February 6, 2020

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Comments transmitted via email to: comments-northern-idpanhandle-sandpoint@usda.gov and michelle.norton@usda.gov

Ms. Norton:

Please accept into the public record these comments on the Buckskin Saddle Integrated Restoration Project Environmental Assessment (EA), on behalf of Alliance for the Wild Rockies (AWR).

AWR transmitted comments dated September 9, 2019 during the scoping phase of public involvement. There is little indication in the EA that the FS recognizes the meaning in those comments. We respectfully include those comments within this letter, to provide the FS with a second opportunity to respond. Please respond in writing to all the comments included in this letter.

Quotes in these comments are from the EA unless attributed otherwise. Text in blue appears exactly as it did in our comments and is included because of its relevance.

Several aspects of the Buckskin Saddle Integrated Restoration Project (Buckskin Saddle) proposal raise questions of significant and cumulative effects, necessitating the preparation of an Environmental Impact Statement under the National Environmental Policy Act (NEPA). The massive logging and road construction proposed, including thousands of acres of clearcut-type logging would not be "insignificant" under any definition, nor without cumulative effects. The proposal would also adversely affect the roadless characteristics and wilderness potential of roadless area. And there are so many "purposes" claimed for the project, and serving them all will create significant conflicts.

The proposed action would log 13,400 acres, the vast majority being clearcut-type logging resulting in huge openings, removing 162 million board feet from this national forest. Over thirty

(30.4) miles of new road would be constructed. 5,000 more acres would be set fire. Rock quarries would be established to use for road construction. And while the analysis of effects are sorely inadequate and lack use of adequate data, the FS still assuming there will be no significant impacts.

The Buckskin Saddle project would implement the 2015 revised Forest Plan. In carrying out its mission, AWR has participated in the public processes concerning management of the Idaho Panhandle National Forests (IPNF) since the early days of original 1987 Forest Plan implementation, and has taken legal action a few times to force the Forest Service (FS) to manage in conformance with environmental laws such as the Endangered Species Act (ESA), the National Forest Management Act (NFMA), and the National Environmental Policy Act (NEPA). AWR also participated fully in the public process as the FS developed its revised Forest Plan, including commenting at every stage and submitting a formal objection. And because the FS provided essentially no relief in response to the formal objection, AWR incorporates the documentation of public participation in the revised Forest Plan public process within these comments on the Buckskin Saddle proposal. By implementing the revised Forest Plan with this project, the FS would be operating outside of environmental laws and regulations.

AWR participated in the public process during the development of the Access Amendments, and we incorporate AWR's comments and appeal of that Decision within these comments. AWR also participated during the public process as the Northern Rockies Lynx Management Direction (NRLMD) was developed, and continues to believe that the Forest Plan/NRLMD does not consider the best available science. AWR incorporates the documentation of its participation in the NRLMD public process within this comment on the Buckskin Saddle proposal.

<u>Necessary Elements for Project analysis:</u>

- Disclose all IPNF Forest Plan direction for logging/burning projects and explain how the project complies with them;
- Explain how the project will comply with forest plan big game hiding cover requirements;
- Disclose the location and acreages of past, current, and reasonably foreseeable logging, grazing, and roadbuilding activities within the project area;
- Solicit and disclose comments from the Idaho Department of Fish and Game regarding the impact of the project on wildlife habitat;
- Solicit and disclose comments from the Idaho Department of Environmental Quality regarding the impact of the project on water quality;
- Disclose the biological assessment for the candidate, threatened, or endangered species with potential and/or actual habitat in the project area;
- Disclose the biological evaluation for the sensitive and management indicator species (MIS) with potential and/or actual habitat in the project area;
- Disclose the snag densities in the project area, and the method used to determine those densities;
- Disclose the current, during-project, and post-project road densities in the project area;
- Disclose the IPNF's record of compliance with state best management practices regarding stream sedimentation from ground-disturbing management activities;

- Disclose the IPNF's record of compliance with its monitoring requirements as set forth in its 1987 and revised forest plans;
- Disclose the IPNF's record of compliance with the additional monitoring requirements set forth in previous DN/FONSIs and RODs on the IPNF;
- Disclose the results of the field surveys for threatened, endangered, sensitive, and rare plants in each of the proposed units;
- Formally consult with the U.S. Fish and Wildlife Service (USFWS) on the impacts of this project on candidate, threatened, or endangered wildlife, fish, and plant species;

<u>Also please address the following questions and issues:</u>

- Will this project exacerbate existing noxious weed infestations and start new infestations?
- Do unlogged old growth forest store more carbon than the wood products that would be removed from the same forest in a logging operation?
- What is the cumulative effect of national forest logging on U.S. carbon stores? How many acres of national forest lands are logged every year? How much carbon is lost by that logging?
- Please list each visual quality standard that applies to each unit and disclose whether each unit meets its respective visual quality standard. A failure to comply with visual quality Forest Plan standards violates NFMA.
- For the visual quality standard analysis please define "ground vegetation," i.e. what age are the trees, "re-establishes," "short-term," "longer term," and "revegetate."
- Please disclose whether you have conducted surveys in the project area for this project for all threatened, endangered, sensitive and management indicator species (MIS).
- Please disclose how often the project area has been surveyed for all MIS, sensitive, threatened, and endangered species suspected to inhabit the project area.
- Would the habitat be better for all MIS, sensitive, threatened, and endangered species if roads were removed in the project area?
- What is the USFWS position on the impacts of this project on all candidate, threatened, and endangered species?
- Have you conducted ESA consultation?
- Please provide us with the full Biological Evaluations/Assessments for the all threatened, endangered, sensitive, and MIS species.
- What is wrong with uniform forest conditions?
- Have insects and tree diseases contributed to a diverse landscape?
- Disclose the level of current noxious weed infestations in the project area and the cause of those infestations;
- Disclose the impact of the project on noxious weed infestations and native plant communities;
- Disclose the amount of detrimental soil disturbance that currently exists in each proposed unit from previous logging and livestock grazing activities;
- Disclose the expected amount of detrimental soil disturbance in each unit after ground disturbance and prior to any proposed mitigation/remediation;
- Disclose the expected amount of detrimental soil disturbance in each unit after proposed mitigation/ remediation;
- Disclose the analytical data that supports proposed soil mitigation/remediation measures;

- Disclose the timeline for implementation;
- How do you define a healthy forest[1]?
- Disclose the funding source for non-commercial activities proposed.
- Disclose the current level of old growth forest in each third order drainage in the project area;
- Disclose the method used to quantify old growth forest acreages and its rate of error based upon field review of its predictions;
- Disclose the historic levels of mature and old growth forest in the project area;
- Disclose the level of mature and old growth forest necessary to sustain viable populations of old-growth associated wildlife species in the area;
- Disclose the amount of mature and old growth forest that will remain after implementation;
- Disclose the amount of current habitat for old growth and mature forest dependent species in the project area;
- Disclose the amount of habitat for old growth and mature forest dependent species that will remain after project implementation;
- Disclose the method used to model old growth and mature forest dependent wildlife habitat acreages and its rate of error based upon field review of its predictions;
- Disclose the amount of big game (moose and elk) hiding cover, winter range, and security currently available in the area;
- Disclose the amount of big game (moose and elk) hiding cover, winter range, and security during project implementation;
- Disclose the amount of big game (moose and elk) hiding cover, winter range, and security after project implementation;
- Disclose the method used to determine big game hiding cover, winter range, and security, and its rate of error as determined by field review;
- Disclose and address the concerns expressed by the Planning Team in the draft Five-Year Review of the Forest Plan regarding the failure to monitor population trends of MIS, the inadequacy of the Forest Plan old growth standard, and the failure to compile data to establish a reliable inventory of sensitive species on the Forest;
- Disclose the actions being taken to reduce fuels on private lands adjacent to the project area and how those activities/or lack thereof will impact the efficacy of the activities proposed for this project;
- Disclose the efficacy of the proposed activities at reducing wildfire risk and severity in the project area in the future, including a two-year, five-year, ten-year, and 20-year projection;
- Disclose when and how the IPNF made the decision to suppress natural wildfire in the project area and replace natural fire with logging and prescribed burning;
- Disclose the cumulative impacts on the Forest-wide level of the IPNF policy decision to replace natural fire with logging and prescribed burning;
- Disclose how Project complies with the Idaho Roadless Rule;

[1] The Scoping Notice states, "The area is experiencing declining forest health, based on annual forest health surveys…"

- Disclose the impact of climate change on the efficacy of the proposed treatments;
- Disclose the impact of the proposed project on the carbon storage potential of the area;
- Disclose the baseline condition, and expected sedimentation during and after activities, for all streams in the area;
- Disclose maps of the area that show the following elements:
  1. Past, current, and reasonably foreseeable logging units in the project area;
  2. Past, current, and reasonably foreseeable livestock grazing allotments in the project area;
  3. Density of human residences within 1.5 miles from the project unit boundaries;
  4. Hiding cover in the project area according to the Forest Plan definition;
  5. Old growth forest in the project area;
  6. Big game security areas;
  7. Moose winter range.

The Scoping Notice makes a preliminary determination that the impacts of this proposal will be documented in an Environmental Assessment. We believe that use of an EA is only appropriate in the context of a national forest being managed in accordance to its forest plan, NFMA, and best available science, and also in the context of a detailed narrative of the project area evaluating management performance of past FS actions. Please disclose the best available science the FS is relying upon to support the Buckskin Saddle proposed action.

Using the EA process means the FS would not be required to provide written responses to public comments, rendering the notion of public involvement rather meaningless. We believe the FS is obligated to prepare an EIS, and provide written responses to all comments at every stage.

Unlawful Forest Plan

The Forest Plan revision process itself violated NEPA and NFMA and failed to utilize the best available science. Implementing actions under the Forest Plan would be significant. Therefore these comments identify legal deficiencies of the Forest Plan as well as the project proposal.

The Forest Plan exhibits a relative absence of explicit reference to the 1982 planning rule. The Forest Plan is inconsistent with the regulations written to guide planning under NFMA.

Many Forest Plan Objectives are not linked with Forest Plan Goals, as required.

The use of the word "should" in Forest Plan Standards and Guidelines allows land managers to have too much or undefined levels of discretion.

"Short term" and "long term" are not adequately defined in the Forest Plan.

The Forest Plan desired ranges for dominance groups are not supported by reliable historic data taken from IPNF surveys or scientific research. Also, the FS has not explained how the effects of climate change and white pine blister rust affect the attainability of those desired ranges.

The Forest Plan desired ranges for Size Class are not supported by reliable historic data taken from IPNF surveys or scientific research. And the FS has not explained how the effects of climate change and white pine blister rust affect the attainability of those desired ranges.

In FW-DC-VEG-03 the term “substantial amounts” is not defined. The desired “greater increase” related to the identified tree species is not supported by citation to specific reliable historic data taken from IPNF surveys or scientific research. The FS has not explained how the effects of climate change and white pine blister rust affect the attainability of those increases.

In FW-DC-VEG-04 the implication that trees are generally too dense on the IPNF is not supported by specific reliable historic data gathered from IPNF surveys or scientific research.

In FW-DC-VEG-05 the desired increase in size of forest patches in the seedling and sapling size classes and decreases in size of forest patches in the small and medium size classes is not supported by specific reliable historic data gathered from IPNF surveys or scientific research.

In FW-DC-VEG-06 the implied assertion that root fungi and forest insects are causing too much tree mortality on the IPNF is not supported by specific reliable historic data gathered from IPNF surveys or scientific research.

In FW-DC-VEG-07 the desired ranges for snags are not supported by reliable historic data taken from IPNF surveys or scientific research. The scientific basis for the delineation of snags into two diameter groups using 20” d.b.h. as the division point is not established.

In FW-DC-VEG-11 the desired ranges for forest composition, structure, and pattern for each biophysical setting are not supported by reliable historic data taken from IPNF surveys or scientific research. The Forest Plan does not explained how the effects of climate change and white pine blister rust affect the attainability of those desired ranges.

The Forest Plan does not cite the scientific basis for the minimum amounts of coarse woody debris to be retained under Guideline FW-GDL-VEG-03.

In FW-GDL-VEG-05 it is unclear if the use of the word “should” is intended to recognize the second consistency requirement on page 4 of the Forest Plan, or if it is intended to render the entire Guideline to be discretionary. Also, the “fire salvage” provision for using untreated areas to meet snag requirement would lead to insufficient retention in logged areas.

In FW-GDL-VEG-06 it is unclear if the use of the word “should” is intended to recognize the second consistency requirement on page 4 of the Forest Plan, or if it is intended to render the entire Guideline to be discretionary.

