] 10% standard (and the 5% distribution standard) up to a level within the natural range of variability, resembling reference conditions. Unfortunately, it looks as though the Nez Perce National Forest had its preferred [ldquo]expert[rdquo] weigh in on this topic: [ldquo]The Ranger has indicated he is not interested in increasing old growth, believing there is enough OG out there.[rdquo] (111017WildlifeClearCreekNFMAComments.docx)

Jahn, 2012 is a report commissioned by the NPCNF, apparently for helping them sort out the confusion concerning their own Forest Plan Appendix N direction for old growth. Jahn, 2012 states, [ldquo]At the time of the 1987 NPNF Plan, the work of Thomas and others8 was considered the best science on the subject.[rdquo] Jahn also states, [ldquo]there is little, if any, available documentation or evidence of forest planning interdisciplinary team deliberations that suggests the incorporation or use of any other old growth management research material.[rdquo]

We note that Thomas, et al., 1979 also provided the NPNF with no basis for setting the 10% forestwide old-growth minimum standard.

In using the Green et al. 1992 old-growth guidelines, the FS also ignores that R-1 did not use an independent scientific peer review process, as discussed by Yanishevsky, 1994:

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

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

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

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

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

The IPNF[rsquo]s 1987 Forest Plan also included standards for protection of old growth and associated wildlife (USDA Forest Service 1987c). 1987 Forest Plan Appendix 27 (USDA Forest Service, 1987d) provided other direction and biological information concerning old growth and old- growth associated wildlife species.

Likewise the Kootenai National Forest[rsquo]s 1987 Forest Plan included standards for protection of old growth and associated wildlife, along with Appendix 17 (USDA Forest Service 1987a, USDA Forest Service 1987b).

We incorporate USDA Forest Service, 1987a as well as USDA Forest Service, 1987b which contains a list of [ldquo]species [hellip](which) find optimum habitat in the [ldquo]old[rdquo] successional stage[hellip][rdquo] We also incorporate Kootenai National Forest, 1991 which states that [ldquo]we[rsquo]ve recognized its (old growth) importance for vegetative diversity and the maintenance of some wildlife species that depend on it for all or part of their habitat.[rdquo] USDA Forest Service 1987a, and USDA Forest Service 1987b also provides biological information concerning old growth and old-growth associated wildlife species.

The NPCNF has conducted no research or monitoring comparing pre- and post-logging old growth occupancy by or abundance of the wildlife species with strong biological association with habitat components found in old growth. Pfister et al., 2000 agree that the outcome of legitimate experimentation to help create old growth could only be known far into the future:

(T)here is the question of the appropriateness of management manipulation of old-growth stands[hellip] Opinions of well-qualified experts vary in this regard. As long term results from active management lie in the future [ndash] likely quite far in the future [ndash] considering such manipulation as appropriate and relatively certain to yield anticipated results is an informed

guess at best and, therefore, encompasses some unknown level of risk. In other words, producing [ldquo]old-growth[rdquo] habitat through active management is an untested hypothesis.

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

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

Science also does not support the notion that logging can protect old growth. Wales, et al. 2007 modeled various potential outcomes of fire and fuel management scenarios on the structure of forested habitats in northeast Oregon. They projected that the natural disturbance scenario resulted in the highest amounts of all types of medium and large tree forests combined and best emulated the Natural Range of Variability for medium and large tree forests by potential vegetation type after several decades.

The FS has not embraced wider old-growth values or ecological perspectives for recognizing old-growth landscapes or old-growth ecosystems. Both the Forest Plan definitions and Green et al., 1992 set forth the process whereby the agency identifies old growth by focusing on characteristics within stands or within patches consisting of multiple contiguous stands.

Kaufmann et al. 2007 identify limitations of this approach: [ldquo]The term [lsquo]stand[rsquo] may be more useful for management purposes than for describing the ecology of forests.[rdquo] They describe [ldquo]Old-growth forests or landscapes[rdquo] which:

[hellip]contain sufficient numbers of patches and stands of old growth to be reasonably representative of the forest type in historical times. However, portions of the landscape may be in various stages of development (even temporary openings or patches of very young trees) to provide future old-growth patches in the landscape. Landscapes vary in size, but are generally considered to be at least as large as major natural disturbances, such as fire.

Franklin and Spies, 1991 also warn against focusing too narrowly:

Our failure to study old-growth forests as ecosystems is increasingly serious in considerations of old-growth issues. Without adequate basic knowledge of the ecosystem, we risk losing track of its totality in our preoccupation with individual attributes or species. Definitional approaches to old growth based on attributes, including those that we have presented here, predispose us to such myopia. The values and services represented by old- growth ecosystems will be placed at ever greater risk if we perpetuate our current ignorance about these ecosystems. It will also increase doubts about our ability to manage for either old-growth ecosystems or individual attributes (for example, species and structures) associated with old growth. We must increase ecosystem understanding and management emphasis on holistic perspectives as we plan for replacement of old-growth forests.

Kaufmann et al. 2007 discuss the dynamics of old-growth landscapes:

The arrangement of patches[mdash]the landscape mosaic [mdash]is not constant over time. Rather, natural processes, such as fire, insect activity, disease, wind, regeneration of new seedlings, and competition among individual trees, interact to maintain a variety of conditions across the landscape. Just as the components of patches, stands, and landscapes vary spatially, so do the characteristics of ecological processes vary with time. A wind event may be as brief as a moment or as long as hours or days, fire an hour or a day or months, drought a season or a year or more, regeneration a year or decades or a century or more, and reaching an old- growth condition a matter of centuries. Under the influence of climate and fire, the patches in the mosaic changed with time, and in a fully functioning ecosystem, the old-growth forest landscape was maintained even though the locations and proportions of various patch types varied. And through all the changes of fire-adapted forests, fire remained a primary factor that, with some regularity, shaped the spatial arrangement of patches and stands in the landscape.

Marcot, et al., 1991 recommend integrating biological needs of wildlife across large landscapes to inform management policies, and also Green et al., 1992; acknowledge the need for considerations beyond mere stand-level attributes:

1. stand[rsquo]s landscape position may be as important, or more important than any stand old growth attribute. [hellip]Stands are elements in dynamic landscape. We need to have representatives of the full range of natural variation, and manage the landscape mosaic as a whole in order to maintain a healthy and diverse systems. (Emphases added.)

USDA Forest Service 1987d notes spatial and temporal diversity created by natural disturbance processes:

Episotic high and low mortality caused by fire, disease and insects are balanced by primary production. Borman and Likens (1979) describe this condition as a [ldquo]shifting-mosaic steady state.[rdquo] Over a large area the average condition (steady state) of the vegetation is a forest dominated by old-growth trees. Within the gross boundaries of the old-growth forest are found patches representing every successional stage. The location of these patches of seral vegetation shift over time, for as one stand passes from pole to mature to old-growth trees, another stand may be eliminated by an insect attack. Thus, within the gross boundaries of an old-growth ecosystem a mosaic of varying age class stands constantly shift internal boundaries. Traditional ideas about climax vegetation are not really appropriate, for seral species and a heterogeneous age class are important elements in this [ldquo]shifting mosaic steady state.[rdquo]

The Forest Service[rsquo]s 1989 [ldquo]Generic Definition and Description of Old Growth Forests[rdquo] (in Green, et al., 1992) states, [ldquo]Sporadic, low to moderate severity disturbances are an integral part of the internal dynamics of many old growth ecosystems. Canopy openings resulting from the death of overstory trees often give rise to patches of small trees, shrubs, and herbs in the understory.[rdquo] (Emphasis added.)

Hamilton, 1993 acknowledges that natural tree mortality is important for creating the very conditions that define old growth:

Tree deaths resulting in standing dead and down woody materials, plus some living trees with broken tops or rotting boles contribute to decadence, a necessary attribute of Old- growth. Decadent conditions in old-growth result in important snags, logs, and rotting trees that provide potential habitat for several species of birds and small mammals. Decadent conditions also indicate suitable habitat for certain plants which are not easily seen such as saprophytes and lichens which are not readily inventoried.

Franklin et al. 1987, state: [ldquo]Tree death also demonstrates some principles of ecological processes: the importance of defining the spatial and temporal context of a study, the importance of stochastic processes, the fact that most ecological processes are driven by multiple mechanisms and that the relative importance of these mechanisms changes in time and space, and the importance of species[rsquo] and ecosystems[rsquo] natural histories.[rdquo]

Bollenbacher and Hahn, 2008 recognize that [ldquo]OG stands, as well as various other forest conditions, have been influenced by landscape-level processes, such as fire (low-, mixed-, and high-severity), insect outbreaks, and disease. These processes result in a mosaic pattern of forest conditions across the landscape.[rdquo]

Rose et al., 2001 is scientific information on dead wood in forest ecosystems, which is a defining element of old growth. They make several good points, citing dozens of other scientific sources. Below, the internal citations are omitted for ease of reading:

* Decaying wood has become a major conservation issue in managed forest ecosystems. Of particular interest to wildlife scientists, foresters, and managers are the roles of wood decay in the diversity and distribution of native fauna, and ecosystem processes. Numerous wildlife functions are attributed to decaying wood as a source of food, nutrients, and cover for organisms at numerous trophic levels. Principles of long-term productivity and sustainable forestry include decaying wood as a key feature of productive and resilient ecosystems. (Internal cites omitted.)
* Inputs of decaying wood are crucial to most aspects of stream processes, such as channel morphology, hydrology, and nutrient cycling.
* Wood decay in forests of the Pacific Northwest has recently become a topic of renewed interest at national and global scales, regarding the role of terrestrial carbon storage in the reduction of atmospheric CO_2 (a greenhouse gas).
* New research over the past three decades has emphasized the significance of decaying wood to many fish and wildlife species, and to overall ecosystem function. The importance of decaying wood to ecosystem biodiversity, productivity, and sustainability is a keynote topic in two recent regional ecosystem assessments in Oregon and Washington. These, and other publications address both the specific roles of wood decay in ecosystem processes and functions, as well as ecological functions of wildlife species associated with wood decay.
* Interactions among wildlife, other organisms, and decaying wood substrates are essential to ecosystem processes and functions. In the process of meeting their needs, animals accomplish ecosystem work with respect to transformation of energy and cycling of nutrients in wood. For example, chipmunks and squirrels disperse mycorrhizal fungi which play key roles in nutrient cycling for tree growth; birds, bats, and shrews consume insects that decompose wood or feed on invertebrates and microbes; beavers and woodpeckers create habitats by modifying physical structures; arthropods build and aerate soil by decomposing wood material. Relations between wood decay and wildlife have been examined in several recent analyses.
* Managed forests, on average, have lower amounts of large down wood and snags than do natural forests.
* Emphasis on concepts of long-term productivity in this chapter reflects an underlying principle that habitat functions of decaying wood are inextricably linked to ecosystem processes. Careful attention to the whole ecosystem is a prerequisite to successful management of decaying wood for wildlife.
* Of the biological agents of wood decay, insects and fungi are the principal players in coniferous forest ecosystems.
* Down wood, snags, and live trees with decay serve vital roles in meeting the life history needs of wildlife

species in Oregon and Washington.
* Woodpeckers, sapsuckers, and nuthatches are highly specific in their selection of tree species for nesting and roosting, and this selectivity is attributed to the presence of decay fungi.
* To be useful to most cavity excavators, live trees usually must contain wood in a Class 2 stage of decomposition. For example, strong excavators, such as Williamson[rsquo]s sapsuckers, pileated woodpeckers, and black-backed woodpeckers, select trees with a sound exterior sapwood shell and decaying heartwood to excavate their nest cavities.
* Hollow trees larger than 20 inches (51 cm) in diameter at breast height (dbh) are the most valuable for denning, shelter, roosting, and hunting by a wide range of animals. Hollow chambers are used as dens by black bears, as night roosts by woodpeckers, and as dens, shelter, roosts, and hunting sites by a variety of animals, including flying squirrels, wood rats, bats, American marten, northern flickers and Vaux[rsquo]s swift.
* Hollow trees and down wood are formed from only a few tree species that can maintain bole structural integrity as the heartwood decays. Western redcedar is especially valuable in providing hollow trees because the decay-resistant sapwood remains structurally sound for centuries. In the Interior Columbia Basin, grand fir and western larch form the best hollow trees for wildlife uses.
* Broomed trees caused by mistletoe, rust, or needlecast fungi may remain alive for decades, and have attributes distinct from decay patches in live trees. Abundant forage is produced from mistletoe shoots and fruits. Regardless of the extent of decay, broom infections provide various habitat functions to wildlife depending on how and where they form along the bole. For example, mistletoe brooms form platforms used for nesting, roosting, and resting sites by owls, hawks, and song birds; roosting by grouse; and resting cover by squirrels, porcupines, and marten.
* The abundance of cavity-using species is directly related to the presence or absence of suitable cavity trees. Habitat suitability for cavity-users is influenced by the size (diameter and height), abundance, density, distribution, species, and decay characteristics of snags. In addition, the structural condition of surrounding vegetation determines foraging opportunities.
* Stumps provide a variety of wildlife habitats. Stumps with sloughing bark (Class 2) provide sites for bat roosts, and foraging sites for flickers, and downy, hairy and pileated woodpeckers. In openings, tall stumps with advanced decay (Class 3) provide nest sites for flickers, and subsequently for blue birds and other secondary cavity-nesters associated with openings. Squirrels and chipmunks also use stumps as lookouts and platforms for cone-shredding.
* Down Woody Material (logs). Down wood affords a diversity of habitat functions for wildlife, including foraging sites, hiding and thermal cover, denning, nesting, travel corridors, and vantage points for predator avoidance. Larger down wood (diameter and length) generally has more potential uses as wildlife habitat. Large diameter logs, especially hollow ones are used by vertebrates for hiding and denning structures. Bears forage for invertebrates in logs during summer and fall. Fishers use large logs to a limited degree as den sites.
* Lynx select dense patches of downed trees for denning. Jackstrawed piles of logs form a habitat matrix offering thermal cover, hiding cover, and hunting areas for species such as

marten, mink, cougar, lynx, fishers, and small mammals (Figure 8). Smaller logs benefit amphibians, reptiles, and mammals that use wood as escape cover and shelter. Small mammals use logs extensively as runways (Figure 9). California red-backed voles use Class 2-3 down logs for cover, and feed on fungi (especially truffles) and lichens growing in close association with down wood.

* The moist environment beneath loose bark, bark piles and in termite channels of logs with advanced decay provides a protected area for foraging by salamanders. The cool, moist environment of rotten wood may be required for some species of salamanders to survive heat stress during summer. Decaying wood also provides habitat for invertebrates on which salamanders and other foraging vertebrates feed (e.g., collembolans, isopods, millipedes, mites, earthworms, ants, beetles, flies, spiders and snails). The folding-door spider constructs a silk tube within the cracks and crevices of wood with advanced decay.
* Habitat structures in upper layers of the forest floor (soil, litter, duff) result from processes involving organic material (litter, decaying roots, vertebrate and invertebrate carrion, and fecal matter) and a diverse community of

organisms, including bacteria, fungi, algae, protozoa, nematodes, arthropods, earthworms, amphibians, reptiles, and small mammals. The complex trophic web supported by nutrient and moisture conditions within the litter and duff layers transforms plant material into a variety of degradation products, thereby storing and releasing nutrients within the ecosystem.

* Decaying wood forms many habitat structures in riparian forests. Accumulations of large wood on stream banks provide habitat for small mammals and birds that feed on stream biota, and provide structural diversity in streamside forests.

* The role of down wood in salmon habitat has received much attention over the past two decades. Large wood is a key component of salmonid habitat both as a structural element and as cover and refugia from high flows. Large wood serves key functions in channel morphology, as well as sediment and water routing. The importance of wood to salmon habitat varies from headwater to stream mouth. As stream order increases and gradient decreases in third- to fifth-order streams, down wood is a dominant channel-forming feature. Larger wood deflects water and increases hydraulic diversity, producing a range of pool conditions that serve as habitats for juvenile salmonids in summer. Diverse channel margins are a primary aspect of rearing habitat. Flow obstructions created by large wood provide foraging areas for young salmonid fry that are not yet able to swim in fast currents, and provide refugia to juvenile salmonids at high flow. In higher order streams, flow deflections created by large wood trap sediments and nutrients, and enhance the quality of gravels for spawning. Down wood is less of a channel-forming feature along large rivers, but defines meander cutoffs and provides cover and increased invertebrate productivity for juvenile salmonids.

* Processes that sustain the long-term productivity of ecosystems have become the centerpiece of new directives in ecosystem management and sustainable forestry. Given the key role of decaying wood in long-term productivity of forest ecosystems in the Pacific Northwest, the topic should remain of keen interest to scientists and managers during the coming decade. Below, we highlight functions of decaying wood directly linked to long-term productivity, including influences on the frequency and severity of disturbances such as fire, disease, and insect outbreaks.

* Nutrient Cycling and Soil Fertility. Decaying wood has been likened to a savings account for nutrients and organic matter, and has also been described as a short-term sink, but a long-term source of nutrients in forest ecosystems.

* Nutrient cycling via foliage and fine litter has been well-described. Substantial amounts of nitrogen are returned to the soil from coarse wood inputs, yet even where annual rates of wood input are high, 4 to 15 times more nitrogen is returned to the forest floor from foliage than from large wood. This is a consequence of the higher nutrient concentrations and shorter turnover times of leaf litter compared to wood. The relative contribution of large wood to the total nutrient pool in an ecosystem depends to a large extent, on the size of other organic pools in the system.

* The slow rate of nutrient release from decomposing wood may serve to synchronize nutrient release with nutritional demands in forests, and also to minimize nutrient losses via leaching to the ground water. In addition to nitrogen bound chemically within wood, down wood reduces nutrient losses from ecosystems by intercepting nutrients in litterfall and throughfall. Favorable temperature and moisture conditions also makes large decaying wood sites of significant nitrogen inputs via N-fixation.

* Soil is the foundation of the forest ecosystem. Large wood is a major source of humus and soil organic matter that improves soil development.

* Moisture Retention. Water stored in large decomposing wood accelerates microbial decay rates by stabilizing temperature and preventing desiccation during the summer.11, 160, 376 Moist conditions within the wood favor decay by attracting burrowing and tunneling mammals and invertebrates that improve aeration of wood, and by providing colonization substrate and moisture for mycorrhizae and other fungi. Moist .nurse logs. also provide excellent sites for seedling establishment and production of sporocarps. These processes increase retention and cycling of nutrients within ecosystems and contribute to higher biodiversity and biomass production.

* Mycorrhizae. Mycorrhiza, meaning fungus-root, is a symbiotic association of fungi with plant roots. The fungus improves nutrient and water availability to the host in exchange for energy derived from plant sugars. Mycorrhizae are necessary for the survival of numerous tree families, including pine, hemlock, spruce, true fir, Douglas-fir, larch, oak, and alder. Mycorrhizal associations are a source of nutrients to promote wood decay. By

the time a log reaches more advanced stages of decomposition (Class 3) fungal colonization leads to the accumulation of nutrients in hyphae, rhizomorphs and sporocarps, especially for ectomycorrhizal fungi, where >90% of the fungal activity is associated with organic material. Ectomycorrhizal fungi decrease the ratio of carbon to nitrogen in decomposing wood, and mediate nutrient availability to plants while improving nutrient retention by forest ecosystems.
* The energy derived from falling or flowing water is the driving force behind erosion processes in Pacific Northwest forests. By covering soil surfaces and dissipating energy in flowing and splashing water, logs and other forms of coarse wood significantly reduce erosion. Large trees lying along contours reduce erosion by forming a barrier to creeping and raveling soils, especially on steep terrain. Material deposited on the upslope side of fallen logs absorbs moisture and creates favorable substrates for plants that stabilize soil and reduce runoff.
* Stand Regeneration and Ecosystem Succession. Decomposing wood serves as a superior seed bed for some plants because of accumulated nutrients and water, accelerated soil

development, reduced erosion, and lower competition from mosses and herbs. In the Pacific Northwest, decaying wood influences forest succession by serving as nursery sites for shade-tolerant species such as western hemlock, the climax species in moist Douglas- fir habitat. Wood that covers the forest floor also modifies plant establishment by inhibiting plant growth, and by altering physical, microclimatic, and biological properties of the underlying soil. For example, elevated levels of nitrogen fixation in Ceanothus velutinus and red alder have been reported under old logs.

* Streams and Riparian Forests. Long-term productivity in streams and riparian areas is closely linked to nutrient inputs, to attributes of channel morphology, and to flow dynamics created by decaying wood. Small wood contributes to nutrient dynamics within streams and provides substrates to support biological activity by microorganisms, as well as invertebrates and other aquatic organisms. Much of the organic matter processed by the aquatic community originates in riparian forests and is stored as logs.
* Large wood is the principal factor determining the productivity of aquatic habitats in low- and mid-order forested streams. Large wood stabilizes small streams by dissipating energy, protecting streambanks, regulating the distribution and temporal stability of fast- water erosional areas and slow-water depositional sites, shaping channel morphology by routing sediment and water, and by providing substrate for biological activity. The influence of large wood on energy dissipation in streams influences virtually all aspects of ecological processes in aquatic environments, and is responsible for much of the habitat diversity in stream and riparian ecosystems. The stair-step gradients produced by wood in small stream basins supports higher productivity and greater habitat diversity than that found in even-gradient streams lacking wood structure.
* The input rates and average piece size of dead wood generally increase with stand age, although the amount of decaying wood can follow a U-shaped pattern if young forests inherit large amounts of decaying wood and live trees from preceding stands.346
* Insects and pathogens play a key role in maintaining diverse and productive forests by creating habitat and stimulating nutrient cycling
* Intensive forest management activities that have decreased the density of large snags in early forest successional stages (sapling/pole and small tree stages) may have had adverse impacts on the 61 associated wildlife species (Figure 12). Similarly, the lesser amount of large down wood in early forest successional stages may not provide as well for the 24 associated wildlife species. Such results suggest the continuing need for specific management guidelines to provide large standing and down dead wood in all successional stages.
* These silvicultural practices clearly altered the abundance and recruitment of large down wood and snags in managed forests of the Pacific Northwest, including:

1. Lower abundance of large diameter snags and down wood legacies in managed forests (and streams); e.g. lack of the U-shaped pattern; higher accumulation of smaller-diameter fuels in eastside forests.
2. Reduced recruitment and retention of large trees to provide future legacies.
3. Shorter mean residence time for down wood (i.e. faster decomposition as a function of reduced log diameter).

4. Altered species composition of forests (westside: more Douglas-fir, less western red cedar; eastside: less pine, more true fir species).

* Several major lessons have been learned in the period 1979-1999 that have tested critical assumptions of these earlier management advisory models:

* Calculations of numbers of snags required by woodpeckers based on assessing their biological potential. (that is, summing numbers of snags used per pair, accounting for unused snags, and extrapolating snag numbers based on population density) is a flawed technique. Empirical studies are suggesting that snag numbers in areas used and selected by some wildlife species are far higher than those calculated by this technique.
* Setting a goal of 40% of habitat capability for primary excavators, mainly woodpeckers, is likely to be insufficient for maintaining viable populations.
* Numbers and sizes (dbh) of snags used and selected by secondary cavity-nesters often exceed those of primary cavity excavators.
* Clumping of snags and down wood may be a natural pattern, and clumps may be selected by some species, so that providing only even distributions may be insufficient to meet all species needs.
* Other forms of decaying wood, including hollow trees, natural tree cavities, peeling bark, and dead parts of live trees, as well as fungi and mistletoe associated with wood decay, all provide resources for wildlife, and should be considered along with snags and down wood in management guidelines.
* The ecological roles played by wildlife associated with decaying wood extend well beyond those structures per se, and can be significant factors influencing community diversity and ecosystem processes.

* Furthermore, although the analysis of inventory data presents data on dead wood abundance, management actions at the local level may best be focused on the ecological processes that lead to development of these forest structures rather than on the abundance of structures themselves. Management decisions also may require information on the spatial distribution (landscape pattern) of dead wood, which cannot be estimated from sample-based inventories.
* If detailed data on the current and historical range of natural conditions is lacking (which is likely), it may be preferable to substitute functional target values for specific wildlife species. For example, to provide maximum habitat elements for specific cavity-nesting species, a designated quantity and distribution of snags
* Effective management of decaying wood must do more than simply provide for inputs of dead trees. Rather, management should strive to provide for diversity of tree species and size classes, in various stages of decay and in different locations and orientations within the stand and landscape.
* Green trees function as a refugium of biodiversity in forests. For example, many species of invertebrate fauna in soil, stem, and canopy habitats of old-growth forests do not disperse well, and thus, do not readily recolonize clear-cut areas. The same concept holds for many mycorrhizae-forming fungal species. Added benefits of green tree retention include moderated microclimates of the cutover area, which may increase seedling survival, reduce additional losses of biodiversity on stressed sites, and facilitate movement of organisms through cutover patches of the landscape.
* In situations where forest management objectives extend beyond wood production to broader biological and human values, intensive forestry practices by themselves may inadequately maintain or restore biodiversity, especially in early and late successional

forest development phases. Species, processes, and values associated with older stages of stand development (transition and shifting gap stages) are likely impaired or absent from intensively managed stands. Species and processes associated with the early establishment phase also have shorter duration than may occur naturally. This does not mean that intensive forest management practices are incompatible with multiple forest objectives at a landscape scale, but rather that species and processes associated with early and late stages of forest development should be assessed over large areas such as landscapes, subregions, and regions.

* Management for certain species must consider habitat requirements at different spatial and temporal scales. It

may then be possible to modify silvicultural practices at the stand scale to meet multiple objectives at landscape and larger scales. The landscape perspective also is pertinent to managing riparian systems, where the role of wood decay in riparian environments varies according to the type and geography of the associated water body.
* The decline of species associated with late-successional forest structures, as well as the prolonged time needed to produce wood legacies, suggests that it is both ecologically and economically advantageous to retain legacy structures across harvest cycles wherever possible, rather than attempt to restore structures that have been depleted. This is especially obvious for slow-growing tree species and very large wood structures. Retention of old- growth structural legacies has been identified as critical to conservation of biodiversity between large reserves and conservation areas.

We incorporate the discussion on old growth from FOC[rsquo]s comments on the Draft Forest Plan and EIS (pp. 134-156).

Remedies:
1. Choose the no-action alternative or drop the project; or
2. Re-analyze the impacts to old growth in a manner that addresses the issues raised above.

VIABILITY

At page 16 of FOC[rsquo]s scoping comments the importance of monitoring for compliance with the NFMA regulations[rsquo] viability provisions is discussed.

The Forest Plan requires the FS to [ldquo]Maintain viable populations of existing native and desirable non-native vertebrate wildlife species.[rdquo] The Forest Plan defines [ldquo]viable population[rdquo] as [ldquo]A population which has adequate numbers and dispersion of reproductive individuals to ensure the continued existence of the species population in the planning area.[rdquo]

Forest Plan Chapter V cites a [ldquo]NFMA Requirement 36 CFR 219.19(6)[rdquo] in regards to [ldquo]Actions, Effects, or Resources to be Measured: Population trends of indicator species[mdash]wildlife and fish.[rdquo]

36 CFR 219.19, as cited in the Forest Plan, states:

Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a

viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area.

The NPCNF[rsquo]s End Of The World Wildlife Specialists Report acknowledges:

The National Forest Management Act (NFMA), requires the Forest Service to manage fish and wildlife habitat [ldquo]to maintain viable populations of existing native and desired non- native vertebrate species in the planning area[rdquo] (36 CFR 219.19). Management indicator species (MIS) are designated as surrogates for other species with similar life histories or habitat requirements in order to assess the effects of management activities.

The Nez Perce Forest Plan includes a Goal to: [ldquo]Provide and maintain a diversity and quality of habitat to support viable populations of native and desirable non-native wildlife species.[rdquo]

The Forest Plan defines Indicator Species as [ldquo]Species identified in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.[rdquo] Indicator species are also known as Management Indicator Species (MIS). By including MIS population trend monitoring requirements in the Forest Plan, the FS acknowledged, wisely, that it needed to verify its assumption that allowing old-growth habitat to be reduced to 10% forestwide (a level well below the NRV)[mdash]assures viability of such species. The FS has failed to meet its MIS monitoring commitments. The FS has also failed to verify its minimum habitat old-growth MIS assumption.

Forest Plan Appendix N also explains the basis for the use of old-growth MIS as a proxy for viability of other species associated with old growth:

Old-growth indicator species are those species of wildlife that are dependent on or that find optimum habitat in old-growth stands for at least part of their life cycle. It is assumed that if the requirements of these species are met, the requirements of other old-growth associated species will be satisfied.

In other words, if viability is not being assured for the old-growth MIS, it is also not being assured for the Sensitive, Threatened, and Endangered species that fulfill important life history needs by utilizing key old-growth forest attributes.

MIS population trend monitoring is an important mechanism upon which the FS[rsquo]s forest plan management assumptions rely upon to insure old-growth associated wildlife viability. Without such trend data, the FS is unable to apply [ldquo]adaptive management[rdquo] to change its management of the forest plan habitat standards turn out to be insufficient for maintaining viability. Therefore the FS is also is unable to provide an adequate cumulative effects analysis of its management, as required by NEPA.

Specifically for MA 20 and MA 21, the Forest Plan states:

The monitoring requirements from Chapter V that are applicable to Management Area 20 are: 1d, 1e, 1f, 1h, 1i, 1j, 2a, 2d, 2g, 2h, 2i, 2j, 2k, 4, 5, 6, 7, 10, 11. The procedures outlined in Chapter V will be followed to evaluate the data gathered during monitoring.

The monitoring requirements from Chapter V that are applicable to Management Area 21 are: 1d, 1e, 1f, 1h, 1i, 1j, 2a, 2d, 2g, 2h, 2i, 2j, 2k, 4, 5, 6, 7, 10, 11. The procedures outlined in Chapter V will be followed to evaluate the data gathered during monitoring.

(Emphases added.) The FS has failed to adequately monitor population trends of old-growth MIS and other old-growth associated wildlife. The Committee of Scientists (1999) state:

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

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

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

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

USDA Forest Service, 1987d states:

Defining viable populations and assessing diversity are difficult tasks in the time frame of the Forest Plan. The wildlife and fisheries section of the Forest Service Handbook on Planning (FSH 1902.12) defines a viable population as one that [ldquo]consists of the number of individuals, adequately distributed throughout their range, sufficient to perpetuate their long-term existence in natural self-sustaining populations.[rdquo] Shaffer (1981) refines this definition by saying a minimum viable population is one that can withstand these environmental changes and have a 99 percent chance of surviving 1000 years. The terms

viable, minimum viable and threshold level are often used interchangeably in relation to population levels. I prefer to distinguish between viable and minimum viable populations and consider a minimum viable population as a population at the threshold level of viability. Above the threshold the population is viable, below it isn[rsquo]t.

Salwasser and Hanley (1980) also list five factors that largely determine population viability. These factors are:

1. population size and density;
2. reproductive potential;
3. dispersal capability
4. competitive capability; and
5. habitat characteristics.

(T)here are some wildlife species that are very sensitive to Forest activities and development such as timber sales, road construction, and oil, gas and mineral development. [hellip]Maintaining viable populations of these species will require special consideration. These species can be lumped into three categories:

1. endangered, threatened or sensitive species
2. old-growth dependent species; and
3. snag dependent species.

The FS says a viable population is one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. The FS must address issues consistent with best available scientific information, such as the [ldquo]estimated numbers[rdquo], minimum number of reproductive individuals of each species, and population dynamics.

Traill et al., 2010 and Reed et al., 2003 are published, peer-reviewed scientific articles discussing what constitutes a minimum viable population. The FS does not identify best available scientific information that provides scientifically sound, minimum viable populations for any species.

The fact that the Nez Perce NF has not monitored the population trends of its MIS as required by the Forest Plan bears more discussion. Considering potential difficulties of using population viability analysis at the project analysis area level (Ruggiero, et al., 1994a), the cumulative effects of carrying out multiple projects simultaneously across the Forest makes it imperative that population viability be assessed at least at the forest-wide scale (Marcot and Murphy, 1992). Also, temporal considerations of the impacts on wildlife population viability from implementing something with such long duration as a Forest Plan must be considered (Id.) but the FS has not done this either. It is also of paramount importance to monitor population trends (which the FS promised the public it would do during development of the Forest Plan) during Forest Plan implementation in order to validate assumptions used about long-term species persistence i.e., population viability (Marcot and Murphy, 1992; Lacy and Clark, 1993).

Schultz, 2010 criticizes Forest Service wildlife analyses based primarily upon habitat availability, because habitat alone is insufficient for understanding the status of populations. (See also Noon

et al., 2003; Committee of Scientists, 1999.). Schultz, 2010 recommendations call for peer review of large-scale assessments and project level management guidelines, and for adoption of robust, scientifically sound monitoring and measurable objectives and thresholds for maintaining viable populations of native species.

Mills, 1994 also criticizes the FS[rsquo]s use of the term [ldquo]viable[rdquo] while only referring to habitat characteristics while ignoring population dynamics. Population dynamics refers to persistence of a population over time[mdash]which is key to making predictions about population viability. Mills, 1994 explains the range of parameters that must be used to make a scientifically sound assessment of wildlife species viability, including assessing population size, population growth rate, and linkages to other populations. Ruggiero, et al. (1994a) also point out that a sound population viability analysis must utilize measures of population dynamics. The FS fails to consider best available science on population dynamics.

In the absence of meaningful thresholds of habitat loss and no monitoring of wildlife populations at the Forest level, projects will continue to degrade wildlife habitat across the Forest over time. (See also Schultz 2012.). The FS would never be able to detect the likelihood of complete extirpation of any wildlife species, using such methodology.

The FS relies upon Region-wide database analyses such as FIA or upon analyses by Samson to conclude that species viability is assured for various wildlife species of concern on the NPCNF. However, those reports have not been subject to scientific peer review and thus fail to meet the best available science standard. The Samson reports rely upon the databases of outdated, unreliable information as its quantitative source. The FS does not address the age and reliability of the data.

The FS tends to claim that population viability for some species (pileated woodpecker, goshawk, fisher and pine marten) has been addressed at the Regional level by Samson (2006b), who concluded well-distributed habitats exist in Region 1 and these habitats are present at levels well in excess of the amounts required to support minimum viable populations.

The FS fails to address the fact that Sampson[rsquo]s analyses are about as old as a Forest Plan was designed to last, and who knows how old the data are that he used in his analyses. Samson did not evaluate long-term viability for the fisher and marten, but he did do so for the goshawk, pileated woodpecker, flammulated owl and black-backed woodpecker. Sampson concluded that [ldquo]In regard to long-term viability, this conservation assessment has found that long-term habitat

conditions in terms of Representativeness, Redundancy, and Resiliency are [ldquo]low[rdquo] for all species.[rdquo]

The FS must explain Sampson[rsquo]s long-term viability conclusions. In his analysis, Sampson merely uses home range size for each species and makes assumptions of overlap in ranges of males and females. Home range size is then multiplied by the effective population size (ne- a number that includes young and non-breeding individuals - Allendorf and Ryman 2002) and this is projected as the amount of habitat required to maintain a minimal viable population in the short-term. This simplistic approach ignores a multitude of factors and makes no assumptions about habitat loss or change over time. For the fisher and marten, Samson uses a [ldquo]critical habitat threshold[rdquo] as calculated in another publication (Smallwood 2002).