The first sentence of FW-GDL-VEG-08 along with the consistency requirement on page 4 of the Forest Plan suggest that any silvicultural system may be used in any proposed treatment unit, regardless of its appropriateness.

Essentially, FW-DC-FIRE-02 and Guideline MA6-GDL-FIRE-01 can be used to justify treatments regardless if they result in forest conditions that would not likely occur naturally, or if the biophysical setting would require frequent, intensive fuel treatments to maintain the desired fuel conditions. Regardless of natural fire regime, "Fire behavior is characterized by low-intensity surface fires with limited crown fire potential." Also, they prioritize fuel reduction over natural processes that create important wildlife habitat components and maintain soil productivity.

The wording of FW-DC-TBR-03 essentially nullifies any meaningful distinction between suitable and unsuitable land, and together FW-OBJ-TBR-01, MA6-STD-TBR-01, and the ASQ (FW-DC-TBR-04), encourages logging in unsuitable land. One or more of the "purposes" of logging it allows in land that is "unsuitable" appear in every timber sale NEPA document.

FW-DC-TBR-04. The Allowable Sale Quantity (ASQ) of 120 million board feet annually is not based upon scientifically sound modeling that adequately considers ecological and economic constraints. It is simply not ecologically sustainable. It creates a sense of false expectations for forest products industries.

FW-OBJ-TBR-01. This timber target provides incentives which conflict with ecological sustainability. The annual target of offering 45 million board feet is not based upon scientifically sound modeling that adequately considers ecological and economic constraints. It creates a sense of false expectations for forest products industries

FW-STD-TBR-02 perpetuates the fiction that there is a category of natural processes that are some sort of "catastrophe." This effectively translates to dead trees not being logged (not maximizing timber volume produced) as the catastrophe rather than there really being something truly ecologically harmful.

Desired Condition FW-DC-SES-04 perpetuates the Smoky Bear myth that protection from fire is a promise that the government can and should make. Unlike the direction provided in the Forest Plan Fire section, there is no recognized balance with ecological considerations. This Desired Condition does not provide any further increment of public safety.

The EA states, "Fifty-seven percent of the National Forest System lands within the project area have been determined to be suitable for timber production: Please cite the specific documentation which determined that these specific lands (57% of the national forest land in the project area) are suitable for timber production. We want to know when and how this was determined.

To the degree the forest plan direction has legitimacy, the EA fails to state all the relevant Plan direction and demonstrate consistency with it.

Cumulative Effects

"The existing vegetation condition encompasses the cumulative effects analysis area and captures the effects of past activities on the forest vegetation resource in the planning area. Direct and indirect effects of the activities proposed in alternative 2 are additive to the activities which have led to the existing condition." This is typical of cumulative effects (non)analysis in the EA. To paraphrase, things are the way they are now because things happened in the past, and never mind that data is lacking to adequately describe the way things are now.

Project activities and their environmental impacts will extend beyond the mapped project area boundary shown on the map, and the FS is obligated to acknowledge and disclose those impacts. The FS should utilize an analysis area formed by the watershed boundaries encompassing all the logging and any other proposed active management.

It is vital that the results of past monitoring be incorporated into this project analysis and planning. We request the following be disclosed:

- 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.

Please provide an analysis of how well those past FS projects met the goals, objectives, desired conditions, etc. stated in the corresponding NEPA documents, and how well the projects conformed to forest plan standards and guidelines.

Those items are a critical part of the NEPA analysis. Without this critical link the validity of the FS's current assumptions are baseless. 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 not accurate, and the agency is making similar decisions, then the process will lead to failure. For instance, if in previous processes 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, it is important for the public and the decision maker to know. If there have been problems with FS implementation in the past, it is not logical to assume that implementation will now all of a sudden be appropriate. If prior logging, prescribed fire and other "forest health treatments" have not been monitored appropriately, then there is no valid reason for this project.

Please analyze and disclose the cumulative effects of past, ongoing, and proposed management actions, within a logically defined cumulative effects analysis area, on land of all ownerships. Please disclose if the FS has performed all of the monitoring and mitigation required or recommended in those NEPA documents, and the results of the monitoring. The FS would be unable to properly analyze and disclose cumulative effects of management plan implementation if it is not adequately informed by past project monitoring and plan-mandated monitoring.

Please provide an analysis to determine if implementation of past management activities contributed to the claimed deficiency in resiliency.

The EA fails to analyze and disclose cumulative impacts of the ongoing North Zone Roadside Salvage Project and the foreseeable Chloride Gold Project.

Ecologically Deficient Forest Plan "Desired Conditions"

The FS's "desired conditions" rationale is inconsistent with a more holistic ecosystem management approach, which acknowledges the forest's capability of operating in a self-regulatory manner. For example, Harvey et al., 1994 state:

> Although usually viewed as pests at the tree and stand scale, insects and disease organisms perform functions on a broader scale.
>
> …Pests are a part of even the healthiest eastside ecosystems. Pest roles—such as the removal of poorly adapted individuals, accelerated decomposition, and reduced stand density—may be critical to rapid ecosystem adjustment.
>
> …In some areas of the eastside and Blue Mountain forests, at least, the ecosystem has been altered, setting the stage for high pest activity (Gast and others, 1991). **This increased activity does not mean that the ecosystem is broken or dying; rather, it is demonstrating functionality, as programmed during its developmental (evolutionary) history**. (Emphasis added.)

Would the above statement—made by government scientists as part of their participation with the Interior Columbia Basin Ecosystem Management Project—be automatically rejected from consideration as Best Available Science for the Buckskin Saddle process, because it is inconsistent with the assumptions contained in the Scoping Notice?

The EIS must demonstrate consistency with all the applicable direction in the Forest Plan to comply with NEPA and NFMA.

The IPNF Forest Plan and its wildlife viability methodology rely heavily upon the assumption that the FS knows the Historic Range of Variability (HRV) of a wide enough set of vegetation/habitat parameters, upon which "Desired Conditions" are constructed, and toward which "movement" is most of what's necessary for determining Forest Plan/NFMA compliance. Yet the reliability of the data sources used to construct the HRV is not disclosed. The data sources themselves are not identified or obscure.

The Forest Plan relies upon static Desired Conditions (DCs) to direct active management on the IPNF. The philosophy driving the FS strategy to "move toward" and replicate historic vegetative conditions (basically, replace natural processes with logging and prescribed burning) is that emulation of the **results of** disturbance processes would conserve biological diversity. McRae et al. 2001 provide a scientific review summarizing empirical evidence that finds marked contrasts between the results of logging and wildfire. A plethora of scientific evidence directs that DCs be more properly stated in terms of **desired future dynamics**, in line with best available science. Hessburg and Agee (2003) for example, state:

> Patterns of structure and composition within existing late-successional and old forest reserve networks will change as a result of wildfires, insect outbreaks, and other processes. What may be needed is an approach that marries a short-term system of reserves with a long-term strategy to convert to a continuous network of landscapes with dynamic properties. In such a system, late-successional and old forest elements would be continuously recruited, but would shift semi-predictably in landscape position across space and time. Such an approach would represent a planning paradigm shift from NEPA-like desired future conditions, to planning for landscape-scale **desired future dynamics**. (Emphasis added.)

Likewise, Sallabanks, et al., 2001 state:

> Given the dynamic nature of ecological communities in Eastside (interior) forests and woodlands, particularly regarding potential effects of fire, **perhaps the very concept of defining "desired future conditions" for planning could be replaced with a concept of describing "desired future dynamics."**

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 <u>products</u> of ecosystem processes rather than the processes themselves**. It does not address the most critical issue—long-term perpetuation of diverse forest habitats, a mosaic pattern which includes stands of old-growth larch. **The processes that produce suitable habitat must be retained or reinstated by managers. Snags are the result of these processes** (fire, insects, disease, flooding, lightning, etc.).

(Emphasis added.) There is much other support for such an approach in the scientific literature. Noss 2001, for example, believes "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." (Emphasis added.)

Noss 2001 describes basic ecosystem components:

> 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.

(Emphasis added.) Noss 2001 goes on to define those basic components:

> **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.

(Emphasis added.) 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**…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.)

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. …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. … **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.)

Hessburg and Agee 2003 also emphasize the primacy of natural processes for management purposes:

> Ecosystem management planning must acknowledge **the central importance of natural processes and pattern–process interactions, the dynamic nature of ecological systems** (Attiwill, 1994), the inevitability of uncertainty and variability (Lertzman and Fall, 1998) and cumulative effects (Committee of Scientists, 1999; Dunne et al., 2001). (Emphasis added.)

The EA also fails to provide a rational explanation of the alleged need to conduct logging to mimic natural processes' effects creating patch size and pattern. Churchill, 2011 points out:

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

(Emphases added.) Churchill describes above the ongoing natural processes that will alleviate the vegetative imbalances alleged in the EA—without expensive and ecologically risky logging and road building. Since no proper spatial analysis of the <u>landscape pattern's departure</u> has been completed, the EA has no scientifically defensible logging solution.

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. … Although it is not ubiquitously applicable, (wildland fire use) could potentially be a cost-effective and ecologically sound tool for "treating" 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.

Typically, vegetation management proposals and their accompanying NEPA documents on the IPNF acknowledge that attempts to control or resist the natural process of fire have been a contributor to deviations from DCs. This Buckskin Saddle proposal is no exception. Often these same documents characterize fire as well as native insects and other natural pathogens as threats to the ecosystem rather than rejuvenating natural processes. They seem to need such an obsolete viewpoint in order to justify and prioritize the proposed vegetation manipulations, tacitly for replacing natural processes with "treatments" and "prescriptions." However the scientific support for assuming that large landscapes and ecosystems can be restored or continuously maintained by such manipulative actions is entirely lacking.

The FS has recognized that natural processes are vital for achieving ecological integrity. USDA Forest Service, 2009a incorporates "ecological integrity" into its concept of "forest health" thus:

> "(E)cological integrity": Angermeier and Karr (1994), and Karr (1991) define this as: The capacity to support and maintain a balanced, integrated, and adaptive biological system having the **full range of** elements and **processes** expected in a region's natural habitat. "…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 the natural habitat of the region." **That is, an ecosystem is said to have high integrity** if its full complement of native species is present in normal distributions and abundances, and **if normal dynamic functions are in place and working properly.** In systems with integrity, the "…capacity for self-repair when perturbed is preserved, and minimal external support for management is needed."

(Emphases added.) In their conclusion, Hessburg and Agee, 2003 state "Desired future conditions will only be realized by planning for and creating the desired ecosystem dynamics represented by ranges of conditions, set initially in strategic locations with minimal risks to species and processes."

Climate Change and Carbon Sequestration

Please analyze how proposed management actions would be affected by likely climate change scenarios. Please quantify all human-caused CO_2 emissions for all project activities. Please quantify carbon sequestration for each alternative. Please disclose how climate change has affected ecological conditions in the project area, and include an analysis of these conditions under climate change scenarios.

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

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

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

Where is the cumulative effects analysis of IPNF carbon sequestration over time?

Respected experts say that the atmosphere might be able to safely hold 350 ppm of CO_2.[2] So when the atmosphere was at pre-industrial levels of about 280 ppm, there was a cushion of about 70 ppm which represents millions of tons of greenhouse gas emissions. Well, now that cushion is completely gone. The atmosphere is now over 400 ppm CO_2 and rising. Therefore the safe level of additional emissions (from logging or any other activity) is negative. There is no safe level of additional emissions that our earth systems can tolerate. We need to be removing carbon from the atmosphere—not adding to it.[3] How? By allowing forest to grow. Logging moves us away from our objective while conservation moves us toward our objective.

Researchers Mackey, et al., 2013 "clarify some well-established fundamentals of the global carbon cycle that are frequently either misunderstood, or seemingly overlooked." These authors state: "At present some forests have carbon sequestration potential due to depletion of carbon stocks from past land use." The authors call this potential, "Reforestation of previously cleared or logged land…" They do not attribute this potential to "increasing forest resilience to disturbance" or the kind of forest "restoration" implied by this EA.

Mackey, et al., 2013 also make the following points:

- Avoiding and reducing land carbon emissions is therefore an integral part of any comprehensive approach to solving the climate change problem.

- In addition to deforestation, forests have been degraded by land-use activities such as logging and soil disturbance that deplete their organic carbon stocks and emit CO_2. Emissions from forest degradation are poorly quantified globally, but estimates indicate that they increase regional carbon emissions by nearly 50% over deforestation alone.

- The capacity of the land to remove atmospheric carbon and store it in vegetation and soil is limited to the amount previously depleted by land use.

- If the forest is allowed to develop into an ecologically mature state, the carbon stock approaches a dynamic equilibrium with prevailing environmental conditions, where respiration approximately balances photosynthesis. At this point, the depleted land carbon stock has been refilled and the sink function has gone. The mitigation value of the ecosystem resides in maintenance of the stored carbon stock.