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

Samson also admits that [ldquo]Methods to estimate canopy closure, forest structure, and dominant forest type may differ among the studies referred to in this assessment and from those used by the Forest Service to estimate these habitat characteristics[rdquo] and that [ldquo]FIA sample points affected within the prior 10 years by either timber harvest or fire are excluded in the estimates of habitat for the four species[rdquo] and finally that [ldquo]FIA does not adequately sample rare habitats[rdquo]. This especially concerning given the reliance on the FIA queries to identify suitable habitat and the fact that the data used in the analysis is now likely at least 20 years old. There have been more wildfires in this time frame, and more large timber sales.

Thus, the short-term viability analysis is scientifically unsound and it is very doubtful it could sustain scientific peer review. Schultz (2010) captured this sentiment in her critique: [ldquo]some interviewees also thought the work should be peer reviewed, especially if it was conducted by USFS management, and several were skeptical that it would survive such review.[rdquo]

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

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

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

Fragmentation also breaks the population into small subunits, each with dynamics different from the original contiguous population and each with a greater chance than the whole of local extinction from stochastic factors. Such fragmented populations are metapopulations,

in which the subunits are interconnected through patterns of gene flow, extinction, and recolonization (Gill 1978, Lande and Barrowclough 1987, Levins 1970).

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

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

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

U.S. Forest Service and Bureau of Land Management 1996 and 1997).

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

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

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

al. 1996). The benefit of this approach depends on the degree of risk from natural disturbances if left untreated.

Effects on old growth habitat and old growth associated species relate directly to [hellip] [ldquo]Landscape dynamics[mdash]Connectivity[rdquo]; and [hellip] [ldquo]Landscape dynamics[mdash]Seral/structural stage patch size and shapes.[rdquo]

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

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

(Id., internal citations omitted.) Harrison and Voller, 1998 further discuss these mechanisms: Linkages are mechanisms by which the principles of connectivity can be achieved.

Although the definitions of linkages vary, all imply that there are connections or movement among habitat patches. Corridor is another term commonly used to refer to a tool for maintaining connectivity. [hellip]the successful functioning of a corridor or linkage should be judged in terms of the connectivity among subpopulations and the maintenance of potential metapopulation processes. (Internal citations omitted.)

Harris, 1984 discusses connectivity and effective interior habitat of old-growth patches:

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

Harris, 1984 discusses habitat effectiveness of fragmented old growth:

(A) 200-acre (80 ha) circular old-growth stand would consist of nearly 75% buffer area and only 25% equilibrium area. [hellip]A circular stand would need to be about 7,000 acres (2,850 ha) in order to reduce the 600-foot buffer strip to 10% of the total area. It is important to note, however, that the surrounding buffer stand does not have to be old growth, but only tall enough and dense enough to prevent wind and light from entering below the canopy of the old-growth stand.

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

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

The FS fails to provide any analysis of this issue whatsoever. For the End Of The World Project, the Overview for Wildlife Specialist Report however, states:

[hellip]clearcut harvests have contributed to forest conditions and landscape patterns that differ from those that would have occurred in the absence of such actions. [hellip]Early- and late- successional forest stages have been reduced in extent and diversity of patch size.
Movement corridors and diversity of wildlife cover are less available. (Emphasis added.)

Remedy: Choose the No Action alternative. Otherwise, prepare an EIS to deal with the analysis deficiencies this objection identifies.

GRIZZLY BEAR

FOC[rsquo]s comments on the PA discuss the grizzly bear on p. 13. Please see our comments on the Draft Forest Plan and its Draft EIS, for a discussion of best available science on the grizzly bear. We also transmitted to the Forest Planning Team a March 11, 2021 letter as supplemental comments on the 2019 Draft Forest Plan / Draft EIS, specific to the grizzly bear. We fully incorporate those comment letters into this objection.

The grizzly bear is a Threatened species under the Endangered Species Act (ESA).

The Green Horse EA states, [ldquo]The grizzly bear is considered present on the Forest. The USFWS considers that such presence does not mean the area is considered occupied range, or that a project will automatically have significant effects (USFWS 2020). Therefore, the determination for the species in the Green Horse Project is No Effect to the grizzly bear.[rdquo] That is the only mention of the grizzly bear in the EA.

The FS demonstrates the FS[rsquo]s complete lack of a strategy and recognition of best available science for insuring a viable population of the grizzly bear. The FS has no strategy to provide habitat protections outside Recovery Zones (RZs) that would allow for a larger protected zone and/or natural augmentation from outside the RZs.

FOC submitted a July 17, 2020 request to the FS under the Freedom of Information Act (FOIA), seeking documents relating to all known grizzly bear sightings or grizzly presence on the NPCNF subsequent to October 30, 2013. We incorporate all the documents we received in response to that FOIA, within this objection.

Since there is solid documentation of recent and ongoing grizzly bear occupancy in the Nez Perce and Clearwater National Forests, grizzly bear residency should be considered permanent. Consultation on the 1987 Forest Plan is out of date. Formal consultation with the USFWS is needed in regards to this project.

Documents provided in response to the FOIA indicate a grizzly bear was confirmed in the White Bird area in 2019 and again in 2020, which means it likely denned in that vicinity. It was confirmed in the End Of The World project area of the NPNF[rsquo]s Salmon River Ranger District, which is not that far away from the Green Horse project area considering known movement patterns of grizzly bears[mdash]especially males. The FOIA documents also include photos of a grizzly bear near the project area in Newsome Creek.

We note the FS has failed to regulate black bear baiting in the NPCNF, allowing the state of Idaho to be the sole oversight agency of this unethical practice on the Forests. In 2007, a grizzly bear was shot and killed at a black bear baiting station in the Kelly Creek watershed in the Clearwater National Forest. Given that the grizzly bear[rsquo]s habitat on the Clearwater NF was lethal to the only confirmed occurrence for over half a century, it[rsquo]s clear that FS management is preventing the grizzly population from recovering. All of this triggers a duty for the federal agencies to re-consult and find a way to reduce or eliminate this take of grizzlies under the ESA.

It[rsquo]s well known that young female grizzly bears tend to establish home territories in close proximity to their mother[rsquo]s. Also, grizzly bears have a strong tendency to avoid highly roaded landscapes, which now effectively wall off the Bitterroot Ecosystem recovery area from known female grizzly home ranges in other Recovery Areas. In contrast to the BE and the Clearwater country, habitat for bears in other Recovery Areas is delineated by forest plans into Bear Management Units (BMUs) where total and open road densities are limited in order to reduce human caused bear mortality and increase habitat security.

So what would it take for the FS to institute BMUs and road density standards? In one of the documents received, the FS explains: [ldquo]Bear Management Units have not been developed for the BE however the Recovery Plan identifies delineation of BMUs as a future task once home range size and habitat use data are available (USFWS 1996). Such data in currently unavailable for the BE because of the lack of resident grizzly bears.[rdquo] Also, [ldquo]the definition of a population of grizzly bears (i.e. two or more reproductive females or one female reproducing during two separate years) in the Bitterroot Environmental Impact Statement (EIS) (Service 2000, pp. 3-14[ndash]15).[rdquo]

In other words, female grizzly bears would have to migrate into the BE across perilous, roaded landscapes, find a mate, have cubs, and wait for the federal agencies to acknowledge their existence, determine home range size and gather habitat use data[mdash]all in order to earn habitat protections provided in other Recovery Areas/Zones.

The EA[rsquo]s questioning of whether grizzly bears, recently confirmed in and around the Clearwater and Nez Perce National Forest, are [ldquo]residents[rdquo] is beside the point. Grizzly bear habitat quality is still potentially outstanding, but only if strong steps are taken to remove the human impediments to natural recovery. Recovery of the grizzly bear requires its population to grow and its range expand, especially anticipating the impending risks of climate change. We not believe the grizzly bear needs to leap high arbitrary agency-established hurdles before adequate habitat protections are established.

Squires et al. (2013) noted that long-term population recovery of lynx and other species such as the grizzly bear requires maintenance of short and long-distance connectivity. Effective connectivity is not provided for under the Forest Plan.

Carroll et al. (2001b) state:

[hellip] the 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.

The Analysis of the Management Situation Technical Report for Revision of the Kootenai and Idaho Panhandle Forest Plans states:

Direct mortality (related to access) from trapping, legal hunting, and illegal shooting has impacted all wide-ranging carnivores (e.g. lynx, wolverine, grizzly and black bears, wolves)[hellip]

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

In updating the consultation on forest plan impacts on grizzly bears, the FS should be identifying key habitat components for grizzly bears for prioritizing road density reductions (Proctor, et al., 2020) so populations can recover.

Proctor et al. (2017) is relevant to judging the trade-off between proposed [ldquo]treatments[rdquo] and habitat security for grizzlies, especially the hazards associated with road access.

Schwartz et al. (2010) noted that management for grizzly bears requires provisions for security areas and limits of road densities between security areas. Otherwise, grizzly bear mortality risks will be high as bears attempt to move across highly roaded landscapes to other security areas.

The forest plan lacks direction regarding road densities located outside of and between security areas.

The FS is aware of the best programmatic agency direction it has adopted to date, that

established in Flathead Forest Plan Amendment 19.9 It established Open Motorized Route Density (OMRD)/Total Motorized Route Density (TMRD)/Security Core indices. These are based upon the scientific information concerning security from roads and road density requirements for grizzly bears as found in Mace and Manley, 1993 and Mace et al., 1996. Also see McLellan and Shackleton, 1988.

We incorporate the documents, [ldquo]Brebner Flat reply brief filed 10.13.20[rdquo], [ldquo]ECOS Conservation Online System-grizzly bear[rdquo] and [ldquo]Species Profile for Grizzly bear (Ursus arctos horribilis)[rdquo] which explain why the FS[rsquo]s [ldquo]no effect[rdquo] determination is wrong, and contrary to law. The fact that the grizzly bear may occur in the project area is not adequately considered.

The FS must analyze the impacts of late-season snowmobile use on grizzly bear spring range.

The FS must analyze and disclose cumulative impacts on grizzly bears from human activities and habitat alternations on land of other ownerships.

Remedy: Choose the No Action Alterative. Otherwise, amend the forest plan to include scientifically established grizzly bear security measures and conduct formal consultation with the USFWS.

CANADA LYNX

FOC[rsquo]s comments on the PA at pp. 12 - 13 discuss Canada lynx. Also, please see our comments on the Draft Forest Plan and its Draft EIS, for a discussion of lynx and best available science (pp. 209-219).

The USFWS listed the Canada lynx as a [ldquo]Threatened[rdquo] species under the ESA in 2000 due to [ldquo]lack of guidance for conservation of lynx and snowshoe hare habitat...[rdquo] and subsequent authorization of actions that may cumulatively adversely affect the lynx.

FOC PA comments stated:

According to the 2002 Nez Perce National Forest Lynx Analysis Unit (LAU) map, ther are two LAUs in the project area[mdash]Fivemile and Lick. As such, the PA is in error regarding lynx habitat. Some of the cutting units in Horse Creek are within prime lynx habitat as is the unit at the head of Lick Creek. Thus, we question the accuracy of the PA.

The FS did not respond to this comment.

The EA states, [ldquo]No analysis is required for the Canada lynx as no habitat is present in the project area.[rdquo] However the FS doesn[rsquo]t say if surveys have been conducted. The Hungry Ridge FEIS states, [ldquo]Nez Perce National Forest is considered unoccupied, secondary habitat (Northern Rockies Lynx Amendment 2007).[rdquo] The Hungry Ridge FEIS identified that project area as

[ldquo]located within one lynx analysis unit (LAU3050602)[rdquo] and that the timber sale [ldquo][rsquo]may affect[rsquo] Canada Lynx.[rdquo]

The Proposed Action for the nearby End Of The World project acknowledges, [ldquo]There have been two documented sightings within the project area near Goodwin Meadow (2002) and Schwartz Meadow (2001) along the Grangeville Salmon Road.[rdquo] The End of the World project area is not so far from the Green Horse project area to preclude lynx from being here.

A big problem with the Forest Plan, including the Northern Rockies Lynx Management Direction (NRLMD) is that it allows with few exceptions the same level of industrial forest management activities that occurred prior to Canada lynx listing under the ESA. The FS approval and implementation of the NRLMD is arbitrary and capricious, violates NEPA[rsquo]s hard look requirement and scientific integrity mandate and fails to apply the best available science necessary to conserve lynx. For example, the NRLMD contains no protection or standard for conservation of winter lynx habitat (old growth forests).

The FS doesn[rsquo]t disclose if snowshoe hare occurrence is documented determined in the Green Horse project area.

More often than not, when the FS conducts logging projects in Lynx Analysis Units (LAUs), surveys of stands for lynx habitat result in less suitable habitat than previously assumed. The FS needs to step back and consider the likelihood that its range-wide Canada lynx suitable habitat estimations and assumptions for the NRLMD are too high.

Best available science demonstrates that lynx travel between areas of high hare densities but tend to avoid low cover areas in winter.

The FS doesn[rsquo]t analyze and disclose cumulative impacts of recreational activities on lynx, such as snowmobiles. As the Kootenai NF[rsquo]s Galton FEIS states, [ldquo]The temporal occurrence of forest uses such [hellip] winter (skiing and snowmobiling) [hellip] may result in a temporary displacement of lynx use of that area[hellip][rdquo]

The EA doesn[rsquo]t analyze and disclose the cumulative effects on Canada lynx from trapping or from use of the road and trail networks in the project area. The Hungry Ridge FEIS states, [ldquo]Road construction has impacted wildlife security, making [hellip]lynx [hellip]more vulnerable to hunting and trapping mortality. Additionally, the wide-spread availability and use of off-road vehicles has resulted in a reduction in wildlife security.

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 Feg. Reg. at 8617. The contiguous United States is at the southern edge of the boreal forest range, resulting in limited and patchy forests that can support snowshoe hare and lynx populations.

Lynx subsist primarily on a prey base of snowshoe hare, and survival is highly dependent upon snowshoe hare habitat, forest habitat where young trees and shrubs grow densely. In North America, the distribution and range of lynx is nearly [ldquo]coincident[rdquo] with that of snowshoe hares, and protection of snowshoe hares and their habitat is critical in lynx conservation strategies.

Squires et al. (2013) noted that long-term population recovery of lynx, as well as other species as the grizzly bear, require maintenance of short and long-distance connectivity. The importance of maintaining lynx linkage zones is also recognized by the FS's Lynx Conservation Assessment and Strategy (LCAS) which stresses that landscape connectivity should be maintained to allow for movement and dispersal of lynx.

Squires et al. (2013) noted in their research report that some lynx avoided crossing highways; in their own report, they noted that only 12 of 44 radio-tagged lynx with home ranges including 2- lane highways crossed them.

The current best science indicates that lynx winter foraging habitat is critical to lynx persistence (Squires et al. 2010), and that this habitat should be [ldquo]abundant and well-distributed across lynx habitat.[rdquo] (Squires et al. 2010; Squires 2009.) Existing clearcuts not yet recovered are likely to be avoided by lynx in the winter. (Squires et al. 2010; Squires et al. 2006a.)

Lynx winter habitat, provided only in older, multi-storied forests, is critical for lynx preservation. (Squires et al. 2010.) Winter is the most limiting season for lynx in terms of resource use; starvation mortality has been found to be the most common during winter and early spring. (Squires et al. 2010.) Prey availability for lynx is highest in the summer. (Squires et al. 2013.)

Openings, whether in uneven-aged management such as the proposed [ldquo]variable density thinning[rdquo] or with the proposed [ldquo]regeneration[rdquo] (aka clearcut or modified clearcut) logging, remove lynx winter travel habitat on those affected acres, since lynx avoid such openings. (Squires et al.

2010.)

Squires et al., 2010 reported that lynx winter habitat should be [ldquo]abundant and spatially well- distributed across the landscape.[rdquo] Those authors also note that in heavily managed landscapes, retention and recruitment of lynx habitat should be a priority.

The LCAS (Ruediger et al. 2000) recommends agencies retain future options until conclusive information is developed concerning lynx management; that is, err on the side of maintaining and restoring habitat for lynx and their prey. To err on the side of caution, the FS would retain all remaining stem exclusion forests for recruitment into lynx winter habitat, so that this key habitat would more closely resemble historic conditions.

The LCAS notes that lynx seemingly prefer to move through continuous forest (1-4); lynx have been observed to avoid large openings, either natural or created (1-4); opening and open forest areas wider than 650 feet may restrict lynx movement (2-3); large patches with low stem densities may be functionally similar to openings, and therefore lynx movement may be disrupted (2-4). Squires et al. 2006a reported that lynx tend to avoid sparse, open forests and forest stands dominated by small-diameter trees during the winter. Squires et al. 2010 again

reported that lynx avoid crossing clearcuts in the winter; they generally avoid forests composed of small diameter saplings in the winter; and forests that were mechanically thinned were generally avoided in the winter.

Squires et al. 2010 show that the average width of openings crossed by lynx in the winter was 383 feet, while the maximum width of crossed openings was 1240 feet.

And scientific findings since the Forest Plans were amended by the NRLMD call into question much of its direction. This creates a scientific controversy the FS fails to resolve, and in fact it essentially ignores it.

For one, Kosterman, 2014 found that 50% of lynx habitat must be mature undisturbed forest for it to be optimal lynx habitat where lynx can have reproductive success and no more than 15% of lynx habitat should be young clearcuts, i.e. trees under 4 inched dbh. Young regenerating forest should occur only on 10-15% of a female lynx home range, i.e. 10-15% of an LAU. This renders inadequate the agency[rsquo]s assumption in the Forest Plan/NRLMD that 30% of lynx habitat can be open, and that no specific amount of mature forest needs to be conserved. Kosterman, 2014 demonstrates that Forest Plan/NRLMD standards are not adequate for lynx viability and recovery.

Also, the Forest Plan essentially assumes that persistent effects of vegetation manipulations other than regeneration logging and some intermediate treatments are essentially nil. However, Holbrook, et al., 2018 [ldquo]used univariate analyses and hurdle regression models to evaluate the spatio-temporal factors influencing lynx use of treatments.[rdquo] Their analyses [ldquo]indicated [hellip]there was a consistent cost in that lynx use was low up to [sim]10 years after all silvicultural actions.[rdquo] (Emphasis added.) From their conclusions:

First, we demonstrated that lynx clearly use silviculture treatments, but there is a [sim]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 [sim]10 years (Homyack et al., 2007). Second, if a treatment is implemented, Canada lynx used thinnings at a faster rate post- treatment (e.g.,[sim]20 years posttreatment to reach 50% lynx use) than either selection or regeneration cuts (e.g., [sim]34[ndash]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 contradicts Forest Plan assumptions that clearcuts can be considered useful lynx habitat as early as 20 years post-logging.

Results of a study by Vanbianchi et al., 2017 also conflict with Forest Plan/NRLMD assumptions: [ldquo]Lynx used burned areas as early as 1 year postfire, which is much earlier than the 2[ndash]4 decades postfire previously thought for this predator.[rdquo] The NRLMD erroneously assumes clearcutting/regeneration logging have basically the same temporal effects as stand-replacing fire as far as lynx re-occupancy.

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

Remedy: Select the No Action Alternative. Alternatively, prepare an EIS which addresses the scientific and analytical deficiencies noted above.

OTHER WILDLIFE

FOC[rsquo]s comments on the PA at pp. 8 - 13 discuss old growth and old-growth associated wildlife. We incorporate the FOC/AWR comments on the Draft Forest Plan and its Draft EIS (pp. 227- 253 discuss these wildlife species) within this Objection.

Pileated Woodpecker
We incorporate the discussion on the pileated woodpecker from FOC[rsquo]s comments on the Draft Forest Plan and EIS (pp. 239-243).

The Green Horse EA states:

The pileated woodpecker was identified as a Nez Perce National Forest management indicator species for old growth forest and large snag habitat. Habitat estimates were derived from FIA data (The U.S. Forest Service[rsquo]s Forest Inventory and Analysis Program Bush and Lundberg 2008). The Nez Perce National Forest has approximately 299,667 acres of nesting habitat and 444,789 acres of foraging habitat well distributed to support pileated woodpeckers (Bush and Lundberg 2008).

The critique of the use of FIA data and analyses in our old growth section (above) applies here for similar reasons including use of stale data and invalid methodology.

The NPCNF[rsquo]s Lolo Insect & Disease EA 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).

We can[rsquo]t help but notice that the above habitat characteristics are the kind of features that the Green Horse Project is managing to suppress or prevent from developing.

There is no analysis in the EA that discloses the geographic and temporal cumulative effects of the FS[rsquo]s overall management strategy (basically tree farming), which is to suppress the natural processes that allow the development of decadent trees and snags which the pileated woodpecker rely upon. There is no reliable, up-to-date forestwide analysis of habitat, and forestwide population trends have not been monitored.

The EA discloses, [ldquo]The time frame for disturbed areas to recover to potential woodpecker nesting habitat is about 80-100 year.[rdquo] That ignores the fact that trees the size needed for nesting of this species likely won[rsquo]t develop in that time frame, as indicate by best available science.

The Ninth Circuit has stated the FS [ldquo]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.[rdquo] (Lands Council v. McNair).

Since the EA does not include a genuine cumulative effects analysis as required by NEPA, it is impossible to tell how much pileated woodpecker habitat has already been destroyed or degraded by logging, road building, and other management.

No estimates of snags for the project area are found in the EA. All the EA says is, [ldquo]Snag habitat would be retained according to Appendix N in the Forest Plan that requires an average of 1.4 snags/acre; with one snag per 10 acres greater than 20 inches DBH (document 11-004).[rdquo] There[rsquo]s no analysis whatsoever[mdash]qualitative or quantitative, direct, indirect, or cumulative. So the FS has no idea if conditions in the project area are adequate for supporting reproducing populations of pileated woodpeckers or other snag- and down log-dependent wildlife.

The EA doesn[rsquo]t disclose a scientifically sound strategy to insure viable populations of the pileated woodpecker. Bull et al. 2007 represents over 30 years of investigation into the effects of logging on the pileated woodpecker and is recent 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 cavity nesting wildlife.

The Idaho Panhandle NF[rsquo]s original Forest Plan old-growth standards (USDA Forest Service, 1987c) were largely built around the habitat needs of its indicator species, the pileated woodpecker. Very similar direction is found in the Clearwater Forest Plan, as cited above. Bull and Holthausen 1993, recommend 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[rdquo] dbh per acre
* Number of potential nesting trees >30[rdquo] dbh per acre
* Average DBH of potential nest trees larger than 20[rdquo] dbh
* Number of potential feeding sites per acre
* Average diameter of potential feeding sites

USDA Forest Service, 1990 states, [ldquo]To provide suitable pileated woodpecker habitat, strips should be at least 300 feet in width[hellip][rdquo]

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[rdquo]) dbh. The pileated woodpecker[rsquo]s strong preference for trees of very large diameter is not adequately considered in the Forest Plan. The EA provides no firm numerical commitment for leaving 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, [hellip]the mean dbh of these trees is 30 inches[hellip] 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[hellip] 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 [ldquo]programmed[rdquo] 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.

Recent scientific research reveals the inadequacy of Forest Plan snag retention guidelines. For one example, Lorenz et al., 2015 state:

Our findings suggest that higher densities of snags and other nest substrates should be provided for PCEs (primary cavity excavators) than generally recommended, because past research studies likely overestimated the abundance of suitable nest sites and underestimated the number of snags required to sustain PCE populations. Accordingly, the felling or removal of snags for any purpose, including commercial salvage logging and home firewood gathering, should not be permitted where conservation and management of PCEs or SCUs (secondary cavity users) is a concern (Scott 1978, Hutto 2006).

This means only the PCEs themselves (i.e., pileated woodpecker) have the ability to decide if a tree is suitable for excavating. This also means managers know little about how many snags per acre are needed to sustain populations of cavity nesting species. Lorenz et al., 2015 must be considered best available science to replace inadequate forest plan snag retention guidelines.

The FS[rsquo]s Vizcarra, 2017 notes that researchers [ldquo]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.[rdquo]

On the same subject, Hutto 2006, notes from the scientific literature: [ldquo]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).[rdquo]

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. These authors state:

Many species of birds are dependent on snags for nest sites, including 85 species of cavity- nesting birds in North America (Scott et al. 1977). Therefore, information of how many and what types of snags are required by cavity-nesting bird species is critical for wildlife biologists, silviculturists, and forest managers.

Researchers across many forest types have found that cavity-nesting birds utilize snags with large DBH and tall height for nest trees (Scott, 1978; Cunningham et al., 1980; Mannan et al., 1980; Raphael and White, 1984; Reynolds et al., 1985; Zarnowitz and Manuwal, 1985; Schreiber and deCalesta, 1992).

Spiering and Knight (2005) found the following.

Larger DBH and greater snag height were positively associated with the presence of a cavity, and advanced stages of decay and the presence of a broken top were negatively associated with the presence of a cavity. Snags in larger DBH size classes had more evidence of foraging than expected based on abundance.

Percent bark cover had little influence on the presence of a cavity. Therefore, larger and taller snags that are not heavily decayed are the most likely locations for cavity-nesting birds to excavate cavities.

The association of larger DBH and greater height of snags with cavities is consistent with other studies (Scott, 1978; Cunningham et al., 1980; Mannan et al., 1980; Raphael and White, 1984; Reynolds et al., 1985; Zarnowitz and Manuwal, 1985; Schreiber and deCalesta, 1992).

Spiering and Knight (2005) state that the [ldquo]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.[rdquo]

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 fails to quantify 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 EA also fails to quantify expected snag loss due to safety concerns, which varies with different methods of log removal.

Without any analysis, the FS merely assumes that management will result in snags and down logs in abundance to continuously support viable populations. No monitoring is cited to support claims of benefits to snag and down log-dependent species[rsquo] population numbers or distribution.

The FS has stated: [ldquo]Well distributed habitat is the amount and location of required habitat which assure that individuals from demes, distributed throughout the population[rsquo]s existing range, can interact. Habitat should be located so that genetic exchange among all demes is possible.[rdquo]

(Mealey, 1983.) That document also provides guidance as to how habitat for the pileated woodpecker must be distributed for populations to persist.

The EA fails 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.

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

Black-Backed Woodpecker

The EA doesn[rsquo]t state if this Sensitive native species is found in the project area, or if surveys have been conducted. The EA doesn[rsquo]t disclose the FS[rsquo]s strategy and best available science for insuring viable populations of the black-backed woodpecker. The EA states:

The area of analysis is the project area. It is large enough to provide habitat for the life- cycle of numerous breeding woodpecker pairs and their offspring. The woodpecker is an irruptive species that is attracted to recently burned habitats or outbreaks of wood-boring beetles (Dixon and Saab 2000). The time span of the bird[rsquo]s presence in a disturbed area may be up to eight years (Hoyt and Hannon 2002; Dudley et al. 2012).

Combined habitat for the woodpecker is around 1,100 acres.

The EA fails to explain why only 1,100 acres of the project area are considered for the black- backed woodpecker. This makes no sense, scientifically.

The EA states, [ldquo]The recent fires (Wash and Falls) would continue to provide habitat for the woodpecker for another 3-5 years.[rdquo] The total project area acreage of the two fires is 980 + 160 (EA at 30) so this is probably where the 1,100 acres is coming from. However this still makes no sense, as the science cited below indicates. In sum, black-backed woodpeckers use forest other than recently burned, and also logging of any mature forest reduces its potential value long-term as black-backed woodpecker habitat once a fire occurs. And since the project is part of a larger fire suppression regime, the logging of forest not recently burned acts to suppress natural processes from creating the black-backed woodpecker habitat.

FS biologists Hillis et al., 2002 note, [ldquo]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.[rdquo] Those researchers also state, [ldquo]The greatest concerns for this species, however, are decades of successful fire suppression and salvage logging targeted at recent bark beetle outbreaks.[rdquo] 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[rsquo] 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[rsquo]Neil et al. 2001). The species physically fragments standing and logs by its foraging and nesting behavior (Marcot 1997; O[rsquo]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[ndash]5 years after a fire. This species[rsquo] restricted diet renders it vulnerable to the effects of fire suppression and to post-fire salvage logging in its habitat (Dixon and Saab 2000).

[hellip] Black-backed woodpeckers are proposed as an MIS because of their association with high numbers of snags in disturbed forests, use of late-seral old forest conditions, and relationship with beetle outbreaks in the years immediately following fire or insect or disease outbreaks. Management activities, such as salvage logging, timber harvest, and firewood collection, can affect KEFs this species performs or KECs associated with this species, and therefore its role as an MIS would allow the Forest to monitor and evaluate the effects of management activities on identified forest communities and wildlife species. (Emphasis added.)

All the areas to be logged are potential habitat of the highest quality. All it takes is a fire. The areas logged before a fire would have far less habitat value to this species.

Current forest management policies serious implications for the black-backed woodpecker. Forestwide suppression of habitat conditions would eliminate population viability. The Wildlife Specialist Report for the nearby End Of The World timber sale explains, [ldquo]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.[rdquo] The Green Horse EA fails to quantify such impacts of this proposed timber sale[mdash]directly, indirectly, and cumulatively. Such failures to quantify and meaningfully analyze and disclose cumulative effects is pervasive throughout the analyses for all ESA-listed, MIS, and Sensitive species.

Hutto, 2006 addresses this subject; from the Abstract:

The bird species in western North America that are most restricted to, and therefore most dependent on, severely burned conifer forests during the first years following a fire event depend heavily on the abundant standing snags for perch sites, nest sites, and food resources. Thus, it is critical to develop and apply appropriate snag-management guidelines to implement postfire timber harvest operations in the same locations. Unfortunately, existing guidelines designed for green-tree forests cannot be applied to postfire salvage sales because the snag needs of snag-dependent species in burned forests are not at all similar to the snag needs of snag-dependent species in green-tree forests. Birds in burned forests have very different snag-retention needs from those cavity-nesting bird species that have served as the focus for the development of existing snag-management guidelines.

Specifically, many postfire specialists use standing dead trees not only for nesting purposes but for feeding purposes as well. Woodpeckers, in particular, specialize on wood-boring beetle larvae that are superabundant in fire-killed trees for several years following severe fire. Species such as the Black-backed Woodpecker (Picoides arcticus) are nearly restricted in their habitat distribution to severely burned forests. Moreover, existing postfire salvage- logging studies reveal that most postfire specialist species are completely absent from burned forests that have been (even partially) salvage logged. I call for the long-overdue development and use of more meaningful snag-retention guidelines for postfire specialists, and I note that the biology of the most fire-dependent bird species suggests that even a cursory attempt to meet their snag needs would preclude postfire salvage logging in those severely burned conifer forests wherein the maintenance of biological diversity is deemed important.

Hutto, 2008 cautions against the common practice of landscape scale thinning to [ldquo]restore[rdquo] forests to a condition thought to be more congruent with historical conditions:

Black-backed Woodpeckers [hellip]require burned forests that are densely stocked and have an abundance of large, thick-barked trees favored by wood-boring beetles (Hutto 1995, Saab and Dudley 1998, Saab et al. 2002, Russell et al. 2007, Vierling et al. 2008). Indeed, data collected from within a wide variety of burned forest types show that the probability of Black-backed Woodpecker occurrence decreases dramatically and incrementally as the intensity of traditional (pre-fire) harvest methods increases. (Emphases added.)

The Hutto, 2008 Abstract states:

I use data on the pattern of distribution of one bird species (Black-backed Woodpecker,

Picoides arcticus) as derived from 16,465 sample locations to show that, in western

Montana, this bird species is extremely specialized on severely burned forests. Such specialization has profound implications because it suggests that the severe fires we see burning in many forests in the Intermountain West are not entirely [ldquo]unnatural[rdquo] or [ldquo]unhealthy.[rdquo] 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.

Hutto, 2008 found a distribution of black-backed woodpeckers, which [ldquo]suggests that conditions created by severe fires probably represent the historical backdrop against which this species evolved.[rdquo] And, [ldquo][t]he desire to rid our forests of severe fire beyond the urban interface is, for many forest types, not well grounded in ecological science.[rdquo] Also see LeQuire 2009 and Odion et al. 2014.

Please see Hanson Declaration, 2016 for an explanation of what a cumulative impact is with regard to the backed woodpecker, how the FS failed apply the best available science in their analysis of impacts to black-backed woodpeckers for a timber sale, why FS[rsquo]s (including Samson[rsquo]s) reports are inaccurate and outdated, and why FS[rsquo]s reliance on them results in an improper minimization of adverse effects and cumulative impacts to black-backed woodpeckers with regard to the agency[rsquo]s population viability assessment.

The viability of the black-backed woodpecker is threatened by fire suppression and other [ldquo]forest health[rdquo] policies which specifically attempt to prevent its habitat from developing. [ldquo]Insect infestations and recent wildfire provide key nesting and foraging habitats[rdquo] for the black-backed woodpecker and [ldquo]populations are eruptive in response to these occurrences[rdquo] (Wisdom et al.

2000). A basic purpose of the FS[rsquo]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.

Hutto, 1995 states: [ldquo]Fires are clearly beneficial to numerous bird species, and are apparently necessary for some.[rdquo] (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[hellip]

[hellip]Several bird species seem to be relatively restricted in distribution to early post-fire conditions[hellip] I believe it would be difficult to find a forest-bird species more restricted to a single vegetation cover type in the northern Rockies than the Black-backed Woodpecker is to early [first 6 years] post-fire conditions. (Emphasis added).

USDA Forest Service 2011c states:

Hutto (2008), in a study of bird use of habitats burned in the 2003 fires in northwest Montana, found that within burned forests, there was one variable that exerts an influence that outstrips the influence of any other variable on the distribution of birds, and that is fire severity. Some species, including the black-backed woodpecker, were relatively abundant only in the high-severity patches. . Hutto[rsquo]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[rsquo]s Fire Science Brief, 2009, which states, [ldquo]Hutto found that Black-backed Woodpeckers fared best on sites unharvested before fire and poorest in the heavily harvested sites.[rdquo]

Hutto, 2008 states, [ldquo]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.[rdquo]

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 [lsquo]healthy[rsquo] 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.)

FS management emphasis continues to suppress this species[rsquo] habitat, as evident from the EA[rsquo]s Purpose and Need.

The black-backed woodpecker is a primary cavity nester, and also the closest thing to an MIS for species depending upon the process of wildland fire in the ecosystem. Cherry (1997) notes:

Woodpeckers play critical roles in the forest ecosystem. Woodpeckers are primary cavity nesters that excavate at least one cavity per year, thus making these sites available to secondary cavity nesters (which include many species of both birds and mammals). Black- backed and three-toed woodpeckers can play a large role in potential insect control. The

functional roles of these two woodpecker species could easily place them in the [lsquo]keystone[rsquo] species category[mdash]a species on which other species depend for their existence.

Wickman (1965) calculated that woodpeckers may eat up to 50 larvae per day that were each about 50 mm in length. The predation on these larvae is significant. It has been estimated that individual three-toed woodpeckers may consume thousands of beetle larvae per day, and insect outbreaks may attract a many-fold increase in woodpecker densities (Steeger et al. 1996). The ability of woodpeckers in to help control insect outbreaks may have previously been underestimated.

Cherry (1997) also notes:

Black-backed woodpeckers preferred foraging in trees of 34 cm (16.5 in) diameters breast height and (63 ft) 19 m height (Bull et al. 1986). Goggans et al. (1987) found the mean dbh of trees used for foraging was 37.5 cm (15 in) and the mean dbh of trees in the lodgepole pine stands used for foraging was 35 cm (14 in). Steeger et al. (1996) found that both

(black-backed and three-toed) woodpecker species fed in trees from 20-50 cm (8-20 in) dbh.

Black-backed woodpeckers excavate their own cavities in trees for nesting. Therefore, they are referred to as primary cavity nesters, and they play a critical role in excavating cavities that are later used by many other species of birds and mammals that do not excavate their own cavity (secondary cavity nesters). Black-backed woodpeckers peel bark away from the entrance hole and excavate a new cavity every year. Other woodpeckers sometimes take over their cavities (Goggans et al. 1987).

Also, FS biologists Goggans et al., 1989 studied black-backed woodpecker use of unburned stands in the Deschutes NF in Oregon. They discovered that the black-backed woodpeckers used unlogged forests more than cut stands. In other words, effects to the black-backed woodpecker accrue from logging forest habitat that has not been recently burned.

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[mdash] 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.

Bond et al., 2012a explain the need for a conservation strategy for the black-backed woodpecker:

In California, the Black-backed Woodpecker[rsquo]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[rsquo] 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 [ndash] both because pre-fire stand conditions affect the suitability of post-fire habitat for the species, and because a substantial proportion of California[rsquo]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 [ndash] recently burned forest [ndash] as well as appropriate management of [lsquo]green[rsquo] 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[rsquo]s 1970s study and 14% of the time in Nielsen-Pincus[rsquo]s study of the same general area in 2003- 2004.

The emphasis on stand thinning and salvage of dying trees is of a concern for the black-backed woodpecker (Hutto 2008, Dudley et al. 2012, and Tingley et al. 2014).

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

Northern Goshawk
We incorporate the discussion on the northern goshawk from FOC[rsquo]s comments on the Draft Forest Plan and EIS (pp. 250-253).

The northern goshawk is a Forest Plan MIS for old-growth forest habitat. The Green Horse EA states:

A 2005 survey of the frequency of northern goshawk presence in the Northern region found that based on a random sample (n=114) of 12,350 sampling units, goshawks were detected in 39% of available habitat in road-accessible areas in Region 1 (Kowalski 2005, Brewer et al. 2009). The results suggest that goshawks are relatively common and widely distributed in the managed portions of National Forest lands.

The FS is relying on stale data[mdash]at least 10 years old, perhaps more than 15 years old.

The EA states, [ldquo]Design features [hellip]for activities around an occupied goshawk nest would maintain a minimum 40-acre, yearlong no-treatment buffer, around a recently occupied goshawk nest tree.[rdquo] However there is no indication the FS has thoroughly searched for goshawk nest stands in the project area. Nothing in the EA indicates the FS has surveyed, or will survey for goshawks. It seems the agency could care less about the goshawk:

The project area is large enough to host two of such ranges for the raptor. [hellip] Two potential territories may be reduced to the point where there is not adequate habitat to support a nesting pair. However, each home range has habitat for displacement and other potential territories.

So the FS is obviously ignoring the design criteria it has just written.

The FS must utilize goshawk survey methodology consistent with the best available science. For example the recent and comprehensive protocol, [ldquo]Northern Goshawk Inventory and Monitoring Technical Guide[rdquo] 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.)

There is no discussion of the loss of goshawk habitat by road construction or use. The EA does not include a genuine cumulative effects analysis as required by NEPA, so it is impossible to tell how much goshawk habitat has already been destroyed or degraded by logging, road building, and other management.

Moser (2007) found that goshawk breeding home ranges in northern Idaho are much larger than other regions (mean of about 12,720 acres for males; 9,540 acres for females).

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 [ldquo]may be described as mature to overmature conifer forest with a closed canopy (75-85% cover)[hellip].[rdquo]

The FS fails to apply the best available science to describe the quantity and quality of habitat necessary to sustain the viability of the northern goshawk.

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

Pine Marten (American Marten)
We incorporate the discussion on the pine marten from FOC[rsquo]s comments on the Draft Forest Plan/Draft EIS (pp. 237-239).

[ldquo]The American marten was identified as a Nez Perce National Forest management indicator species for trapped species and old growth forest.[rdquo] (EA at 38).

The EA states, [ldquo]Timber harvest activities and temporary roads in marten habitat would reduce potential habitat by 15% across the project area. The total fragmentation of marten habitat would increase to 61% across the project area.[rdquo]

The EA states:

Upon project completion, fragmentation of marten habitat would have increased to 61%. This level is above the 40% of openings suggested by the researchers (Wasserman et al. 2012); the forest utilizes for modelled habitat. Such would likely be unfavorable for marten occurrence in most of the project area. Habitat is available in areas adjacent to the project area; and a displaced marten may move to such areas.

So the FS is saying to marten in the project area, tough luck[mdash]go elsewhere. Yet the EA fails to analyze habitat quality elsewhere, including in adjacent areas or forestwide. There[rsquo]s no genuine cumulative effects analysis. The Clearwater NF[rsquo]s White Pine project Wildlife Report acknowledges, however, [ldquo]Statewide trends for catch-per-unit-effort (measure of harvest per unit of time to predict population trends) have steadily declined from 2002 to 2012.[rdquo] Such information is not considered or disclosed in the EA.

The pine marten is a species whose habitat is significantly altered by thinning and other active forest management. (See Moriarty et al., 2016; Bull and Blumton, 1999; Hargis et al., 1999 and Wasserman et al., 2012).

Moriarty et al., 2016 found that the odds of detecting a marten was 1,200 times less likely in openings and almost 100 times less likely in areas treated to reduce fuels, compared to structurally-complex forest stands.

Ruggiero et al. 1994b recognize that for martens, [ldquo]trapper access is decreased, and de facto partial protection provided, by prohibitions of motorized travel.[rdquo] Despite the EA[rsquo]s admission that trapping is reason for the marten[rsquo]s selection as an MIS, such cumulative impacts are ignored.

Old growth allows martens to avoid predators, provides resting and denning places in coarse woody debris and large diameter trees, and allows for access under the snow surface. USDA Forest Service, 1990 reviewed research suggesting that martens prefer forest stands with greater than 40% tree canopy closure and rarely venture more than 150 feet from forest cover, particularly in winter. USDA Forest Service, 1990 also cites research suggesting that at least 50% of female marten home range should be maintained in mature or old growth forest. Also, consideration of habitat connectivity is essential to ensuring marten viability: [ldquo]To ensure that a viable population of marten is maintained across its range, suitable habitat for individual martens should be distributed geographically in a manner that allows interchange of individuals between habitat patches (Ibid.).

Ruggiero et al. 1994b recognize that for martens, [ldquo]trapper access is decreased, and de facto partial protection provided, by prohibitions of motorized travel.[rdquo]

The FS fails to apply the best available science to describe the quantity and quality of habitat that is necessary to sustain the viability of the pine marten.

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

Fisher
The fisher is a forest plan MIS for old-growth habitat. The Lolo Insects and Disease FEIS discloses, [ldquo]Fishers have a [hellip]state rank of S1 (critically imperiled) (Nature Serve 2017).[rdquo] Fisher populations in the Forest are genetically unique (see Schwartz 2007). As such, they take on even more importance from a conservation perspective.

The EA states:

Past events have affected potential fisher habitat. About 1,100 acres in the project area were burned from wildfires in the past decade. Not all habitat was lost, but the fires were large and consumed large patches of forest. Timber harvest in the past 40 years occurred in about 900 acres. Both the fires and harvests were analyzed as non-fisher habitat and were considered in the analysis for fragmentation.

The existing condition for the O[rsquo]Hara territory is 49.9% mature habitat and fragmentation at 5.1%. The Glover/Selway and Horse Creek territory is at 57.7% mature habitat and fragmentation at 5.8%. Each of the two territories contain habitat to support two females and one male territory each for a total of four females and two males.

The desired levels of habitat for a territory is 50% or greater of mature habitat, and fragmentation at or below 5% (Sauder & Rachlow 2015). In the existing condition, one

potential territory contains the desired mature habitat level, while the other does not, and both are above the suggested level of fragmentation.

So even before further clearcutting, the FS[rsquo]s own metrics for fisher habitat indicate the project area may already be unsuitable. The Green Horse timber sale would make things worse:

The O[rsquo]Hara subwatershed would experience a decrease in mature habitat to 49%, and an increase in fragmentation to 6.2%. The Glover-Selway and Horse Creek subwatersheds would see a drop in mature fisher habitat to 54%, and fragmentation would increase to 6.3%. Both territories would have an increase in fragmentation levels which means that increased open areas may alter or shift the fisher[rsquo]s movement patterns. This may affect foraging opportunities and avoidance of predators.

[ldquo]Forty years after the project is completed, mature forest would return to the affected areas, unless other disturbances (man-made or natural events) occur.[rdquo] What are the chances that the FS, under its current regime, would not come back multiple times to clearcut this same project area? Nil. This also ignores the fact that simple [ldquo]mature forest[rdquo] is itself insufficient for fisher habitat needs. For example, large down logs, which will be recruited at a significantly lower rate for at least a hundred years after clearcutting.

Starting with the relatively low numbers that the Nez Perce 2002 Monitoring report recognizes, cumulative impacts from trapping have been accumulating. Trapping is allowed on the Nez Perce-Clearwater National Forest. In response to an information request from Western Watersheds Project, Idaho Department of Fish and Game (IDFG) reported that traps set for wolves had caught 56 fisher (20 of which died in the traps) since 2012. See IDFG Non-target wolf trapping LICYEAR2013-2019 spreadsheet, accompanying this letter. The year that the FS drafted the assessment, in the 2013-2014 season, IDFG reported that 22 fisher were trapped that season, 10 of which died in traps. While the trappers reporting these numbers indicated the

balance were released, we don[rsquo]t know if trapping contributed to mortality shortly thereafter. Also, these are just the numbers reported, so we don[rsquo]t know if there were more unreported, either because trappers chose not to or did not check their traps. While we don[rsquo]t know where this trapping occurred, the FS has recognized that the NPCNF contains a lot of fisher habitat, so it follows that at least some of these numbers were likely from this Forest. Also, it is very reasonably foreseeable that trapping is going to increase for several reasons. For one, Idaho Fish and Game Commission extended the wolf trapping season, so active traps will exist longer on the landscape, and these season modifications impact parts of both the Nez Perce and Clearwater National Forests. See Idaho Fish and Game Commission (2020), compare with IDFG hunting units map (2020)[mdash]both accompanying this letter. The second reason is that trapping depends on access. As discussed above, roads create access for trappers, and in every alternative, logging levels are increasing, and to increase those logging levels the Forest Service will build roads, both temporary and permanent.

Starting with the relatively low numbers in the Nez Perce 2002 Monitoring report, habitat loss has cumulatively impacted fisher as well. The FS has increased logging on this Forest, with some of the highest amounts of timber sold over the last 20 years occurring in recent years. Many of these projects have eliminated and fragmented fisher habitat, with each individual project

claiming that it might impact fisher, but would not impact the species as a whole. Those projects, forestwide, have added up, and the FS must now account for them.

There is no cumulative effects analysis that considers the cumulative impacts of all nearby timber sales with the impacts from the Green Horse timber sale as it pertains to fisher or any other species, both in terms of number of acres of habitat altered or how the spatial aspect of altered habitat exacerbates habitat fragmentation.

[ldquo][S]pecies at the brink have been pushed to a critical conservation status because of human activities[hellip][rdquo] 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.

These impacts must be analyzed with the impacts of global warming to fisher. McKelvey and Buotte 2018.

When compared to the description of the habitat in which fishers thrive, one can see the FS[rsquo]s description of how to increase the health of tree stands by 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 does not have a pulse on the existing condition of the fisher in this area or anywhere on the forest, making any finding that there would be no significant impact unsupported. The EA fails to address fisher entirely, and according to a forest-plan-revision map, regeneration logging overlaps with fisher habitat that appears to be a habitat corridor. See USDA Forest Service 2019f. Isolating habitat by fragmenting it negatively impacts species. See Laurance 2008. Pulsford et al. 2015 describes the importance of habitat connectivity.

The FS apparently has no idea how much fisher habitat has been eliminated with projects over the last several decades. With this Objection we include time lapse imaging which demonstrate the cumulative impacts of logging and recent wildfire in since the mid-1980s on old-growth associated species such as the fisher and others. (See: Green Horse Timelapse [ndash] Google Earth Engine.) All the areas which show effects of heavy logging in the time span of the time lapse are still several decades away from providing suitable habitat for old-growth associated species.

Allen et al. (2021) found that fishers in their study scavenged more in the winter than in the summer, and hypothesize this is due to the season making them energetically stressed. This increases cumulative effects from trapping, particularly where baiting is allowed.

Jones and Garton, 1994 found that 54% of fisher use during the winter was in mature/old growth forest. More recently, scientific literature (Aubry et al. 2013, Olsen et al. 2014, Raley et al. 2012, Sauder 2014, Sauder and Rachlow 2014, Schwartz et al. 2013, Weir and Corbould 2010) suggest that fishers are heavily associated with older forests throughout the year.

Sauder, 2014 found that [ldquo]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[rdquo] (Sauder and Rachlow 2014).

Most studies have found that fishers are reluctant to stray from forest cover and that they prefer more mesic forests (Olson et al. 2014, Schwartz et al. 2013, Sauder 2014, Sauder and Rachlow 2014, Weir and Corbould 2010). Both Sauder and Rachlow (2014) and Weir and Corbould (2010) predicted the influence of openings on fisher habitat occupancy based on their data. For example, Weir and Corbould predicted that a 5% increase in forest openings would decrease the likelihood of fisher occupancy by 50%. Sauder and Rachlow (2014) suggested that an [ldquo]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 [ldquo]results from California where fisher home ranges, on average, contained < 5.0% open areas[rdquo] (Raley et al. 2012).

Sauder and Rachlow (2014) report the average home range size is approximately 12,200 acres and for a female fisher and approximately 24,300 acres for a male fisher. Home ranges generally do not overlap greatly for the individual sexes (21.3% for females and 15.3% for males), but male home ranges can overlap female home ranges. Preferred habitat would likely occur in upland areas and stands composed of cedar and grand fir forests (Schwartz et al. 2013).

This species needs large areas for recovery and most of the preferred habitat on the Nez Perce Clearwater National Forest that is preferred by this species has been target of historical and proposed timber management activities (Nez Perce Clearwater Forest Plan Revision Proposed Action). Sauder (2014) accurately portrays his concerns with this statement: [ldquo]Although these figures represent relatively large areas, taken in the context of the large forested landscapes that individual fishers require (male and female home ranges average 98.4 km2 and 49.3 km2, respectively; Sauder and Rachlow 2014), this does not constitute a surplus of habitat[rdquo]. Looking at potential population numbers it is a little easier to understand, why the species has been extirpated across much of its range. The literature (Sauder 2014) suggests that roadless areas will not be the salvation for this species, and that management guidelines are sorely needed in areas like the Green Horse project area, in order to assure species viability.

Sauder (2014) suggests that five national forests (Clearwater, Nez Perce, Coeur d[rsquo]Alene, Kaniksu, and Kootenai) hold the key to recovery of the species in the Northern Region. These Forests along with the St. Joe National Forest (Number 6 on the list) are currently being managed as three Forests (Nez Perce/Clearwater, Idaho Panhandle and the Kootenai). They include the Forests with the highest historical and proposed timber cuts in the Region and most of the existing and proposed harvest is scheduled in habitats preferred by fishers. On the Nez Perce-Clearwater Forests this area has been termed the [ldquo]Front Country[rdquo] and several large projects have been proposed for these areas (Slate Creek, Clear Creek, Lolo Creek, Orogande, French Larch, Johnson Bar, End Of The World, Doc Denny, etc.). The Nez Perce-Clearwater Forests have no idea on what the cumulative impact of all this activity will be on fishers.

As with most of the Sensitive wildlife, the EA fails to disclose the direct, indirect and cumulative impacts on important habitat components such as snags, logs, foraging habitat configuration, connectivity, cover, and impacts on predator and prey species.

The EA fails to include a quantitative cumulative effects analysis for fisher considering trapping and use of the road and trail networks in the project area. Hayes and Lewis, 2006 state [ldquo]The two most significant causes of the fisher[rsquo]s decline were over-trapping by commercial trappers and loss and fragmentation of low to mid-elevation late-successional forests.[rdquo] Hayes and Lewis, 2006 also present a science synthesis in the context of a recovery plan for fisher in the state of Washington. Hayes and Lewis, 2006 state:

Trapping reduced populations quickly. Despite decades of protection from harvest, fisher populations never recovered in Washington. Fishers use forest structures associated with late-successional forests, such as large live trees, snags and logs, for giving birth and raising their young, as well as for rest sites. Travel among den sites, rest sites, and foraging areas occurs under a dense forest canopy; large openings in the forest are avoided.

Commercial forestry removed the large trees, snags and logs that were important habitat features for fishers, and short harvest rotations (40-60 years) didn[rsquo]t allow for the replacement of these large tree structures. Clearcuts fragmented remaining fisher habitat and created impediments to dispersal, thus isolating fishers into smaller populations that increased their risk of extinction.

Wisdom et al. (2000) state:

Carnivorous mammals such as marten, fisher, lynx, and wolverine are vulnerable to over- trapping (Bailey and others 1986, Banci 1994, Coulter 1966, Fortin and Cantin 1994, Hodgman and others 1994, Hornocker and Hash 1981, Jones 1991, Parker and others 1983, Thompson 1994, Witmer and others 1998), and over-trapping can be facilitated by road access (Bailey and others 1986, Hodgman and others 1994, Terra-Berns and others 1997, Witmer and others 1998).

Ruggiero et al. 1994b state, [ldquo](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[rsquo]s existence in natural forest communities is valued by many Americans.[rdquo] Ruggiero et al. 1994b discuss fisher habitat disruption by human presence:

[hellip]The fisher[rsquo]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 [ldquo]wilderness[rdquo] as the wolverine (V. Banci, Chapter 5), the fisher is usually characterized as a species that avoids humans (Douglas and Strickland 1987; Powell 1993).

Also Jones, (undated) recognizes:

Roads are directly correlated with trapper access, and consequently, fisher vulnerability. Even in areas where fishers cannot be legally trapped, trapping pressure for other furbearers (i.e., marten) may contribute significantly to fisher mortality. Roads bisecting or adjacent to preferred habitats (i.e., drainage bottoms) have the greatest potential of increasing a trapper[rsquo]s probability of encountering fishers.[rdquo]

And Witmer et al., 1998 state, [ldquo]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).[rdquo]

Heinemeyer and Jones, 1994 state:

Fishers are susceptible to trapping, and are frequently caught in sets for other furbearers. Additionally, populations are vulnerable to trapping, as even light pressure may cause local extinction. Western fisher populations may have lower natality and higher natural mortality rates as compared to eastern populations. Consequently, western populations may be more susceptible to over-trapping. It has been suggested that incidental captures may limit population growth in some areas.

Jones and Garton, 1994 noted [ldquo]Fishers seemed to prefer large-diameter Engelmann spruce trees and hollow grand fir logs as resting sites in north-central Idaho (Jones 1991).[rdquo] The FS[rsquo]s silvicultural focus would reduce grand fir, a fact not reconciled in the analysis.

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

Rocky Mountain Elk
We incorporate the FOC/AWR comments on the Draft Forest Plan and its Draft EIS (see discussion on elk at pp. 219-227) within this Objection.

The EA identifies the elk as [ldquo]a management indicator species for commonly hunted big game species on the Nez Perce Forest.[rdquo]

The EA explains:

Four elk analysis areas (EAA) overlap the project area. Most of the habitat is elk summer habitat; however, two of the EAAs have some winter habitat that are Falls Creek (493 acres) and Island Creek (16 acres). (Id.)

The EA claims the FS [ldquo]is meeting the guidelines of Servheen et al. (1997) for three of the EAAs. The Island EAA is below the desired 75% EHE in the existing condition. Project activities would not reduce the EHE level.[rdquo] (Emphasis added.) The EA does not explain why the Island EAA is below the desired 75%, nor why the FS cannot act to meet the EHE. It also doesn't

explain how increasing opening percentages during the timber sale, as shown in Table 6, doesn[rsquo]t further reduce EHE in the Island EAA.

In addressing cumulative effects, the EA states, [ldquo]The foreseeable projects would remove or reduce the tree overstory, thereby creating a potential increase in forage for elk.[rdquo] In other words, other management actions are cumulatively portrayed as beneficial for elk. However the EA fails to provide any quantitative analysis of EHE in the four EAAs overlapping the project area, which might very well experience reduced EHE below what the Green Horse project would do.

Furthermore, the EA also fails to quantify cumulative elk vulnerability calculated at the Game Management Unit (GMU) scale.

Newly accessible roads and routes to be created for logging access would impact elk security. The FS[rsquo]s inability to effectively prevent motorized traffic behind roads is an issue. Moreover, it[rsquo]s not just hunters in season[mdash]it[rsquo]s poachers during every season. Also, even lawful hunters find easier travel on newly accessible routes. Although this is usually by walking, it is also increasingly by bicycle[mdash]even eBikes, which were not yet conceived for the Forest Plan EIS.

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

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

Optimum size for thermal cover on summer and spring-fall range is 12 to 24 ha (30 to 60 acres). Areas less than 12 ha (30 acres) are below the size required to provide necessary internal stand conditions and to accommodate the herd behavior of elk.

[hellip]Cover requirements on winter ranges must be considered separately and more carefully. Animals distributed over thousands of square miles in spring, summer and fall are forced by increasing snow depths at higher elevations to concentrate into much restricted, lower- elevation areas in mid- to late-winter. Winter range, because of its scarcity and intensity of use, is more sensitive to land management decisions.

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

Thomas et al., 1988a also state:

Thomas and others (1979, p. 104-127) defined two types of cover: thermal and hiding. Thermal cover was "any stand of coniferous trees 12 meters (40 ft) or more tall, with an average canopy closure exceeding 70 percent" (p. 114). Disproportionate use of such cover by elk was thought to be related to thermoregulation. Whether such thermoregulatory activity occurs or is significant has been argued (Geist 1982,Peek and others 1982). In the context of the model presented here, arguing about why elk show preference for such stands is pointless. They do exhibit a preference (Leckenby 1984; see Thomas 1979 for a review). As this habitat model is based on expressed preferences of elk, we continue to use that criterion as a tested habitat attribute. We cannot demonstrate that the observed preference is an expression of need, but we predict energy exchange advantages of such cover to elk (Parker and Robbins 1984). We consider it prudent to assume that preferred kinds of cover provide an advantage to the elk over nonpreferred or less preferred options.

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

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

The EA[rsquo]s analysis fails to fully demonstrate consistency with the forest plan, a NFMA violation. The lack of analysis also violates NEPA.

The Nez Perce Forest Plan sets a forest-wide standard to use Appendix B to assess the attainment of elk habitat objectives, which include formulas on elk habitat effectiveness. In complying with the forest plan, the FS must use Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho to manage for and to assess the attainment of summer elk habitat objectives in project evaluations (see Appendix B of Forest Plan). This appendix B contains worksheets identical to Servheen et al. 1997, which the EA identifies as analysis methodology. An excerpt

from [ldquo]Form 1[rdquo] of Servheen et al. is below, and this same excerpt can be found in the forest plan at Appendix B, p. 26:

We cannot see any such worksheets or analysis in the project website documents at the time this Objection is written.

There is also no disclosure (including mapping) of how the logging units will impact the size and distribution of hiding and thermal cover, the size and distribution of security areas, and the size and distribution of forage areas. Forest Plan Appendix B has a process and gives examples.

While there is a map of logging units, we didn[rsquo]t see one that overlays with the elk analysis units,

a map or overlay of an aerial photo that discusses, according to Appendix B, what is hiding cover, and there wasn[rsquo]t a discussion on how logging would fragment habitat for elk. Given that there

are so many 40+ acre openings, it is important to consider the spacing, and it is not clear to the public that the agency has done that.

Forestwide standard for wildlife requires using Appendix B to manage for and assess the attainment of summer elk habitat objectives. Appendix B of the forest plan requires accounting for cattle density in terms of how it impacts elk use. The EA states that cattle impacts are minimal, but again the way the EA comes up with numbers is not presented in any sort of math calculation, it[rsquo]s just a conclusion without analytical basis.

There is no analysis as to whether the FS is meeting its forest-wide goal on timber management lands (MA 12). The forest plan outlines the goal for managing 109,444 acres to achieve at least 75 percent habitat potential, 310,544 acres to achieve at least 50 percent habitat potential, and 114,225 acres to achieve at least 25 percent of habitat potential, and then directs the analyzers to Appendix B. There is nothing in the EA discussing whether this goal is being met. Given the uptick in projects in the recent years, assessing whether the agency is even close to attaining these goals is integral to a hard look at the environmental impacts as required by NEPA, as the disclosure to the public.

The EA fails to take a hard look at the impacts of the project required by NEPA, and fails to disclose a high level of information to the public (also required by NEPA).

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

Gray wolf
The EA doesn[rsquo]t disclose the FS[rsquo]s strategy and best available science for insuring viable populations of the gray wolf.

FOC transmitted to the Forest Planning Team a December 18, 2020 letter as supplemental comments on the 2019 Draft Forest Plan / Draft EIS, specific to the gray wolf. That comment letter responded to newly released documents, from which the public learned the extent of the slaughter of wolves sanctioned and facilitated by the Idaho Department of Fish and Game (IDFG) and the federal Wildlife Services, at least some of which happening on national forest lands. We fully incorporate that comment letter into this objection.

The various actions to kill wolves on national forest lands also impacts rare forest carnivores, the ecosystem, and public-land users who would rather experience seeing a wolf than have it killed. The FS has the authority and duty to protect the gray wolf, including creating protections and forest planning direction (amendment to the 1987 plan or in the revised forest plan.)

As indicated in the EA, IDFG claims that the elk population in the two Game Management Units (GMUs) have declined at least partially due to high predation. The EA states, [ldquo]Predator control is also mentioned, but this effort is outside of Forest[rsquo]s management. [hellip]The Idaho Department of

Fish & Game would determine management actions on the wolf.[rdquo] As discussed above, this is a cop-out and abrogation of management duties.

The EA claims, [ldquo]The proposed action would not affect wolf habitat.[rdquo] Then the EA contradicts that conclusion, for good biological reasons: [ldquo]Implementation of timber harvest operations (noise and movement by man and machine) may temporarily agitate or displace a wolf from the project area during periods of activity.[rdquo] And the EA admits that road access, to increase at least over the life of the project, would make it easier for wolf hunters/trappers: [ldquo]Wolves may benefit from road closures, as some hunters or trappers would not be willing to expend the energy to [lsquo]take[rsquo] a wolf that is a distance from their vehicle.[rdquo]

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

Wolverine
We incorporate the FOC/AWR comments on the Draft Forest Plan and its Draft EIS (see discussion on wolverines at pp. 189-193) within this Objection.

The EA doesn[rsquo]t disclose the FS[rsquo]s strategy for insuring viable populations of the wolverine. Wolverines in the project area or vicinity depend upon connectivity to other wolverines beyond the project vicinity to comprise a population of sufficient size to be viable. There is no viability analysis for NPCNF wolverines.

The EA at p. 26 states that wolverine habitat is found in the project area. The EA states:

The best available science shows that the factors affecting wolverine populations are not as significant as believed in 2013 when the U.S. Fish and Wildlife Service (Service) proposed to list the wolverine found in the contiguous United States as threatened. New research and analysis show that wolverine populations in the

American Northwest remain stable, and individuals are moving across the Canadian border in both directions and returning to former territories.

However, the EA improperly omits other information as best available science. The FS is ignoring much other scientific information and opinion. For example, from Lukacs et al. (2020), published after the USFWS[rsquo]s listing denial, the scientists conclude:

Relatively few data exist to provide a clear understanding of whether the population distribution or status, or effects of purported threats on distribution or demographics, place the species at risk. No population monitoring program exists that is commensurate with the large scale at which the wolverine population of the western United States operates. Given this lack of monitoring, significant changes to the population distribution or status could occur and go unnoticed for years. In addition, factors contributing to any such changes would not be discernable. (Emphasis added.)

We incorporate, within this Objection, the 60-day notice to sue under the ESA and the associated Complaint filed to challenge the USFWS[rsquo]s refusal to list the wolverine. FOC is party to that

litigation. Those filings discuss, among other points, the USFWS[rsquo]s arbitrary and capricious dismissal of other scientific information that must be considered as best available science.

The EA downplays the possibility of the Green Horse project area being important habitat for wolverine:

Potential habitat for the wolverine is now modelled as primary, maternal, and dispersal habitats (Inman et al. 2013). Primary and maternal habitats are considered as highly likely to be utilized by the species as important habitat for denning, reproduction, forage opportunities and rearing of young. Dispersal habitat is considered as transitory habitat; and is not providing the quality of attributes as mentioned for the other habitat types transitory habitat is present in the Green Horse project area. [hellip] Dispersal habitat is present within the entire the project area where all 2,260 acres of proposed treatments would occur.

However, Inman (2013) shows the NPCNF as largely primary habitat:The above is similar to a figure in the research cited by the EA (Inman, et al., 201) which actually shows much of the NPCNF is largely primary or maternal denning habitat:

Also, survey detection results from Lukacs et al. (2020) strongly suggest the NPCNF should be considered occupied habitat, as their Figure 2 map reveals (below).

The meaning of the EA[rsquo]s [ldquo]dispersal[rdquo] habitat is challenged based on Lukacs et al. (2020) detections of wolverines, and the studies by Inman (2013) and Inman et al. (2013).

Logging and road activities may affect wolverines; published, peer-reviewed research finds: [ldquo]Roaded and recently logged areas were negatively associated with female wolverines in summer.[rdquo] Fisher et al., 2013. The [ldquo]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.[rdquo] Id.

Wolverines use habitats ranging from Douglas-fir and lodgepole pine forest to subalpine whitebark pine forest (Copeland et al., 2007). Lofroth (1997) in a study in British Columbia, found that wolverines use habitats as diverse as tundra and old-growth forest. Wolverines are also known to use mid- to low-elevation Douglas-fir forests in the winter (USDA Forest Service, 1993).

Aubry, et al. 2007 note that wolverine range in the U.S. had contracted substantially by the mid- 1900s and that extirpations are likely due to human-caused mortality and low to nonexistent immigration rates.

May et al. (2006) cite: [ldquo]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).[rdquo]

Ruggiero, et al. (2007) state: [ldquo]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.[rdquo]

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 [ldquo]Over most of its distribution, the primary mortality factor for the wolverines is trapping.[rdquo] Scrafford et al., 2018: state, [ldquo]the 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).[rdquo] Also, Carroll et al. (2001b) state, [ldquo]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[ndash] 8%, lower than that documented in most studies of trapping mortality (Banci 1994, Weaver et al. 1996).[rdquo] And the Analysis of the Management Situation Technical Report for Revision of the Kootenai and Idaho Panhandle Forest Plans states, [ldquo]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)[hellip][rdquo] As with bear baiting and wolf trapping discussed elsewhere in this Objection, the FS has the authority to regulate such activities on national forest land. The agency is violating NEPA to pretend otherwise, and is short-changing the public owners of these forests by failing to act in our interest.

Ruggiero et al. (1994b) state, [ldquo]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.[rdquo]

Results from Scrafford et al., 2018:

[hellip]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.[rdquo]

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 [ndash] including roads (Krebs et al. 2007). Wolverine occurrence has shown a negative relationship with road densities greater than 2.8 mi/mi2 (1.7 km/km2) (Carroll et al. 2001b).

Krebs et al. (2007) state, [ldquo]Human use, including winter recreation and the presence of roads, reduced habitat value for wolverines in our studies.[rdquo]

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).

[hellip]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, [ldquo][hellip]the 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.[rdquo]

Wisdom et al. (2000) offered the following strategies:

* Provide large areas with low road density and minimal human disturbance for wolverine and lynx, especially where populations are known to occur. Manage human activities and road access to minimize human disturbance in areas of known populations.
* Manage wolverine and lynx in a metapopulation context, and provide adequate links among existing populations.
* Reduce human disturbances, particularly in areas with known or high potential for wolverine natal den sites (subalpine talus cirques).

The Analysis of the Management Situation Technical Report for Revision of the Kootenai and Idaho Panhandle Forest Plans states, [ldquo]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.[rdquo]

In regards to the 2013 memo from the Regional Office (USDA Forest Service, 2013c), we see that district-level specialists are not allowed to arrive at effects conclusions based upon their own expertise and judgment.

Moose
Moose are a management indicator species (MIS) according to the Forest Plan. The Proposed Action stated, [ldquo]General moose habitat (based on grand fir) was modelled, and about 6,650 acres were calculated in the Green Horse project area.[rdquo] The EA substantially reduced that estimate: [ldquo]Potential moose habitat in the project area is about 6,009 acres.[rdquo]

The Forest Plan Management Area 21 [ldquo]Description[rdquo] includes:

Management Area 21 consists of timber stands in timber productivity classes 3 and 4 that are old-growth, grand fir-Pacific yew vegetative communities that have been identified as moose winter range. These stands are generally located between the elevations of 4,000 to 6,000 feet on a variety of landtypes. These areas occur across the entire nonclassified portion of the Forest. These areas are key winter habitat for moose.

Management Area 21 Goals include:

Manage the grand fir-Pacific yew plant communities to provide for a continuing presence of Pacific yew [ldquo]suitable" for moose winter habitat.

We further discuss Forest Plan direction for MA 21 in the OLD GROWTH section of this objection, above, along with the failure of the EA to demonstrate consistency with it.

The Proposed Action states: [ldquo]There are approximately 1,818 acres of MA 21 within the project area and no treatments would impact this habitat.[rdquo] But since then the FS changed course, with the EA stating, [ldquo]Project activities in MA-21 are approximately 1.5 acres of regeneration harvest and one acre of intermediate harvest. No yew would be affected, if it is found it would be buffered from treatments (see Silvicultural Treatments section under the Proposed Action).[rdquo] Actually the EA is not so certain as far protecting Pacific yew/moose habitat, as it states, [ldquo]if Pacific yew is present in the understory, it would be considered for a retention clump or patch for wildlife[rdquo] (emphasis added).

The EA states, Fuels treatments are proposed in 294 acres, and timber harvest in proposed in another 1,250 acres.[rdquo] Also, [ldquo]Proposed activities would reduce general moose habitat by 25% in the project area.[rdquo] So the FS is proposing the cumulative destruction of about 25% of the moose[rsquo]s preferred habitat in the project area, along with providing more road access for poachers or other habitat disturbance. This is in the context of what the FS[rsquo]s Hungry Ridge Draft EIS admits, [ldquo]Based on harvest record and hunter reports, moose populations in the Clearwater Region are declining (Nadeau 2013).[rdquo] Other cumulative effects not properly analyzed, as the EA indicates: [ldquo]Past fires affected about 1,100 acres of moose habitat in the area. Most notably the eastern portion of the project area (about 800 acres) is fairly open from fire and timber events.[rdquo]

The FS makes management commitments for moose in the Forest Plan:

About 53,000 acres of old-growth grand fir/Pacific yew communities make up a significant portion of the moose winter range on the Forest. These communities will be managed under appropriate silvicultural prescriptions to maintain habitat for existing or slightly increased moose populations. Road access will be controlled during fall and winter to reduce harassment and poaching.

Pacific yew communities dominated primarily by old-growth grand fir constitute the majority of the winter range for moose on the Forest. Timber management and engineering must be coordinated with managing these winter ranges in order to maintain them as

suitable winter habitat. Access to these ranges must be controlled in order to reduce the current high level of poaching moose that occurs during the fall and winter months.