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[2] http://www.350.org/about/science.

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

- Ecologically mature (>200 years) and old-growth forests aged up to 800 years can continue to function as sinks. … In terms of carbon mitigation policy, the primary reason to conserve forests is the carbon stocks they contain. The idea that replacing primary forests by plantations will 'create sinks' and thereby be positive for climate mitigation is incorrect, as it fails to account for the loss of carbon stock from the primary forest. Furthermore, plantation forests store less carbon than the pre-existing natural primary forest, secondary (regenerating) natural forests or a primary forest under the same environmental conditions.

- Consistent with our understanding of the lifetime of the airborne fraction of a pulse of CO_2, the most effective form of climate change mitigation is to avoid carbon emissions from all sources.

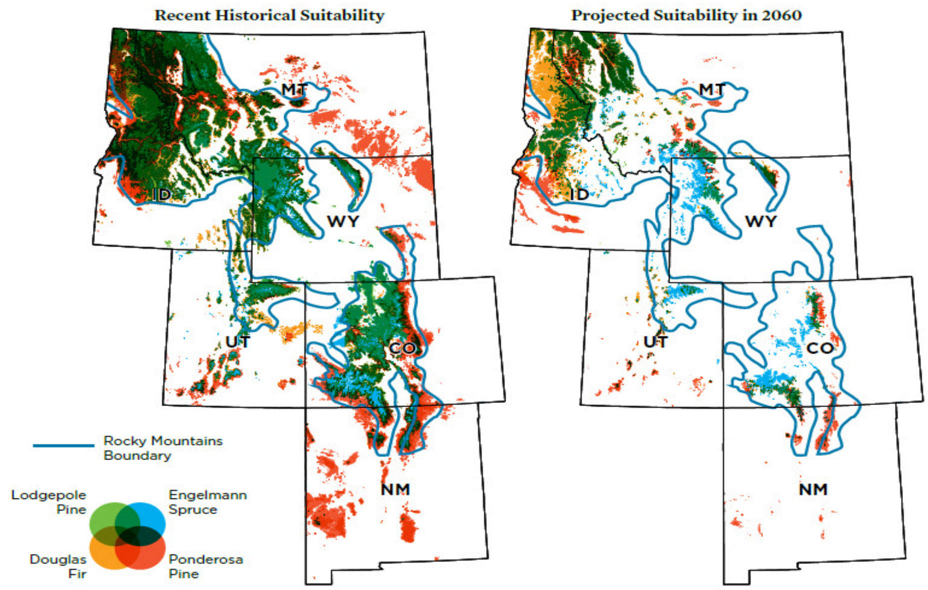
Pecl, et al. 2017 "review the consequences of climate-driven species redistribution for economic development and the provision of ecosystem services, including livelihoods, food security, and culture, as well as for feedbacks on the climate itself." They state, "Despite mounting evidence for the pervasive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

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—movements that, with or without effective emission reduction, will continue for the foreseeable future, owing to the inertia in the climate system.

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

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



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

The caption under Funk et al.'s Figure 5 and Table 1 states:

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

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

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

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

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

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

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

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

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

> Robust statistical associations between wildfire and hydro-climate in western forests indicate that increased wildfire activity over recent decades reflects sub-regional responses to changes in climate. Historical wildfire observations exhibit an abrupt transition in the mid-1980s from a regime of infrequent large wildfires of short (average of one week) duration to one with much more frequent and longer-burning (five weeks) fires. This transition was marked by a shift toward unusually warm springs, longer summer dry

> seasons, drier vegetation (which provoked more and longer-burning large wildfires), and longer fire seasons. Reduced winter precipitation and an early spring snowmelt played a role in this shift. Increases in wildfire were particularly strong in mid-elevation forests. …The greatest increases occurred in mid-elevation, Northern Rockies forests, where land-use histories have relatively little effect on fire risks, and are strongly associated with increased spring and summer temperatures and an earlier spring snowmelt.

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

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

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

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

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

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

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

Council, Northern Plains Resource Council, the Sierra Club, and the Natural Resources Defense Council.

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

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

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

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

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

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

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

KEY MESSAGES

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

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

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

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

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

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

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

Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. The Battle Creek Alliance et al., 2017 comments on the January 20, 2017 Draft California Forest Carbon Plan contains headings such as "The …assertion that increased thinning/logging will increase carbon storage in forests is unsupported by the best available science."

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

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

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

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

We incorporate the following article from the *Missoulian* ("Fire study shows landscapes such as Bitterroot's Sapphire Range too hot, dry to restore trees") 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 tree stands are getting replaced by grass and shrubs after fire across the western United States due to climate change.

Courtesy Kim Davis

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

“The drier aspects aren’t coming back, especially on north-facing slopes,” said Kim Davis, a UM landscape ecologist and lead investigator on the study. “It’s not soil sterilization. Other vegetation like grasses are re-sprouting. It’s too warm. There’s not enough moisture for the trees.”

Davis worked with landscape ecologist Solomon Dobrowski, fire 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.

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

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

“We did over 4,000 miles of road-tripping across the West, as well as lots of miles hiking and backpacking,” Davis said. The survey crews brought back everything from dead seedlings to 4-inch-diameter tree rings; nearly 3,000 samples in total. Then they analyzed how long each tree had been growing and what conditions had been when it sprouted. Before the 1990s, the test sites had enough soil moisture, humidity and other factors to recruit new seedlings after forest fires, Dobrowski said.

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

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

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

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

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

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

> Lost Trail Pass have recovered, the lower- elevation Ponderosa pine and Douglas firs haven't.
>
> Another factor driving regeneration is the availability of surviving seed trees that can repopulate a burn zone. If one remains within 100 meters of the burned landscape, the area can at least start the process of reseeding. Unfortunately, the trend toward high-severity fires has reduced the once-common mosaic patterns that left some undamaged groves mixed into the burned areas.
>
> Higuera said he hoped land managers could use small or prescribed fires to make landscapes more resilient, as well as restructure tree-planting efforts to boost the chances of heavily burned places.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The IPNF Forest Plan draft EIS defines carbon sequestration: "…the process by which atmospheric carbon dioxide is taken up by vegetation through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils."

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

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

> Off-road vehicles in California currently emit more than 230,000 metric tons — or 5000 million pounds — of carbon dioxide into the atmosphere each year. This is equivalent to the emissions created by burning 500,000 barrels of oil. The 26 million gallons of gasoline consumed by off-road vehicles each year in California is equivalent to the amount of gasoline used by 1.5 million car trips from San Francisco to Los Angeles.
>
> . . . Off-road vehicles emit considerably more pollution than automobiles. According to the California Air Resources Board, off-road motorcycles and all-terrain vehicles produce 118 times as much smog-forming pollutants as do modern automobiles on a per-mile basis.
>
> . . . Emissions from current off-road vehicle use statewide are equivalent to the carbon dioxide emissions from 42,000 passenger vehicles driven for an entire year or the electricity used to power 30,500 homes for one year.

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

192 million pounds (96 thousand tons) of climate-warming CO_2 per year into the atmosphere. Can we really afford this?

This indicates managers are able to estimate fossil fuel emissions created by motor vehicles on the Forest. But the Buckskin Saddle EA fails to disclose fossil fuel emissions such as those caused by recreational activities and resource management.

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

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

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

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

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

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

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

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

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

Moomaw and Smith, 2017 state:

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

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

> All plant material releases slightly more carbon per unit of heat produced than coal. Because plants produce heat at a lower temperature than coal, wood used to produce electricity produces up to 50 percent more carbon than coal per unit of electricity.
>
> Trees are harvested, dried, and transported using fossil fuels. These emissions add about 20 percent or more to the carbon dioxide emissions associated with combustion.

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

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

Van der Werf, et al. 2009 discuss the effects of land-management practices and state:

> (T)he maximum reduction in CO_2 emissions from avoiding deforestation and forest degradation is probably about 12% of current total anthropogenic emissions (or 15% if peat

> degradation is included) - and that is assuming, unrealistically, that emissions from deforestation, forest degradation and peat degradation can be completely eliminated.
>
> ...reducing fossil fuel emissions remains the key element for stabilizing atmospheric CO_2 concentrations.
>
> (E)fforts to mitigate emissions from tropical forests and peatlands, and maintain existing terrestrial carbon stocks, remain critical for the negotiation of a post-Kyoto agreement. Even our revised estimates represent substantial emissions ...

Keith et al., 2009 state:

> Both net primary production and net ecosystem production in many old forest stands have been found to be positive; they were lower than the carbon fluxes in young and mature stands, but not significantly different from them. Northern Hemisphere forests up to 800 years old have been found to still function as a carbon sink. Carbon stocks can continue to accumulate in multi-aged and mixed species stands because stem respiration rates decrease with increasing tree size, and continual turnover of leaves, roots, and woody material contribute to stable components of soil organic matter. There is a growing body of evidence that forest ecosystems do not necessarily reach an equilibrium between assimilation and respiration, but can continue to accumulate carbon in living biomass, coarse woody debris, and soils, and therefore may act as net carbon sinks for long periods. Hence, process-based models of forest growth and carbon cycling based on an assumption that stands are even-aged and carbon exchange reaches an equilibrium may underestimate productivity and carbon accumulation in some forest types. Conserving forests with large stocks of biomass from deforestation and degradation avoids significant carbon emissions to the atmosphere. Our insights into forest types and forest conditions that result in high biomass carbon density can be used to help identify priority areas for conservation and restoration.

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

> Our forests are functioning as carbon sinks (net sequestration) where logging has been reduced or halted, and wildland fire helps maintain high productivity and carbon storage.
>
> Even large, intense fires consume less than 3% of the biomass in live trees, and carbon emissions from forest fires is only tiny fraction of the amount resulting from fossil fuel consumption (even these emissions are balanced by carbon uptake from forest growth and regeneration).
>
> "Thinning" operations for lumber or biofuels do not increase carbon storage but, rather, reduce it, and thinning designed to curb fires further threatens imperiled wildlife species that depend upon post-fire habitat.

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

> It has been suggested that thinning trees and other fuel-reduction practices aimed at reducing the probability of high-severity forest fire are consistent with efforts to keep

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

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

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

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

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

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

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

Managing forest lands with concerns for water will be increasingly difficult under new conditions expected for the 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: "Changes in the timing of streamflow related to changing snowmelt are already observed and will continue, reducing the supply of water for many competing demands and causing far-reaching ecological and socioeconomic consequences." (Mote et al. 2014.)

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

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

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

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

> Forests are changing in ways they've never experienced before because today's growing conditions are different from anything in the past. The climate is changing at an unprecedented rate, exotic diseases and pests are present, and landscapes are fragmented by human activity often occurring at the same time and place.
>
> The current drought in California serves as a reminder and example that forests of the 21st century may not resemble those from the 20th century. "When replanting a forest after disturbances, does it make sense to try to reestablish what was there before? Or, should we find re-plant material that might be more appropriate to current and future conditions of a changing environment?
>
> "Restoration efforts on U.S. Forest Service managed lands call for the use of locally adapted and appropriate native seed sources. The science-based process for selecting these seeds varies, but in the past, managers based decisions on the assumption that present site conditions are similar to those of the past.
>
> "This may no longer be the case."

This raises the important issue: are our forests really "suitable" for timber production if the likely impacts of climate change mean that regeneration following this massive clearcutting operation may not be feasible.

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

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

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

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

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

Davis et al., 2019 state: "At dry sites across our study region, seasonal to annual climate conditions over the past 20 years have crossed these thresholds, such that conditions have become increasingly unsuitable for regeneration. High fire severity and low seed availability further reduced the probability of postfire regeneration. Together, our results demonstrate that climate change combined with high severity fire is leading to increasingly fewer opportunities for seedlings to establish after wildfires and may lead to ecosystem transitions in low-elevation ponderosa pine and Douglas-fir forests across the western United States."

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

The EA does not disclose restocking monitoring data and analysis.

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

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

The FS refused to consider scientific research and opinion that recognizes the critical challenge posed by climate change to global ecosystems and the IPNF. The statement in the 2010 KIPZ Climate Change Report, "Harvested wood products increase the net sequestration on these forests by an undetermined amount" is unsubstantiated by cited scientific research or information.

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. Managers of national forest lands 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. Please analyze, disclose, and consider the full range of scientific information on carbon storage, vegetation management, and wildfire.

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

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

In other words, the Desired Conditions the Forest Plan relies upon must be evaluated in the context of how realistic—or even "desirable"—achieving them really is in the context of rapidly changing climate.

Please disclose the body of science that implicates logging activities as a contributor to reduced carbon stocks in forests and increases in greenhouse gas emissions.