The EA does not demonstrate the FS is managing consistent with those Forest Plan commitments. Two other Forest Plan commitments the EA ignores are:

* Data Requirement: [ldquo]Moose Winter Range: Inventory, Update and Verify[rdquo] by 1990.
* Research Needs: [ldquo]Investigate the ecology of Pacific yew communities with emphasis on its response to silvicultural treatments and subsequent effects on Shiras moose.[rdquo]

A Forest Plan Standard requires the FS to [ldquo]Monitor population levels of all Management Indicator Species on the Forest. These include [hellip] moose[hellip][rdquo] The FS has failed to monitor population levels of moose on the Forest, which means that viability is not assured.

The Forest Plan[rsquo]s Summary of Analysis of the Management Situation states:

Pacific yew communities dominated primarily by old-growth grand fir constitute the majority of the winter range for moose on the Forest. Timber management and engineering must be coordinated with managing these winter ranges in order to maintain them as suitable winter habitat. Access to these ranges must be controlled in order to reduce the current high level of poaching moose that occurs during the fall and winter months.

The EA does not demonstrate how the project would be consistent with the MA 21 Standards: [ldquo]Close all but specifically-identified roads during the fall and winter[rdquo] and [ldquo]Meet established fishery/water quality objectives for all prescription watersheds as shown in Appendix A.[rdquo]

Despite the Forest Plan[rsquo]s emphasis on winter habitat (MA-21) for conserving moose populations, the FS states in its Hungry Ridge Wildlife Report: [ldquo]more recent research suggests summer forage quality and availability is the most limiting habitat factor impacting moose populations across northern Idaho today (Schrempp 2017).[rdquo] The EA fails to disclose this conclusion. The FS must address that issue programmatically, investigating cumulative effects on summer forage quality and availability so that conservation efforts for moose can reverse the above-noted population decline.

Habitat management guidelines that have been developed based on research (Pierce and Peek 1984). Also, Peek et al., 1997 guidelines are the best available science regarding this management indicator species. The guidelines suggest that no more than 45% of MA 21 should be in age classes younger than 90 years and that no more than 14% should be logged in any 30- year period. The FS doesn[rsquo]t demonstrate the project would meet the Peek et al., 1997 guidelines.

Peek et al., 1987 guidelines should also be considered on moose winter range outside of MA-21.

Studies of moose habitat on the NPNF have documented the importance of dense understories of Pacific yew stands under old-growth grand fir communities (Pierce and Peek 1984). The Forest Plan discloses that [ldquo]about 20 percent of the potential Pacific yew communities that provide

moose winter range has already been harvested without regard for managing Pacific yew.[rdquo] The Proposed Action states, [ldquo]Additional habitat may also be found in grand fir stands with a tree size of 15 inches or greater dbh.[rdquo] Despite the fact that grand fir in potential Pacific yew ecotones is important for moose, the Draft Forest Plan under revision identifies grand fir as an [ldquo]undesirable[rdquo] type of old growth and proposes to clearcut most of it. The EA does not consider this foreseeable impact.

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

FAILURE TO MONITOR AND PROPERLY ANALYZE CUMULATIVE EFFECTS

FOC[rsquo]s scoping letter at pp. 16 - 17 raises this issue of inadequate monitoring, along with its implications.

Failure to monitor is a continuing concern. Because of the systemic failure of the FS to do its monitoring duties and meet its monitoring commitments, the agency moves further and further away from any grasp of the degree of cumulative impacts its management actions are causing.

The Forest Plan includes a Standard requiring the FS to:

Monitor population levels of all Management Indicator Species on the Forest. These include bald eagle, grizzly bear, gray wolf, peregrine falcon, elk, moose, bighorn sheep, pileated woodpecker, goshawk, pine marten, fisher, westslope cutthroat trout, summer steelhead, and spring chinook. These species have been selected because[hellip] their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality. Population levels will be monitored and evaluated as described in the Forest Plan Monitoring Requirements (Chapter V of the Forest Plan).

The EA fails to demonstrate consistency with this Standard, and as well the EA does not even disclose anything about this FS monitoring failure.

The EA fails to integrate the results of past monitoring from other projects and as directed by the forest plan into the Green Horse project analysis. More importantly, the EA fails to analyze the implications of the fact that it has not conducted monitoring it has committed to, which means the agency decisionmakers lack information needed for an informed decision.

Monitoring is both a requirement of the Nez Perce Forest Plan and the high-quality information owed to the public and necessary for a hard look at the true impacts of the project. Without monitoring, the agency has violated NEPA because it hasn[rsquo]t examined, considered, or analyzed a true hard look at its analysis. Without monitoring, the agency hasn[rsquo]t disclosed the high quality information to the public, as NEPA also requires.

Monitoring helps define cause-and-effect relationships[mdash]it is how the FS is to ascertain whether the past projects were having (or avoiding) intended effects, as part of the agency[rsquo]s adaptive management philosophy and policies.

The Forest Plan itself is in total accord. Chapter V, which calls monitoring and evaluation the [ldquo]management control system[rdquo] for the forest plan, states the following:

Monitoring and evaluation entails comparing the end results being achieved to those projected in the Plan. Costs, outputs, and environmental effects, both experienced and projected, will be considered. To do this, a comparison will be made, on a sample basis, of overall progress in implementing the Plan as well as whether the overall relationships on which the Plan is based have changed over time. When changes occur, they will be evaluated as to their significance, and appropriate amendments or revisions made.

The goals for monitoring and evaluating this Forest Plan are to determine:

1. How well the Forest is meeting its planned goals and objectives;
2. If existing and emerging public issues and management concerns are being adequately addressed;

3. How closely the Forest Plan[rsquo]s management standards are being followed;
4. If outputs and services are being provided as predicted;
5. If the effects of implementing the Forest Plan are occurring as predicted, including significant changes in the productivity of the land;
6. If the dollar and manpower costs of implementing the Forest Plan are as predicted;
7. If implementing the Forest Plan is affecting the land, resources, and communities adjacent to or near the Forest;
8. If activities on nearby lands managed by other Federal or other governmental agencies, or under the jurisdiction of local governments, are affecting management of the Forest;
9. If research is needed to support the management of the Forest, beyond that identified in Chapter II of the Forest Plan; and
10. If there is a need to amend or revise the Forest Plan.

Nez Perce Forest Plan, Chapter V, p. 4-5. Surveying the existing condition without some kind of context and analysis (i.e., a prior condition before implementing a project or knowledge of a general comparison for specific projects in the same management areas across the forest) does not achieve the goals of monitoring. There is no comparison to pre-projects or some kind of general comparison between the before-and-after of projects in specific management areas

Nez Perce Forest Plan, Chapter V also states:

Project environmental analyses provide an essential source of information for Forest Plan monitoring. First, as project analyses are completed, new or emerging public issues or management concerns may be identified. Second, the management direction designed to facilitate achievement of the management area goals are validated by the project analyses. Third, the site-specific data collected for project environmental analyses serve as a check on the correctness of the land assignment. All of the information included in the project

environmental analyses is used in the monitoring process to determine when changes should be made in the Forest Plan.

It is vital that the results of past monitoring be incorporated into project analysis and planning. This means including in the analysis:

* A list of all past projects (completed or ongoing) implemented in the analysis area.
* A list of the monitoring commitments made in all previous NEPA documents covering the analysis area.
* The results of all that monitoring.
* A description of any monitoring, specified in those past project NEPA for the analysis area, which has yet to be gathered and/or reported.
* A summary of all monitoring of resources and conditions relevant to the proposal or analysis area as a part of the Forest Plan monitoring and evaluation effort.
* A cumulative effects analysis which includes the results from the monitoring required by the Forest Plan.

* The regional impacts of projects that border each other

The forest plan has outlined the monitoring requirements and their frequency for each management area. If we rely upon the information the agency has given us, this hasn[rsquo]t been done on a timely basis and as frequently as required in the Forest Plan. In plain terms, it means the FS apparently has no idea how well past FS projects met the goals, objectives, desired conditions, etc. stated in the NEPA documents, and how well the projects conformed to forest plan standards and guidelines.

Monitoring is a critical part of the NEPA analysis. Without this critical link the validity of many FS assumptions are baseless, rendering conclusions completely arbitrary. Without analyzing the accuracy and validity of the assumptions used in previous NEPA processes, one has no way to judge the accuracy and validity of the current proposal. The predictions made in previous NEPA processes also need to be disclosed and analyzed because if these were inaccurate, and the agency is making similar decisions, then the process will lead to failure. For instance, if for previous projects the FS said they were going to do a certain monitoring plan or implement a certain type of management and these were never effectively implemented or monitored, it is important for the public and the decision maker to know. If there have been problems with FS implementation or monitoring in the past, it is not logical to assume that implementation will now all of a sudden be appropriate. If prior logging or prescribed fire have not been monitored appropriately, then the agency lacks the basis for concluding this timber sale could or would meet its objectives/purpose and need, so there is no valid justification for this project.

The deficiencies of required Forest Plan implementation monitoring make it impossible for the public to gauge whether the agency might really have the impact it is assuming it will. The FS is operating in the dark.

Forest Plan Chapter V states, [ldquo]The Forest Supervisor shall review the conditions on the land covered by the Plan at least every 5 years to determine whether conditions or demands of the public have changed significantly.[rdquo] This is another mandate for information, and another

mandate ignored by the FS. As the Regional Forest office[rsquo]s December 9, 1991 letter to the Forest Supervisor (FYR RO_12-9-1991) states:

The FS also apparently has no methodology for considering and analyzing cumulative impacts accruing from timber sales occurring concurrently in adjacent watersheds. This matters for various resources. For example, many wildlife species have home ranges, or disperse after reproduction, into areas beyond single project boundaries. Below are maps showing some contiguous project boundaries.

Then there[rsquo]s [ldquo]The ADSIRM is a road maintenance and hazard tree removal project[hellip][rdquo]. The EA does not disclose and analyze as NEPA requires.

The EA insufficiently discusses all these foreseeable future actions under its cumulative effects analysis. This violates NEPA[rsquo]s hard look at possible impacts as well as the duty to disclose to the public quality information. Overall, the agency has ignored these cumulative effects, which violates NEPA in the hard look the agency must take as well as the quality of information it discloses to the public.

Remedy:
1. Select the No Action alternative;
2. Drop the project;
3. Acquire the necessary monitoring, consider the cumulative impacts from that monitoring, and reanalyze the issues in a way that addresses the problems above.

ROADLESS/WILDERNESS

FOC voiced concern with the logging and burning in the Selway watershed, including Meadow Creek and O[rsquo]Hara Creek on the very first page of our March 2020 comments. We further discussed the inventoried roadless and roadless expanse issues (p. 7). FOC/AWR comments on the Draft Revised Forest Plan also discuss inventoried and uninventoried roadless areas at pp. 271 [ndash] 286, and that document is incorporated into this objection.

Roadside hazard tree removal and burning could both impact roadless areas in a manner insufficiently considered by the Forest Service.

The EA discloses some impacts to the roadless resource:

Intermediate Harvest: Salvage harvest along Forest Roads 2116, 464, 464-A, 356, and 2013 that are located on borders of the O[rsquo]Hara-Falls Creek and West Meadow Creek roadless areas is proposed to remove dead and dying trees (approximately 9.4 miles and 180 acres) within falling or striking distance of improvements and/or the road (pose a hazard to the road). Retention would vary across units and be dependent upon the amount of dead and dying hazard trees within the unit. Areas with little-to-no mortality would have higher amounts of retention, while areas of high mortality will have lower areas of retention.

The EA states that, [ldquo]Intermediate treatments would decrease the number of dead and dying trees adjacent to roads and other infrastructure. This would[hellip][ ] [hellip]while maintaining forested cover within the roadless area.[rdquo] (Emphasis added.) Later the EA hedges, stating [ldquo]there would be a decrease in the number of dead and dying trees adjacent to roads and other infrastructure[hellip] while likely maintaining forested cover within the roadless area.[rdquo] (Emphasis added.)

Disclosing roadside salvage as an [ldquo]intermediate[rdquo] treatment is neither accurate nor a given based on this forest[rsquo]s previous roadside logging authorizations, which means the impact to roadless

could be greater than what the Forest Service has represented or considered in its environmental analysis.

Past environmental assessments recognize what this one euphemistically glossed over: roadside salvage can exceed what the Forest Service would consider an [ldquo]intermediate harvest.[rdquo] Take for example, the Nez Perce-Clearwater National Forests Road, Administrative and Recreation Site Maintenance Project from 2016. In that project[rsquo]s EA, the Forest Service stated:

This project would address public safety along existing Forest roads by removing hazard trees up to 200 feet of designated roads. This is generally considered an intermediate treatment; however, there is potential for the removal to be considered a clearcut when road segments converge in high mortality areas. This determination would be made with site-specific prescriptions when it is the optimum method for addressing hazard trees.

Nez Perce-Clearwater National Forests Road, Administrative and Recreation Site Maintenance Project Environmental Assessment 2016, p. 8. And guess what happened when the project went forward? Clearcuts. The below pictures are from the Tom Beall Road and are in the inventoried roadless areas impacted by this project.

As you can see, none of what was depicted here were [ldquo]intermediate harvests[rdquo] as anticipated in that project[rsquo]s EA. They were clearcut.

This above wasn[rsquo]t just a one-time occurrence. In 2013, the Forest Service on the Nez Perce and Clearwater National Forests also approved roadside hazard logging, calling this [ldquo]generally[rdquo] intermediate treatment with possible areas of clearcuts. See USDA FS 2013 Nez Perce- Clearwater Roadside Hazard Tree Project Environmental Assessment. After implementation, FOC monitoring found clearcuts. The below logging, pursuant to the EA, was in the North Fork Spruce-White Sands inventoried roadless area.

Roadside harvests are not just intermediate[mdash]it is not unusual for them to end up as clearcuts. Not only is [ldquo]intermediate harvest[rdquo] a misrepresentation of what will likely end up happening, but this is a bigger impact because a portion of this roadside logging will end up happening in inventoried roadless areas.

Roadside harvest, in addition to being clearcuts, can impact roadless areas in potentially significant way, according to the Forest Service[rsquo]s own analysis. In the Nez Perce-Clearwater National Forests Road, Administrative and Recreation Site Maintenance Project Environmental Assessment 2016, felling and removal of hazard trees were planned in (among others) Lochsa Face, Mallard, and O[rsquo]Hara Falls Creek. These timber harvests reduced the naturalness of the area, and in the draft forest-plan revision, Lochsa Face, Mallard, and O[rsquo]Hara Falls Creek were not recommended for wilderness. When reading the Forest Service[rsquo]s justifications for dropping these areas from wilderness consideration, the reduced naturalness at the timing when it was analyzed was a contributing factor. And the next time these areas might be considered to recommend is wilderness will be in the next forest plan revision. Given our current forest plan is almost 35 years old, this means the next time these areas could be considered will likely be in another 35 years. That is a generation[mdash]longer than the [ldquo]short term[rdquo] impact euphemistically claimed in Green Horse.

In the Green Horse EA, the Forest Service stated, [ldquo]As documented above and corresponding resource analysis; the proposed hazard tree removal (intermediate harvest) will have minimal effects.[rdquo] EA p. 67. Based on the above past assessments and past actions by the Forest Service that we have provided above, impacts are uncertain and possibly long-term, so a more in-depth analysis is necessary.

What happens in a small percentage of roadless acreage may very well impact the roadless expanse in a potentially significant way. Take the Orogrande project and the West Fork Crooked River Inventoried Roadless Area, for example. When analyzing this project, the Forest Service claimed there would be no significant impact to the roadless areas because only 2.4 percent of the roadless expanse would be directly affected, and that [ldquo]impacts to the IRA would be minimal once the road is obliterated and that the roadless characteristics would not be impacted in the long-term.[rdquo] Orogrande project Decision Notice-Finding of No Significant Impact p. 14. Below are pictures from the Orogrande project in the West Fork Crooked River Inventoried Roadless Area.

When assessing the West Fork Crooked River inventoried roadless area for wilderness characteristics in the forest plan revision, the Forest Service referenced this timber harvest[mdash]2.4 percent of the roadless expanse[mdash]had reduced the apparent naturalness of the area and that timber harvest. In the end, this timber harvest was one of the contributing reasons that the Forest Service recommended dropping the entire roadless area (the 2.4 percent of the roadless expanse logged in this project as well as the other 97.6 percent) from further consideration as wilderness. Prior to the project, the Forest Service claimed, in its environmental analysis and later to a federal judge, that logging in the West Fork Crooked River would not impact the Forest Service[rsquo]s wilderness consideration. The judge, holding not on the merits of the case but on a preliminary injunction,10 explicitly relied on the Forest Service[rsquo]s representation that the Orogrande Project would not impact the Forest Service[rsquo]s ability to recommend the roadless area as wilderness. See Friends of the Clearwater v. Probert, Case 3:16-cv-00485 Memo decision and order (May 31, 2017), pp. 17-18. Yet what Friends of the Clearwater predicted to that court would happen was exactly what happened after the Forest Service allowed logging to go forward; the Forest Service dropped this area from wilderness consideration, citing the recent logging as a contributing reason why the Forest Service should consider recommending the entire roadless area for wilderness designation.

The next time the West Fork Crooked River roadless expanse might be considered for recommendation as wilderness will be in the next forest plan revision. Given the Nez Perce and Clearwater current forest plans are almost 35 years old, this means the next time these areas could be considered will likely be in another 35 years. But, if the 2.4 percent depicted above is required to recover for the Forest Service to consider the whole roadless area for wilderness, it will take much, much longer than 35 years to achieve the size of trees that originally existed in the West Fork Crooked River inventoried roadless area. Any layperson can see that the 2.4 percent impacted likely won[rsquo]t recover to have roadless characteristics in the lifetime of anyone reading this comment.

In the Green Horse project, the Forest Service is again claiming that, because only a small percentage of the roadless area is impacted[mdash]1 percent, it won[rsquo]t have an impact to the entire roadless area. But, only a slightly bigger 2.4 percent made a difference that contributed to the Forest Service deciding not to recommend the West Fork Crooked River inventoried roadless area as wilderness. Also, the logging in the Orogrande Project was on the boundary of a roadless area. Here, the logging is both on roadless boundaries as well as through roadless expanses.

There is no explanation as to how this time will be different, or why this time the direct impacts won[rsquo]t indirectly impair the entire area. The truth is that these impacts can indirectly affect the entire roadless expanse, and they may be long-term as well as short term. It will take several generations for the impacts of roadside logging to fade. The Forest Service has not recognized or adequately discussed any of this.

The EA claims benefits to burning in the roadless area. That has been a consistent theme with the FS. The trammeling impacts of agency-ignited fire are admitted but passed over quickly. In fact, there is no real analysis of these impacts. This section omits the crucial issue of spring burning, which is not the time when fires were naturally ignited.

Furthermore, there is other evidence that the Forest Service considers prescribed fire as adverse impacts to roadless areas, which tracks with the trammeling impacts glossed over in the EA. For example, again in Lochsa Face, when the Forest Service discusses apparent naturalness of this roadless area, it appeared to consider management fire as a human activity, and recommended dropping the Lochsa Face inventoried roadless area from further consideration as wilderness. See Revised Forest Plan Environmental Impact Statement, Appx E, p. 224. With another inventoried roadless areas, the manner in which the Forest Service states prescribed burning suggests these are human impacts to be considered in assessing roadless and wilderness characteristics: [ldquo]Mining, grazing, and prescribed fire activities have had little impact [].[rdquo] Revised Forest Plan Environmental Impact Statement, Appx E, p. 166. Mining negatively impacts wilderness characteristics. Grazing negatively impacts wilderness characteristics. And, as denoted by this

comma series and recognized by the Forest Service when evaluating wilderness, prescribed burns also negatively impact wilderness characteristics. The EA does admit that the roadside logging (and later burning) in IRAs would cause [ldquo]short term[rdquo] impacts occurring for as long as 15 years, but arbitrarily calls this [ldquo]insignificant.[rdquo] But, this is a much longer term if it impacts recommending wilderness because the next opportunity to consider recommending an area with prescribed burning for wilderness would be the next forest plan, which have a life like the current one[mdash]35 years. For the logging, as discussed above (and what can be seen from both the roadside logging and logging in other areas), impacts are much longer than 15 years.

Here, West Meadow Creek and O[rsquo]Hara Falls Creek are the inventoried roadless areas that will be impacted.

FOC[rsquo]s scoping comments pointed out that some of this logging is illegal under the Forest Plan:

We also note that this proposal is not consistent with the existing Forest Plan. The Forest Plan FEIS states on page I-17 (and elsewhere), [ldquo]no road construction or timber harvesting activities will be implemented during the Plan period in the portion of the West Meadow Creek roadless area that is within the Meadow Creek drainage.[rdquo] Yet, logging is proposed for 90 acres in the roadless area and we are still in the 1987 plan period.

Nothing in the EA responds to that comment. The FS basically acts like the Idaho Roadless Rule is the only restriction applying to the West Meadow Creek roadless area. (73 acres according to the EA at Table 18.)

West Meadow Creek is currently under consideration to recommend as wilderness, but there has been no discussion about the cumulative effects this project would add to degrading wilderness quality. As noted above with the Forest Service[rsquo]s own analysis, both roadside logging and prescribed burns reduce the wilderness quality of the area. In West Meadow Creek, there has already been roadside hazard tree removal that the Forest Service has already noted [ldquo]reduces the apparent naturalness of portions of the area.[rdquo] Revised Forest Plan Draft EIS Appx E, p. 229.

While the Forest Service recommended moving forward with considering this roadless area to recommend as wilderness, there is no consideration about how the proposed logging in Green Horse might move forward might add to the reduced naturalness from other roadside logging to cumulatively impact whether the Forest Service might recommend this area for wilderness.

The FS doesn[rsquo]t recognize best scientific information that indicates the high ecological integrity and functioning of roadless and unmanaged areas. Management activities have damaged the streams and other natural features found in the project area watersheds. The FS has yet to demonstrate it can extract resources in a sustainable manner in roaded areas.

Scientific literature emphasizes the importance of unroaded areas greater than 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 and larger than 1,000 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[ndash]irrespective of size[ndash]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[rsquo] 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) roadlessregions smaller than 1,000 acres that are biologically significant[hellip]. 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[hellip]. 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 smallerareas that have special ecological significance because of their contributions toregional 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 at7risk 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. Sixty7four percent of the IRA acreage is in properly functioning watersheds, 34 percent is in at7risk watersheds, and 2 percent is in impaired watersheds. Finally, other Forest Service lands [ndash] which make up slightly more than half of the National Forest System [ndash] 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 functioning7at7risk (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.

There is also the confusing manner in which how the Forest Service discusses road maintenance. On one hand, the Forest Service in the Green Horse project notes that a lack of maintenance on a road in the inventoried roadless area would result in the closure of roads, thereby negatively impacting the quality in a roadless area because it adversely affects the [ldquo]recreation[rdquo] component of the definition of [ldquo]roadless characteristics.[rdquo] Green Horse EA p. 6. But, on the other hand, the Forest Service notes that more motorized recreation can reduce the opportunity for solitude, a noted wilderness characteristic. See USDA 2019 Revised Forest Plan DEIS, Appx E, p. 229. And maintaining the road will continue to adversely impact biodiversity and wildlife habitat. So, by maintaining the road, the Forest Service might not be reducing the recreation aspect of roadless characteristics, but the Forest Service would be impacting just about all the other roadless characteristics: a high quality of undisturbed soil, diversity of plant and animal communities, reference landscapes, and would be impacting these same substantive features and opportunity for solitude in terms of wilderness characteristics. Also, for West Meadow Creek, Forest Service Road 2116 is literally a road to nowhere. It ends. And, there is a trail parallel to it off a ways, so closing it doesn[rsquo]t damage the [ldquo]recreation[rdquo] component of roadless areas. You don[rsquo]t need to recondition this road. Just decommission it. It is unclear the ingress-egress necessary for [ldquo]fire fighting[rdquo] or public safety when the alternative is simply letting the natural processes govern in the roadless area. Same with 464-A and the road leading up to Saddle Ridge, both of which end. The Forest Service could close them, and without the logging, the Forest Service wouldn[rsquo]t fragment O[rsquo]Hara Falls Creek by creating openings. Yet, the Forest Service unreasonably refused to consider this cheaper and more ecologically sound strategy, opting instead to log and fragment habitat.

It is also quite unclear the scale of reconditioning, as that has proved to be a significant amount of roadwork in other projects. Take for example, the East Saddle Project on the North Fork of the Clearwater. The decision memo map denotes work to [ldquo]recondition[rdquo] Road 582.

Road 581, approximately at the intersection of Rds 581 and 582, looked like this in 2018:

That intersection, looking from Road 581 looking onto Road 582, looked like below in 2018:

This is a completely grown in road. FOC volunteers and staff walked down the single trail onto what the map labeled [ldquo]Road 582.[rdquo] Below are the series of pictures until the first intersection with Clayton Creek. The cross is where Roads 581 and 582 meet, and the pictures on the next page were taken between the intersection and the blue bar across Clayton Creek.Is this what the roads to be [ldquo]reconditioned[rdquo] in the Green Horse Project look like? For the No Action alternative the EA states:

Natural processes would continue (see No Action under the Forest Vegetation section). Where road access is blocked due to fallen trees, routine maintenance cannot occur, culverts may become plugged leading to catastrophic road failures which could have significant negative effects to the natural integrity of the area.

Why are you saying that with No Action, you can[rsquo]t do routine road maintenance there? Regardless of whether or not you carry out the timber sale, if natural integrity and water quality is threatened due to the culverts being plugged (whether by these nasty trees or from your failure to do routine maintenance), it would be irresponsible and a dereliction of duty to not deal with the issue.

This ludicrous scapegoating of falling trees as causing negative effects to the roadless area is indicative of the agency[rsquo]s systemic denial of its addiction to roads. If you can[rsquo]t maintain a road without a timber sale, that means it will only be maintained over part of the life of the timber sale anyway, so your acknowledged maintenance disability situation will inevitably recur shortly.

And where is the analysis of that situation?

Below is a snip from the Proposed Action Figure 4 map along with the map[rsquo]s key.

This reveals how the FS is proposing to [ldquo]Reconstruct[rdquo] a long segment of 9716 merely to do roadside clearcutting, some of the clearcutting in the IRA, the roadless expanse, or both. For other roads indicated as not to receive treatment, the FS did not explain why the same rationale for logging wouldn[rsquo]t apply along those roads. Nor does the EA explain why leaving those other road segments festering on the landscape is in the best interest of taxpayers, wildlife, soil productivity, or water quality.

The EA also fails to provide an analysis of cumulative effects in the IRAs as a whole. It states, [ldquo]The cumulative effects boundary for this analysis is the individual O[rsquo]Hara-Falls Creek and

West Meadow Creek roadless area boundaries that would be affected by the proposed action.[rdquo] (Emphasis added.) This is not sufficient for NEPA. Existing conditions and cumulative impacts

of past, present, ongoing, and future actions inside proper and logical analysis units[mdash]entire IRAs and roadless expanse[mdash]has been omitted from the EA.

FOC[rsquo]s scoping comments also pointed out that analysis impacts of entire roadless expanses is required:

Lastly, the proposal excludes any larger roadless expanse, including land at the head of Lick Creek. In Kettle Range Conservation Group v. USFS, 971 F. Supp 480 (D. Or,1997) the court again held logging in roadless areas, including ones that are uninventoried, is an [ldquo]irretrievable commitment of resources.[rdquo] It is what is on the ground that counts. The agency needs to determine whether the proposed logging, such as at the head of Lick Creek in units 17A and B is within the larger roadless expanse.

Again, nothing in the EA responds to that comment. The FS is required to discuss a project's impacts on areas of "sufficient size" for future wilderness designation. Lands Council, 529 F.3d at 1231, citing 16 U.S.C. [sect] 1131(c).

The Kootenai National Forest[rsquo]s Lower Yaak, O[rsquo]Brien, Sheep Draft Environmental Impact Statement explains the concept of [ldquo]roadless expanse[rdquo] as explained in USDA Forest Service, 2010e:

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

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

Below are two snips from the Proposed Action Figure 4 map along with the map[rsquo]s key.

We find nothing in the EA explaining why the area with [ldquo]02B[rdquo] and [ldquo]03B[rdquo] south of the road to be reconstructed, and the area of units [ldquo]17A[rdquo] and [ldquo]17B[rdquo] on the American River side of the road, were left out of the IRA boundaries, and there is no analysis of impacts on the roadless expanses.

Unroaded areas greater than about 1,000 acres, whether they have been inventoried or not, provide valuable natural attributes that are better left protected from logging and other management activities. Scientific research on roadless area size and relative importance is ongoing. Such research acknowledges variables based upon localized ecosystem types, naturally occurring geographical and watershed boundaries, and the overall conditions within surrounding ecosystems. In areas such as the Green Horse project area, where considerable past logging and management alterations have occurred, protecting relatively ecologically intact roadless areas even as small as 500 - 1,000 acres has been shown to be of significant ecological importance.

These valuable and increasingly rare roadless area attributes include: water quality; healthy soils; fish and wildlife refugia; centers for dispersal, recolonization, and restoration of adjacent disturbed sites; reference sites for research; non-motorized, low-impact recreation; carbon sequestration; refugia that are relatively less at-risk from noxious weeds and other invasive non- native species, and many other significant values. (See USDA Forest Service, 2000e.)

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.

It seems the FS, in its incoherent policy, identifies roadless areas as only those areas covered under one of the roadless rules. USDA Forest Service 2015a (FSH 1920.12, Chapter 71.2) specifically states, [ldquo]The primary function of the inventory step is to efficiently, effectively, and transparently identify all lands in the plan area that may have wilderness characteristics as defined in the Wilderness Act.[rdquo] The discussion in the EA reveals that even the FS is confused about artificial distinctions it established for various categories of roadless areas.

It seems that only areas the agency terms [ldquo]roadless areas[rdquo], which are apparently a subset of what is truly roadless, are the only ones the FS believes [ldquo]meet(s) the minimum criteria for wilderness,[rdquo] thereby eliminating or downgrading the portions of the larger roadless area in the project vicinity.

Areas the FS often calls [ldquo]unroaded[rdquo] or [ldquo]uninventoried roadless[rdquo] are usually the result of the fact that many are part of a larger roadless area/expanse, because they are contiguous to recognized or inventoried roadless areas (IRAs), existing Wilderness, or roadless land administered by another agency. In most or all of these cases, that the so-called [ldquo]unroaded[rdquo] lands were not part of formal roadless inventories is the result of FS failure in properly identifying roadless boundaries in past inventories. There has been a history of the FS doing this since the 1970s.

The inconstancy in the way the FS has evaluated and considered what kinds of actions negatively affect roadless areas so that boundaries should be redrawn to remove recently completed development activities (usually timber sales) has created a policy quagmire. For example, a portion of one inventoried roadless area[mdash]the West Fork Crooked River Roadless Area[mdash]was recently logged even though the agency claims this area still has roadless and wilderness characteristics. (See above pictures.)

This contrasts with areas that may show little or no evidence of past development the agency claims still lack these characteristics. These failures at adequate analysis of logging and roadbuilding on wilderness and roadless characteristics have been documented in the Friends of the Clearwater Roadless Report (Friends of the Clearwater, 2020) our past comments, and below.

The roadless boundary in the EA is inadequate. As indicated above, the FS fails to map the entire roadless expanse. Rather the maps provided only include the project area without the context of a larger map. The [ldquo]analysis area[rdquo] for any given roadless expanse is the entire roadless expanse[mdash] not some portion of it inside a project area. That is what case law has decided, as discussed in R- 1[rsquo]s [ldquo]Our Approach to Roadless Area Analysis of Unroaded Lands Contiguous to Roadless Areas[rdquo] (12/2/10), which the NPCNF seems unable to grasp.

The inconsistency in the way the FS analyzes impacts to roadless areas would affect how the agency draws a roadless expanse boundary. If the FS were consistent with recent claims it has made about logging and temporary roads not affecting roadless areas, then everything except major roads would be included in the roadless expanse(s) affected by the Green Horse timber sale project. The fact that the EA does not include comprehensive roadless area boundaries reinforces the impression of the agency[rsquo]s duplicity in identifying roadless or unroaded areas and in analyzing negative impacts to these same areas.

In recent years, the FS[rsquo]s position was that logging doesn[rsquo]t significantly affect the potential of roadless or unroaded areas to be recommended or qualified for wilderness designation. More recently the Lolo, Insect & Disease EA states, [ldquo]wilderness designations and mapping in the short term (approximately 20 years following harvest) of the Eldorado Creek IRA would likely be drawn to exclude the approximate 318 acres of proposed timber harvest within the IRA[hellip][rdquo] The FS should provide a credible explanation for its flip-flopping.11

Another example is illustrative. Given the fact that the NPCNF[rsquo]s consideration of [ldquo]temporary[rdquo] roads as something that will be decommissioned and then reconstructed in unlimited cycles, to repeatedly react to the impacts of its never-ending fire suppression, the public has no reason to believe that temporary road impacts to roadless areas would be limited to only about 20 years. What is the likelihood of the FS proposing constructing roads, however [ldquo]temporary,[rdquo] into project area unroaded areas in the future?

Perhaps the biggest problem is that areas slated for logging will experience lost or reduced roadless and wilderness character, at least for decades.

While roadless/unroaded areas do not enjoy the same statutory protection as areas designated as wilderness, the important values of those areas can also be affected by outside activities, though such activities do not render an area roaded and undeveloped. Indeed, motorized and mechanized vehicle use, though it has a negative impact on wildlife and other visitors to a roadless area, do not preclude the area from being roadless or change the physical character of an area so that it is no longer roadless.

Between the Forest Service[rsquo]s last comment period and this objection period, the US Fish and Wildlife Service proposed to list the whitebark pine as a threatened species under the Endangered Species Act. The Forest Service notes that whitebark pine habitat is present in the

11 For example, the Fuzzy Bighorn NEPA document declares that logging in roadless areas, even at the fringe, has a definite negative impact. Johnson Bar project file documents discuss impacts from past logging that eliminated consideration of one roadless area. However in contradiction, the Lowell WUI Project File, the Orogrande Community and the Little Slate NEPA documents declare no impact.

West Meadow Creek inventoried roadless area. The definition of roadless characteristics includes [ldquo][h]abitat for threatened, endangered, proposed, candidate, and sensitive species,and for those species dependent on large, undisturbed areas of land.[rdquo] The areas where the Forest Service proposes to conduct roadside logging appears to be close to the type of elevation where whitebark pine might occur. See Forest Service topos of Lick Point and Anderson Butte. Yet there is absolutely no discussion or even mention of whitebark pine. Given the limited ways whitebark pine reproduces, by Clark[rsquo]s nutcracker, eliminating any living whitebark pine is going to also reduce their reproductive success for a species rare enough that the Fish and Wildlife Service has proposed to list it under the Endangered Species Act. The Forest Service hasn[rsquo]t discussed the implications of its project on whitebark pine inside or outside the roadless boundaries.

By proposing logging, burning, and road reconditioning in roadless areas, you have violated the forest plan, and given the entirely inconsistent ways you consider impacts, have violated NEPA by failing to take a hard look at true environmental impacts based on your own previous actions. Your conclusion has no rational connection to any of the facts underlying this section. Because of such varying results of what the Forest Service represents will be the impact and the impacts that actually happen in retrospect, an environmental impact statement should have been done.

We understand you still might be under regional direction not to do an environmental impact statement (Region 1 Memo Decisions and Agreements to implement our Environmental Analysis and Decision Making Effort, Apr. 26, 2019)[mdash]but the Forest Service can[rsquo]t override the law. If the region won[rsquo]t permit you to do an EIS, then you should be dropping this project or dropping all work associated with the inventoried roadless areas to satisfy the roadless issues raised.

Remedy:
* Conduct an environmental impact statement
* Redo the roadless/unroaded area analysis, starting with a mapping of the complete roadless expanse(s) affected by this timber sale project.
* Drop the units or portions of units affecting the roadless expanse.
* Close the roads instead of roadside logging roads to nowhere, especially roads 2116, 464- A, and the road leading up to Saddle Ridge.
* Allow natural fire to accomplish the burning in the roadless area.
* Do on-the-ground work to determine whether any of your logging proposals will eliminate whitebark pine.

FIRE POLICY AND FIRE ECOLOGY

FOC comments on the PA discuss fire at pp. 4 - 7. We incorporate those comments, and add the following.

The EA claims there is a need to [ldquo]Reduce [hellip]hazardous fuels, and wildfire risk.[rdquo] The FS is taking the position that [ldquo]fuel[rdquo] arrangement is the overriding threat to private property and structures.

This runs counter to best available scientific information. The EA fails to disclose that fuel moisture, weather, and topography are by far the factors with the most influence on fire behavior and spread. Responsibility for the risk of fire burning private structures rests squarely on the shoulders of the owners of those structures[mdash]not on U.S. taxpayers.

The EA completely omitted any discussion around well-documented uncertainty of the strategy of logging to reduce future fire behavior, especially regeneration logging of mature forests, which could serve as fire refugia. It is increasingly understood and accepted that reducing fuels does not consistently prevent large fires and does not reduce the outcome of these fires. See Lydersen et al. 2014. Because there is scientific controversy surrounding this issue, the FS must prepare an EIS.

We incorporate [ldquo]A New Direction for California Wildfire Policy[mdash]Working from the HomeOutward[rdquo] dated February 11, 2019 from the Leonard DiCaprio Foundation. It criticizes policies from the state of California, which are essentially the same FS fire policies on display in the NPCNF. From the Executive Summary: [ldquo]These policies try to alter vast areas of forest in problematic ways through logging, when instead they should be focusing on helping communities safely co-exist with California[rsquo]s naturally fire-dependent ecosystems by prioritizing effective fire-safety actions for homes and the zone right around them. This new direction[mdash] working from the home outward[mdash]can save lives and homes, save money, and produce jobs in a strategy that is better for natural ecosystems and the climate.[rdquo] It also presents an eye-opening analysis of the Camp Fire, which destroyed the town of Paradise.

We also incorporate the John Muir Project document [ldquo]Forest Thinning to Prevent Wildland Fire

[hellip]vigorously contradicted by current Science[rdquo] (Attachment 2).

We likewise incorporate [ldquo]Open Letter to Decision Makers Concerning Wildfires in the West[rdquo] signed by over 200 scientists (Attachment 3).

And also see [ldquo]Land Use Planning More Effective Than Logging to Reduce Wildfire Risk[rdquo] (Attachment 4).

The EA does not disclose if actions have been taken to reduce fuels on private lands the FS supposes will be somehow protected by this [ldquo]project[rdquo], or how those activities (or lack of) will impact the efficacy of the activities proposed for this Project.

The risks of fire are best dealt with in the immediate vicinity of homes, and by focusing on routes for egress during fire events[mdash]not by logging national forest lands well away from human occupied neighborhoods. The EA fails to disclose that the only effective way to prevent structure damage is to manage the fuels in the immediate vicinity of those structures.

The nine-part Wildfire Research Fact Sheet Series was produced by the National Fire Protection Association (NFPA)[rsquo]s Firewise USA[reg] program, as part of the NFPA/USDA Forest Service cooperative agreement and with research provided by the Insurance Institute for Business and Home Safety (IBHS). They are a product of the research done by the IBHS lab in South Carolina, covering a wide range of issues. This Firewise approach also begs the question[mdash]why isn[rsquo]t the NPCNF implementing an aggressive outreach and education program to assist homeowners

living in and near project areas, and elsewhere in the Wildland-Urban Interface (WUI)?

In support of focusing on manipulating limited areas near homes, Finney and Cohen, 2003, state:

Research findings indicate that a home[rsquo]s characteristics and the characteristics of a home[rsquo]s immediate surroundings within 30 meters principally determine the potential for wildland- urban fire destruction. This area, which includes the home and its immediate surroundings, is termed the home ignition zone. The home ignition zone implies that activities to reduce the potential for wildland-urban fire destruction can address the necessary factors that determine ignitions and can be done sufficiently to reduce the likelihood of ignition.

Wildland fuel reduction outside and adjacent to a home ignition zone might reduce the potential flame and firebrand exposure to the home ignition zone (i.e., within 30 m of the home). However, the factors contributing to home ignition within this zone have not been mitigated. Given a wildfire, wildland fuel management alone (i.e., outside the home ignition zone) is not sufficient nor does it substitute for mitigations within the home ignition zone

(I)t is questionable whether wildland fuel reduction activities are necessary

and sufficient for mitigating structure loss in wildland urban fires.

[hellip](W)ildland fuel management changes the [hellip] probability of a fire reaching a given location. It also changes the distribution of fire behaviors and ecological effects experienced at each location because of the way fuel treatments alter local and spatial fire behaviors (Finney 2001). The probability that a structure burns, however, has been shown to depend exclusively on the properties of the structure and its immediate surroundings (Cohen 2000a). (Emphasis added.)

Our take from Finney and Cohen (2003) is that there is much uncertainty over effects of fuel reduction, which the EA fails to acknowledge or recognize. The authors point out:

Although the conceptual basis of fuel management is well supported by ecological and fire behavior research in some vegetation types, the promise of fuel management has lately become loaded with the expectation of a diffuse array of benefits. Presumed benefits range from restoring forest structure and function, bringing fire behavior closer to ecological precedents, reducing suppression costs and acres burned, and preventing losses of ecological and urban values. For any of these benefits to be realized from fuel management, a supporting analysis must be developed to physically relate cause and effect, essentially evaluating how the benefit is physically derived from the management action (i.e. fuel management). Without such an analysis, the results of fuel management can fail to yield

the expected return, potentially leading to recriminations and abandonment of a legitimate and generally useful approach to wildland fire management.

Finney and Cohen, 2003 recognize: [ldquo]To reduce expected loss from home ignition, it is necessary and often sufficient to manage fuels only within the home ignition zone [hellip]and abide by fire resistant home construction standards[hellip][rdquo] (Emphasis added).

The EA emphasizes actions that attempt to adapt a fire-prone ecosystem to the presence of human development, however we firmly believe the emphasis must be the opposite[mdash]assisting human communities to adapt to the fire-prone ecosystems into which they been built.

We strongly support government actions that facilitate cultural change towards private landowners taking the primary responsibility for mitigating the safety and property risks from fire, by implementing firewise activities on their property. Indeed, the best available science supports such a prioritization. (Kulakowski, 2013; Cohen, 1999a) Also, see Firewise Landscaping12 as recommended by Utah State University, and the Firewise USA website by the National Fire Protection Association13 for examples of educational materials.

A recent article in Phys.org reports on results of a study by DellaSala and Hanson, 2019:

They found no significant trend in the size of large high-severity burn patches between 1984 and 2015, disputing the prevailing belief that increasing megafires are setting back post-fire forest regeneration. "This is the most extensive study ever conducted on the high- severity fire component of large fires, and our results demonstrate that there is no need for massive forest thinning and salvage logging before or after a forest fire," says Dr.

Dominick A. DellaSala, lead author of the study and Chief Scientist at the Geos Institute. "The perceived megafire problem is being overblown. After a fire, conditions are ideal for forest re-establishment, even in the interior of the largest severely burned patches. We found conditions for forest growth in interior patches were possible over 1000 feet from the nearest low/moderately burned patch where seed sources are most likely."

DellaSala, et al. (1995) state:

Scientific evidence does not support the hypothesis that intensive salvage, thinning, and other logging activities reduce the risk of catastrophic fires if applied at landscape scales ... At very local scales, the removal of fuels through salvage and thinning may hinder some fires. However, applying such measures at landscape scales removes natural fire breaks such as moist pockets of late-seral and riparian forests that dampen the spread and intensity of fire and has little effect on controlling fire spread, particularly during regional droughts.

... Bessie and Johnson (1995) found that surface fire intensity and crown fire initiation were strongly related to weather conditions and only weakly related to fuel loads in subalpine forest in the southern Canadian Rockies Observations of large forest fires during

regional droughts such as the Yellowstone fires in 1988 (Turner, et al. 1994) and the inland northwest fires of 1994 raise serious doubts about the effectiveness of intensive fuel

reductions as [ldquo]fire-proofing[rdquo] measures.

[ldquo]Only treating fuels in the immediate vicinity of the homes themselves can reduce risk to homes, not backcountry fuel reductions projects that divert scarce resources away from true home protection.[rdquo] DellaSala et al. 2015 (Chapter 13), p. 384 (citing Cohen, 2000; Gibbons et al. 2012; Calkin et al. 2013; Syphard et al, 2014).

Veblen (2003) states:

The premise behind many projects aimed at wildfire hazard reduction and ecological restoration in forests of the western United States is the idea that unnatural fuel buildup has resulted from suppression of formerly frequent fires. This premise and its implications need to be critically evaluated by conducting area-specific research in the forest ecosystems targeted for fuels or ecological restoration projects. Fire regime researchers need to acknowledge the limitations of fire history methodology and avoid over-reliance on summary fire statistics such as mean fire interval and rotation period. While fire regime research is vitally important for informing decisions in the areas of wildfire hazard mitigation and ecological restoration, there is much need for improving the way researchers communicate their results to managers and the way managers use this information.

Riggers, et al. 2001 state:

(T)he real risk to fisheries is not the direct effects of fire itself, but rather the existing condition of our watersheds, fish communities, and stream networks, and the impacts we impart as a result of fighting fires. Therefore, attempting to reduce fire risk as a way to reduce risks to native fish populations is really subverting the issue. If we are sincere about wanting to reduce risks to fisheries associated with future fires, we ought to be removing barriers, reducing road densities, reducing exotic fish populations, and re-assessing how we fight fires. At the same time, we should recognize the vital role that fires play in stream systems, and attempt to get to a point where we can let fire play a more natural role in these ecosystems.

Those FS biologists emphasize, [ldquo]the importance of wildfire, including large-scale, intense wildfire, in creating and maintaining stream systems and stream habitat (I)n most cases,

proposed projects that involve large-scale thinning, construction of large fuel breaks, or salvage logging as tools to reduce fuel loading with the intent of reducing negative effects to watersheds and the aquatic system are largely unsubstantiated.[rdquo]

Kauffman (2004) suggests that current FS fire suppression policies are what is catastrophic, and that fires are beneficial:

Large wild fires occurring in forests, grasslands and chaparral in the last few years have aroused much public concern. Many have described these events as [ldquo]catastrophes[rdquo] that must be prevented through aggressive increases in forest thinning. Yet the real catastrophes are not the fires themselves but those land uses, in concert with fire suppression policies that have resulted in dramatic alterations to ecosystem structure and composition. The first step in the restoration of biological diversity (forest health) of western landscapes must be to implement changes in those factors that have resulted in the current state of wildland ecosystems. Restoration entails much more than simple structural modifications achieved through mechanical means. Restoration should be undertaken at landscape scales and must allow for the occurrence of dominant ecosystem processes, such as the natural fire regimes achieved through natural and/or prescribed fires at appropriate temporal and spatial scales. (Emphases added.)

Noss et al. (2006) state:

Forest landscapes that have been affected by a major natural disturbance, such as a severe wildfire or wind storm, are commonly viewed as devastated. Such perspectives are usually far from ecological reality. Overall species diversity, measured as number of species[ndash]at least of higher plants and vertebrates [ndash] is often highest following a natural stand replacement disturbance and before redevelopment of closed-canopy forest (Lindenmayer and Franklin 2002). Important reasons for this include an abundance of biological legacies, such as living organisms and dead tree structures, the migration and establishment of additional organisms adapted to the disturbed, early-successional environment, availability of nutrients, and temporary release of other plants from dominance by trees. Currently, early-successional forests (naturally disturbed areas with a full array of legacies, i.e. not subject to post-fire logging) and forests experiencing natural regeneration (i.e. not seeded or planted), are among the most scarce habitat conditions in many regions.

High-severity fire is ecologically important. (Bond et al. 2012.) Snag forest habitat [ldquo]is one of the most ecologically important and biodiverse forest habitat types in western U.S. conifer forests (Lindenmayer and Franklin 2002, Noss et al. 2006, Hutto 2008).[rdquo] (Hanson 2010.)

Even if there is scientific legitimacy to the claims that fuel reductions reduce ecological damage from subsequent fire[mdash]a claim that is scientifically controversial and unproven for the long term, and unquantified for any defined short term[mdash]the area affected by such projects in recent years is miniscule compared to the entire, allegedly fire-suppressed Forest.

It may be that fire suppression in the project area has not, in reality, caused a significantly elevated risk of abnormal fire in the project area. We believe the agency is playing this fire-scare card largely to justify logging as restoration. However, playing the fire scare card is not just a project area issue[mdash]it's forestwide. The agency puts the joker in the deck, changing the whole game[mdash]not just for one hand as the FS pretends.

Scientific information concerning fire suppression was a major theme of the Interior Columbia Basin Ecosystem Management Project (ICBEMP) in the 1990s: [ldquo]Aggressive fire suppression policies of Federal land-managing agencies have been increasingly criticized as more has been learned about natural fire cycles.[rdquo] (USDA FS & USDI BLM 1996, p. 22.)

Also, [ldquo]Substantial changes in disturbance regimes[mdash]especially changes resulting from fire suppression, timber management practices, and livestock grazing over the past 100 years[mdash]have resulted in moderate to high departure of vegetation composition and structure and landscape mosaic patterns from historical ranges.[rdquo] (USDA FS & USDI BLM 2000, Ch. 4. P. 18.)

The effects of fire suppression are not unique to this project area[mdash]similar language has been included in NEPA documents for all logging projects on this Forest for at least a decade. If fire suppression effects as described in the EA are occurring, it means that, as forestwide fire suppression continues, the results of this management include continuing increases in these adverse effects across the entire forest. So multiply the above list of effects times the extent of the entire forest, and what the agency tacitly admits is, forestwide fire suppression is leading to stand-replacing fires outside what is natural, and that alternation of fire regimes results in wide-

scale disruption of habitats for wildlife, rare plants, tree insect and disease patterns and increases the occurrence of noxious weeds. Such analyses and disclosures are not found in the Forest Plan FEIS.

The no-action alternative contemplated under the ICBEMP EIS is the management directionfound in the Forest Plan: [ldquo]Alternative S1 (no action) continues management specified under each existing Forest Service and BLM land use plan, as amended or modified by interim direction[mdash] known as Eastside Screens (national forests in eastern Oregon and Washington only), PACFISH, and INFISH[mdash]as the long-term strategy for lands managed by the Forest Service or BLM.[rdquo] (USDA FS & USDI BLM 2000. Ch. 5, pp 5-6.)

The philosophy driving the FS strategy to replicate historic vegetative conditions (i.e. desired conditions) is that emulation of the results of disturbance processes would conserve biological diversity. McRae et al. 2001 provide a scientific review summarizing empirical evidence that illustrates several significant differences between logging and wildfire[mdash]differences which the FS fails to address. Also, Naficy et al. 2010 found a significant distinction between fire-excluded ponderosa pine forests of the northern Rocky Mountains logged prior to 1960 and paired fire- excluded, unlogged counterparts:

We document that fire-excluded ponderosa pine forests of the northern Rocky Mountains logged prior to 1960 have much higher average stand density, greater homogeneity of stand structure, more standing dead trees and increased abundance of fire-intolerant trees than paired fire-excluded, unlogged counterparts. Notably, the magnitude of the interactive effect of fire exclusion and historical logging substantially exceeds the effects of fire exclusion alone. These differences suggest that historically logged sites are more prone to severe wildfires and insect outbreaks than unlogged, fire-excluded forests and should be considered a high priority for fuels reduction treatments. Furthermore, we propose that ponderosa pine forests with these distinct management histories likely require distinct restoration approaches. We also highlight potential long-term risks of mechanical stand manipulation in unlogged forests and emphasize the need for a long-term view of fuels management.

Bradley et al. 2016 studied the fundamental premise that mechanical fuel reduction will reduce fire risk. This study [ldquo]found forests with higher levels of protection had lower severity values even though they are generally identified as having the highest overall levels of biomass and fuel loading.[rdquo] In fact, the study[rsquo]s results suggest the opposite: [ldquo](B)urn severity tended to be higher in areas with lower levels of protection status (more intense management), after accounting for topographic and climatic conditions in all three model runs. Thus, we rejected the prevailing forest management view that areas with higher protection levels burn most severely during wildfires.[rdquo] The study goes on to discuss other findings:

An extension of the prevailing forest/fire management hypothesis is that biomass and fuels increase with increasing time after fire (due to suppression), leading to such intense fires that the most long-unburned forests will experience predominantly severe fire behavior (e.g., see USDA Forest Service 2004, Agee and Skinner 2005, Spies et al. 2006, Miller et al. 2009b, Miller and Safford 2012, Stephens et al. 2013, Lydersen et al. 2014,

Dennison et al. 2014, Hessburg 2016). However, this was not the case for the most long- unburned forests in two ecoregions in which this question has been previously investigated[mdash]the Sierra Nevada of California and the Klamath-Siskiyou of northern California and southwest Oregon. In these ecoregions, the most long-unburned forests experienced mostly low/moderate-severity fire (Odion et al. 2004, Odion and Hanson 2006, Miller et al. 2012, van Wagtendonk et al. 2012). Some of these researchers have hypothesized that as forests mature, the overstory canopy results in cooling shade that allows surface fuels to stay moister longer into fire season (Odion and Hanson 2006, 2008). This effect may also lead to a reduction in pyrogenic native shrubs and other understory vegetation that can carry fire, due to insufficient sunlight reaching the understory (Odion et al. 2004, 2010).

From a news release announcing the results of the Bradley et al. 2016 study:

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

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

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

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

Zald and Dunne, 2018 state, [ldquo]intensive plantation forestry characterized by young forests and spatially homogenized fuels, rather than pre-fire biomass, were significant drivers of wildfire severity.[rdquo]

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

In his testimony before Congress, DellaSala, 2017 discusses [ldquo][hellip]how proposals that call for increased logging and decreased environmental review in response to wildfires and insect

outbreaks are not science driven, in many cases may make problems worse, and will not stem rising wildfire suppression costs[rdquo] and [ldquo]what we know about forest fires and beetle outbreaks in relation to climate change, limitations of thinning and other forms of logging in relation to wildfire and insect management[rdquo] and gives [ldquo]recommendations for moving forward based on best available science.[rdquo]

Typically, attempts to control or resist the natural process of fire have been a contributor to deviations from historic conditions. The FS analyses skew toward considering fire as well as native insects and other natural pathogens as threats to the ecosystem rather than rejuvenating natural processes. It seems to need the obsolete viewpoint in order to justify and prioritize the proposed vegetation manipulations, tacitly for replacing natural processes with [ldquo]treatments[rdquo] and [ldquo]prescriptions.[rdquo] However the scientific support for assuming that ecosystems can be restored or continuously maintained by such manipulative actions is entirely lacking.

Karr (1991) cites a definition of ecological integrity as [ldquo]the ability to support and maintain "a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region.[rdquo] Karr (1991) also cites a definition of ecological health: [ldquo]a biological system ... can be considered healthy when its inherent potential is realized, its condition is stable, its capacity for self-repair when perturbed is preserved, and minimal external support for management is needed.[rdquo] (Emphasis added.) The FS misses that last aspect of ecological health[mdash]specifically that it doesn[rsquo]t need management meddling.

Likewise Angermeier and Karr (1994) describe biological integrity as referring to [ldquo]conditions under little or no influence from human actions; a biota with high integrity reflects natural evolutionary and biogeographic processes.[rdquo]

In their conclusion, Hessburg and Agee, 2003 state [ldquo]Desired future conditions will only be realized by planning for and creating the desired ecosystem dynamics represented by ranges of conditions, set initially in strategic locations with minimal risks to species and processes.[rdquo]

The FS[rsquo]s foreseeable budget for the NPCNF would not allow enough vegetation management under the agency[rsquo]s paradigm to [ldquo]fix[rdquo] the problems the FS says would be perpetuated by fire suppression. The FS did not conduct any analysis that faces up to any likely budget scenario, in regards to the overall management emphases. The implication is clear: logging and fire suppression is intended to continually dominate, except in those weather situations when and where suppression actions are ineffective, in which case fires of high severity will occur across relatively wide areas. No cumulative effects analysis at any landscape scale exists to disclose the environmental impacts.

Also in claiming and implying departures from historic conditions, the FS does not provide a spatial analysis, either for the true reference conditions or of current project area conditions. The FS has no scientifically defensible analysis of the project area landscape pattern departure from HRV.

Churchill, 2011 points out:

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

(Emphases added.) Churchill describes above the ongoing natural processes that will alleviate problems alleged in the EA[mdash]without expensive and ecologically risky logging and road building. Since no proper spatial analysis of the landscape pattern[rsquo]s departure has been completed, the EA has no scientifically defensible logging solution.

Any assumption that drier forests did not experience stand-replacing fires, that fire regimes were frequent and nonlethal, that these stands were open and dominated by large well-spaced trees, and that fuel amounts determine fire severity (the false thinning hypothesis that fails to recognize climate as the overwhelming main driver of fire intensity) are not supported by science (see for example Baker and Williams 2015, Williams and Baker 2014, Baker et al. 2006, Pierce et al.

2004, Baker and Ehle 2001, Sherriff et al. 2014). Even research that has uncritically accepted the questionable ponderosa pine model that may only apply to the Mogollon Rim of Arizona and New Mexico (and perhaps in similar dry-forest types in California), notes the inappropriateness of applying that model to elsewhere (see Schoennagel et al. 2004). The EA[rsquo]s assertion that the proposed treatments will result in likely or predictable later wildland fire effects is of considerable scientific doubt (Rhodes and Baker, 2008).

Despite the fact that the EA makes many statements to the effect that without the proposed treatments there is a high likelihood of highly adverse effects on various resources due to wildfire, it discloses nothing about such effects from recent fires in the general area. The FS[rsquo]s fear-invoking statements about the impacts of fire are speculative and not based upon data or any empirical evidence, in violation of NEPA.

Large fires are weather-driven events, not fuels-driven. When the conditions exist for a major fire[mdash]which includes drought, high temperatures, low humidity and high winds[mdash]nothing, including past logging, halts blazes. Such fires typically self-extinguish or are stopped only when less favorable conditions occur for fire spread. As noted in Graham, 2003:

The prescriptions and techniques appropriate for accomplishing a treatment require understanding the fuel changes that result from different techniques and the fire behavior responses to fuel structure. Fuel treatments, like all vegetation changes, have temporary effects and require repeated measures, such as prescribed burning, to maintain desired fuel structure.

If the predictions of uncharacteristically severe fire were accurate, one might think that the results of scientific validation of such assumptions would have been conducted in the NPCNF by now, and cited in the EA. We find no data or scientific analysis of those fires[rsquo] effects validating the FS[rsquo]s predictions of uncharacteristically severe fire effects if the logging is not conducted.

The EA fails to explain the fire implications of no treatment applied to untreated portions of the project area under the action alternatives.

The EA did not provide a genuine analysis and disclosure of the varying amounts and levels of effectiveness of fuel changes attributable to: the varying ages of the past cuts, the varying forest types, the varying slash treatments, etc.

There has been extensive research in forests about the ecological benefits of mixed-severity (which includes high-severity) fire over the past two decades, so much so that in 2015 science and academic publishers Elsevier published a 400-page book, The Ecological Importance of Mixed-Severity Fires: Nature[rsquo]s Phoenix which synthesizes published, peer-reviewed science investigating the value of mixed- and high-severity fires for biodiversity (DellaSala and Hanson, 2015). The book includes research documenting the benefits of high-intensity wildfire patches for wildlife species, as well as a discussion of mechanical [ldquo]thinning[rdquo] and its inability to reduce the chances of a fire burning in a given area, or alter the intensity of a fire, should one begin under high fire weather conditions, because overwhelmingly weather, not vegetation, drives fire behavior (DellaSala and Hanson, 2015, Ch. 13, pp. 382-384).

Baker, 2015, states: [ldquo]Programs to generally reduce fire severity in dry forests are not supported and have significant adverse ecological impacts, including reducing habitat for native species dependent on early-successional burned patches and decreasing landscape heterogeneity that confers resilience to climatic change.[rdquo]

Baker, 2015 concluded: [ldquo]Dry forests were historically renewed, and will continue to be renewed, by sudden, dramatic, high-intensity fires after centuries of stability and lower-intensity fires.[rdquo]

Baker, 2015 writes: [ldquo]Management issues[hellip] The evidence presented here shows that efforts to generally lower fire severity in dry forests for ecological restoration are not supported.[rdquo]

In his book, [ldquo]Fire Ecology in Rocky Mountain Landscapes[rdquo] William Baker writes on page 435, [ldquo][hellip]a prescribed fire regime that is too frequent can reduce species diversity (Laughlin and Grace 2006) and favor invasive species (M.A. Moritz and Odion 2004). Fire that is entirely low severity in ecosystems that historically experience some high-severity fire may not favor germination of fire-dependent species (M.A. Moritiz and Odion 2004) or provide habitat key animals (Smucker, Hutto, and Steele 2005).[rdquo] And on page 436: [ldquo]Fire rotations equal the average mean fire interval across a landscape and are appropriate intervals at which individual points or the whole landscape is burned. Composite fire intervals underestimate mean fire interval and fire rotation (chap 5) and should not be used as prescribed burning intervals as this would lead to too much fire and would likely lead to adversely affect biological diversity (Laughlin and Grace 2006).[rdquo]

Baker estimates the high severity fire rotation to be 135 - 280 years for lodgepole pine forests. (See page 162.). And on pp. 457-458: [ldquo]Fire rotation has been estimated as about 275 years in the Rockies as a whole since 1980 and about 247 years in the northern Rockies over the last century, and both figures are near the middle between the low (140 years) and high (328 years) estimates for fire rotation for the Rockies under the HRV (chap. 10). These estimates suggest that since

EuroAmerican settlement, fire control and other activities may have reduced fire somewhat in particular places, but a general syndrome of fire exclusion is lacking. Fire exclusion also does not accurately characterize the effects of land users on fire or match the pattern of change in area burned at the state level over the last century (fig. 10.9). In contrast, fluctuation in drought linked to atmospheric conditions appear to match many state-level patterns in burned area over the last century. Land uses that also match fluctuations include logging, livestock grazing, roads and development, which have generally increased flammability and ignition at a time when the climate is warming and more fire is coming.[rdquo]

Schoennagel et al., 2004 state: [ldquo]High-elevation subalpine forests in the Rocky Mountains typify ecosystems that experience infrequent, high-severity crown fires []. . . The most extensive subalpine forest types are composed of Engelmann spruce (Picea engelmannii), subalpine fir (Abies lasiocarpa), and lodgepole pine (Pinus contorta), all thin-barked trees easily killed by fire. Extensive stand-replacing fires occurred historically at long intervals (i.e., one to many centuries) in subalpine forests, typically in association with infrequent high-pressure blocking systems that promote extremely dry regional climate patterns.[rdquo]

Schoennagel et al., 2004 state:

(I)t is unlikely that the short period of fire exclusion has significantly altered the long fire intervals in subalpine forests. Furthermore, large, intense fires burning under dry conditions are very difficult, if not impossible, to suppress, and such fires account for the majority of area burned in subalpine forests.

Moreover, there is no consistent relationship between time elapsed since the last fire and fuel abundance in subalpine forests, further undermining the idea that years of fire suppression have caused unnatural fuel buildup in this forest zone.

No evidence suggests that spruce[ndash]fir or lodgepole pine forests have experienced substantial shifts in stand structure over recent decades as a result of fire suppression. Overall, variation in cli-mate rather than in fuels appears to exert the largest influence on the size, timing, and se-verity of fires in subalpine forests []. We conclude that large, infrequent stand replacing fires are [lsquo]business as usual[rsquo] in this forest type, not an artifact of fire suppression.

Contrary to popular opinion, previous fire suppression, which was consistently effective from about 1950 through 1972, had only a minimal effect on the large fire event in 1988 []. Reconstruction of historical fires indicates that similar large, high-severity fires also occurred in the early 1700s []. Given the historical range of variability of fire regimes in high- elevation subalpine forests, fire behavior in Yellowstone during 1988, although severe, was neither unusual nor surprising.

Mechanical fuel reduction in subalpine forests would not represent a restoration treatment but rather a departure from the natural range of variability in stand structure.

Given the behavior of fire in Yellowstone in 1988, fuel reduction projects probably will not substantially reduce the frequency, size, or severity of wildfires under extreme weather conditions.

The Yellowstone fires in 1988 revealed that variation in fuel conditions, as measured by stand age and density, had only minimal influence on fire behavior. Therefore, we expect fuel- reduction treatments in high-elevation forests to be generally unsuccessful in reducing fire frequency, severity, and size, given the overriding importance of extreme climate in controlling fire regimes in this zone. Thinning also will not re-store subalpine forests, because they were dense historically and have not changed significantly in response to fire suppression. Thus, fuel-reduction efforts in most Rocky Mountain subalpine forests probably would not effectively mitigate the fire hazard, and these efforts may create new ecological problems by moving the forest structure out-side the historic range of variability.

The proposed action will result in increased fire severity and more rapid fire spread. This common sense is recognized in a news media discussion of the 2017 Eagle Creek fire in Oregon:

Old growth not so easy to burn:

Officials said the fire spread so rapidly on the third and fourth days because it was traveling across lower elevations.

The forests there aren't as thick and as dense as the older growth the fire's edge is encountering now - much of it in the Mark O. Hatfield Wilderness, Whittington said.

Whittington said because there's more cover from the tree canopy, the ground is moister -- and that's caused the fire to slow. Also, bigger trees don't catch fire as easily, he said.

(Emphasis added.) The FS also likes to trot out the premise that tree mortality from native insect activity and other agents of tree mortality increase risk of wildfire. Again, this is not supported by science. Meigs, et al., 2016 found [ldquo]that insects generally reduce the severity of subsequent wildfires. [hellip] By dampening subsequent burn severity, native insects could buffer rather than exacerbate fire regime changes expected due to land use and climate change. In light of these findings, we recommend a precautionary approach when designing and implementing forest

management policies intended to reduce wildfire hazard and increase resilience to global change.[rdquo] [Also see Black, 2005; Black, et al., 2010; DellaSala (undated); Kulakowski (2013); Hanson et

al., 2010; Hart et al., 2015.] And for an ecological perspective from the FS itself, see Rhoades et al., 2012, who state: [ldquo]While much remains to be learned about the current outbreak of mountain pine beetles, researchers are already finding that beetles may impart a characteristic critically lacking in many pine forests today: structural complexity and species diversity.[rdquo] (Emphasis added.)

McClelland (undated) criticizes the aim to achieve desired conditions by the use of mitigation measures calling for retention of specific numbers of certain habitat structures:

The snags per acre approach is not a long-term answer because it concentrates on the products of ecosystem processes rather than the processes themselves. It does not address the most critical issue[mdash]long-term perpetuation of diverse forest habitats, a mosaic pattern which includes stands of old-growth larch. The processes that produce suitable habitat must be retained or reinstated by managers. Snags are the result of these processes (fire, insects, disease, flooding, lightning, etc.).

Castello et al. (1995) discuss issues ignored in chasing static Desired Conditions:

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

Hayward, 1994 states:

Despite increased interest in historical ecology, scientific understanding of the historic abundance and distribution of montane conifer forests in the western United States is not sufficient to indicate how current patterns compare to the past. In particular, knowledge of patterns in distribution and abundance of older age classes of these forests in not available. [hellip]Current efforts to put management impacts into a historic context seem to focus almost exclusively on what amounts to a snapshot of vegetation history[mdash]a documentation of forest conditions near the time when European settlers first began to impact forest structure. [hellip]The value of the historic information lies in the perspective it can provide on the potential variation[hellip] I do not believe that historical ecology, emphasizing static conditions in recent times, say 100 years ago, will provide the complete picture needed to place present conditions in a proper historic context.

Conditions immediately prior to industrial development may have been extraordinary compared to the past 1,000 years or more. Using forest conditions in the 1800s as a baseline, then, could provide a false impression if the baseline is considered a goal to strove toward.

Noss, 2001, believes [ldquo]If the thoughtfully identified critical components and processes of an ecosystem are sustained, there is a high probability that the ecosystem as a whole is sustained.[rdquo] (Emphasis added.) Noss 2001 describes basic ecosystem components (Emphasis added):

Ecosystems have three basic components: composition, structure, and function. Together, they define biodiversity and ecological integrity and provide the foundation on which standards for a sustainable human relationship with the earth might be crafted.

Noss, 2001 goes on to define those basic components (Emphases added):

Composition includes the kinds of species present in an ecosystem and their relative abundances, as well as the composition of plant associations, floras and faunas, and

habitats at broader scales. We might describe the composition of a forest, from individual stands to watersheds and regions.

Structure is the architecture of the forest, which includes the vertical layering and shape of vegetation and its horizontal patchiness at several scales, from within stands (e.g., treefall gaps) to landscape patterns at coarser scales. Structure also includes the presence and abundance of such distinct structural elements as snags (standing dead trees) and downed logs in various size and decay classes.

Function refers to the ecological processes that characterize the ecosystem. These processes are both biotic and abiotic, and include decomposition, nutrient cycling, disturbance, succession, seed dispersal, herbivory, predation, parasitism, pollination, and many others. Evolutionary processes, including mutation, gene flow, and natural selection, are also in the functional category.

Hutto, 1995 also addresses natural processes, referring specifically to fire:

Fire is such an important creator of the ecological variety in Rocky Mountain landscapes that the conservation of biological diversity [required by NFMA] is likely to be accomplished only through the conservation of fire as a process[hellip] Efforts to meet legal mandates to maintain biodiversity should, therefore, be directed toward maintaining processes like fire, which create the variety of vegetative cover types upon which the great variety of wildlife species depend. (Emphases added.)

Noss and Cooperrider (1994) state:

Considering process is fundamental to biodiversity conservation because process determines pattern. Six interrelated categories of ecological processes that biologists and managers must understand in order to effectively conserve biodiversity are (1) energy flows, (2) nutrient cycles, (3) hydrologic cycles, (4) disturbance regimes, (5) equilibrium processes, and (6) feedback effects. (Emphasis added.)

The Environmental Protection Agency (1999) recognizes the primacy of natural processes:

(E)cological processes such as natural disturbance, hydrology, nutrient cycling, biotic interactions, population dynamics, and evolution determine the species composition, habitat structure, and ecological health of every site and landscape. Only through the conservation of ecological processes will it be possible to (1) represent all native ecosystems within the landscape and (2) maintain complete, unfragmented environmental gradients among ecosystems. (Emphasis added.)

Frissell and Bayles (1996) state:

[hellip]The concept of range of natural variability [hellip]suffers from its failure to provide defensible criteria about which factors ranges should be measured. Proponents of the concept assume that a finite set of variables can be used to define the range of ecosystem

behaviors, when ecological science strongly indicates many diverse factors can control and limit biota and natural resource productivity, often in complex, interacting, surprising, and species-specific and time-variant ways. Any simple index for measuring the range of variation will likely exclude some physical and biotic dimensions important for the maintenance of ecological integrity and native species diversity. (Emphases added.)

Forest Service researcher Everett (1994) states:

To prevent loss of future options we need to simultaneously reestablish ecosystem processes and disturbance effects that create and maintain desired sustainable ecosystems, while conserving genetic, species, community, and landscape diversity and long-term site productivity.