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

> Patterns, mechanisms, projections, and consequences of tree mortality and associated broad-scale forest die-off due to drought accompanied by warmer temperatures—hotter drought", an emerging characteristic of the Anthropocene—are the focus of rapidly expanding literature.
>
> …(R)ecent studies document more rapid mortality under hotter drought due to negative tree physiological responses and accelerated biotic attacks. Additional evidence suggesting greater vulnerability includes rising background mortality rates; projected increases in drought frequency, intensity, and duration; limitations of vegetation models such as inadequately represented mortality processes; warming feedbacks from die-off; and wildfire synergies.
>
> …We also present a set of global vulnerability drivers that are known with high confidence: (1) droughts eventually occur everywhere; (2) warming produces hotter droughts; (3) atmospheric moisture demand increases nonlinearly with temperature during drought; (4) mortality can occur faster in hotter drought, consistent with fundamental physiology; (5) shorter droughts occur more frequently than longer droughts and can become lethal under warming, increasing the frequency of lethal drought nonlinearly; and (6) mortality happens rapidly relative to growth intervals needed for forest recovery.
>
> These high-confidence drivers, in concert with research supporting greater vulnerability perspectives, support an overall viewpoint of greater forest vulnerability globally. We surmise that mortality vulnerability is being discounted in part due to difficulties in predicting threshold responses to extreme climate events. Given the profound ecological and societal implications of underestimating global vulnerability to hotter drought, we highlight urgent challenges for research, management, and policy-making communities.

Also see: "Scientists Letter to the Senate on carbon neutrality of forest biomass."

Moomaw and Smith, 2017 conclude:

> With the serious adverse consequences of a changing climate already occurring, it is important to broaden our view of sustainable forestry to see forests …as complex ecosystems that provide valuable, multiple life-supporting services like clean water, air, flood control, and carbon storage. We have ample policy mechanisms, resources, and funding to support conservation and protection if we prioritize correctly.
>
> …We must commit to a profound transformation, rebuilding forested landscapes that sequester carbon in long-lived trees and permanent soils. Forests that protect the climate also allow a multitude of species to thrive, manage water quality and quantity and protect our most vulnerable communities from the harshest effects of a changing climate.
>
> Protecting and expanding forests is not an "offset" for fossil fuel emissions. To avoid serious climate disruption, it is essential that we simultaneously reduce emissions of carbon dioxide from burning fossil fuels and bioenergy along with other heat trapping gases and accelerate the removal of carbon dioxide from the atmosphere by protecting and expanding forests. It is not one or the other. It is both!

> Achieving the scale of forest protection and restoration needed over the coming decades may be a challenging concept to embrace politically; however, forests are the only option that can operate at the necessary scale and within the necessary time frame to keep the world from going over the climate precipice. Unlike the fossil fuel companies, whose industry must be replaced, the wood products industry will still have an important role to play in providing the wood products that we need while working together to keep more forests standing for their climate, water, storm protection, and biodiversity benefits.
>
> It may be asking a lot to "rethink the forest economy" and to "invest in forest stewardship," but tabulating the multiple benefits of doing so will demonstrate that often a forest is worth much more standing than logged. Instead of subsidizing the logging of forests for lumber, paper and fuel, society should pay for the multiple benefits of standing forests. It is time to value U.S. forests differently in the twenty-first century. We have a long way to go, but there is not a lot of time to get there.

Please consider that the "desired" vegetation conditions may not be achievable or sustainable. Please conduct an analysis as to how realistic and achievable Forest Plan desired conditions are in the context of a rapidly changing climate, along an unpredictable but changing trajectory.

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

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

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

Alleged forest imbalance

The EA states, "There is a need to shift the composition away from the tree species that are generally more susceptible to those agents (for example, Douglas-fir, grand fir, lodgepole pine and subalpine fir) and towards the species that are more resistant and resilient (such as western larch, western white pine and ponderosa pine). In describing any landscape departures from the historical range of variability (HRV), please provide a spatial analysis, comparing true reference conditions to current project area conditions. The EA mentions, "the historic range of structural distribution at the landscape scale (USDA 2000)." If the FS has any sources of data **from the project area or IPNF** that determine the "historic range of structural distribution at the landscape scale" please cite them. Since the FS failed to provide a list of references in the EA, we can only guess that USDA 2000 is about the entire Interior Columbia Basin Ecosystem Management Project area—not specific to the IPNF.

Also, please disclose the PROJECT AREA HRVs of "tree species that are generally more susceptible to those agents (for example, Douglas-fir, grand fir, lodgepole pine and subalpine fir)" and also "the species that are more resistant and resilient (such as western larch, western white pine and ponderosa pine." In doing so, please use metrics such as sizes and ages of trees, acres "dominated by" all those tree species, tree densities, canopy layers, and patch sizes. Please cite your sources of information for establishing these baseline/HRV numbers.

"Alternative 2 would **increase the percentage** of desirable, potentially long-lived, early seral species (ponderosa pine, western larch, and western white pine) across the project area and would **decrease the percentage** of shade-tolerant species, root disease prone species, and shorter-lived species (grand fir, Douglas-fir, and lodgepole pine)." Please disclose all of those post project percentages.

"Across the project area, vegetation treatments would increase ponderosa pine, western larch, and western white pine forest cover types by approximately 13,268 acres (Table 8)." Like many analyses of project effects, the EA has little more to say about the staying power of such accomplishments, pretending there would be no fading of such effect over time. This is extremely misleading.

Please disclose an accurate comparison of baseline (pre-management) species composition in the project area vs. present-day project area species composition. Likewise, please disclose an accurate analysis of baseline (pre-management) vs present-day regarding structural diversity, patch size, and age class.

Please disclose the impacts of past and ongoing livestock grazing on forest composition, "fuels" arrangement, and all other measurable aspects of vegetation in the project area. Please disclose the impacts of livestock grazing on soil conditions in the project area. Please analyze the interactions between livestock grazing and noxious weeds in the project area.

The EA states, "we want to …Improve the resiliency and resistance of the forest vegetation to disturbances such as wildfire, drought, insects and diseases." It makes no sense, ecologically speaking to "increase resilience" to the identified natural processes. An ecosystem that is fully functioning is naturally resilient. When an ecosystem is disturbed, succession according to natural processes occurs. If previous management has led to restoration needs, then the course of action should be to work with natural processes, removing human-caused impediments as necessary.

Ecological resilience, which the FS implies it would foster with this project, is not the absence of natural disturbances such as wildland fire or beetle kill. Rather, it is the opposite (DellaSala and

Hanson, 2015, Chapter 1, pp. 12-13). What the FS is promoting here is the human control of the forest ecosystem through mechanical means in order to maintain unnatural stasis by eliminating, suppressing or altering natural disturbances such as wildland fire and insect or disease effects, to maximize the commercial potential of natural resources.

The EA states, "The Buckskin Saddle project proposes to increase the resilience of the forests in the project area to insects, diseases, droughts and the undesirable effects from wildfires." But ecological resilience, which the FS implies they are creating through this project, is not the absence of natural disturbances like wildfire or beetle kill, rather it is the opposite (DellaSala and Hanson, 2015, Chapter 1, pp. 12-13). What the FS is promoting here is the human control of the forest ecosystem through mechanical means in order to maintain unnatural stasis by eliminating, suppressing or altering natural disturbances such as wildfire, to facilitate the extraction of commercial resources for human use. This is the antithesis of ecological resilience and conservation of native biodiversity. Ecological resilience is the ability to ultimately return to predisturbance vegetation types after a natural disturbance, including higher-severity fire. This sort of dynamic equilibrium, where a varied spectrum of succession stages is present across the larger landscape, tends to maintain the full complement of native biodiversity on the landscape. (Thompson et al., 2009).

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

S*ee* Black, S.H. 2005 (Logging to Control Insects: The Science and Myths Behind Managing Forest Insect "Pests." A Synthesis of Independently Reviewed Research) and Black, et al., 2010 (Insects and Roadless Forests: A Scientific Review of Causes, Consequences and Management Alternatives) as well as DellaSala (undated), Kulakowski (2013), Hanson et al., 2010, and Hart et al., 2015. And for an ecological perspective from the FS itself, see Rhoades et al., 2012, who state: "While much remains to be learned about the current outbreak of mountain pine beetles, researchers are already finding that **beetles may impart a characteristic critically lacking in many pine forests today: structural complexity and species diversity**." (Emphasis added.)

Castello et al. (1995) state:

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

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

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

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

> "We were surprised to see how significant the differences were between protected areas managed for biodiversity and unprotected areas, which our data show burned more severely," said lead author Curtis Bradley, with the Center for Biological Diversity.
>
> The study focused on forests with relatively frequent fire regimes, ponderosa pine and mixed-conifer forest types; used multiple statistical models; and accounted for effects of climate, topography and regional differences to ensure the findings were robust.

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

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

A significant body of our concerns about the Forest Plan surround its over-reliance on "Desired Conditions" (DCs) as directing management, and too few standards that refrain management. As we pointed out, this results in an overall lack of accountability for the FS to ever accomplish anything positive expressed in the Forest Plan's timeless, aspirational DCs, as well as there being far too few restraints that serve the conservation of biological diversity and promotion of ecological sustainability.

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

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

Hayward, 1994 states:

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

Frissell and Bayles (1996) ask:

> From the point of view of many aquatic species, the range of natural variability at any one site would doubtless include local extirpation. At the scale of a large river basin, management could remain well within such natural extremes and we would still face severe degradation of natural resource and possible extinction of species (Rhodes et al., 1994). The missing element in this concept is the landscape-scale *pattern* of occurrence of extreme conditions, and patterns over space and time of recovery from such stressed states. How long did ecosystems spend in extreme states vs. intermediate or mean states? Were extremes chronologically correlated among adjacent basins, or did asynchrony of landscape disturbances provide for large-scale refugia for persistence and recolonization of native species? These are critical questions that are not well addressed under the concept of range of natural variability as it has been framed to date by managers.
>
> …The concept of range of natural variability also suffers from its failure to provide defensible criteria about **which factors ranges should be measured**. Proponents of the concept assume that a finite set of variables can be used to define the range of ecosystem behaviors, when ecological science strongly indicates many diverse factors can control and limit biota and natural resource productivity, often in complex, 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.** (Bold emphasis added.)

Biologist Roger Payne has the following to say about the same kind of hubris represented by the FS's view that it can manipulate and control its way to a restored forest using intensive industrial management:

> One often hears that because humanity's impact has become so great, the rest of life on this planet now relies on us for its succession and that we are going to have to get used to managing natural systems in the future—the idea being that since we now threaten everything on earth we must take responsibility for holding the fate of everything in our hands. This bespeaks a form of unreality that takes my breath away… The cost of just finding out enough about the environment to become proper stewards of it—to say nothing of the costs of acting in such a way as to ameliorate serious problems we already understand, as well as problems about which we haven't a clue—is utterly prohibitive. And the fact that monitoring must proceed indefinitely means that on economic grounds alone the only possible way to proceed is to face the fact that by far the cheapest means of continuing life on earth as we know it is to **curb ourselves instead of trying to take on the proper management of the ecosystems we have so entirely disrupted.**

(Payne 1995, emphasis added.) Not accompanying all the EA's hypothetical promises of improving nature are any acknowledgments of the potential or degree of unintended side effects that pose risk or present likely damage to some other composition, structure, or function of the ecosystem. Regarding this characteristic agency hubris, Frissell and Bayles (1996) comment:

> 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.

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

The EA fails to consider the extensive science that argues that the strategy of "moving towards" DCs for restoring wildlife habitat and populations is scientifically deficient. The Committee of

Scientists, 1999 recommended management emphasis contrasts with the IPNF's current management strategy merely emphasizing manipulation of habitat for insuring wildlife viability:

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

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

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

Soil Productivity

"**Detrimental Soil Disturbance (DSD)**, a proxy measurement for impairment to soil function and soil productivity…" Yet the EA doesn't define DSD, nor state how each type is measured. "Region 1 soil quality standards" are not even stated.

Under No Action, "1,261 acres within the project area (are) not meeting forest plan guideline FW-GDL-VEG-03, a guideline for coarse woody debris management." Elsewhere the EA indicates that 1,261 acres will be brought into compliance with this Guideline by the Project. How many acres will still fail to meet forest plan guideline FW-GDL-VEG-03 after the project is completed, because they won't get treated?

"Although permanent roads do affect soil-hydrologic function, that analysis is performed using the appropriate watershed modeling techniques." Which watershed modeling technique quantifies "soil-hydrologic function"?

Please provide an analysis of soil conditions in the analysis area, noting any detrimental soil disturbance and its consequences for diminishing soil and land productivity. Please disclose the extent of soils in the analysis area that are already hydrologically impacted, and analyze and disclose their watershed impacts.