[hellip]We must address restoration of ecosystem processes and disturbance effects that create sustainable forests before we can speak to the restoration of stressed sites; otherwise, we will forever treat the symptom and not the problem. [hellip] One of the most significant management impacts on the sustainability of forest ecosystems has been the disruption of ecosystem processes through actions such as fire suppression (Mutch and others 1993), dewatering of streams for irrigation (Wissmar and others 1993), truncation of stand succession by timber harvest (Walstad 1988), and maintaining numbers of desired wildlife species such as elk in excess of historical levels (Irwin and others 1993). Several ecosystem processes are in an altered state because we have interrupted the cycling of biomass through fire suppression or have created different cycling processes through resource extraction (timber harvest, grazing, fish harvest). (Emphases added.)

George and Zack, 2001 [ldquo]recommend that managers: (1) identify the wildlife species they want to target for restoration efforts, (2) consider the size and landscape context of the restoration site and whether it is appropriate for the target species, (3) identify the habitat elements that are necessary for the target species, (4) develop a strategy for restoring those elements and the ecological processes that maintain them, and (5) implement a long-term monitoring program to gauge the success of the restoration efforts.[rdquo] (Emphasis added.) None of this is found in any White Pine analysis of restoration needs.

Collins and Stephens (2007) understand that educating the publicis a prerequisite for restoring the process of wildland fire. This means explaining and embracing the inevitability of wildland fire and teaching about fire ecology. Also, there is a proliferation of information on the worldwide web for property owners, who have the primary responsibility for protecting their homes. See this video by the National Fire Protection Association, for example.

Further, Collins and Stephens (2007) suggest direction to implement restoring the process of fire by educating the public:

(W)hat may be more important than restoring structure is restoring the process of fire (Stephenson 1999). By allowing fire to resume its natural role in limiting density and reducing surface fuels, competition for growing space would be reduced, along with

potential severity in subsequent fires (Fule and Laughlin 2007). As a result, we contend that the forests in Illilouette and Sugarloaf are becoming more resistant to ecosystem perturbations (e.g. insects, disease, drought). This resistance could be important in allowing these forests to cope with projected changes in climate. [hellip] Although it is not ubiquitously applicable, (wildland fire use) could potentially be a cost-effective and ecologically sound tool for [ldquo]treating[rdquo] large areas of forested land. Decisions to continue fire suppression are politically safe in the short term, but ecologically detrimental over the long term. Each time the decision to suppress is made, the risk of a fire escaping and causing damage (social and economic) is essentially deferred to the future. Allowing more natural fires to burn under certain conditions will probably mitigate these risks. If the public is encouraged to; recognize this and to become more tolerant of the direct, near-term consequences (i.e. smoke production, limited access) managers will be able to more effectively use fire as a tool for restoring forests over the long term.

Biologist Payne, 1995 includes a commentary on the kind of hubris represented by the FS[rsquo]s view that it can manipulate and control its way to a restored forest by more intensive management:

One often hears that because humanity[rsquo]s impact has become so great, the rest of life on this planet now relies on us for its succession and that we are going to have to get used to managing natural systems in the future[mdash]the idea being that since we now threaten everything on earth we must take responsibility for holding the fate of everything in our hands. This bespeaks a form of unreality that takes my breath away[hellip] The cost of just finding out enough about the environment to become proper stewards of it[mdash]to say nothing of the costs of acting in such a way as to ameliorate serious problems we already understand, as well as problems about which we haven[rsquo]t a clue[mdash]is utterly prohibitive. And the fact that monitoring must proceed indefinitely means that on economic grounds alone the only possible way to proceed is to face the fact that by far the cheapest means of continuing life on earth as we know it is to curb ourselves instead of trying to take on the proper management of the ecosystems we have so entirely disrupted. (Emphasis added.)

Hutto, 1995 states: [ldquo]Fires are clearly beneficial to numerous bird species, and are apparently necessary for some.[rdquo]

See Attachment 5, which is a collection of news media articles, quoting experts including those in the FS, who do understand the high value of severely burned forest for wildlife and other resources.

The FS fails to disclose or acknowledge the scientific information that indicates severe fires burning over large acreages are normal for these forests, and that fire intensity and severity are dependent much more upon weather than fuels. It[rsquo]s common knowledge by now. If the purpose for a project is built upon false information about ecological functioning, then the predicted effects of the project are not credible. This EA does not comply with NEPA[rsquo]s requirements for scientific integrity.

Huff et al., 1995 state:

In general, rate of spread and flame length were positively correlated with the proportion of area logged (hereafter, area logged) for the sample watersheds. [hellip]The potential rate of spread and intensity of fires associated with recently cut logging residues is high, especially the first year or two as the material decays. High fire-behavior hazards associated with the residues can extend, however, for many years depending on the tree.

Logged areas generally showed a strong association with increased rate of spread and flame length, thereby suggesting that tree harvesting could affect the potential fire behavior within landscapes. In general, rate of spread and flame length were positively correlated with the proportion of area logged in the sample watersheds.

As a by-product of clearcutting, thinning, and other tree-removal activities, activity fuels create both short- and long-term fire hazards to ecosystems. The potential rate of spread and intensity of fires associated with recently cut logging residues is high, especially the first year or two as the material decays. High fire-behavior hazards associated with the residues can extend, however, for many years depending on the tree. Even though these hazards diminish, their influence on fire behavior can linger for up to 30 years in the dry forest ecosystems of eastern Washington and Oregon.

We incorporate DellaSala, et al. (2018), a synopsis of current literature summarizing some of the latest science around top-line wildfire issues, including areas of scientific agreement, disagreement, and ways to coexist with wildfire.

As far as the [ldquo]restoration[rdquo] being alleged to address the impacts of long-term fire suppression, there is no coherent plan for integrating wildland fire back into this ecosystem. Nothing is being changed to learn from the admitted suppression ecological damage. The war against wildland fire, i.e., nature, is ongoing.

The proposed and ongoing management are all about continuing a repressive and suppressive regime, however the FS has never conducted an adequate cumulative effects analysis of forestwide fire suppression despite the vast body of science that has arisen since the Forest Plan was adopted. The [ldquo]plan[rdquo] is clearly to log now, suppress fires continuously, and log again in the future based on the very same [ldquo]need[rdquo] to address the ongoing results of fire suppression.

Odion and DellaSala, 2011 describe this situation: [ldquo][hellip]fire suppression continues unabated, creating a self-reinforcing relationship with fuel treatments which are done in the name of fire suppression. Self-reinforcing relationships create runaway processes and federal funding to stop wildfires now amounts to billions of tax dollars each year.[rdquo]

The FS has never conducted consultation with the USFWS on its forestwide fire management plan, which has clear ramifications for species listed under the Endangered Species Act.

Tingley et al., 2016 note the diversity of habitats following a fire is related to the diversity ofburn severities: [ldquo](W)ithin the decade following fire, different burn severities represent unique habitats whose bird communities show differentiation over time[hellip] Snags are also critical

resources for many bird species after fire. Increasing densities of many bird species after fire[mdash] primarily wood excavators, aerial insectivores, and secondary cavity nesters[mdash]can be directly tied to snag densities[hellip][rdquo]

Similarly, Hutto and Patterson, 2016 state, [ldquo]the variety of burned-forest conditions required by fire-dependent bird species cannot be created through the application of relatively uniform low- severity prescribed fires, through land management practices that serve to reduce fire severity or through post-fire salvage logging, which removes the dead trees required by most disturbance- dependent bird species.[rdquo]

Hutto et al., 2016 urge [ldquo]a more ecologically informed view of severe forest fires[rdquo]:

Public land managers face significant challenges balancing the threats posed by severe fire with legal mandates to conserve wildlife habitat for plant and animal species that are positively associated with recently burned forests. Nevertheless, land managers who wish to maintain biodiversity must find a way to embrace a fire-use plan that allows for the presence of all fire severities in places where a historical mixed-severity fire regime creates conditions needed by native species while protecting homes and lives at the same time.

This balancing act can be best performed by managing fire along a continuum that spans from aggressive prevention and suppression near designated human settlement areas to active [ldquo]ecological fire management[rdquo] (Ingalsbee 2015) in places farther removed from such areas. This could not only save considerable dollars in fire-fighting by restricting such activity to near settlements (Ingalsbee and Raja 2015), but it would serve to retain (in the absence of salvage logging, of course) the ecologically important disturbance process over most of our public land while at the same time reducing the potential for firefighter fatalities (Moritz et al. 2014). Severe fire is not ecologically appropriate everywhere, of course, but the potential ecological costs associated with prefire fuels reduction, fire suppression, and postfire harvest activity in forests born of mixed-severity fire need to considered much more seriously if we want to maintain those species and processes that occur only where dense, mature forests are periodically allowed to burn severely, as they have for millennia.

Ultimately the EA reflects an overriding bias favoring vegetation manipulation and resource extraction via [ldquo]management[rdquo] needed to [ldquo]move toward[rdquo] some selected desired conditions, along the way neglecting the ecological processes driving these ecosystems. Essentially the FS rigs the game, as its desired conditions would only be achievable by resource extractive activities. But since desired conditions must be maintained through repeated management/manipulation the management paradigm conflicts with natural processes[mdash]the real drivers of the ecosystem.

Since the FS[rsquo]s Desired Conditions must be maintained through repeated management/manipulation, the management paradigm conflicts with natural processes[mdash]the evolutionary drivers of the ecosystem. This is evident by the habitat types identified by Cooper et al. 1991, which identify the climax vegetation when climate drives the ecological process and the Forest Service doesn[rsquo]t set arbitrary static numbers.

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

See David Erickson[rsquo]s news article [ldquo]Experts: more logging and thinning to battle wildfires might just burnt taxpayer dollars[rdquo]. It cites testimony to Congress from scientist Tania Schoennagel (Schoennagel, 2017.)

We likewise incorporate Scientists Letter-Wildfire, 2018, signed by over 200 scientists.

The EA fails to present an analysis of the cumulative effects of livestock grazing on fire regimes. USDA Forest Service 2012c states:

Fire regime condition class ... is used to describe the degree of departure from the historic fire regimes that results from alterations of key ecosystem components such as composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, grazing, introduction and establishment of nonnative plant species, insects or disease (introduced or native), or other past management activities. (Id., emphasis added.)

The EA primarily discusses fuel conditions only in the areas proposed for treatment, yet wildland fire operates beyond artificial ownership or other boundaries. In regards to the proper cumulative effects analysis area for fire risk, Finney and Cohen (2003) discuss the concept of a [ldquo]fireshed involving a wide area around the community (for many miles that include areas that fires can come from).[rdquo] In other words, for any given entity that would apparently have its risk of fire reduced by the proposed project (or affected cumulatively from past, ongoing, or foreseeable actions on land of all ownerships within this [ldquo]fireshed[rdquo])[mdash]just how effective would fuel reduction be? The EA fails to include a thorough discussion and detailed disclosure of the current fuel situation within the fireshed within and outside the proposed treatment units, making it impossible to make scientifically supportable and reasonable conclusions about the manner and degree to which fire behavior would be changed by the project.

The EA also fails to deal with the fuels issue on the appropriate temporal scale. How landscape- level fire behavior at any period except for very shortly after treatment would be changed or improved is ignored.

Rhodes (2007) states: [ldquo]The transient effects of treatments on forest, coupled with the relatively low probability of higher-severity fire, makes it unlikely that fire will affect treated areas while fuel levels are reduced.[rdquo] (Internal citations omitted.) And Rhodes also points out that using mechanical fuel treatments (MFT) to restore natural fire regimes must take into consideration the root causes of the alleged problem:

In order to be ultimately effective at helping to restore natural fire regimes, fuel treatments

must be part of wider efforts to address the root causes of the alteration in fire behavior. At best, MFT can only address symptoms of fire regime alteration. Evidence indicates that primary causes of altered fire regimes in some forests include changes in fuel character caused by the ongoing effects and legacy of land management activities. These activities include logging, post-disturbance tree planting, livestock grazing, and fire suppression.

Many of these activities remain in operation over large areas. Therefore, unless treatments are accompanied by the elimination of or sharp reduction in these activities and their impacts in forests where the fire regime has been altered, MFT alone will not restore fire regimes. (Internal citations omitted.)

Cohen, 1999a recognizes [ldquo]the imperative to separate the problem of the wildland fire threat to homes from the problem of ecosystem sustainability due to changes in wildland fuels[rdquo] (Id.). In regards to the latter[mdash]ecosystem sustainability[mdash]Cohen and Butler (2005) state:

Realizing that wildland fires are inevitable should urge us to recognize that excluding wildfire does not eliminate fire, it unintentionally selects for only those occurrences that defy our suppression capability[mdash]the extreme wildfires that are continuous over extensive areas. If we wish to avoid these extensive wildfires and restore fire to a more normal ecological condition, our only choice is to allow fire occurrence under conditions other than extremes. Our choices become ones of compatibility with the inevitable fire occurrences rather than ones of attempted exclusion. (Emphasis added.)

In their conclusion, Graham, et al., 1999a state:

Depending on intensity, thinning from below and possibly free thinning can most effectively alter fire behavior by reducing crown bulk density, increasing crown base height, and changing species composition to lighter crowned and fire-adapted species. Such intermediate treatments can reduce the severity and intensity of wildfires for a given set of physical and weather variables. But crown and selection thinnings would not reduce crown fire potential. (Emphasis added.)

The EA does not disclose the project logging impacts on the rate of fire spread. Graham, et al., 1999a point out that fire modeling indicates:

For example, the 20-foot wind speed14 must exceed 50 miles per hour for midflame wind speeds to reach 5 miles per hour within a dense Stand (0.1 adjustment factor). In contrast, in an open stand (0.3 adjustment factor), the same midflame wind speeds would occur at only a 16-mile-per-hour wind at 20 feet.

The EA also fails to recognize the implications of how the fire regime is changing due to climate change.

And many direct and indirect effects of fire suppression are also ignored in the EA as well as in the programmatic context. For example, Ingalsbee, 2004 describes the direct, indirect, and cumulative environmental impacts of firefighting:

Constructing firelines by handcrews or heavy equipment results in a number of direct environmental impacts: it kills and removes vegetation; displaces, compacts, and erodes soil; and degrades water quality. When dozerlines are cut into roadless areas they also create long-term visual scars that can ruin the wilderness experience of roadless area recreationists. Site-specific impacts of firelines may be highly significant, especially for interior-dwelling wildlife species sensitive to fragmentation and edge effects.

...Another component of fire suppression involves tree cutting and vegetation removal. Both small-diameter understory and large-diameter overstory trees are felled to construct firelines, helispots, and safety zones.

...A host of different toxic chemical fire retardants are used during fire suppression operations. Concentrated doses of retardant in aquatic habitats can immediately kill fish, or lead to algae blooms that kill fish over time. Some retardants degrade into cyanide at levels deadly to amphibians. When dumped on the ground, the fertilizer in retardant can stimulate the growth of invasive weeds that can enter remote sites from seeds transported inadvertently by suppression crews and their equipment.

...One of the many paradoxes of fire suppression is that it involves a considerable amount of human-caused fire reintroduction under the philosophy of "fighting fire with fire." The most routine form of suppression firing, "burnout," occurs along nearly every linear foot of perimeter fireline. Another form of suppression firing, "backfiring," occurs when firefighters ignite a high-intensity fire near a wildfire's flaming edge, with or without a secured containment line. In the "kill zone" between a burnout/backfire and the wildfire edge, radiant heat intensity can reach peak levels, causing extreme severity effects and high mortality of wildlife by entrapping them between two high-intensity flame fronts.

...Firelines, especially dozerlines, can become new "ghost" roads that enable unauthorized or illegal OHV users to drive into roadless areas. These OHVs create further soil and noise disturbance, can spread garbage and invasive weeds, and increase the risk of accidental human-caused fires.

...Roads that have been blockaded, decommissioned, or obliterated in order to protect wildlife or other natural resource values are often reopened for firefighter vehicle access or use as firelines.

...Both vegetation removal and soil disturbance by wildfire and suppression activities can create ideal conditions for the spread of invasive weeds, which can significantly alter the native species composition of ecosystems, and in some cases can change the natural fire regime to a more fire-prone condition. Firefighters and their vehicles can be vectors for transporting invasive weed seeds deep into previously uninfested wildlands.

...Natural meadows are attractive sites for locating firelines, helispots, safety zones, and fire camps, but these suppression activities can cause significant, long-term damage to meadow habitats.

The FS does not disclose scientifically-acknowledged limitations of the use of Fire Regime Condition Classes. Fire Regime Condition Class is a metric that estimates the departure of the forest from historic fire processes and vegetation conditions. Fire regime condition class is derived by comparing current conditions to an estimate of the historical conditions that existed before significant Euro-American settlement. The EA does not disclose the limitations of this methodology. This method likely has very limited accuracy and tends to overestimate the risk of higher-severity fire posed by fuel loads, as documented by studies of recent fires (Odion and Hanson, 2006).

Those researchers state:

Condition Class, was not effective in identifying locations of high-severity fire. [hellip] In short, Condition Class identified nearly all forests as being at high risk of burning with a dramatic increase in fire severity compared to past fires. Instead, we found that the forests under investigation were at low risk for burning at high-severity, especially when both spatial and temporal patterns of fire are considered.

Another critique is found in Rhodes (2007) who states:

Several of the biases [hellip]are embodied in the Fire Regime Condition Class (FRCC) approach (Hann and Bunell, 2001), which is widely used to provide an index of the potential for uncharacteristically severe fire and fire regime alteration. The FRCC relies on of estimates of mean fire intervals, but does not require that they be estimated on the basis of site- specific historical data. It emphasizes fire scar data, but does not require its collection and analysis on a site-specific basis. The FRCC[rsquo]s analysis of departure from natural fire regimes also relies on estimates of how many estimated mean fire intervals may have been skipped. The method does not require identification and consideration of fire-free intervals in site-specific historic record. Notably, a recent study that examined the correlation of FRCC estimates of likely fire behavior with actual fire behavior in several large fires recently burning the Sierra Nevada in California concluded: [ldquo][Fire Regime] Condition Class was not able to predict patterns of high-severity fire.. Condition Class identified

nearly all forests as being at high risk of burning with a dramatic increase in fire severity compared to past fires. Instead, we found that the forests under investigation were at low risk for burning at high-severity, especially when both spatial and temporal patterns of fire are considered.[rdquo] (Odion and Hanson, 2006.) These results corroborate that FRCC is biased toward overestimating the alteration of fire regimes and the likelihood of areas burning at uncharacteristically high severity if affected by fire. Therefore, in aggregate there is medium degree of certainty that the FRCC is biased toward overestimating departures from natural fire regimes and the propensity of forests to burn at higher severity when affected by fire.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that remedies the above noted analytic and scientific deficiencies.

CUMULATIVE EFFECTS OF LIVESTOCK GRAZING

Impacts from livestock grazing were raised in FOC PA comments at p. 13. FOC/AWR et al. comments on the Draft Revised Forest Plan and Draft Environmental Impact Statement also raise this issue, at pp. 346-369, and this objection incorporates those comments.

The EA discloses, [ldquo]The project lies within a portion of American River grazing allotment where 115 cow/calf pairs are permitted to graze from June 17 to October 2. The area of the allotment where the Green Horse proposed action would occur is usually grazed during the fall months of the grazing season.[rdquo]

We incorporate into this objection the scientific opinion as expressed in Scientists Letter (2011) [Livestock Grazing Comments on National Forest System Land Management Planning Draft Programmatic Environmental Impact Statement (DEIS)].

It is not scientifically defensible to engage in [ldquo]ecosystem restoration[rdquo] via timber harvest in an area already significantly impacted by ongoing livestock grazing without including grazing in a comprehensive environmental analysis including a full range of ecological alternatives that accounts for the cumulative impacts to the degraded ecosystem from historic timber harvest, roads, fire suppression, climate change and livestock grazing.

The most immediate progress in healing damaged riparian areas is made under rest from livestock grazing (Platts, 1991), and studies of larger-sized livestock exclosures confirm that exclusion promotes more rapid recovery of damaged riparian areas (Duff, 1977; Belsky et al., 1999).

There is no analysis in the Green Horse EA or other document disclosing existing conditions in the American River grazing allotment, specific to impacts caused by livestock in the allotment. The EA states, [ldquo]Direct and indirect effects were analyzed within the Green Horse project area and cumulative effects were analyzed within the entire American River allotment.[rdquo] Yet the EA doesn[rsquo]t even show a map with allotment boundaries or list the affected acres in the Green Horse project area.

The EA[rsquo]s analysis is essentially about how the Green Horse timber sale project would impact management of livestock grazing in the allotment[mdash]not much is analyzed or disclosed on how this project and livestock grazing affect other resources cumulatively.

The EA states, [ldquo]the improved forage in harvest areas will serve to draw livestock away from some of the more sensitive areas where rare species and suitable habitat are found.[rdquo] However, the subject of how livestock are currently affecting these sensitive areas, rare species, and suitable habitat is hardly broached.

Impacts of continued grazing in the analysis area will include continued degradation of riparian and upland habitats; aquatic species habitats; soil erosion; invasion of weedy species; loss of fish and wildlife habitat and numbers; altered fire cycles and accelerated fragmentation of habitat; and impairment of the aesthetic, recreational and scientific experiences of public lands users.

Clearing trees and other wood through logging and burning creates openings and corridors for expanding and intensifying cattle impacts into previously less accessible areas of the streams, drainage arteries and watershed uplands.

We find it difficult to understand how increasing cattle access to streams, riparian areas and other areas of dense trees, while increasing forage in those opened areas via prescribed burning and [ldquo]mechanical treatments[rdquo] constitutes [ldquo]restoration[rdquo] since what will also occur is spreading the weeds, soil damage, and other direct impacts of livestock into areas they don[rsquo]t currently access.

The EA fails to analyze and disclose the extent, degree, and significance of livestock grazing (and associated infrastructure and activities) impacts on other resources.

Belsky and Gelbard, 2000 is a literature review of livestock as contributing to noxious weed spread.

The interactions between the invasive grass cheatgrass and fire regimes is a positive feedback system which has led to very extensive infestation in the western U.S. Wildfire and this highly flammable grass feed off each other. The plant grows well in areas that have been disturbed, so fire generally results in more cheatgrass, which results in more fire, which again results in more cheatgrass. Livestock grazing corresponds with increased cheatgrass occurrence and prevalence regardless of variation in climate, topography, or community composition (Williamson et al., 2019).

Belsky et al., 1999 is a literature review of peer-reviewed studies concerning effects of livestock grazing on water resources:

Livestock grazing was found to negatively affect water quality and seasonal quantity, stream channel morphology, hydrology, riparian zone soils, instream and streambank vegetation, and aquatic and riparian wildlife[hellip] through direct impacts of cattle on riparian areas and aquatic habitats, as well as indirect and cumulative effects from disturbance and impairment to the watershed uplands and drainage network. An extensive body of scientific literature has developed concerning the harmful effects of domestic livestock grazing on western public lands, on the environmental effects of deforestation, and climate change stress on ecosystems and ecosystem processes.

Livestock grazing would work hand in hand with other agency policies to create the adverse effects of fire suppression claimed in the EA. Belsky and Blumenthal, 1997 investigate these impacts livestock grazing causes to stand dynamics and soils of upland forests of the Interior West.

Cumulatively, rilling, gullying, and soil erosion will accelerate due to logging, burning, and continued chronic grazing stress and overarching climate stress. Once disturbed, soils which may take millennia to form in arid lands like this can wash away in a single thunderstorm or snowmelt runoff event, or be eroded by winds. Ephemeral and intermittent drainages, including those located in areas of very erodible or unprotected soils, may suffer significant harmful

impacts from livestock grazing and trampling. During spring runoff or thunderstorm events, intermittent drainages carry large flows of water, sediments, and debris.

Protective vegetative cover in uplands is usually the most important management variable affecting surface runoff and erosion from uplands that deliver runoff, sediment, and bacteria to these drainages. Extensive soil disturbance from logging, skidding, burning, bulldozing roads, and other project activities combine cumulatively with chronic grazing disturbance stressors by creating access for cattle to vacant allotment areas and previously inaccessible riparian zones.

Scientific studies have found significant reductions in runoff and sediment yield related to livestock grazing changes (Lusby, 1979).

Extensive deforestation and bulldozing roads exacerbate climate change effects [ndash] causing hotter, dry, windier local site conditions, changing local microclimate conditions. Cleared areas lose protective vegetation cover to buffer extreme rainfall or other weather events. With earlier snowmelt and runoff predicted under climate change, watersheds dry out earlier, lengthening the fire season and perennial flows are reduced. Cattle cause soil and microbiotic crust disturbance accelerating site drying and erosion, soil compaction and other impacts. This reduces the capacity of the watershed and drainage networks to absorb and slowly release water in sustainable perennial flows. Soils disturbed by logging, skidding, road bulldozing, and burning, considered cumulatively with ongoing cattle grazing and trampling disturbances, will be prone to rapid snowmelt runoff and erosion into drainage networks. Drainages subject to these kinds of cumulative ecological stressors increasingly erode, downcut, suffer accelerated runoff, and lose water holding capacity.

With the advent of climate change, air temperature increases, altered precipitation patterns, and drought periods are expected to become more frequent. One effective means of ameliorating the effects of climate change on ecosystems is to reduce environmental stressors under management control, such as land and water uses (Beschta et al., 2012). Climate change and ungulates, singly and in concert, influence ecosystems at the most fundamental levels by affecting soils and hydrologic processes. These effects, in turn, influence many other ecosystem components and processes - nutrient and energy cycles; reproduction, survival, and abundance of terrestrial and aquatic species; and community structure and composition. Moreover, by altering so many factors crucial to ecosystem functioning, the combined effects of a changing climate and ungulate use can affect biodiversity at scales ranging from species to ecosystems and limit the capability of large areas to supply ecosystem services (Christensen and others, 1996; Millenium Ecosystem Assessment, 2005b; Beschta et al., 2012).Gerber, et al., 2013 state, [ldquo]Livestock producers, which include meat and dairy farming, account for about 15 percent of greenhouse gas emissions around the world. That[rsquo]s more than all the world[rsquo]s exhaust-belching cars, buses, boats, and trains combined.[rdquo]

Gerber, et al., 2013 state, [ldquo]Livestock producers, which include meat and dairy farming, account for about 15 percent of greenhouse gas emissions around the world. That[rsquo]s more than all the world[rsquo]s exhaust-belching cars, buses, boats, and trains combined.[rdquo]

Saunois et al., 2016a note [ldquo]the recent rapid rise in global methane concentrations is predominantly biogenic[mdash]most likely from agriculture[mdash]with smaller contributions from fossil fuel use and possibly wetlands. [hellip]Methane mitigation offers rapid climate benefits and economic, health and agricultural co-benefits that are highly complementary to CO_2 mitigation.[rdquo] (Also see Saunois et al., 2016b; Gerber et al., 2013; and the Grist articles [ldquo]Why isn[rsquo]t the U.S. countingmeat producers[rsquo] climate emissions?[rdquo] and [ldquo]Cattle grazing is a climate disaster, and you[rsquo]re payingfor it[rdquo] and Stanford News article [ldquo]Methane from food production could be wildcard in

combating climate change, Stanford scientist says[rdquo].)

Ripple et al. 2014 provide some data and point out the opportunities available for greenhouse gas reductions via change in livestock policy.

Beschta et al., 2012 provide a scientific basis for expecting significant environmental damage from livestock grazing with the changing climate:

* Climate impacts are compounded from heavy use by livestock and other grazing ungulates, which cause soil erosion, compaction, and dust generation; stream degradation; higher water temperatures and pollution; loss of habitat for fish, birds and amphibians; and desertification.
* Encroachment of woody shrubs at the expense of native grasses and other plants can occur in grazed areas, affecting pollinators, birds, small mammals and other native wildlife.
* Livestock grazing and trampling degrades soil fertility, stability and hydrology, and makes it vulnerable to wind erosion. This in turn adds sediments, nutrients and pathogens to western streams.
* Water developments and diversion for livestock can reduce streamflows and increase water temperatures, degrading habitat for fish and aquatic invertebrates.
* The advent of climate change has significantly added to historic and contemporary problems that result from cattle and sheep ranching.

We present more discussion by Beschta et al., 2012 in the objection section on Climate Change and Carbon Sequestration.

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

SCIENTIFIC INTEGRITY

FOC comments on the PA discusses science throughout, starting on page 1. FOC/AWR et al. comments on the Draft Revised Forest Plan and Draft Environmental Impact Statement also raise this issue, at pp. 12-25, and this objection incorporates those comments.

The FS does not consider the statistical reliability of the data the it relies upon for project analyses. Since [ldquo]an instrument[rsquo]s data must be reliable if they are valid[rdquo] (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 [ldquo]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.[rdquo] And Larson et al. 2011 state:

[ldquo]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.[rdquo]

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: [ldquo]To what extent can we say the data are consistent?[rdquo] [hellip](T)he notion of consistency is at the heart of the matter in each case.

[hellip](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, the FS criticized a report provided by plaintiffs, stating [ldquo](Its) purported [lsquo]statistical analysis[rsquo] reports no confidence intervals, standard deviations or standard errors in association with its conclusions.[rdquo]

As Huck (2000) states, the issue of [ldquo]standard deviations or standard errors[rdquo] 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 [ldquo]standard deviations or standard errors[rdquo] 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, [ldquo]USDA-Objectivity of Statistical and Financial Information[rdquo] is instructional on this topic.

The next level of scientific integrity is the notion of [ldquo]validity.[rdquo] 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 [ldquo]content validity,[rdquo] 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 has not disclosed the limitations of all models the agency relies upon for the Green Horse project analyses, which would begin to address model validity.

In fact, the Forest Plan requires the FS to validate the models it uses. In Chapter V, the Forest

Plan monitoring plan notes a [ldquo]NFMA Requirement 36 CFR 219.12(K)(2)[rdquo] and the [ldquo]Action () [hellip][rdquo] is [ldquo]Validation of resource prediction models; wildlife, water quality, fisheries, timber.[rdquo] Again,

the FS has not validated such models.

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

In the NPCNF[rsquo]s Clear Creek Integrated Restoration Project FEIS, the FS defines [ldquo]model[rdquo] as [ldquo]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.[rdquo] (FEIS at G-14.) From www.thefreedictionary.com:

Empirical [ndash] 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 [ldquo]theoretical[rdquo] 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, [ldquo]Any approach to ecological modelling has little merit if the predictions cannot be, or are not, assessed for their accuracy using independent data.[rdquo] This corresponds directly to the concept of [ldquo]validity[rdquo] as discussed by Huck, 2000: [ldquo](A) measuring instrument is valid to the extent that it measures what it purports to measure.[rdquo]

However, there is no evidence that the FS has performed validation of any the models for the way they were used to support your analyses. There is no documentation of someone using observation or experiment to support the model hypotheses.

As Huck, (2000) explains, the degree of [ldquo]content validity,[rdquo] or accuracy of the model or methodology is established by utilizing other experts. This, in turn, demonstrates the necessity for utilizing the peer review process. The validity of the various models utilized in the EA[rsquo]s analyses have, by and large, not been established for how agency utilizes them. No studies are cited which establishes their content validity, and no independent expert peer review process of the models has occurred.

Larson et al. 2011 state:

Habitat models are developed to satisfy a variety of objectives..... A basic objective of most

habitat models is to predict some aspect of a wildlife population (e.g., presence, density, survival), so assessing predictive ability is a critical component of model validation. This requires wildlife-use data that are independent of those from which the model was developed It is informative not only to evaluate model predictions with new

observations from the original study site but also to evaluate predictions in new geographic areas.

(Internal citations omitted, emphasis added). USDA Forest Service, 2000c (a FS forest plan monitoring and evaluation report) provides an example of the agency acknowledging the

problems of data that are old and incomplete, leading to the limitation of models the FS typically uses for wildlife analyses for old-growth wildlife habitats:

Habitat modeling based on the timber stand database has its limitations: the data are, on average, 15 years old; canopy closure estimates are inaccurate; and data do not exist for the abundance or distribution of snags or down woody material[hellip] .

In the above case, the FS expert believed the data were unreliable, limiting the usefulness and applicability (validity) of the model.

USDA Forest Service, 1994b states [ldquo]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.[rdquo] (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[mdash]that is, evaluating their validity. Three of their criteria are especially relevant to this discussion:

The EA violates NEPA because the FS has not insured the reliability of data relied upon by the EA's models, and the FS has not validated the models for the way the analyses utilizes them.

The documents, [ldquo]USDA-Objectivity of Regulatory Information[rdquo] and [ldquo]USDA-Objectivity of Scientific Research Information[rdquo] 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 [ldquo]independent scientific review of proposed conservation strategies[hellip][rdquo] The interpretation of scientific information the analyses do cite is problematic as we discuss throughout this objection.

The FS has not insured the reliability of data input to the models, the FS has not validated the models for the way the FS utilizes them, and the FS has overly narrowed the information it considers to be best available science.

A Science Consistency Review is long overdue for the Forest Plan (See Guldin et al., 2003, 2003b). The FS prepared Guldin et al. (2003) which:

...outlines a process called the science consistency review, which can be used to evaluate the use of scientific information in land management decisions. Developed with specific reference to land management decisions in the U.S. Department of Agriculture Forest Service, the process involves assembling a team of reviewers under a review administrator to constructively criticize draft analysis and decision documents. Reviews are then forwarded to the responsible official, whose team of technical experts may revise the draft documents in response to reviewer concerns. The process is designed to proceed iteratively until reviewers are satisfied that key elements are consistent with available scientific information.

Darimont, et al., 2018 advocate for more transparency in the context of government conclusions about wildlife populations, stating:

Increased scrutiny could pressure governments to present wildlife data and policies crafted by incorporating key components of science: transparent methods, reliable estimates (and their associated uncertainties), and intelligible decisions emerging from both of them.
Minimally, if it is accepted that governments may always draw on politics, new
oversight by scientists would allow clearer demarcation between where the population data begin and end in policy formation (Creel et al. 2016b; Mitchell et al. 2016).

Undeniably, social dimensions of management (i.e., impacts on livelihoods and human[ndash] 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[rsquo]s length now have the opportunity and responsibility to scrutinize government wildlife policies and the data underlying them. Such scrutiny could support transparent, adaptive, and ultimately trustworthy policy that could be generated and defended by governments. (Emphasis added.)

The Committee of Scientists (1999) state:

To ensure the development of scientifically credible conservation strategies, the Committee recommends a process that includes (1) scientific involvement in the selection of focal species, in the development of measures of species viability and ecological integrity, and in the definition of key elements of conservation strategies; (2) independent scientific review of proposed conservation strategies before plans are published; (3) scientific involvement in designing monitoring protocols and adaptive management; and

(4) a national scientific committee to advise the Chief of the Forest Service on scientific issues in assessment and planning.

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

TEMPORARY ROADS

The Forest Service proposes to construct 2.3 miles of temporary roads to implement the proposed action, explaining they [ldquo]would be constructed on or near ridge tops with no stream crossings and would be hydrologically disconnected from any stream network (Table 2). All temporary roads would be obliterated after use. Draft DN at 5. There is absolutely no map in the EA clearly showing the locations of the temporary road segments.