In FW-DC-SOIL-01 the meaning of "Areas with sensitive and highly erodible soils or land types with mass failure potential are not detrimentally impacted or destabilized as a result of management activities" is unclear.

In FW-DC-SOIL-02 the meaning of the term "Managed areas" is unclear. The areal extent could be delineated as a few square feet, a logging unit, a timber sale contract area, an entire watershed, or even a Ranger District.

Forest Plan soil Objective FW-OBJ-SOIL-01 would accomplish little soil restoration. The meaning of "not meeting soil quality criteria" is unclear.

The Forest Plan includes no soil quality standards. By adopting FSM-2500-99-1 the Forest Service does not avoid irreversible soil damage on the IPNF.

There is no Forest Plan requirement to quantify, minimize, or even consider the total amount of detrimentally disturbed soils on the IPNF or in a watershed.

The Forest Plan adopts a proxy—detrimental soil disturbance—rather than more direct measures of management-induced losses or reductions of soil productivity. We are aware of no scientific information based upon IPNF data that correlates the proxy (areal extent of detrimental soil disturbance in activity areas) to metrics of long-term reductions in soil productivity in activity areas, in order to validate the use of the proxy as a scientifically meaningful estimate of changes in soil productivity.

The proxy results in some levels of observable or measurable soil damage to be completely discounted because it falls below an arbitrary threshold—even though it may cumulatively affect the productivity of the soil.

FW-GDL-SOIL-01, 02, 03, and 04: It is unclear if the use of the word "should" is intended to recognize the second consistency requirement on page 4 of the Forest Plan, or if it is intended to render these entire Guidelines to be discretionary.

Guideline FW-GDL-SOIL-04 leaves too much discretion allowing activities on landslide-prone areas.

The proxy results in some levels of observable or measurable soil damage to be completely discounted because it falls below an arbitrary threshold—even though it may cumulatively affect the productivity of the soil.

Alexander and Poff (1985) reviewed literature and found that the amount of soil damage varies even with the same logging system, depending on many factors. For example, as much as 10% to 40% of a logged area can be disturbed by skyline logging. They state:

> There are many more data on ground disturbance in logging, but these are enough to indicate the wide diversity of results obtained with different equipment operators, and logging techniques in timber stands of different composition in different types of terrain with different soils. Added to all these variables are different methods of investigating and reporting disturbance.

Lacy, 2001 examines the importance of soils for ecosystem functioning and points out the failure of most regulatory mechanisms to adequately address the soils issue. From the Abstract:

> Soil is a critical component to nearly every ecosystem in the world, sustaining life in a variety of ways—from production of biomass to filtering, buffering and transformation of water and nutrients. While there are dozens of federal environmental laws protecting and addressing a wide range of natural resources and issues of environmental quality, there is a significant gap in the protection of the soil resource. Despite the critical importance of maintaining healthy and sustaining soils, conservation of the soil resource on public lands is generally relegated to a diminished land management priority. Countless activities,

including livestock grazing, recreation, road building, logging, and mining, degrade soils on public lands. This article examines the roots of soil law in the United States and the handful of soil-related provisions buried in various public land and natural resource laws, finding that the lack of a public lands soil law leaves the soil resource under protected and exposed to significant harm. To remedy this regulatory gap, this article sketches the framework for a positive public lands soil protection law. This article concludes that because soils are critically important building blocks for nearly every ecosystem on earth, a holistic approach to natural resources protection requires that soils be protected to avoid undermining much of the legal protection afforded to other natural resources.

Lacy, 2001 goes on:

> Countless activities, including livestock grazing, recreation, road building, logging, mining, and irrigation degrade soils on public lands. Because there are no laws that directly address and protect soils on the public lands, consideration of soils in land use planning is usually only in the form of vaguely conceived or discretionary guidelines and monitoring requirements. This is a major gap in the effort to provide ecosystem-level protection for natural resources.
>
> The rise of an "ecosystem approach" in environmental and natural resources law is one of the most significant aspects of the continuing evolution of this area of law and policy. One writer has observed that there is a
>
>> fundamental change occurring in the field of environmental protection, from a narrow focus on individual sources of harm to a more holistic focus on entire ecosystems, including the multiple human sources of harm within ecosystems, and the complex social context of laws, political boundaries, and economic institutions in which those sources exist.
>
> As federal agencies focus increasingly on addressing environmental protection from a holistic perspective under the current regime of environmental laws, a significant gap remains in the federal statutory scheme: protection of soils as a discrete and important natural resource. **Because soils are essential building blocks at the core of nearly every ecosystem on earth, and because soils are critical to the health of so many other natural resources—including, at the broadest level, water, air, and vegetation—they should be protected at a level at least as significant as other natural resources.** Federal soil law (such as it is) is woefully inadequate as it currently stands. It is a missing link in the effort to protect the natural world at a meaningful and effective ecosystem level.
>
> … This analysis concludes that the lack of a public lands soil law leaves the soil resource under-protected and exposed to significant harm, and emasculates the environmental protections afforded to other natural resources.

The Region 1 Soil Quality Standards (SQS) are the only directives limiting damage to soil during industrial extraction on the IPNF, and even they are full of loopholes. Furthermore, they basically boil down to a mitigation of soil productivity losses with an entirely uncertain outcome, as explained below.

The FS states:

> The Forest Service Soils Manual (FSM 2550; November 2010) and Region 1 Soil Quality Standards provide guidelines and methods to show compliance with the National Forest Management Act (NFMA). The objectives of the Region 1 Soil Quality Standards (R1 SQS) include managing National Forest System lands "without permanent impairment of land productivity and to maintain or improve soil quality", similar to the NFMA. Region 1 Soil Quality Standards are based on the use of six physical and one biological attribute to assess current soil quality and project effects. These attributes include compaction, rutting, displacement, severely-burned soils, surface erosion, soil mass movement, and organic matter.[4]

Please disclose soil conditions in the project area that are <u>outside</u> the project treatment units. The cumulative amount of existing soil damage over the entire project area has implications for every other resource including water quality and the development of old-growth forests and even sustained yield of timber. The public deserves to know the scale of total area needing soil restoration in this project area.

The FS generally provides no idea of the degree of soil impacts in a project area—except for an estimate of a limited category (detrimental soil disturbance or "DSD")—but only if a site happens to occur in a unit proposed for logging or burning under the project. Such a narrow view of the cumulative impacts on soils contradicts other FS policy and best available science.

The Soil and Water Conservation Practices Handbook (FSH 2509.22) states:

> Practice <u>11.01 – Determination of Cumulative Watershed Effects</u>
> OBJECTIVE: To determine the cumulative effects or impact on beneficial water uses by multiple land management activities. Past, present, or reasonably foreseeable future actions in a watershed are evaluated relative to natural or undisturbed conditions. Cumulative impacts are a change in beneficial water uses caused by the accumulation of individual impacts over time and space. Recovery does not occur before the next individual practice has begun.
>
> EXPLANATION: The Northern and Intermountain Regions will manage watersheds to avoid irreversible effects on the soil resource and to produce water of quality and quantity sufficient to maintain beneficial uses in compliance with State Water Quality Standards. Examples of potential cumulative effects are: 2) excess sediment production that may reduce fish habitat and other beneficial uses; 3) water temperature and nutrient increases that may affect beneficial uses; 4) compacted or disturbed soils that may cause site productivity loss and increased soil erosion; an 5) increased water yields and peak flows that may destabilize stream channel equilibrium.
>
> IMPLEMENTATION: As part of the NEPA process, the Forest Service will consider the potential cumulative effects of multiple land management activities in a watershed which may force the soil resource's capacity or the stream's physical or biological system beyond the ability to recover to near-natural conditions. A watershed cumulative effects feasibility analysis will be required of projects involving significant vegetation removal, prior to

[4] Jam Cracker Environmental Assessment, Lolo National Forest, 2016

> including them on implementation schedules, to ensure that the project, considered with other activities, will not increase sediment or water yields beyond or fishery habitat below acceptable limits. The Forest Plan will define these acceptable limits. The Forest Service will also coordinate and cooperate with States and private landowners in assessing cumulative effects in multiple ownership watersheds.

Booth, 1991 explains how soil quality conditions translate to watershed hydrology and thus, water quality and quantity:

> Drainage systems consist of all of the elements of the landscape through which or over which water travels. These elements include the soil and the vegetation that grows on it, the geologic materials underlying that soil, the stream channels that carry water on the surface, and the zones where water is held in the soil and moves beneath the surface. Also included are any constructed elements including pipes and culverts, cleared and compacted land surfaces, and pavement and other impervious surfaces that are not able to absorb water at all.
>
> …The collection, movement, and storage of water through drainage basins characterize the hydrology of a region. Related systems, particularly the ever-changing shape of stream channels and the viability of plants and animals that live in those channels, can be very sensitive to the hydrologic processes occurring over these basins. Typically, these systems have evolved over hundreds of thousands of years under the prevailing hydrologic conditions; in turn, their stability often depends on the continued stability of those hydrologic conditions.
>
> Alteration of a natural drainage basin, either by the impact of forestry, agriculture, or urbanization, can impose dramatic changes in the movement and storage of water. …Flooding, channel erosion, landsliding, and destruction of aquatic habitat are some of the unanticipated changes that …result from these alterations.
>
> …Human activities accompanying development can have irreversible effects on drainage-basin hydrology, particularly where subsurface flow once predominated. Vegetation is cleared and the soil is stripped and compacted. Roads are installed, collecting surface and shallow subsurface water in continuous channels. …These changes produce measurable effects in the hydrologic response of a drainage basin.

Elsewhere the FS recognizes that amounts of soil compaction and other measures of DSD across a watershed accumulates over space and time to harm watersheds. From USDA Forest Service, 2008f:

> Many indirect effects are possible if soils are detrimentally-disturbed… Compaction can indirectly lead to decreased water infiltration rates, leading to increased overland flow and associated erosion and sediment delivery to stream. Increased overland flow also increases intensity of spring flooding, degrading stream morphological integrity and low summer flows.

USDA Forest Service, 2009c states:

> Compaction can decrease water infiltration rates, leading to increased overland flow and associated erosion and sediment delivery to streams. Compaction decreases gas exchange, which in turn degrades sub-surface biological activity and above-ground forest vitality. Rutting and displacement cause the same indirect effects as compaction and also channel water in an inappropriate fashion, increasing erosion potential.

Subwatersheds which have high levels of existing soil damage could indicate a potential for hydrologic and silviculture concerns. (USDA Forest Service, 2005b, p. 3.5-11, 12.) The IPNF (USDA Forest Service, 2007c) acknowledges that soil conditions affect the overall hydrology of a watershed:

> Alteration of soil physical properties can result in loss of soil capacity to sustain native plant communities and reductions in storage and transmission of soil moisture that may affect water yield and stream sediment regimes. (P. 4-76, emphasis added.)

USDA Forest Service, 2009c states:

> Compaction can decrease water infiltration rates, leading to increased overland flow and associated erosion and sediment delivery to streams. Compaction decreases gas exchange, which in turn degrades sub-surface biological activity and above-ground forest vitality. Rutting and displacement cause the same indirect effects as compaction and also channel water in an inappropriate fashion, increasing erosion potential.

Kuennen et al. 2000 (a collection of Forest Service soil scientists) state:

> An emerging soils issue is the cumulative effects of past logging on soil quality. Pre-project monitoring of existing soil conditions in western Montana is revealing that, where ground-based skidding and/or dozer-piling have occurred on the logged units, soil compaction and displacement still are evident in the upper soil horizons several decades after logging. Transecting these units documents that the degree of compaction is high enough to be considered detrimental, i.e., the soils now have a greater than 15% increase in bulk density compared with undisturbed soils. Associated tests of infiltration of water into the soil confirm negative soil impacts; **the infiltration** rates on these compacted soils are several-fold slower than rates on undisturbed soil.
>
> …**The effects of extensive areas of compacted and/or displaced soil in watersheds along with impacts from roads, fire, and other activities are cumulative.** A rapid assessment technique to evaluate soil conditions related to past logging in a watershed is based on a step-wise process of aerial photo interpretation, field verification of subsamples, development of a predictive model of expected soil conditions by timber stand, application of this model to each timber stand through GIS, and finally a GIS **summarization of the predicted soil conditions in the watershed.** This information can then be combined with an assessment of road and bank erosion conditions in the watershed to give a holistic description of watershed conditions and to help understand cause/effect relationships. **The information can be related to Region 1 Soil Quality Standards to determine if, on a watershed basis, soil conditions depart from these standards.** Watersheds that do depart from Soil Quality Standards can be flagged for more accurate and intensive field study during landscape level and project level assessments. **This process is essentially the application of Soil Quality Standards at the watershed scale with the intent of**

> **maintaining healthy watershed conditions**. (Emphases added.)

Please provide an analysis of the hydrological implications of the cumulative soil damage caused by past management added to timber sale-induced damage in project area watersheds. Kootenai NF hydrologist Johnson, 1995 noted this effect from reading the scientific literature: "Studies by Dennis Harr have consistently pointed out the effects compacted surfaces (roads, skid trails, landings, and firelines) on peak flows." Elevated peak flows harm streams and rivers by increasing both bedload and suspended sediment are effects to be analyzed in a watershed analysis.

Harr, 1987 rejects absolute thresholds for making determinations of significant vs nonsignificant levels of soil compaction in watersheds, but nevertheless he does refer to his experience as noted above by Johnson, 1995. Harr, 1987 states:

> …a curvilinear relation between amount of compaction and increased flow is shown.
>
> Numerous plans, guidelines, and environmental impact statements have related the predicted amount of soil compaction to a defined threshold of compaction totalling 12 percent of watershed area. …The 12 percent figure is arbitrary. Flow changes at lesser amounts of compaction may also cause adverse impacts. …Without reference to the stream channels in question, we cannot arbitrarily say nothing will happen until the mythical 12 percent figure is surpassed.
>
> In some watersheds, compaction was determined from postlogging surveys, but in others, compaction was taken as the area in roads (including cut and fill surfaces), landings, and skid trails.

The FS has at times even quantified past DSD across watersheds of various sizes. USDA Forest Service 2005d states:

> **Cumulative effects may also occur at the landscape level, where large areas of compacted and displaced soil affect vegetation dynamics, runoff, and water yield regimes in a subwatershed.** About 4,849 acres are currently estimated to have sustained detrimental compaction or displacement in the American River watershed due to logging, mining, or road construction. … About 4,526 acres are currently estimated to have sustained detrimental compaction or displacement in the Crooked River watershed due to logging, mining, and road or trail construction.
>
> …An estimated 73 percent (208) of past activity areas on FS lands in American River (and an estimated 69 percent (166) of past activity areas on FS lands in Crooked River) today would show detrimental soil disturbance in excess of 20 percent. (Emphasis added.)

A recent IPNF forest plan monitoring report (USDA Forest Service 2013a) revealed the relatively high frequency of violating the 15% standard. Other units of the national forest system have monitored DSD with very mixed results (e.g., Reeves et al., 2011). The point is—as weak as the standards are—FS pledges to meet the standards must be taken with a grain of salt.

There is also an issue of reliability and validity of the FS's soil survey methods. USDA Forest Service, 2012a states:

> The U.S. Forest Service Soil Disturbance Field Guide (Page-Dumroese et al., 2009) was used to establish the sampling protocol.
>
> …Field soil survey methodology based on visual observations, such as the Region 1 Soil Monitoring Guide used here, can produce variable results among observers, and the confidence of results is dependent on the number of observations made in an area (Page-Dumroese et al., 2006). **The existing and estimated values for detrimental soil disturbance (DSD[5]) 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.) USDA Forest Service, 2012a admits that DSD estimates are "not absolute."

One set of cumulative soil impacts ignored by the SQS is associated with permanent, or "system" roads. Although every square foot of road is, of course compacted, this compaction is in no way limited by the application of the SQS. The same goes for existing or ongoing erosion—no amount of soil erosion on these road templates would violate the SQS. Also, the DSD type "displacement" (organic matter layer(s) displaced due to management actions)—practically 100% on permanent/system roads—is not limited in any way by the SQS.

Another cumulative impact the SQS ignores is the existing or prior management-induced DSD on old log landings kept on the land for future use. They are typically flattened areas which had been compacted and/or had organic layers displaced to use as temporary log storage and log truck loading and often were not recontoured to original slope or decompacted following use. Unless they are being used by the current project (and thus within an activity area), they are not limited in extent by the SQS. Much like system roads, there are no limits to total DSD from landings set by the SQS, and there is no requirement that their extent in a project area be disclosed. Roads and log landings might be limited by other resource considerations such as road densities in sensitive wildlife habitat, but they are not limited by the SQS.

Still more cumulative soil damages the SQS ignore involve existing DSD on areas the FS maintains as part of the "suitable" or productive land base such as timber stands, grazing allotments and riparian zones that are <u>not within the boundaries of any current project activity areas</u>. The SQS do not limit or require disclosure of the existing/prior DSD in such areas, possibly caused by past management activities such as log skidding, partially reclaimed log landings and temporary roads, firelines, burning of slash piles or other prescribed burns, compaction due to the hooves of livestock in springs, wetlands, or other riparian areas or simply in upland pasture areas. Furthermore, SQS do not compel the FS to take actions that might restore the soil productivity in such areas because their existing DSD does not matter for determining consistency with the SQS —until the day arrives when another project is proposed

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

and the damaged site in question is included within an "activity area" because it is proposed for a new round of logging and soil damage.

USDA Forest Service, 2016a explains another major cumulative effect ignored by the SQS, which is the indirect effect of soil damage, or DSD, on sustained yield. It states that the SQS "created the concept of 'Detrimental Soil Disturbance' (DSD) for National Forests in Region One as a measure to be used in assessing potential loss of soil productivity resulting from management activities." USDA Forest Service, 2016a further explains (emphases added):

> **Without maintaining land productivity, neither multiple use nor sustained (yield) can be supported by our National Forests**. Direct references to maintaining productivity are made in the Sustained Yield Act "…coordinated management of resources without impairment of the productivity of the land" and in the Forest and Rangeland Renewable Resources Act "…substantial and permanent impairment of productivity must be avoided".
>
> Soil quality is a more recent addition to Forest Service Standards. The Forest and Rangeland Renewable Resources Act (1974) appears to be the first legal reference made to protecting the "quality of the soil" in Forest Service directives. **Although the fundamental laws that directly govern policies of the U.S. Forest Service clearly indicate that land productivity must be preserved, increasingly references to land or soil productivity in Forest Service directives were being replaced by references to soil quality as though soil quality was a surrogate for maintaining land productivity. This was unfortunate, since although the two concepts are certainly related, they are not synonymous.**
>
> Our understanding of the relationship between soil productivity and soil quality has continued to evolve since 1974. Amendments to the Forest Service Manual, Chapter 2550 – Soil Management in 2009 and again to 2010 have helped provide some degree of clarity on this issue and acknowledged that **the relationship is not as simple as originally thought**. The 2009 (2500-2009-1) amendment to Chapter 2550 of the Forest Service Manual states in section 2550.43-5, directs the Washington Office Director of Watershed, Fish, Wildlife, Air and Rare plants to "Coordinate validation studies of soil quality criteria and indicators with Forest Service Research and Development staff to ensure soil quality measurements are appropriate to protect soil productivity" (USFS-FSM 2009). **Inadvertently this directive concedes that the relationship between soil productivity and soil quality is not completely understood.** In the end, the primary objective provided by National Laws and Directives relative to the management of Forest Service Lands continues to be to maintain and where possible potentially improve soil productivity. (Emphases added.)

Please provide a map showing the locations of all past logging units, including the intensity of the logging activities.

The IPNF (USDA Forest Service, 2009c) admits, in regards to project area sites where DSD soils were not to be restored by active management: "For the …severely disturbed sites,… "no action" …would **create indirect negative impacts by missing an opportunity to actively restore damaged soils**. (Emphasis added.)

In order to meet NFMA and NFMA regulations' mandates to protect soil productivity, the IPNF adopted the SQS. Again, the SQS requires the FS to delineate specific geographic areas called "activity areas" for the purpose of predicting, measuring, monitoring, and analyzing impacts on soil productivity from management activities. FSM 2500-99-1 includes a mandate to maintain 85% of an activity area in a satisfactory, non-DSD soil condition.

Please explain how your methodology for determining DSD produces statistically reliable data. This also raises questions of the validity of DSD estimation and other analysis methodology, and therefore compliance with the FS's proxy for soil productivity. Please explain how the FS arrives at current DSD estimates, and provide sufficient detail to indicate the intensity of soil surveys or monitoring of past projects.

Please disclose that the SQS methodology for "activity areas" inherently encourages gerrymandering areas not previously logged into project "activity areas", helping to artificially dilute the amount of effective DSD from previously logged units by creating a more favorable average.

There are other kinds of fishy accounting because of the FS's DSD methodology. Table 24 indicates unit 270 has 10% existing DSD, and after project activities including mitigation there would be 20%, violating the Regional soil quality standards. So FS then comes up with logic stretched to the breaking point:

> A design feature has been created that will allow the disturbed portion of this unit to be excluded during project layout and avoided during implementation. This means the disturbed portion would be allowed to recover through natural processes, and there would be no existing DSD within unit 270. Therefore unit 270 would remain under the 15% threshold.

In other words, pay no attention to the man behind the curtain.

That table also come up with numbers based on "Projected DSD% adjusted for skid trail reuse and rehab" which is not consistent with the Regional soil quality standards.

"This rehabilitation process would result in a 30% recovery rate of DSD." What is the scientific/research basis—please cite your support for that number.

Please disclose that DSD percent limit is based upon the amount of damage that is operationally feasible, not scientific data that measures land and soil productivity losses caused by DSD. The SQS were developed internally by the FS without the use of any public process such as Forest Planning, NEPA, or independent scientific peer review.

DSD is merely a proxy for soil productivity. The FS lacks science to validate the SQS methodology for use as a soil productivity proxy.

Discussing the SQS, USDA Forest Service, 2008a states:

> Powers (1990) cites that the rationale bulk density is largely based on collective judgment. The FS estimates that a true productivity decline would need to be as great as 15% to detect change using current monitoring methods. Thus the soil-quality standards are set to detect a decline in potential productivity of at least 15%. This does not mean that the FS

> tolerates productivity declines of up to 15%, **but merely that it recognizes problems with detection limits.** (Emphasis added.)

It is important to point out, however, that Powers refers to separate and distinct thresholds when he talks about 15% increases in bulk density, which is a threshold of when soil compaction is considered to be detectable, and 15% areal limit for detrimental disturbance, which is the soil quality standard threshold for how much of an activity area can be detrimentally disturbed (including compaction from temporary roads and heavy equipment, erosion resulting from increased runoff, puddling, displacement from skid trails, rutting, etc.). With that caveat, what Powers has to say in relation to the soil quality standard is quite revealing (as quoted in Nesser, 2002):

> (T)he 15% standard for increases in bulk density originated as the point at which we could reliably measure significant changes, considering natural variability in bulk density… (A)pplying the ***15% areal limit*** for detrimental damage is not correct... (T)hat was never the intent of the 15% limit… and ***NFMA does not say that we can create up* to 15% *detrimental conditions***, it says basically that we cannot create significant or permanent impairment, period... (Emphases added.)

USDA Forest Service 2008b stated, "The 15% change in aerial extent realizes that timber harvest and other uses of the land result in some impacts and impairment that are unavoidable. **This limit is based largely on what is physically possible**, while achieving other resource management objectives" (emphasis added). So the SQS limits are based on feasibility of timber sale implementation rather than concerns over soil productivity; and additionally we have the bulk density increase limit is based upon the limitations of detection by FS bulk density measuring methods—again, not concerns over soil productivity.

The FS's soil proxy—its SQS assumption that up to 15% of an activity area having long-term damage is consistent with NMFA and regulations—is arbitrary. The FS does not cite any scientific basis for adopting its numerical limits. Page-Dumroese et al. 2000 emphasize the importance of validating soil quality standards using the results of monitoring:

> Research information from short- or long-term research studies supporting the applicability of disturbance criteria is often lacking, or is available from a limited number of sites which have relative narrow climatic and soil ranges. …Application of selected USDA Forest Service standards indicate that **blanket threshold variables applied over disparate soils do not adequately account for nutrient distribution within the profile or forest floor depth. These types of guidelines should be continually refined to reflect pre-disturbance conditions and site-specific information.** (Emphasis added.)

Soil productivity can only be protected if it turns out that the soil standards work. To determine if they work, the FS would have to undertake objective, scientifically sound measurements of what the soil produces (grows) following management activities. But the FS has never done this on the IPNF.

There are more direct indices of losses in soil productivity due to management activities. A FS report by Grier et al., 1989 adopted as a measure of soil productivity: "the total amount of plant material produced by a forest per unit area per year." They cite a study finding "a 43-percent reduction in seedling height growth in the Pacific Northwest on primary skid trails relative to uncompacted areas" for example. And in another FS report, Adams and Froehlich (1981) state:

> Measurements of reduced tree and seedling growth on compacted soils show that significant impacts can and do occur. Seedling height growth has been most often studied, with reported growth reductions on compacted soils from throughout the U.S. ranging from about 5 to 50 per cent.