We raised concerns with construction and removal of temporary roads in our previous comments (pp. 7 [ndash] 8), and the Forest Service failed to adequately respond. Much our concerns rest with the poor track record the Forest Service has tracking temporary roads (since the INFRA database only includes system roads), preventing unauthorized use during and after project implementation, and failures to properly remove temporary roads once they are no longer needed. While the FS asserts that all temporary roads will be obliterated after use, the agency fails to include such direction in its mitigation measures or specify that obliteration shall mean

treatments will fully recontour the road template. Rather, the FS states, [ldquo]Obliteration would eliminate future motorized use of the road, and would restore hydrological function and soil productivity by ensuring that the road has adequate drainage and ground cover to prevent erosion (Table 2 and Figure 1).[rdquo] Id. It is important to note here Figure 1 is a map showing temporary road locations, and Table 2 listing mitigation measures only includes one mention of temporary

roads directing they be graveled to protect riparian buffers. Nowhere does it require temporary roads be fully recontoured. The omission is particularly glaring as roads the FS builds are often not really temporary. Once built, they persist on the landscape long after [ldquo]obliteration[rdquo] treatments often leaving remnants in the form of [ldquo]templates[rdquo] or [ldquo]prisms,[rdquo] which make them available to be recommissioned, which means their impacts on the landscape are not temporary.

Furthermore, the FS does not disclose whether or not these temporary roads are being built on existing road prisms, which the agency typically uses when available. Often these road prisms were a result of decommissioned or abandoned temporary roads or decommissioned Forest System roads. Either way, we object to any use of existing road prisms since it undermines the purpose of decommissioning roads and sets their recovery back to the beginning.

FOC explained it this way in our Objection to the End Of The World Project:

The FS mechanism for decommissioning roads will likely not work, and the EA does not have a back-up plan for road decommissioning. The Forest Service stated on EA p. 7, [ldquo]These road prisms will be obliterated/recontoured after use. (Implemented through mandatory contract provisions B6.63, C6.632#, and C6.633#).[rdquo] However, road aren[rsquo]t always decommissioned through [ldquo]mandatory contract provisions[rdquo] when the Forest Service is also doing prescribed burns. Even though the Forest Service cited contract provision B6.63, the following provision, B6.631, directs the logger to leave temporary roads open for Forest Service [ldquo]treatment.[rdquo] C6.632# and C6.633# are equally ineffective, as they only require the logger to obliterate or scarify [ldquo]unless otherwise agreed[rdquo] or [ldquo]unless waived in writing.[rdquo] When that happens, the contract will end, and the timber company will be released of further obligations while the temporary road is still on the landscape. Then there will be no mechanism to decommission it.

FOC observed this unfold during implementation of the Orogrande Community Protection Project, where there is now a road in a roadless area. A temporary road was proposed, approved, and punched into a roadless area. The mechanism by which the FS intended to decommission the temporary road, as outlined by the EA, was by logging contract. However, the actual Orogrande logging contract re-numbered the temporary road and only required the logging contractor to decommission a third of that temporary road[mdash]2/3 of the temporary road was to remain open for FS [ldquo]treatment.[rdquo] The logging contract terminated, releasing the logging company from all obligations. And presently 2/3 of the temporary road (that the FS said would be decommissioned by logging contract) still exists and there are now no definite plans to decommission it. Friends of the Clearwater recently emailed a letter describing this issue to the regional forester and to the forest supervisor, and the full details of how temporary roads are forgotten are described in that letter.15 We incorporate it here because the same narrative is poised to play out again. Because the Green Horse EA does not account for how this could easily play out in the implementation of this project, it omits discussion of a significant and important set of potential impacts.

Clearly, [ldquo]temporary[rdquo] is practically meaningless given that typical [ldquo]projects[rdquo] (timber sales) are of long duration. So while EA states, [ldquo](Temporary) roads would be hydrologically stabilized when not used and obliterated once fuels treatment and reforestation needs are met[rdquo] it also states [ldquo]timber harvest activities described below may [hellip]occur over approximately the next 12 years.[rdquo]

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

TRAVEL MANAGEMENT

The Green Horse project area contains 59 miles of road of which 43 miles are graveled with the remainder having a dirt surface. EA at 57. The FS states that under the selected alternative the Forest Service will recondition approximately 26 miles and reconstruct an additional 19 miles of system roads in order to implement the project activities. Draft DN at 2. An additional 6 miles of road would receive reconditioning to improve watershed health. Altogether, the FS will treat 51 miles of system road, leaving 8 miles in the existing condition.

Our comments raised concerns regarding roads, including the direct, indirect and cumulative impacts of roads on wildlife and other resources. The FS did not explain how the analyses were consistent with the Travel Management Regulations (36 CFR 212) Subpart A (hereafter [ldquo]TMR Subpart A[rdquo]) requirement to conduct a science-based analysisto identify the minimum road system needed to manage the Forest ecologically sustainably and within expected budgets.

Friends of the Clearwater's August 29, 2014 Travel Analysis letter is incorporated within this Objection.

Applicable statutory and regulatory requirements should shape a project[rsquo]s statement of purpose and need. When the agency takes an action [ldquo]pursuant to a specific statute, the statutory objectives of the project serve as a guide by which to determine the reasonableness of objectives outlined in an EIS.[rdquo] Westlands Water Dist. v. U.S. Dept. of Interior, 376 F.3d 853, 866 (9th Cir. 2004). Under subpart A of its travel rule, the FS has a substantive duty to address its over-sized road system. See 36 C.F.R. [sect] 212.5. Identifying a resilient future road system is one of the most important endeavors the Forest Service can undertake to restore aquatic systems and wildlife habitat, facilitate adaptation to climate change, ensure reliable recreational access, and operate within budgetary constraints. This underlying substantive duty must inform the scope of, and be included in, the agency[rsquo]s NEPA analysis. After more than 15 years since finalizing the subpart A rules, the Forest Service can no longer delay in addressing this duty. Yet, the FS fails to incorporate this duty within the Green Horse project[rsquo]s purpose and need. In fact, the agency[rsquo]s response to our comment was that the project-level roads analysis (we assume travel analysis here per FSH 7706.55 Ch. 20) did not identify any unneeded roads. EA at 13. This suggests the existing road system is in fact the minimum road system, but the FS does not claim so in its draft decision and therefore the Green Horse project still fails to fulfill the agency[rsquo]s obligations under the TMR Subpart A. Further, it is arbitrary and capricious for the agency to so narrowly constrain the Green Horse[rsquo]s purpose and need so as to preclude analyzing an alternative that satisfies its duties under the TMR Subpart A. Should the FS revise its decision to include identification of the minimum road system, then it needs to address the numerous deficiencies in its project analysis and demonstrate how the minimum system reflects anticipated funding and minimizes adverse impacts associated with construction, reconstruction, maintenance and decommissioning of roads. Correcting systemic analysis deficiencies with the roads analysis is also necessary to comply with NEPA.

In particular, the FS states the following:

Outside of temporary road construction, road activities that consist of reconstruction, intensive maintenance and road conditioning, and the increased traffic of log haul will have the greatest potential to deliver sediment into live water.

EA at 53. Yet, the FS failed to quantify the potential sedimentation from each of these actions for each year the project activities would occur. This is especially concerning in regards to sedimentation from log hauling as those would occur throughout the entire project period. The one place where the agency disclosed potential sediment yield was for cumulative effects, but that was limited to just the year 2020 and failed to quantify road-related sedimentation for years thereafter. In fact, the FS asserts for the O[rsquo]Hare Creek Subwatershed that the proposed actions

will have no direct or indirect impact on the water quality of the streams within the subwatershed.

Looking more closely, the agency[rsquo]s Watershed Condition Framework classifies the subwatershed as functioning properly, but the road/trail indicator ranks poor. See Watershed Condition Framework Interactive Viewer.16 The American Upper American River Subwatershed is functioning at risk with a poor ranking for the water quality indicator and only a fair ranking for the road/trail indicator. The Forest Service failed to properly disclose the current watershed conditions for these and other subwatersheds in the project area, and failed to disclose how those conditions would change under the proposed action.

Over-reliance on BMPs and design features

Much of the agency[rsquo]s lack of analysis stems from its over-reliance on Best Management Practices and project design features. The FS states the following:

In general, the highest risk for direct sedimentation into live water will be during road maintenance/reconstruction work including actions like cleaning and opening ditches and installing or improving drainage features such as culverts, water bars, or cross-drains.

There will be sediment delivery likely during these work periods; however, the efficacy of BMPs and design features after roads are brought to standard should prevent chronic sedimentation. The Aquatics section details research related to BMP efficacy.

EA at 54. The agency further asserts [ldquo][i]mplementation of project design features, adherence to best management practices, and maintenance of PACFISH buffers would reduce potential erosion and further limit the risk of sediment reaching streams (document 11-004).[rdquo] Id. at 56. Had the FS provided an opportunity to comment on the draft EA before issuing its draft decision, then Guardians and others would have had an opportunity to explain that the agency cannot rely on BMPs or design features as a rationale to forego proper analysis or demonstrate compliance with the Clean Water Act. Yet, the EA contains numerous references to those protection measures rather than properly disclose potential environmental consequences under the actionalternative. WildEarth Guardians, 2020 is a report titled, [ldquo]The Environmental Consequences of Forest Roads and Achieving a Sustainable Road System (March 2020).[rdquo] Section III of this report details the inconsistencies and ineffectiveness of utilizing mitigation measures, which supports the need for more detailed analysis in an EIS to support the FS's reliance on project design features for the Green Horse project.

Specifically, when considering how effective BMPs are at controlling nonpoint pollution on roads, both the rate of implementation, and their effectiveness should both be considered. The Forest Service 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 [ldquo]fully implemented,[rdquo] [ldquo]mostly implemented,[rdquo] [ldquo]marginally implemented,[rdquo] [ldquo]not implemented,[rdquo] and [ldquo]no BMPs.[rdquo] [ldquo]No BMPs[rdquo] represents a failure to consider BMPs in the planning process. More than a hundred evaluations on roads were conducted in FY2014. Of these evaluations, only about one third of the road BMPs were found to be [ldquo]fully implemented.[rdquo] Id. at 12.

The monitoring audit also rated the relative effectiveness of the BMP. The rating categories for effectiveness are [ldquo]effective,[rdquo] [ldquo]mostly effective,[rdquo] [ldquo]marginally effective,[rdquo] and [ldquo]not effective.[rdquo] [ldquo]Effective[rdquo] 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 [ldquo]marginally effective[rdquo] or [ldquo]not effective.[rdquo] Id. at 13.

Further, a technical report by the FS entitled, [ldquo]Effectiveness of Best Management Practices that Have Application to Forest Roads: A Literature Synthesis,[rdquo] summarized research and monitoring on the effectiveness of different BMP treatments for road construction, presence and use.

Edwards et al. 2016. The report found that while several studies have concluded that 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 (Edwards et al. 2016, also see Anderson et al. 2011). Edwards et al. (2016) cites several reasons for why BMPs may not be as effective as commonly thought. 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. Further, Edwards et al. (2016) observes, [ldquo][t]he similarity of forest road BMPs used in many different states[rsquo] forestry BMP manuals and handbooks suggests a degree of confidence validation that may not be justified,[rdquo] because they rely on just a single study. Id. at 133. Therefore, ensuring BMP effectiveness would require matching the site conditions found in that single study, a factor land managers rarely consider.

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.

Climate change will further call 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) states, [ldquo][m]ore-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.[rdquo] Id. at 136.

The EA fails to disclose the impacts of project area system roads not maintained in conformance to BMP or in compliance with standards because of funding shortfalls, and fails to disclose the impacts of roads that go without maintenance because they are unauthorized or non-system.

The FS must not assume the project will adequately mitigate the problems chronically posed by the road network by project road work and BMP implementation. The FS admits such problems in a non-NEPA context (USDA Forest Service, 2010t):

Constructing and improving drainage structures on Forest roads is an ongoing effort to reduce road-related stream sediment delivery. Although BMPs are proven practices that reduce the effects of roads to the watershed, it is not a static condition. Maintaining BMP standards for roads requires ongoing maintenance. Ecological processes, traffic and other factors can degrade features such as ditches, culverts, and surface water deflectors.

Continual monitoring and maintenance on open roads reduces risks of sediment delivery to important water resources.

Also in a non-NEPA context, a forest supervisor (Lolo National Forest, 1999) frankly admits that projects are a [ldquo]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.[rdquo]

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[rsquo]s BMP approach.

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).

Significant uncertainties persist about the effectiveness of BMPs or project design features as a result of climate change, compounded by the inconsistencies revealed by BMP evaluations, which suggests that the Forest Service cannot simply rely on them to mitigate project-level activities. This is especially relevant where the FS relies on the use of BMPs instead of fully analyzing potentially harmful environmental consequences from road design, construction, maintenance or use as it did here for the Green Horse EA.

Travel Analysis [ndash] Failure to properly analyze or disclose findings in the EA
Finally, though the FS provided a project file report on its Green Horse project webpage, the EA failed to properly summarize the report[rsquo]s findings and the analysis lacked any dedicated section discussing the transportation system or the potential effects under the proposed action. For example, the project[rsquo]s transportation report discloses the number of system roads in the project area by maintenance level and how that would change under the proposed action. Green Horse Transportation Report at 3. Omitted from the report and EA is any mention of the number of unauthorized roads in the planning area, and in particular those the FS displays on its map titled [ldquo]Selway Preliminary Roads Analysis 2018,[rdquo] which is labeled [ldquo]14-003_2018SelwaySouthRoadsAnalysisWLidar[rdquo] on the project webpage. It is unclear how a map from 2018 still reflects the existing condition in the Green Horse project areas, and more concerning how the agency considered all the [ldquo]lidar lines[rdquo] and [ldquo]undecided[rdquo] roads displayed on that map in its project analysis. It appears the FS did not consider them at all.

Further, while we appreciate the agency generated a Green Horse Travel Analysis Report (TAR), the FS failed to disclose the methods of the analysis, and in particular each step of the Travel Analysis Process detailed in the FSH 7709.55 Ch. 20. While the transportation report lists the outcomes of the risk/benefit assessment and scores, the FS failed to disclose in the report or the EA the precise issues (Step 3) considered in the analysis or the agency assessed each risk and benefits. This is particularly problematic as it relates to wildfire, since the primary purpose of the Green Horse project is to reduce fire severity. Did the FS consider road access as only a fire suppression benefit, or did it incorporate the ecological risks roads pose not only as a vector for human-ignitions, but also the post-burn environmental consequences from those roads left on the system or abandoned (e.g. [ldquo]lidar lines, undecided[rdquo])?

To be clear, the amount of information necessary is that which supports a NEPA-level decision with sufficient detail to demonstrate the minimum road system complies with the four factors provided in the TMR subpart A requirements:

The minimum road system is the road system necessary: (1) to meet [ldquo]resource and other management objectives[rdquo] consistent with the forest plan; (2) to meet applicable statutory and regulatory requirements[rdquo]; (3) to reflect [ldquo]long term funding expectations[rdquo]; and (4) to ensure the road system [ldquo]minimizes adverse environmental impacts associated with road[s.][rdquo] 36 C.F.R. [sect] 212.5(b)(1).

Friends of Bitterroot v. Marten, No. 9:20-cv-00019-DLC, 2020 WL 5804251 (D. Mont. Sept. 29, 2020). Having established that both the forest wide and project level TARs cannot replace actual NEPA-level analysis and that the agency cannot tier to non-NEPA documents to meet its analysis requirements.

WildEarth Guardians, 2021 details the Forest Service[rsquo]s inconsistencies in complying with the TMR Subpart A direction, and in particular the biases various forest units build into their travel analysis processes. It appears the agency repeats many of these same errors in its Green Horse TAR that must be addressed in an EIS.

More roads issues, discussion and science
The FS simply does not analyze the potential impacts of abandoning culverts to clogging and potential catastrophic failure or any erosion at all.

The FS is playing nondisclosure with its road inventory. It[rsquo]s clear that the FS is making it standard practice to re-use [ldquo]abandoned[rdquo] road templates[mdash]and even roads actively decommissioned[mdash]not including them on the official road inventory therefore constantly avoiding responsibilities, regulations, and forest plan requirements for roads.

[ldquo]Temporary road[rdquo] is a fictitious concept[mdash]much of the impact will affect the landscape indefinitely, at least for many decades.

The FS does not explain if annual maintenance funding will be adequate for the post-project road network, and doesn[rsquo]t disclose how deferred maintenance needs or costs might increase or decrease post-project. Again, this is a concern because roads not properly maintained have caused chronic ecological stress to watersheds and damage other resources.

The EA doesn[rsquo]t disclose the likelihood of the selected alternative covering all the costs of proposed road work activities such as road decommissioning, culvert upgrades, etc.

We can understand that the FS doesn[rsquo]t want to be held accountable for the failure of Congress to appropriate enough money for the agency to do its job adequately, but it is disingenuous and unethical to pretend the ongoing ecological damage is a non-issue. This is also illegal under NEPA.

Forestwide, roads are not being maintained as needed: [ldquo]Congressionally appropriated road maintenance funding is approximately 9% of what is needed for the current classified road system.[rdquo] (Nez Perce National Forest Roads Analysis Report, 2006.) That report also admits:

Some arterial, collector and local roads are not being maintained to specified standards. In some areas the road system will continue to degrade and this will affect future access to areas served by these roads.

The NPCNF[rsquo]s End of the World EA notes that [ldquo]Recent reviews on project roads by the Nez Perce Tribe and Forest Service personnel have noted a number of potential impacts to watershed and streams as a result of deferred maintenance.[rdquo]

The Nez Perce National Forest Roads Analysis Report, 2006 acknowledges:

Some roads are causing adverse impacts, such as sedimentation in streams, wildlife impacts, and reduced access due to landslides, and should be evaluated for mitigation projects at the sub-forest level.

Roads in streamside or valley bottom locations disrupt the riparian areas through constriction, removal of woody debris and shade, introduction of sediment, reduction in leafy primary production, and through increased hazard of introduction of toxic pollutants to the stream.

Roads can alter physical channel dynamics, including isolating floodplains, constraining channel migration, and movement of large wood, fine organic matter, and sediment. This happens most at road-stream intersections and where roads are within close proximity to streams. Of the 3873 miles of National Forest system roads, approximately 23 percent exist within 300 feet of stream channels.

Wolverines are the most sensitive MIS species to motorized access. They typically inhabit remote mountainous areas where human disturbance is lower. Wolverines typically avoid human disturbance and roaded landscapes.

Standing and down dead wood is important to pileated woodpecker and marten habitat. Roads facilitate the removal of these habitat components for firewood. A major implication is that some MIS habitats are likely underused.

The EA does not disclose the Road Management Objectives and Trail Management Objectives of each road and trail segment in the project area. The FS doesn[rsquo]t demonstrate compliance with agency directives: the intended purpose, design criteria (FSM 2353.26 and 7720), and operation and maintenance criteria (FSM 2353.25 and 7730.3) for each NFS road and NFS trail.

The EA also does not demonstrate the FS is managing the project area and forest consistent with 36 CFR 212 Subparts B and C. The FS proposes to increase motorized recreation in some areas without a full analysis of the increased motorized impacts on many resources. The EA doesn[rsquo]t analyze cumulative impacts of winter motorized travel. It doesn[rsquo]t demonstrate consistency with the Travel Management Rule requirements that off-road motorized travel impacts be minimized.

Fly, et al. 2011 is a report on a survey of sediment sources in a project area on the Boise National Forest. It is an example of a rather thorough FS road survey completed according to the FS[rsquo] own Geomorphic Road Analysis and Inventory Package (GRAIP)17 methodology, which the FS

performed to [ldquo]specifically quantified the extent and location of sediment contributions from roads to streams[rdquo] in the 29.9 mi2 Scriver Creek sub-watershed of the Boise NF. Below is a snip from a project website map, showing some existing roads and the RHCAs (streams) they cross:

There doesn[rsquo]t appear to be any analysis based upon field review of those sensitive areas, as exemplified by the Fly et al methodology. It[rsquo]s also important to note that the definition of RHCAs also includes landslide areas not shown on this map, and there[rsquo]s no analysis of their sediment effects in the EA.

The EA also fails to demonstrate consistency with Forest Plan Roads and Trails standards, including #4:

stream sediment input, shallow landslide potential with and without road drainage, gully initiation risk, and the potential for and consequences of stream crossing failures. Detailed information about the performance and condition of the road drainage infrastructure is also supplied. The inventory was conducted in accordance with the Quality Assurance Project Plan (QAPP) developed in cooperation with the USEPA and the RMRS (Black et al. 2009).[rdquo] Fly, et al. 2011.

An Access Management Plan will be implemented to monitor and evaluate the effects of access on forest resources and the ability of the transportation system to accomplish the designed use. As measuring or monitoring tools, Forest access management will use two indices18 to monitor change over time. These indices will allow us to compare between points in time, between areas, and between alternate access management schemes or proposals.

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.)

Friends of the Clearwater's August 27, 2014 Travel Analysis letter to the Forest Supervisor cited scientific information including Wisdom, et al. (2000):

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. (Emphases added.)

36 CFR [sect] 212 Subpart A directs each national forest to conduct [ldquo]a science-based roads analysis,[rdquo] generally referred to as the [ldquo]travel analysis process.[rdquo] The FS Washington Office, through a series of directive memoranda, instructed forests to use the Subpart A process to [ldquo]maintain an appropriately sized and environmentally sustainable road system that is responsive to ecological, economic, and social concerns.[rdquo] 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. [sect] 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 [sect] 212.5 state:

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

minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

The huge estimated annual maintenance costs for roads on the NPCNF far exceed all published estimates of road maintenance funding the Forest has received annually for decades. And

although the FS never likes to conduct an analysis of or disclose the forest-wide ecological impacts of its road maintenance funding shortfalls, projecting from discussion in Gucinski et al. 2001 helps to start imagining the scale of the impacts.

It is also important to recognize the ongoing ecological damage of roads[mdash]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. [hellip] 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 [ldquo]footprint[rdquo]. 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 [ldquo]safe[rdquo] 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[rsquo] 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.

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.

Climate change is 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 Forest Service 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[rsquo]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[rsquo]s hard look at impacts, and integrate them into each of the alternatives, including the no action alternative. The agency should also consider the cumulative impacts likely to result from the proposal, proposed road activities, and climate change. In planning for climate change impacts and the proposed road activities, the Forest Service should consider: (1) protecting large, intact, natural landscapes and ecological processes; (2) identifying and protecting climate refugia that will provide for climate adaptation; and (3) maintaining and establishing ecological connectivity. Schmitz and Trainor, 2014.)

Log hauling itself adds sediment to streams. From an investigation of the Bitterroot Burned Area Recovery Project, hydrologist Rhodes (2002) notes, [ldquo]On all haul roads evaluated, haul traffic has created a copious amounts of mobile, non-cohesive sediment on the road surfaces that will elevate erosion and consequent sedimentation, during rain and snowmelt events.[rdquo] USDA Forest Service, 2001a also presents an analysis of increased sedimentation because of log hauling, reporting [ldquo]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.[rdquo]

USDA Forest Service, 2016b (your Johnson Bar Draft EIS) states, [ldquo]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).[rdquo] 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 1998 Bull Trout Biological Opinion (BO) indicates that bull trout are absent when road densities exceed 1.71 mi./mi2., depressed when the road density = 1.36 mi/mi2 and strong when road density equals or is less than .45 mi/mi2.

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 [hellip]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[rsquo]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.

1. 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.

1. 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[rsquo]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 [ldquo]sacrifice areas[rdquo] 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[rsquo]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.

Forest Plan Roads and Trails Standards state:

1. Develop an "Area Transportation Analysis" prior to entering drainages with land- disturbing activities.
2. Analyze the economics of proposed access developments using proven tools, and incorporate them into the project design.
3. Evaluate all facilities using the Access Management Analysis Worksheet to determine use restrictions and access needs. This worksheet will be an integral part of the Decision Document.
4. An Access Management Plan will be implemented to monitor and evaluate the effects of access on forest resources and the ability of the transportation system to accomplish the designed use. As measuring or monitoring tools, Forest access management will use two indices to monitor change over time. These indices will allow us to compare between points in time, between areas, and between alternate access management schemes or proposals.

The FS fails to demonstrate compliance with all these Standards, in violation of the Forest Plan and NFMA. The EA violates the Travel Management Regulations at 36 CFR [sect] 212. It also violates NEPA by failing to use the best available science, and by failing to disclose project inconsistency with the Travel Management Regulations.

Remedy: Select the No Action alternative. Alternatively, prepare an EIS that addresses the analytical issues identified above. Also, disclose the following information concerning the project area:

* The deferred road maintenance backlog
* The annual road maintenance funding needs
* The annual road maintenance budget
* The capital improvement needs for existing roads
* The road density in the project area
* The number of miles of project area roads that fail to meet BMP standards or design standards
* If adequate maintenance funding will exist for the post-project road network, and disclose how deferred maintenance costs might increase or decrease post-project.

WATER QUALITY AND FISHERIES

Page 8 of FOC[rsquo]s PA comment letter includes a section on watersheds and fisheries. Also this objection incorporates the FOC/AWR comments on the draft revised forest plan, which at pages 109-131 discusses these issues.

The EA[rsquo]s discussions under WATER YIELD are minimalistic and lack proper disclosure and analysis. It uses a metric titled [ldquo]ECA[rdquo] but doesn't explain the acronym or define it except to call it [ldquo]water yield[rdquo] in one place. That accomplishes little, because the EA also doesn[rsquo]t define water yield, or explain cause-and-effect. The EA doesn[rsquo]t explain how ECA was measured or estimated. The EA mentions the Glover Creek-Selway watershed increases in ECA ([ldquo]higher[rdquo]) and indicates [ldquo]Project[rdquo] would further increase it. The EA doesn[rsquo]t explain how it determined other existing ECAs where the 2015 fire apparently didn[rsquo]t burn. Is this natural or induced by logging and road building? The EA does not discuss the likely precision of whatever measurement or estimate methodology was used. The EA assumes no hydrological effects from [ldquo]intermediate harvest[rdquo] but that makes no sense because removing trees changes how snow is deposited, the rate and time it melts, how rain is absorbed into soil and taken up by the remaining trees and vegetation. The EA defines [ldquo]intermediate harvest[rdquo] as removing dead and dying trees, without an explanation of how a tree is determined to be [ldquo]dying.[rdquo] It says [ldquo]areas of high mortality will have lower areas of retention[rdquo] so might this have hydrological effects? Whereas fire as a natural disturbance can elevate ECAs, when trees die otherwise it won[rsquo]t? And there[rsquo]s no analysis of the landscape

burning proposed. The WATER YIELD section of the EA appears perfunctory, as if grudgingly included in the EA for obscure purposes.

The EA[rsquo]s discussion under WATER QUALITY also suffers. It discusses sediment, but doesn[rsquo]t really explain or define water quality in any other terms or metrics. It doesn[rsquo]t explain how NEZSED modeling estimates water quality or sediment, nor does it address data reliability, modeling results precision, or modeling validity. It doesn[rsquo]t indicate if sediment surveys in the project area were done in conjunction with modeling for sediment.

The FS doesn[rsquo]t take a hard look at the condition of all streams and water bodies in the affected watersheds, and explain how those conditions contribute to fish population and trends. The FS doesn[rsquo]t disclose populations of fish species in the project area, and compare those numbers to minimum viable populations.

The EA doesn[rsquo]t contain 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.

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

Appendix A argues that NEZSED results should be disregarded19 anyway[mdash]how could that not

affect the FS[rsquo]s watershed analysis credibility? 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.

Openings accumulate much more snow than in a forested areas that are not as [ldquo]open,[rdquo] thus provide a significant contribution to water yield especially during rain-on-snow (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.

USDA Forest Service, 2018c explains why this is important: [ldquo]Runoff from rain falling on snow has been associated with increased risk of damage to stream banks and flooding. Available data indicates that rain falling on snow in open areas produces more water available for runoff than rain falling in forested areas. Much of the project area (~80%) falls in the rain-on-snow zone based on elevation (between 3500[rsquo] and 4500[rsquo]).[rdquo]

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[hellip]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 [ldquo]threshold[rdquo] levels of activity characteristic of watersheds on the IPNF that are known to be stable, unstable, or on a threshold of stability.

ROS events can be the most channel changing, sediment producing events and can have a significant adverse effect on fish and their habitat (Kappesser, 1991b):

Filling of pools by bedload sediment is seen as a significant factor in the reduction of rearing and overwintering habitat for fish such as West Slope Cutthroat Trout (Rieman and Apperson, 1989). Bedload increases have traditionally been interpreted as the result of channel scour in response to increased peak flows created by timber harvest.

(Also see Kappesser, 1991a.) The Inland Northwest frequently gets at least one mid-winter chinook which is often accompanied by windy and rainy conditions. The warm wind blowing across the snow, especially in relatively open areas on south and southwestern facing slopes between 2,500 to 4,500 feet elevation results in rapid snow melt and high levels of instantaneous water flows.

King, 1994 explains that small headwaters areas are particularly sensitive to the increased water yields due to removal of tree canopy:

Timber removal on 25-37% of the area of small headwater watersheds increased annual water yield by an average of 14.1 inches, prorated to the area in harvest units and roads. Increases in streamflow occurred during the spring snowmelt period, especially during the rising portion of the snowmelt hydrograph. These forest practices also resulted in large increases in short duration peakflows, greatly increasing the sediment transport capacity of these small streams. The cumulative effects of these activities on streamflow in the Main Fork, with only 6.3% of its area in roads and harvest units, were not detectable.

Ziemer, 1998 observed the same phenomenon in his study on flooding and stormflows. Also, King, 1989 observed that [ldquo]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.[rdquo]

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 EA does not 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, [ldquo]Impacts from roads basically fall into three areas: introduced sediment into streams; snowmelt re-direction and concentration; and surface flow production.[rdquo] (Johnson, 1995.)

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

Perry & Jones (2016) looked at decades of hydrologic data from paired watersheds in the Western Cascades and found:

ABSTRACT: Analysis of 60-year records of daily streamflow from eight paired-basin experiments in the Pacific Northwest of the United States (Oregon) revealed that the conversion of old-growth forest to Douglas-fir plantations had a major effect on summer streamflow. Average daily streamflow in summer (July through September) in basins with 34- to 43-year-old plantations of Douglas-fir was 50% lower than streamflow from reference basins with 150- to 500-year-old forests dominated by Douglas-fir, western hemlock, and other conifers. [hellip]. Young Douglas-fir trees, which have higher sapwood area,

higher sapflow per unit of sapwood area, higher concentration of leaf area in the upper canopy, and less ability to limit transpiration, appear to have higher rates of evapotranspiration than old trees of conifer species, especially during dry summers.

Reduced summer streamflow in headwater basins with forest plantations may limit aquatic habitat and exacerbate stream warming, and it may also alter water yield and timing in much larger basins. Legacies of past forest management or extensive natural disturbances may be confounded with effects of climate change on streamflow in large river basins. ...

Discussion - This study showed that, relative to mature and old7growth forest dominated by Douglas7fir and western hemlock or mixed conifers, forest plantations of native Douglas7fir produced summer streamflow deficits within 15 years of plantation establishment, and these deficits have persisted and intensified in 507year7old forest stands . [hellip] This finding has profound implications for understanding of the effects of land cover change, climate change, and forest management on water yield and timing in forest landscapes. The size of canopy opening explained the magnitude and duration of initial summer streamflow surpluses and subsequent streamflow deficits, consistent with work on soil moisture dynamics of canopy gaps. [hellip] Together, the paired basin and experimental gap results indicate that even7aged plantations in 8 ha or larger clearcuts are likely to develop summer streamflow deficits, and these deficits are unlikely to be substantially mitigated by dispersed thinning or small gap creation. Relatively high rates of summer evapotranspiration by young (25 to 45 years old) Douglas7fir plantations relative to mature and old-growth forests apparently caused reduced summer streamflow in treated basins. Young Douglas7fir trees (in AND 1) had higher sapflow per unit sapwood area and greater sapwood area compared to old Douglas7fir trees (in AND 2; Moore, Bond, Jones, Phillips, & Meinzer, 2004). In summer, young Douglas7fir trees have higher rates of transpiration (sapflow) compared to old Douglas7fir trees, because their fast growth requires high sapwood area and because their needles appear to exercise less stomatal control when vapor pressure deficits are high. Leaf area is concentrated in a relatively narrow height range in the forest canopy of a forest plantation, whereas leaf area is distributed over a wide range of heights in a mature or old7growth conifer forest. In summer, these factors appear to contribute to higher daily transpiration rates by young conifers relative to mature or older conifers, producing pronounced reductions in streamflow during the afternoons of hot dry days (Bond et al., 2002). At sunset, transpiration ceases, and streamflow recovers. Hence, daily transpiration produces large diel variations in streamflow in AND 1 (plantation) relative to AND 2 (reference). [hellip] Reduced summer streamflow has potentially significant effects on aquatic ecosystems.

Summer streamflow deficits in headwater basins may be particularly detrimental to anadromous fish, including steelhead and salmon, by limiting habitat, exacerbating stream temperature warming, and potentially causing large7scale die7offs [hellip] Reductions in summer streamflow in headwater basins with forest plantations may affect water yield in much larger basins. Much of the Pacific Northwest forest has experienced conversion of mature and old7growth forests to Douglas7fir plantations over the past century. Climate warming and associated loss of snowpack is expected to reduce summer streamflow in the region (e.g., Littell et al., 2010). Declining summer streamflows in the Columbia River basin may be attributed to climate change (Chang, Jung, Steele, & Gannett, 2012; Chang et al., 2013; Hatcher & Jones, 2013), but these declines may also be the result of cumulative

forest change due to plantation establishment, [hellip] Despite summer streamflow deficits, young forest plantations in the Andrews Forest yield more water in winter, contributing to increased flooding (Harr & McCorison, 1979; Jones & Grant, 1996; Beschta, Pyles, Skaugset, & Surfleet, 2000; Jones, 2000; Jones & Perkins, 2010).

Conclusions [hellip] Long1term paired1basin studies extending over six decades revealed that the conversion of mature and old1growth conifer forests to plantations of native Douglas1 fir produced persistent summer streamflow deficits of 50% relative to reference basins, in plantations aged 25 to 45 years. This result challenges the widespread assumption of rapid [ldquo]hydrologic recovery[rdquo] following forest disturbance [hellip]

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 EA discusses road conditions:

In the project area most of the roads in the project area are graveled, but some of the key roads such as 9716, 9715, and 9714 the gravel is very poor and powdery condition and may not abate sediment.

In general, the highest risk for direct sedimentation into live water will be during road maintenance/reconstruction work including actions like cleaning and opening ditches and installing or improving drainage features such as culverts, water bars, or cross-drains.

There will be sediment delivery likely during these work periods; however, the efficacy of BMPs and design features after roads are brought to standard should prevent chronic sedimentation.

The highest risk for chronic sedimentation following project work is Forest Road #9714, the steep fillslopes, particularly at the stream crossings have several small pre-existing slope failures and following project work the risk of slope failures at crossings will remain high.

The EA says, [ldquo]Road impacts from use and road reconstruction or road reconditioning are modeled in the NEZSED model and result are presented in the Cumulative Effects section.[rdquo] But what about the existing impacts from the problem areas indicated above? Apparently the modeling cannot handle real-world facts.

The EA also mentions the use of the WEPP:Road model. The FS doesn[rsquo]t analyze and disclose the amount of error inherent with the WEPP:Road model. The significance of such omissions is discussed in our objections in the SCIENTIFIC INTEGRITY section. This error is disclosed in another FS hydrologist report, the North Fork Mill Creek A to Z Hydrologist report (USDA Forest Service, 2015c):

The documentation for the WEPP:Road model indicates that sediment delivery estimates are within +/- 50% of predicted values (Elliott et al. 1999). As a result, and like for the WEPP:FuME estimates, model-predicted sediment delivery values are best used to compare relative differences between alternatives and modeling scenarios. Error estimates for the average annual sediment load are not provided by the WFPB watershed analysis manual (WFPB 2011).