Detrimental soil compaction cannot be determined by mere visual observations. Kuennen, et al., 1979 discovered that although "the most significant increase in compaction occurred at a depth of 4 inches… some sites showed that maximum compaction occurred at a depth of 8 inches… Furthermore, ... subsurface compaction occurred in glacial deposits to a depth of at least 16 inches."

Cullen et al. (1991) concluded: (M)ost compaction occurs during the first and second passage of equipment." Page-Dumroese (1993), investigating logging impacts on volcanic ash-influenced soil in the IPNF, stated: "Moderate compaction was achieved by driving a Grappler log carrier over the plots twice." Page-Dumroese (1993) also cited other studies that indicated "Large increases in bulk density have been reported to a depth of about 5 cm with the first vehicle pass over the soil." Williamson and Neilsen (2000) assessed change in soil bulk density with number of passes and found 62% of the compaction to the surface 10cm came with the first pass of a logging machine. In fine textured soils, Brais and Camire (1997) demonstrated that the first pass creates 80 percent of the total disturbance to the site. Adams and Froehlich (1981) state, "(L)ittle research has yet been done to compare the compaction and related impacts caused by low-pressure and by conventional logging vehicles."

We note that it doesn't matter how sensitive the soils, how steep the land, how poor the site is for growing trees, the SQS standard is the same arbitrary 15%.

USDA Forest Service 2014a states:

> Management activities can result in both direct and indirect effects on soil resources. Direct and indirect effects may include alterations to physical, chemical, and/or biological properties. Physical properties of concern include structure, density, porosity, infiltration, permeability, water holding capacity, depth to water table, surface horizon thickness, and organic matter size, quantity, and distribution. Chemical properties include changes in nutrient cycling and availability. Biological concerns commonly include abundance, distribution, and productivity of the many plants, animals, microorganisms that live in and on the soil and organic detritus. (P. 3-279.)

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

One of these biological properties is represented by naturally occurring organic debris from dead trees. The SQS recognize the importance of limiting the ecological damage that logging causes due to retaining inadequate amounts of large woody debris, but set no quantitative limits on such losses caused by logging and slash burning. Please disclose the levels of large woody debris in the project area following past management activities, in addressing your obligations to consider cumulative effects.

Some chemical properties are discussed in Harvey et al., 1994, including:

> The ...descriptions of microbial structures and processes suggest that they are likely to provide highly critical conduits for the input and movement of materials within soil and between the soil and the plant. Nitrogen and carbon have been mentioned and are probably the most important. Although the movement and cycling of many others are mediated by microbes, sulfur phosphorus, and iron compounds are important examples.
>
> The relation between forest soil microbes and N is striking. Virtually all N in eastside forest ecosystems is biologically fixed by microbes... Most forests, particularly in the inland West, are likely to be limited at some time during their development by supplies of plant-available N. Thus, to manage forest growth, we must manage the microbes that add most of the N and that make N available for subsequent plant uptake. (Internal citations omitted.)

The EA doesn't provide enough detail to indicate the thoroughness of the surveys, including whether all sources of DSD were inventoried. 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).

Craigg and Howes (in Page-Dumroese, et al. 2007) state:

> Meaningful soil disturbance standards or objectives must be based on measured and documented relationships between the degree of soil disturbance and subsequent tree growth, forage yield, or sediment production. Studies designed to determine these relationships are commonly carried out as part of controlled and replicated research projects. The paucity of such information has caused problems in determining threshold levels for, or defining when, detrimental soil disturbance exists; and in determining how much disturbance can be tolerated on a given area of land before unacceptable changes in soil function (productive potential or hydrologic response) occur. Given natural variability of soil properties across the landscape, a single set of standards for assessing detrimental disturbance seems inappropriate.

Craigg and Howes (in Page-Dumroese, et al. 2007) state:

> Each soil has inherent physical, chemical, and biological properties that affect its ability to *function* as a medium for plant growth, to regulate and partition water flow, or to serve as an effective environmental filter. When any or a combination of these inherent factors is altered to a point where a soil can no longer *function* at its maximum *potential* for any of these purposes, then its quality or health is said to be reduced or impaired (Larson and Pierce 1991).

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

Recent research reveals even more profound biological properties of forest soil. “(R)esource fluxes though ectomycorrhizal (EM) networks are sufficiently large in some cases to facilitate plant establishment and growth. Resource fluxes through EM networks may thus serve as a method for interactions and cross-scale feedbacks for development of communities, consistent with complex adaptive system theory.” (Simard et al., 2015.) The FS has never considered how management-induced damage to EM networks causes site productivity reductions.

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

The EA states, “Canopy removal and disruption of soil mycorrhizae are a concern for many Region One sensitive plant species. …soil mycorrhizae …may be destroyed during ground-disturbing activities.” The EA discusses soil mycorrhizae only in terms of impacts to Sensitive plants, which is important, but ignores this profound biological function in every other resource analysis, which reveals the FS’s backward thinking.

“(R)esource fluxes though ectomycorrhizal (EM) networks are sufficiently large in some cases to facilitate plant establishment and growth. Resource fluxes through EM networks may thus serve as a method for interactions and cross-scale feedbacks for development of communities, consistent with complex adaptive system theory.” (Simard et al., 2015.) The FS has never considered how management-induced damage to EM networks causes site productivity reductions.

“The big trees were subsidizing the young ones through the fungal networks. Without this helping hand, most of the seedlings wouldn’t make it.” (Suzanne Simard: http://www.ecology.com/2012/10/08/trees-communicate/) “Disrupting network links by reducing diversity of mycorrhizal fungi… can reduce tree seedling survivorship or growth (Simard et al, 1997a; Teste et al., 2009), ultimately affecting recruitment of old-growth trees that provide habitat for cavity nesting birds and mammals and thus dispersed seed for future generations of trees.” (Simard et al., 2013.) (Also see the YouTube video “Mother Tree” embedded within the Suzanne Simard “Trees Communicate” webpage at: https://www.youtube.com/watch?v=-8SORM4dYG8&feature=youtu.be). Gorzelak et al., 2015:

> …found that the behavioural changes in ectomycorrhizal plants depend on environmental cues, the identity of the plant neighbour and the characteristics of the (mycorrhizal network). The hierarchical integration of this phenomenon with other biological networks at broader scales in forest ecosystems, and the consequences we have observed when it is interrupted, indicate that underground “tree talk” is a foundational process in the complex adaptive nature of forest ecosystems.

Also see: “Trees Talk to Each Other in a Language We Can Learn, Ecologist Claims”.

The scientists involved in research on ectomycorrhizal networks have discovered connectedness, communication, and cooperation between what we traditionally consider to be separate organisms. Such a phenomenon is usually studied within single organisms, such as the interconnections in humans among neurons, sense organs, glands, muscles, other organs, etc. so necessary for individual survival. The FS must consider the ecosystem impacts from industrial management activities on this mycorrhizal network. The industrial forestry management paradigm is unfortunately destroying what it fails to recognize.

Please disclose if and how the IPNF has determined if management activities have reduced the diversity of mycorrhizal fungi in any treatment area.

USDA Forest Service, 2007 states:

> Sustained yield was defined in the …Forest Plan …as "the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without permanent impairment of the productivity of the land." Sustained yield is based on the capacity of the lands ability to produce resources.

That statement is on point: Since the FS has no idea how much soil has been permanently impaired either within the project area or forestwide, "sustained yield" is an empty promise. There continues to be a lack of adequate regulatory mechanisms for protecting soil productivity on the IPNF and Northern Region, as advocated for by Lacy (2001). Since the FS has no idea how much soil has been permanently impaired either within the project area or forestwide, the agency's "sustained yield" is an empty promise. The FS lacks adequate measures for protecting soil productivity on the Forest.

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

USDA Forest Service 2005d states:

> **Decompaction** can at least **partly restore** soil porosity and productivity. Soil displacement that mixes or removes the volcanic ash surface layer reduces soil moisture holding capacity, which may be **irreversible and irretrievable**. (Emphases added.)

Of decompaction as a mitigation, USDA Forest Service, 2015a admits:

> ***Anticipated Effectiveness:*** Low to high. Many soil characteristics and operating decisions affect the outcomes of this feature. Forest plan monitoring has shown a 30-60 percent reduction in compaction as measured by bulk density of the soil.

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

Please provide an analysis of the noxious weeds situation in the analysis area. Please disclose the degree to which the productivity of the land and soil has been affected in the project area and forestwide due to noxious weed infestations, and how that situation is expected to change in the coming years and decades. The IPNF's noxious weed treatment program is mitigation for management activities which exacerbate the spread of noxious weeds. Please disclose the effectiveness of this mitigation.

USDA Forest Service, 2015a indicates:

> Infestations of weeds can have wide-ranging effects. They can impact soil properties such as erosion rate, soil chemistry, organic matter content, and water infiltration. Noxious weed invasions can alter native plant communities and nutrient cycles, reduce wildlife and livestock forage, modify fire regimes, alter the effects of flood events, and influence other disturbance processes (S-16). As a result, values such as soil productivity, wildlife habitat, watershed stability, and water quality often deteriorate.

So the project will worsen the noxious weed spread in the project area, and even if post-disturbance treatments are implemented, their uncertain efficacy means that the project will significantly increase noxious weed occurrence.

The FS often proposes winter logging as mitigation. Evidence that logging can affect vegetative production in the absence of significant ground disturbance was collected by Sexton (1994) and summarized by USDA Forest Service (2000a) in a study in central Oregon in postfire ponderosa pine stands, logged over snow. Sexton found that biomass of vegetation produced 1 and 2 years after postfire logging was 38 percent and 27 percent of that produced in postfire unlogged stands. He also found that postfire logging decreased canopy cover, increased exotic plant species, increased graminoid cover, and reduced overall plant species richness. Pine seedlings grew 17 percent taller on unlogged sites in this short-term study. Ground based winter logging may not be effective mitigation for soil impacts and may impede recovery of the burned area.

USDA Forest Service, 2005b states, "Monitoring of winter-logging soil effects conducted by the Forest Soil Scientist on the Bitterroot National Forest over the past 14 years has shown that 58% of the ground-based, winter-logged units failed to meet the SQS. Winter-logging resulted in an average of 16% detrimentally damaged soil." (P. 3.5-21.)

FS Timber Sales Specialist Flatten, 2003 examines the practice of wintertime ground based logging and discusses what winter conditions provide the best protection for the soil resource. He points out the complexities and uncertainties of pulling off successful winter logging that effectively avoids of soil damage. He concludes:

> The conditions necessary to provide protection of the soil resource during winter logging can be both complex and dynamic. Guidelines that take a simplified approach, though well understood during project planning, will likely become problematic once operations begin. The result may be inadequate soil protection or unnecessary constraints on operations. Winter logging guidelines should be developed that incorporate the latest research on snowpack strength and frozen soil and provide measurable criteria for determining when appropriate conditions exist.

The IPNF also admits that soil displacement is essentially permanent anyway despite restoration:

> Surface soil loss from roads through displacement and mixing with infertile substrata also

> has long lasting consequences for soil productivity because of the superiority of the volcanic ash surface layer over subsoils and substrata. (USDA Forest Service, 2007c, Page 4-76.)

Continual and repeated application of the SQS will result in soils maintained at a damaged condition essentially forever: "Activity units that have had little prior disturbance will show a greater incremental increase in potential detrimental disturbance than those units that **already contain a network of existing skid trails**. Little to no increase in disturbance is expected there because equipment would **re-use existing skid trails** and move on slash mats whenever possible." (Emphases added.) Again, the FS has no quantitative data on the resulting continuous deficits in soil and land productivity. To the U.S. Department of Agriculture, such soil damage in national forests hardly matters.

In FW-STD-RIP-01 and FW-STD-RIP-02, the meaning of "intact and …functioning at desired conditions" is unclear. There is no reference to any established objective criteria.

In FW-STD-RIP-02, the last sentence ("Large-scale restoration plans or projects that address other cumulative effects within the same watershed may be considered as compensatory components and shall be described during site specific project analyses") allows this standard to be ignored in project development as long as the FS makes any claim that the project has some vague "large scale" restoration component.

In FW-GDL-RIP-01, 02, 03, 04, and 05 it is unclear if the use of the word "should" is intended to recognize the second consistency requirement on page 4 of the LMP, or if it is intended to render these entire Guidelines to be discretionary.

<u>Water Quality and Fisheries</u>
The existing situation is, "the lack of appropriate levels of road maintenance …lead(s) to …chronic sediment delivery to area streams…" Yet the EA fails to disclose the existing elevated sediment levels in any stream reach of the project area, despite "sediment levels in streams" being chosen as an "issue indicator." The same goes for the action alternative analysis. This exemplifies the lack of data upon which the EA's analyses precariously perch.