The FS is assuming a level of precision in the model that simply does no exist. This violates NEPA. Harr, 1987 states:

Perhaps the most basic of the erroneous beliefs is the idea that simplicity can be willed onthe 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.

1.

1. 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.

From the EA[rsquo]s Appendix A Upward Trend Analysis: [ldquo]The 3,865 acre Island Creek prescription watershed does not meet its Forest Plan sediment yield guideline of 70% based on Cobble embeddedness measures where the 55% measure of cobble embeddedness (data from 2014)[hellip][rdquo]

Water quality is crucial for fish species such as the threatened steelhead and bull trout. Steelhead numbers continue to decline. Cumulative impacts to their habitat are even more important. Bull trout are very sensitive to disturbance and require very cold and clean water.

The EA states, [ldquo]O[rsquo]Hara Creek provides designated critical habitat for ESA listed steelhead trout, feeding, migration and overwintering (FMO) habitat for listed bull trout and EFH (essential fish habitat) for spring

Chinook/coho salmon (Figure 5). None of the other tributaries contain critical habitat for listed fish species.[rdquo] However, fisheries are found downstream of those other tributaries, which means effects to those streams must be analyzed as impacting those fish.

The EA includes no data for stream temperatures; apparently the FS has not measured a parameter that is extremely important for native fish.

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 which indicates the openings created by the project clearcuts would result in increases to water in streams. (Id.):

Groundwater entering streams (especially small streams) may be an important determinant of stream temperatures (Spence et al. 1996) or may provide localized thermal refugia in larger stream systems. Where groundwater flows originate above the neutral zone (16-18 meters below the surface in general) groundwater temperatures will vary seasonally, as influenced by air temperature patterns (Spence et al. 1996). Timber harvest from upland areas exposes the soil surface to greater amounts of solar radiation than under forested conditions (Carlson and Groot 1997), elevating daytime temperatures of both air and soil (Fleming et al. 1998, Buckley et al. 1998, Morecroft et al. 1998) and increasing diurnal temperature fluctuations (Carlson and Groot 1997). Relationships between shallow source groundwater flows and air and soil temperatures indicate that harvest activities in upland areas may increase stream temperatures via increasing temperature of shallow groundwater inflows. Other pathways for harvest actions to influence stream temperature include changing the volume and timing of peak flows, elevating suspended sediment levels, and altering channel characteristics (Chamberlin et al. 1991, Spence et al. 1996, USDA and USDI 1998a).

US Fish and Wildlife Service, 1998 also states:

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).

Gloss (1995) shows that NEZSED (and FISHSED upon which it is based) very significantly underestimated average annual sediment yield in watersheds as compared to what was observed. Even observation such as traps to catch sediment may not pick up all sediment. Further, NEZSED does not take into account mass wasting and inadequately analyzes log landings.

The EA fails to present an analysis of cobble embeddedness, as required by the Forest Plan. It states:

Cobble embeddedness data from a stream is compared to desired conditions as described by Espinosa (1992) to determine where a stream lies in relation to Forest Plan water quality objectives (Table 11). Where embeddedness data is not available, other information is used, such as legacy stream data, disturbance activities occurring within the last 20 years including management and wildfire, watershed restoration activities, and changes in management practices (Conroy and Thompson, 2011).

Data on embeddedness would not be [ldquo]not available[rdquo] if the FS were to actual gather it, as is required for conducting the proper and adequate analysis. [ldquo]Falls, Horse, and Saddle Creek watersheds are assumed to meet their objectives due to minimal management in the last 20 years and low sediment yield even after the Wash Fire of 2015 (Table 11)[rdquo] (emphasis added). Lacking actual data, Forest Plan consistency analysis is impossible.

[ldquo]The use of FISHSED is required by the Forest Plan in conjunction with the NEZSED model. Existing cobble embeddedness levels from survey data are input into the model,[hellip][rdquo] However if there is no data to be input in most cases, how can this model[rsquo]s results mean anything?

Factual documentation of sediment trends requires a credible set of time-series data in order to deal with statistical variation. The EA provides no such trend information.

The EA fails to provide any analysis whatsoever for Sensitive fish species such as the westslope cutthroat. The EA fails to discuss any fish populations and trends.

The PACFISH Forest Plan Amendment was adopted in 1995. It includes direction such as Standards and Guidelines as well as Riparian Management Objectives (RMOs). Yet the EA fail to provide an analysis regarding PACFISH direction. It fails to discuss riparian management objectives and trends in any of their relevant metrics.

The EA fails to present a sufficient analysis to determine if RMOs would be retarded by project and cumulative impacts. The EA fails to 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.

USDA Forest Service, 2017c explains that native westslope cutthroat trout have declined due to habitat degradation and competition with nonnative brook trout (the latter being the most prevalent trout species in the project area):

The distribution and abundance of westslope cutthroat trout has declined from historic levels (less than 59 percent of historically occupied stream habitat) across its range, which included western Montana, central and northern Idaho, a small portion of Wyoming, and portions of three Canadian provinces (Liknes and Graham 1988, Shepard et al. 2005). Westslope cutthroat trout persist in only 27 percent of their historic range in Montana. Due to hybridization, genetically pure populations are present in only 2.5 percent of that range (Rieman and Apperson 1989). Introduced species have hybridized or displaced westslope cutthroat trout populations across their range. Hybridization causes loss of genetic purity of the population through introgression. Within the planning area, genetically pure populations of westslope cutthroat trout are known to persist in Ruby Creek (MFISH 1992, 2012). Some of these remaining genetically pure populations of westslope cutthroat trout are found above fish passage barriers that protect them from hybridization, but isolate them from other populations.

Brook trout are believed to have displaced many westslope cutthroat trout populations (Behnke 1992). Where the two species co-exist, westslope cutthroat trout typically predominate in higher gradient reaches and brook trout generally prevail in lower gradient reaches (Griffith 1988). This isolates westslope cutthroat trout populations, further increasing the risk of local extinction from genetic and stochastic factors (McIntyre and Rieman 1995).

Habitat fragmentation and the subsequent isolation of conspecific populations is a concern for westslope cutthroat trout due to the increased risk of local and general extinctions. The probability that one population in any locality will persist depends, in part on, habitat quality and proximity to other connected populations (Rieman and McIntyre 1993). Therefore, the several small, isolated populations left in the project area are at a moderate risk of local extirpation in the event of an intense drainage-wide disturbance.

Habitat degradation also threatens the persistence of westslope cutthroat trout throughout their range. Sediment delivered to stream channels from roads is one of the primary causes of habitat degradation. Sediment can decrease quality and quantity of suitable spawning substrate and reduce overwintering habitat for juveniles which reduces spawning success and increases overwinter mortality. Roads can also alter the drainage network of a watershed and thereby increase peak flows. The end result of increased peak flows is decreased channel stability and accelerated rates of mass erosion. Across their range the strongest populations of westslope cutthroat trout exist most frequently in the

wilderness, Glacier National Park, and areas of low road densities or roadless areas (Liknes and Graham 1988, Marnell 1988, Rieman and Apperson 1989, Lee et al. 1997).

The EA[rsquo]s contention that no measurable sediment will be delivered to watersheds and fish habitats is largely based on PACFISH buffers (RHCAs), temporary roads, best management practices (BMPs), and the hope that no large storms will occur. PACFISH buffers are certainly not [ldquo]fail-safe.[rdquo] The FS only has to consult their documentation of the 1995-96 storm event in the Clearwater Basin that resulted in hundreds, if not thousands, of road failures, stream blowouts, and landslides in developed watersheds to refute the [ldquo]fail safe[rdquo] contention (McClelland et al., 1997). During this storm, PACFISH buffers (100-300 ft.) did not effectively stop significant sediment delivery from road failures and other mass erosion events. Large amounts of sediment were delivered to the streams. Further, the results from flood events on the Nez Perce and Clearwater National Forests were associated with roads 60% of the time (see Lloyd 2017). And with the advent of climate change, we can expect more frequent and severe storms.

The conclusion that there will be no measurable increase in sediment is not supported by facts. PACFISH/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[rsquo]t see because of the sediment. Below is a detail shot of the above picture where the culvert is.

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, conducting sediment:

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 go far beyond any modeled predictions.

This is how sedimentation gets into the stream, which can be upstream of any logging buffers next to the stream. Yet, the FS bases its conclusion that there won[rsquo]t be sedimentation because PACFISH/INFISH buffers will stop 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 quarter- mile[mdash]even around curves[mdash]essentially cutting a gully instead of flowing off the road within a short distance.

The second photo (above) shows this [ldquo]stream[rdquo] 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[mdash]empty of water despite the storm because of the tempering effect of the native forest vegetation in the draw above the road. (It 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 a subsequent storm event.)

These three photos are not necessarily meant to illustrate fish habitat problems 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. And the strong potential for water quality impacts.

As with other topics addressed in this objection, the lack of consistent monitoring makes any determinations by the FS that there is an upward trend in water quality or fish habitat suspect. Point in time studies are useless in determining trend. A major reason to do the monitoring is to determine trends.

The fisheries Biological Assessment has no credible baseline analysis, nor does it adequately evaluate cumulative impacts. It[rsquo]s [ldquo]no effect[rdquo] and [ldquo]no impact[rdquo] conclusions are not valid.

Remedy: Prepare and EIS that complies with NEPA, the ESA and NFMA

SOIL PRODUCTIVITY

FOC[rsquo]s comments on the PA raised concerns about soil on page 8. FOC/AWR et al. comments on the Draft Revised Forest Plan and Draft Environmental Impact Statement also discuss the soil issue (pp. 76-109), and this objection incorporates those comments.

A big picture concern is that the lack of consistent monitoring makes it hard to verify that the FS is meetings its duties under NFMA to protect the soil resource. The Forest Plan includes Forest Plan Monitoring Requirement 11, requiring monitoring of [ldquo]Site Productivity[rdquo]20 to be measured annually, and contains a [ldquo]Research Need[rdquo] to [ldquo]Determine the effect of different fire intensities on basic soil fertility.[rdquo] Yet the EA and Soil Report don[rsquo]t cite any such forest plan monitoring, or the recommended research.

While we are concerned with the high level of detrimental soil disturbance (DSD) the applicable standards allow, even the standards are not being complied with in every [ldquo]activity area.[rdquo]

The EA fails to even properly state the Forest Plan soils standards. The Forest Plan states these standards thus:

1. Evaluate the potential for soil displacement, compaction, puddling, mass wasting, and surface soil erosion for all ground-disturbing activities.
2. A minimum of 80 percent of an activity area shall not be detrimentally compacted, displaced, or puddled upon completion of activities. This direction does not apply to permanent recreation facilities and other permanent facilities such as system roads.
3. Maintain sufficient ground cover to minimize rill erosion and sloughing on road cut and fill slopes and sheet erosion on other activity areas.

The EA only paraphrases Standard 2 stating: [ldquo][hellip]20% maximum DSD Forest Plan Standard[hellip][rdquo]. It does not define DSD. The Forest Plan also lacks definitions of the relevant parameters for Standard 2, those being activity area, soil displacement, compaction, and puddling. The Soils Effects Analysis Supplement (Soil Report) also fails to define DSD and the relevant forest plan Standard 2 parameters. It does refer to the Regional SQS ([ldquo]U.S. Department of Agriculture, Forest Service, Northern Region 2014[rdquo]) which uses 15%[mdash]not 20%[mdash]as its maximum DSD Standard. The Soil Report fails to reconcile the differences between the forest plan standards and Regional SQS.

The Regional SQS defines DSD:

1. Detrimental Soil Disturbance. These disturbances includes the effects of compaction, displacement, rutting, severe burning, surface erosion, loss of surface organic matter, and soil mass movement. At least 85 percent of an activity area must have soil that is in satisfactory condition. Detrimental conditions include:

Compaction. Detrimental compaction is a 15 percent increase in natural bulk density. The cumulative effects of multiple site entries on compaction should also be considered since compacted soils often recover slowly.

Rutting. Wheel ruts at least 2 inches deep in wet soils are detrimental.

Displacement. Detrimental displacement is the removal of 1 or more inches (depth) of any surface soil horizon, usually the A horizon, from a continuous area greater than 100 square feet.

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).

Surface Erosion. Rills, gullies, pedestals, and soil deposition are all indicators of detrimental surface erosion. Minimum amounts of ground cover necessary to keep soil loss to within tolerable limits (generally less than 1 to 2 tons per acres per year) should be established locally depending on site characteristics.

Soil Mass Movement. Any soil mass movement caused by management activities is detrimental.

The EA watershed analysis states, [ldquo]In 2015, approximately 72% of the Island Creek watershed burned but with only about 16% of the watershed impacted by moderate and severe soil burn severity.[rdquo] Nothing in the soil analysis considers this severe soil burn as DSD. Where as the Regional SQS says this is for evaluating [ldquo]prescribed fire[rdquo] this makes no sense ecologically, because the soil doesn't somehow not be detrimentally affected because the fire is not [ldquo]prescribed.[rdquo] Your Johnson Bar FEIS stated, [ldquo]The effect of the wildfire in the detrimental soil disturbance estimates has been included in the FEIS Soils Resource Section.[rdquo]

The Soil Report rambles about [ldquo]soil bulk density[rdquo] without providing any context for its relevance for

DSD and the Forest Plan. Since the FS indicates it is relevant, 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).

The Soil Report includes no discussion of the cumulative impacts on soil productivity from livestock grazing or noxious weeds. There is nothing about the living biomass in soils, such as mycorrhizal fungi and their role in tree growth or forest productivity. There is nothing about maintaining woody debris in logged areas. It has no cumulative effects analysis whatsoever. One cannot even tell from the Soil Report if the soil scientist did surveys in the project activity areas to accumulate site-specific data from the field. The Soil Report seems to be largely a cut-and- paste job reflecting a lack of appreciation of forest soil ecology.

Craigg and Howes (in Page-Dumroese, et al. 2007) state:

Each soil has inherent physical, chemical, and biological properties that affect its ability to function as a medium for plant growth, to regulate and partition water flow, or to serve as an effective environmental filter. When any or a combination of these inherent factors is altered to a point where a soil can no longer function at its maximum potential for any of these purposes, then its quality or health is said to be reduced or impaired (Larson and Pierce 1991).

The Forest Plan FEIS states, [ldquo]Overgrazing, primarily along bedding grounds, stock driveways, and trails, has compacted soils and contributed to soil erosion, which has resulted in reduced soil productivity.[rdquo] Again, the cumulative impacts of livestock grazing was omitted from all analyses.

The Soil Report also fails to state Forest Plan Soil Standard 3 and demonstrate compliance with it.

The [ldquo]Calculations and Assumptions[rdquo] document on soil discloses that two units are expected to exceed the Forest Plan 20% DSD standard. That document, and the Soil Report apparently claim that sometime later the DSD will be less than 20%, but this is not how the Forest Plan Standard #2 reads or is intended to be implemented. The Forest Plan FEIS states that most skid trails are an irretrievable loss of soil productivity, meaning that it didn[rsquo]t anticipate DSD recovering during the life of the Forest Plan. The project soil analysis doesn[rsquo]t prove otherwise.

The EA and Soil Report also do not address the fact that the [ldquo]Calculations and Assumptions[rdquo] document on soil discloses that, in addition to the two units violating the Forest Plan 20% standard, two other units are expected to violate the Regional SQS 15% DSD maximum.

The [ldquo]Calculations and Assumptions[rdquo] document also fails to attribute DSD from temporary roads built to access units, unless they are [ldquo]inside unit.[rdquo] This is inconsistent with the Regional SQS. Log landings are also apparently not accounted for.

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. Arriving at numbers for soil compaction without providing a scientific basis for their 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.

Yet the FS ignores its own scientific recommendations, without explanation.

The Soil Report states, [ldquo]Potential increases in DSD expected from the proposed management activities were then calculated using assumptions based on local research and monitoring results (Archer 2008; Reeves and others 2011).[rdquo] For each type of ground based logging, the Archer, 2008 average was at least 13% and the reported range was [ldquo]Tractor harvest led to 8 to 22% detrimental disturbance after harvest.[rdquo] An estimate based upon those results is not found in any Green Horse analysis document.

National forests in the Northern Region have monitored DSD with very mixed results. For example, a recent IPNF forest plan monitoring report (USDA Forest Service 2013a) revealed the relatively high frequency of violating the 15% standard, despite implementation of design features and BMPs. In fact, Reeves et al., 2011 (cited in the Soil Report) found mixed results on compliance with the Regional SQS 15% standard, with average DSD for activity areas for some Forests over 15%. Our point is, FS pledges to meet standards must be taken with a grain of salt.

While the Soil Report acknowledges inaccuracies and data limitations, it still obscures the reliability of the gathered data on DSD, considering the methods the FS used for the soils analysis. No inter-rater reliability determination was made. The FS soil analysis is not based upon high quality data.

The EA does not provide a statistically sound explanation of how accurate the DSD estimates are, or what percentage error can be expected of its existing and estimated project-induced values.

This renders the estimates and measures of DSD inadequate for demonstrating consistency with forest plan standards and the Regional SQS, in violation of NFMA.

NEPA requires that agencies specify the effectiveness of their mitigations. 40 C.F.R. 1502.16. The FS fails to specify the effectiveness of its mitigation of DSD. There is no quantitative

monitoring data that demonstrates DSD remediation activities have taken a NPNF activity area with DSD amounts exceeding the quantitative standard to an amount that no longer violates the standard. The project includes design criteria to utilizing existing skid trails and ripping and seeding of skid trail convergence areas, presumably to accelerate restoration of soil functioning and reduce DSD. However, 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.)

On 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.

[hellip]Field soil survey methodology based on visual observations, such as the Region 1 Soil Monitoring Guide used here, can produce variable results among observers, and the confidence of results is dependent on the number of observations made in an area (Page- Dumroese et al., 2006). The existing and estimated values for detrimental soil disturbance (DSD) are not absolute and best used to describe the existing soil condition.

The calculation of the percent of additional DSD from a given activity is an estimate since DSD is a combination of such factors as existing groundcover, soil texture, timing of operations, equipment used, skill of the equipment operator, the amount of wood to be removed, and sale administration. (Emphasis added.)

Horn et al., 2007 state:

Generally, the data obtained for the measured soil stresses and the natural bearing capacityprove that sustainable wheeling is impossible, irrespective of the vehicletype 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.

Following a study by Cullen et al., 1991 the authors concluded: [ldquo]This result lends support to the general observation that most compaction occurs during the first and second passage of equipment.[rdquo] Page-Dumroese (1993), in a Forest Service research report investigating logging impacts on volcanic ash-influenced soil in the Idaho Panhandle National Forest, states, [ldquo]Moderate compaction was achieved by driving a Grappler log carrier over the plots twice.[rdquo]

Page-Dumroese (1993) also cited other studies that indicated: [ldquo]Large increases in bulk density have been reported to a depth of about 5 cm with the first vehicle pass over the soil.[rdquo] Williamson and Neilsen (2000) assessed change in soil bulk density with number of passes and found 62% of the compaction to the surface 10cm to come 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. The FS fails to consider and use the best available science, in violation of NFMA and additionally, NEPA's requirements for scientific integrity. See 36 C.F.R. 219.3; 40 C.F.R. 1502.24.

There is nothing in the EA or Soil Report that shows the FS will investigate the excruciatingly slow recovery of subsurface compaction. This is in regards to soil conditions deeper than a ripper, and even freeze-thaw processes, typically reach.

The FS does not properly account for all the long-term DSD in the project area, including locations outside currently proposed [ldquo]activity areas.[rdquo] The NPCNF[rsquo]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).

[hellip]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 BMPs for insuring post-project DSD levels are consistent with estimates or soil standards.

The Soil Report states, [ldquo]Though permanent roads impact both soil productivity and soil stability, they are not considered in the soils analysis, as the evaluation of effects of permanent roads is most effectively done at the watershed scale (U.S. Department of Agriculture, Forest Service, Northern Region 2014).[rdquo] Yet there is no watershed level cumulative effects analysis for soils.

Nothing in the watershed analysis section specifically addresses the hydrological implications of the cumulative soil damage caused by past management, in addition to timber sale-induced damage in project area watersheds. The FS fails to consider and use the best available science, in violation of NFMA and additionally, NEPA's requirements that the FS demonstrate scientific integrity. See 36 C.F.R. 219.3; 40 C.F.R. 1502.24.

Also, see our comments on the Draft Forest Plan, for an explanation why this is important[mdash]as even the FS admits. For example, USDA Forest Service, 2009c states:

Compaction can decrease water infiltration rates, leading to increased overland flow and associated erosion and sediment delivery to streams. Compaction decreases gas exchange, which in turn degrades sub-surface biological activity and above-ground forest vitality.

Rutting and displacement cause the same indirect effects as compaction and also channel water in an inappropriate fashion, increasing erosion potential.

Kuennen et al., 2000 (a collection of Forest Service soil scientists) state:

An emerging soils issue is the cumulative effects of past logging on soil quality. Pre- project monitoring of existing soil conditions in western Montana is revealing that, where ground-based skidding and/or dozer-piling have occurred on the logged units, soil compaction and 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.

[hellip]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.)

From USDA Forest Service, 2008f:

Many indirect effects are possible if soils are detrimentally-disturbed[hellip] 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.

But no matter how compacted the soils are outside the proposed individual treatment units and associated skid trails, landings, and temporary roads, the fact that reduced water infiltration in those other locations is contributing to increased water yield and erosion during storm events, the FS[rsquo]s position is[mdash]so what? And if the previous logging in those other locations resulted in a paucity of legacy wood that, if present, would have been incorporated into the soil and held water and transmitted nutrients for the next generation[rsquo]s timber stand, the FS cares not one bit.

And if those previously disturbed areas outside the proposed individual treatment units and associated skid trails, landings, and temporary roads have become prime growing sites for noxious weeds[mdash]many species of which are well-adapted to disturbed sites and some of which actively inhibit native vegetation from recovering and therefore the sites exhibit reduced productivity[mdash]the FS does not care.

The NPNF utilized a broader scope of analysis with the American River/Crooked River project FEIS (USDA Forest Service, 2005d), which stated:

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. [hellip] 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.

(Emphasis added.) USDA Forest Service, 2005d also disclosed:

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.

American River (and most of Crooked River) is considered similar in soils and logging history to Red River, where 80 percent of sampled tractor logged activity areas did not meet Forest Plan standards. In many instances, these impacts occurred prior to forest plan implementation, but monitoring of more recent activities shows inconsistent improvement in practices. This degree of soil damage is consistent both with other Forest monitoring (USDA FS 1988a, 1990, 1992), and research (Krag, 1991; Froehlich, 1978;

Davis, 1990, Alexander and Poff, 1985).

Indirect effects of soil surface and substratum erosion include effects to vegetation and hydrologic processes.

Despite the Forest Plan definition[rsquo]s bias toward soils as mainly helping to produce lumber and beef, an implication for the myriad other resources21 that depend upon healthy soils is clear: the FS[rsquo]s ability to sustain all forest resources should at least begin with an understanding of the ability of the soil for producing the agency[rsquo]s favorite [ldquo]crops[rdquo], given that its management of timber inevitably and repeatedly damages soils, perpetually maintaining them in a damaged state. Yet the FS has little accounting of the extent of the accumulated damage.

In discussing the Regional SQS, USDA Forest Service, 2016a explains that a major cumulative effect they ignore is the indirect effect of soil damage, or DSD, on sustained yield. It states that the Soil Standards [ldquo]created the concept of [lsquo]Detrimental Soil Disturbance[rsquo] (DSD) for National Forests in Region One as a measure to be used in assessing potential loss of soil productivity resulting from management activities.[rdquo] USDA Forest Service, 2016a further explains (emphases added):

Without maintaining land productivity, neither multiple use nor sustained (yield) can be supported by our National Forests. Direct references to maintaining productivity are made in the Sustained Yield Act [ldquo][hellip]coordinated management of resources without impairment of the productivity of the land[rdquo] and in the Forest and Rangeland Renewable Resources Act [ldquo][hellip]substantial and permanent impairment of productivity must be avoided[rdquo].

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 [ldquo]quality of the soil[rdquo] 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 [ndash] 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 [ldquo]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[rdquo] (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.)

USDA Forest Service, 2007 states:

Sustained yield was defined in the Kootenai Forest Plan [hellip]as [ldquo]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.[rdquo] Sustained yield is based on the lands[rsquo] ability to produce.

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, [ldquo]sustained yield[rdquo] is an empty promise.

We note that the FS[rsquo]s only quantitative measurement of soil conditions upon which its standards are based is DSD. In other words, the FS is left depending upon data disclosing the amount of DSD, and upon standards limiting such damage. In other words, the FS adopted DSD as a proxy[mdash]a substitute[mdash]for reductions in soil productivity caused by management. However, the FS doesn't cite any science as basis for explaining how its cap on activity area DSD to 15% or 20% corresponds to maintaining soil productivity in any meaningfully ecological way.

Continual and repeated application of projects, hardly limited by the Forest Plan and Regional SQS, will result in soils maintained in a damaged condition in perpetuity. The FS has no quantitative data or inventory of this continuous deficit of soil or land productivity. To the U.S. Department of Agriculture, accountability for losses of soil productivity on national forests is to be avoided.

Powers et al., 2005 explains:

(T)rying to measure the productive potential of a site directly by assaying trends in tree or stand growth is fraught with frustrations and uncertainty. Growth trends in operational stands vary with stand age, structure, stocking and treatment history, and usually lack reference controls for comparison. Alternatively, soil-based indices of productive potential have been proposed as a more objective measure of a site[rsquo]s capacity for vegetative growth. The USDA Forest Service has adopted this approach and first approximation working standards are in place throughout the federal regions. Meant as monitoring tools, these standards are presumed to reflect a site[rsquo]s potential, and to mark thresholds for significantly impaired productivity. (Emphasis added; internal citations omitted.)

How and where these numerical thresholds are set is part of what we[rsquo]re questioning. The FS's favorite crop[mdash]trees[mdash]take decades to mature for harvest as lumber, and well over a century to collectively develop old-growth habitat character critical for wildlife species discussed elsewhere in this objection.

Getting back to the origin of the 15% threshold the Regional SQS uses, there is a passage under the heading of Scientific Uncertainty and Controversy in the NPNF[rsquo]s Johnson Bar FEIS:

Defining the threshold at which productivity is detrimentally disturbed is controversial. The rationale for the 15% limit of change in soil bulk density was largely based on the collective judgment of soil researchers, academics, and field practitioners, and the accepted inability to detect changes in productivity less than 15% using current monitoring methods (Powers 1990). Powers (1990) states that the soil quality guidelines are set to detect a decline in potential productivity of at least 15%. This statement does not mean that the Forest Service tolerates productivity declines at this level, but that it recognizes problems with detection limits.

Thus the FS attempts to sidestep the controversy of FS assessment of soils[mdash]that the limitations of soil productivity measurements are not why the Regional SQS standards were set at 15%. The FS knows that the Regional SQS limits are based on the fact that it is not feasible to do much less

damage than 15% of an activity area while carrying out industrial logging. USDA Forest Service, 2008b states:

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.

The FS chose 15% as its upper limit on soil damage within a unit merely because it believes that logging the merchantable trees and disposing of the slash often compacts or otherwise damages up to 15% of the areal extent of an [ldquo]activity area.[rdquo] This limit has nothing to do with the science of maintaining soil productivity. In other places (USDA Forest Service, 2008b) the FS considers and discloses this fact.

Nesser, 2002 makes a distinction between the threshold for which soil compaction is considered to be detectable (15% increase in bulk density) and the 15% areal limit for detrimental disturbance, which is the Regional SQS upper limit on the sum of the various kinds of DSD:

The 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. It may or may not mean that a 15% increase in BD is detrimental. That may depend on the soil and ecosystem in which it is found. (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. How that works out in terms of practicality is the problem. (Emphasis added.)

So we have the Regional SQS 15% standard (areal extent limit) being based on mere feasibility rather than concerns over soil productivity, and additionally we have the 15% bulk density increase limit based upon the limitations of detection of available soil compaction measurement methods[mdash]not detection of reductions in soil productivity itself. The FS[rsquo]s failure to disclose this is a violation of NEPA.

We also note that it doesn[rsquo]t matter how sensitive the soils, how steep the land, how poor the site is for growing trees, the varying aspects, the varying ratings of landslide or mass wasting potential, the varying ratings of erosion risk, the differing underlying geology, the presence of ash cap, the varying amounts of ground cover due to recent fire[mdash]the Forest Plan and Regional SQS standards (20% and 15%, respectively) don[rsquo]t vary. This is consistent with their rigid basis in operational feasibility. Page-Dumroese et al., 2000 emphasize that utilization of such thresholds does not account for these real-world variables:

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. [hellip]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.)

The FS does not disclose that the methodology for delineating [ldquo]activity areas[rdquo] inherently encourages gerrymandering. For example, areas not previously logged or less impacted can be lumped into project [ldquo]activity areas[rdquo] diluting existing DSD and creating a lower cumulative amount.

The FS does not properly distinguish between the issues of soil disturbance and soil productivity. Whereas soil disturbance measures physical signs of potential soil productivity losses, the FS[rsquo]s measures of soil disturbance do not necessarily provide scientifically valid and reliable measures of soil productivity[mdash]the latter being the focus of NFMA requirements.

A Forest Service scientific report (Grier et al., 1989) proposed a measure of soil productivity: [ldquo]the total amount of plant material produced by a forest per unit area per year.[rdquo] They cite a study finding [ldquo]a 43-percent reduction in seedling height growth in the Pacific Northwest on primary skid trails relative to uncompacted areas[rdquo] for example. And in another Forest Service scientific report (Adams and Froehlich, 1981) states:

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.

The NPCNF[rsquo]s Lolo Insect and Disease FEIS admits, [ldquo]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.[rdquo] However, the Green Horse EA and Soil Report fail to quantify these irreversible and irretrievable soil losses in the project area or forestwide.

USDA Forest Service 2014a discusses and discloses the complexities of fire and management- induced changes on soils:

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.

The definition of DSD considers alterations to physical properties, but not chemical or biological properties. One of these biological properties is partly represented by naturally occurring organic debris from dead trees.

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.)

Recent research reveals profound biological properties of forest soil ignored by the Green Horse analysis: [ldquo](R)esource fluxes through 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.[rdquo] (Simard et al., 2015.) The FS has never considered how management-induced damage to EM networks causes site productivity reductions.

Amaranthus, Trappe, and Molina (in Perry, et al., 1989a) recognize [ldquo]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.[rdquo]

[ldquo]The big trees were subsidizing the young ones through the fungal networks. Without this helping hand, most of the seedlings wouldn[rsquo]t make it.[rdquo] (Suzanne Simard: http://www.ecology.com/2012/10/08/trees-communicate/). Also: [ldquo]Disrupting network links by reducing diversity of mycorrhizal fungi[hellip] 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.[rdquo] (Simard et al., 2013.) (Also see the YouTube video [ldquo]Mother Tree[rdquo] embedded within the Suzanne Simard [ldquo]Trees Communicate[rdquo] webpage at: https://www.youtube.com/watch?v=-8SORM4dYG8&feature=youtu.be) and also this one on the [ldquo]Wood Wide Web[rdquo] on Facebook: https://www.facebook.com/BBCRadio4/videos/2037295016289614/.

Gorzelak et al., 2015:

[hellip]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 [ldquo]tree talk[rdquo] 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 trees and fungal organisms, traditionally viewed as separate and competing. Such connectedness is usually studied within single organisms, such as the interconnections in humans among neurons, sensory organs, glands, muscles, other organs, necessary for individual survival. The tree farming mentality reflected in the Green Horse project fails to consider the ecosystem impacts from industrial management activities on this mycorrhizal network[mdash]or even acknowledge they exist. This management paradigm will inevitably destroy what it refuses to see.

The FS does not adequately account for long-term losses in site or land productivity due to noxious weed infestations caused by management actions. 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[rsquo] ability to compete and can have direct impacts on species diversity (Tyser and Key 1988, Ridenour and Callaway 2001).

USDA Forest Service, 2016a states, [ldquo]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.[rdquo] 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 FS[rsquo]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.

The FS has no idea how the productivity of the land been affected in the Green Horse project area and forestwide due to noxious weed infestations, nor any trends. 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. [hellip]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. [hellip](S)tudies show that productivity can be regained through weed control measures[hellip]

The FS does not cite the results or successes of weed control efforts. Nor is there any data considered regarding trends of invasive species, causes, and cumulative effects.

In focusing only on its flawed DSD proxy, the FS avoids quantifying losses in soil productivity, potentially leading to serious long-term reduction in growth of vegetation of all types, with resulting cascading impacts in food chains and ecosystem function.

The NPCNF[rsquo]s American River/Crooked River FEIS (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.)

Considering decompaction as a mitigation for soil DSD, 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, [ldquo]It is acknowledged that the effectiveness of soil restoration treatments may be low, often less than 50 percent.[rdquo] (P.3.5-20.)

USDA Forest Service, 2005b also states, [ldquo]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.[rdquo] (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 does not 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.

There is no evidence that the FS has incorporated Flatten[rsquo]s recommendations. USDA Forest Service, 2007c admits that soil displacement is essentially permanent, 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.)

To be clear: we are not saying that mitigation and restoration are not effective to a degree. We are saying that the FS cannot attach specific DSD improvement percentages to its mitigation or restoration methodology. Given the critical role soils provide for the functioning of ecosystems[mdash]from the nutrients for the growing of trees and other vegetation that provides not only timber but habitat structure and forage for wildlife, filtering and holding of water, and native vegetation that resists invasive species[mdash]we firmly believe that the FS is recklessly risking soil productivity using vague, [ldquo]the check[rsquo]s in the mail[rdquo] mitigation and restoration. The FS isn't demonstrating consistency with forest plan soil standards or the Regional SQS, in violation of NFMA.

USDA Forest Service, 2009c states, in regards to project area sites where DSD soils were not to be restored by active management: [ldquo]For the [hellip]severely disturbed sites,[hellip] [ldquo]no action[rdquo] [hellip]would create indirect negative impacts by missing an opportunity to actively restore damaged soils. These sites would naturally recover in time, approximately 60 to 80 years.[rdquo] (Emphasis added.)

Again, much of this comes from FS[rsquo]s experts. The Bitterroot National Forest admits that subwatersheds which have high levels of existing soil damage could indicate a potential for hydrologic and silviculture concerns. (USDA Forest Service, 2005b, p. 3.5-11, 12.) The Idaho Panhandle National Forests (USDA Forest Service, 2007c) acknowledge 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.)

Forest Service hydrologist Johnson, 1995 noted this effect from his reading of the scientific literature: [ldquo]Studies by Dennis Harr have consistently pointed out the effects of the compacted surfaces (roads, skid trails, landings, and firelines) on peak flows.[rdquo] Elevated peak flows harm streams and rivers by increasing both bedload and suspended sediment, which is not adequately analyzed in the FS[rsquo]s watershed analysis.

Booth, 1991 further explains the relationship between soil quality conditions and hydrology:

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.

[hellip]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.

[hellip]Flooding, channel erosion, landsliding, and destruction of aquatic habitat are some of the unanticipated changes that [hellip]result from these alterations.

[hellip]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. [hellip]These changes produce measurable effects in the hydrologic response of a drainage basin.

The FS fails to consider and use the best available science, in violation of NFMA and additionally, NEPA's requirements for scientific integrity. See 36 C.F.R. 219.3; 40 C.F.R. 1502.24.

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