The EA characterizes all the soil erosion from 200-plus miles of road work as "disturbance to the fisheries resource in the short term (next 5-15 years)." Yet there is no temporal, quantitative analysis to go with this general statement.

"Long term, those 95 miles of road will be stored, left hydrological inert, and motorized use will be physically and legally restricted – greatly reducing, **but not completely eliminating**, the potential for further disturbance to aquatic habitat." (Emphasis added.)

The EA states, "we want to … Reduce sediment delivery to streams from the forest road and trail networks and restore aquatic organism passage to improve aquatic resources." The trouble is, it's impossible to tell in the EA the full set of watershed restoration activities guaranteed to be performed, because the EA isn't saying. The EA's analysis misleads the public by making statements to the effect that everything proposed in this realm will happen and therefore will result in the clamed benefits. However, that is highly unlikely, due to the funding constraints obfuscated in the EA's analyses.

"In some instances, improperly designed or unmaintained road/trail culverts within streams in the project area are barriers to the movement of these aquatic organisms." Does the FS know how many road/trail culverts in the project area are improperly designed? If so, please disclose the number. How many of those are positively guaranteed to be fixed by the time log hauling is completed and those contractors finish their work?

Does the FS know how many road/trail culverts in the project area are unmaintained? If so, please disclose the number. How many of those are positively guaranteed to be fixed by the time log hauling is completed and those contractors are finished?

Under No Action, "Sediment contributions from roads would remain unchanged from the existing condition. Road maintenance would occur as normal and would be beneficial" despite the fact that "normal" means "Most of the roads in the project area have not received any maintenance for over a decade."

The EA's "Sediment Delivery Estimates" Table 21 says that over 100 miles of road reconstruction and maintenance will result in reduction of 9.2 tons. It pretends all the soil disturbance won't at least temporarily dump sediment into streams. This is extremely disingenuous and misleading.

"(A)lternative 2 would have a net reduction in sediment of approximately 5 to 23 tons per year (average annual amounts)." Which years? Every year forever? And very importantly—reduced <u>from how many tons</u> that reflect the existing annual (elevated from natural) sediment in each stream?

How many miles of new roads will occur in Riparian Habitat Conservation Areas (RHCAs)? How many new road/stream crossings? Why doesn't the EA disclose the sediment yields into streams from those actions?

"Project design features would be expected to reduce negative effects from the increase in road densities during project implementation." If by "reduce" you mean "mitigate" then please say **mitigate**—don't obfuscate and mislead by pretending increases in sediment are, implausibly, reductions in sediment.

"Grant et al. 2008 concluded from a comprehensive literature review that ECA under 20% will not have a detectible influence on water yield or peak flows that can be measured beyond natural variability. …ECA values in the Clark Fork River-Clark Fork (Johnson and Derr Creeks) and Twin Creek would increase to 33% and 32% respectively." Then the EA resorts to misinterpretation of the Grant et al. 2008 research to conclude there would be no effects to aquatic habitat from elevated peak flows.

"For historical context, alternative 2 would be within the historic range of variability when comparing the difference in the increase of ECA from the existing condition." However, this entirely ignores the effects of roads (no historic analogue), which effectively multiply the effects of ECAs exponentially (Johnson, 1995). The EA is being misleading.

The Forest Plan fails to acknowledge the known limitations of the INFISH direction. INFISH deals primarily with riparian zone protection, and does not consider instream and stream bank erosion and sediment deposition during high water yield events, such as spring runoff and rain-on-snow events.

The FS sets an inadequate Aquatic Habitat restoration Objective (FW-OBJ-AQH-01) for the next 15 years, hardly addressing the Forest Plan Goal for this topic.

The Forest Plan does not contain direction that explicitly limits the **amount** of sediment that would be allowed to enter water bodies from management activities in compliance with NFMA regulations at 36 CFR 219.27(e).

Due to the inability of the FS to receive funding for or perform routine maintenance, a very substantial portion of the IPNF road system is not up to BMP standards, meaning that sediment and other pollution that result are violations of state water quality standards and the Clean Water Act.

The Forest Plan is not responsive to NFMA at 36 CFR 219.27(e) which concerns management practices that cause blockages of water courses.

The Forest Plan does not address the lack locally calibrated coefficients of the Equivalent Clearcut Area (ECA) component of the WATSED model, nor validate the model.

The Forest Plan's aquatic Macroinvertebrate Assemblage Management Indicator Species does not comply with 36 CFR 219.19(a)(1), because the FS does not explain how it assures well-distributed, viable populations of other aquatic species such as bull trout, westslope cutthroat trout, inland redband trout, and western pearlshell mussel.

Please disclose the results of monitoring the Macroinvertebrate Assemblage Management Indicator Species.

The Forest Plan has so much discretion as to render the aquatic standards arbitrary. The standards pertaining to watersheds and water quality, riparian, aquatic species and habitat are limited, narrowly focused, and contain language that could subvert the intent of the standard. No matter how badly degraded a drainage might be, no aquatic standards or thresholds would properly limit timber sales.

The IPNF now uses the Water Erosion Prediction Project (WEPP) model to assess potential impacts of surface disturbance on aquatic resources in the IPNF. Please provide project area information validating the use of the WEPP model.

Please 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. Please disclose populations of fish species in the project area, and compare those numbers to minimum viable populations.

Designating BMPs is not sufficient for compliance with CWA and NFMA. Please disclose the actual effectiveness of proposed BMPs in preventing sediment from reaching streams in or near the analysis area. What BMP failures have been noted for past projects with similar landtypes? Also, please disclose which segments of roads in the watersheds to be affected by this proposal would not meet BMPs following project activities.

The EA doesn't explain how the timber sale would comply with the Clean Water Act and all state water quality laws and regulations. Designating BMPs is not sufficient for compliance with CWA and NFMA. Please disclose the actual effectiveness of proposed BMPs in preventing sediment from reaching streams in or near the analysis area. What BMP failures have been noted for past projects with similar landtypes? Also, please disclose which segments of roads in the watersheds to be affected by this proposal would not meet BMPs following project activities.

The FS assumes that this project will adequately mitigate the problems chronically posed by the road network by project road work and BMP implementation, despite the fact that the FS knows otherwise. Without the sufficient funding to maintain its road system in a timely manner, all the BMP implantation that can be mustered in the context of a project such as this will only be a short-term fix, and the road system will remain an ecological liability. 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 "chance to at least correct some (BMP) departures rather than wait until the funding stars align that would allow us to correct all the departures at once."

Please disclose the temporal effectiveness or non-effectiveness of all the road maintenance and upgrading, because merely assuming that the proposed actions will forever mitigate the problems they now exhibit would be obfuscation.

The FS relies heavily upon BMPs to address the issues associated with logging roads, but only implemented within the context of a project such as Buckskin Saddle. However, comprehensive monitoring of the effectiveness of logging road BMPs in achieving water quality standards does not demonstrate the BMPs are protecting water quality, nor does it undermine the abundant evidence that stormwater infrastructure along logging roads continues to deposit large quantities of sediment into rivers and streams (Endicott, 2008). Even as new information becomes available about BMP effectiveness, many states do not update their logging road BMPs, and some states have retained BMPs that have been discredited for some time, such as using fords when they are known to have greater water quality impacts than other types of stream crossings. (Id.) If the measure of success is whether a nonpoint source control program has achieved compliance with state water quality standards, the state forest practices programs have failed.

Again, these programs are only triggered when active logging operations occur. The lack of a requirement in most states to bring existing, inactive logging roads and other forest roads up to some consistent standard results in many forest roads that are not currently being used for logging falling through the regulatory cracks and continuing to have a negative impact on our water quality. Currently, only the State of Washington requires that old roads be upgraded to comply with today's standard BMPs. Across most of the country, the oldest, most harmful logging roads have been grandfathered and continue to deliver sediment into streams and rivers. (Id.)

BMPs are "largely procedural, describing the steps to be taken in determining how a site will be managed," but they lack "practical in-stream criteria for regulation of sedimentation from forestry activities." (Id.) The selection and implementation of BMPs are often "defined as what is practicable in view of 'technological, economic, and institutional consideration." (Id.) The ultimate effectiveness of the BMPs are therefore impacted by the individual land manager's "value system" and the perceived benefit of protecting the resource values as opposed to the costs of operations. (Id.)

Ziemer and Lisle (1993) note a lack of reliable data showing that BMPs are cumulatively effective in protecting aquatic resources from damage. Espinosa et al., 1997 noted that the mere reliance on BMPs in lieu of limiting or avoiding activities that cause aquatic damages serves to increase aquatic damage. Even activities implemented with somewhat effective BMPs still often contribute negative cumulative effects (Ziemer et al. 1991b, Rhodes et al. 1994, Espinosa et al. 1997, Beschta et al. 2004).

In analyses of case histories of resource degradation by typical land management (logging, grazing, mining, roads) several researchers have concluded that BMPs actually increase watershed and stream damage because they encourage heavy levels of resource extraction under the false premise that resources can be protected by BMPs (Stanford and Ward, 1993; Rhodes et al., 1994; Espinosa et al., 1997).

The extreme contrast between streams in roaded areas vs. unroaded areas found on the Lolo NF (Riggers, et al. 1998) is a testament to the failures of the agency's BMP approach.

Roads influence many processes that affect aquatic ecosystems and fish: human behavior (poaching, debris removal, efficiency of access for logging, mining, or grazing, illegal species introductions), sediment delivery, and flow alterations. We incorporate The Wilderness Society (2014) which discusses some of the best available science on the ecological impacts of roads.

The EA fails to provide sufficient evidence or monitoring data demonstrating BMP effectiveness.

When considering how effective BMPs are at controlling non-point pollution on roads, both the rate of implementation of the practice, and the effectiveness of the practice should both be considered. The FS tracks the rate of implementation and the relative effectiveness of BMPs from in-house audits. This information is summarized in the *National BMP Monitoring Summary Report* with the most recent data being the fiscal years 2013-2014 (Carlson et al. 2015). The rating categories for implementation are "fully implemented," "mostly implemented," "marginally implemented," "not implemented," and "no BMPs." "No BMPs" represents a failure to consider BMPs in the planning process. More than a hundred evaluation on roads were conducted in FY2014. Of these evaluations, only about one third of the road BMPs were found to be "fully implemented" (*Id*., p. 12).

The monitoring audit also rated the relative effectiveness of the BMP. The rating categories for effectiveness are "effective," "mostly effective," "marginally effective," and "not effective." "Effective" indicates no adverse impacts to water from project or activities were evident. When treated roads were evaluated for effectiveness, almost half of the road BMPs were scored as either "marginally effective" or "not effective" (*Id*, p. 13).

A recent technical report by the FS (Edwards et al., 2016) summarizes research and monitoring on the effectiveness of different BMP treatments. Researchers found that while several studies have found some road BMPs are effective at reducing delivery of sediment to streams, the degree of each treatment has not been rigorously evaluated. Few road BMPS have been evaluated under a variety of conditions, and much more research is needed to determine the site-specific suitability of different BMPs (*Id.*, also see Anderson et al., 2011).

Edwards et al., 2016 cites several reasons for why BMPs may not be as effective as commonly represented. Most watershed-scale studies are short-term and do not account for variation over time, sediment measurements taken at the mouth of a watershed do not account for in-channel sediment storage and lag times, and it is impossible to measure the impact of individual BMPs when taken at the watershed scale. When individual BMPs are examined there is rarely broad-scale testing in different geologic, topographic, physiological, and climatic conditions. Finally, in some instances, a single study is used to justify the use of a BMP across multiple states without adequate testing.

Climate change will further put into question the effectiveness of many road BMPs (Edwards et al., 2016). While the impacts of climate will vary from region to region (Furniss et al. 2010), more extreme weather is expected across the country which will increase the frequency of flooding, soil erosion, stream channel erosion, and variability of streamflow (*Id*). BMPs designed to limit erosion and stream sediment for current weather conditions may not be effective in the future. Edwards et al., 2016 state, "More-intense events, more frequent events, and longer duration events that accompany climate change may demonstrate that BMPs perform even more poorly in these situations. Research is urgently needed to identify BMP weaknesses under extreme events so that refinements, modifications, and development of BMPs do not lag behind the need."

Climate change is also expected to lead to more extreme weather events, resulting in increased flood severity, more frequent landslides, altered hydrographs, and changes in erosion and sedimentation rates and delivery processes. (Halofsky et al., 2011.) Many National Forest roads are poorly located and designed to be temporarily on the landscape, making them particularly vulnerable to these climate alterations. (*Id*.) Even those designed for storms and water flows typical of past decades may fail under future weather scenarios, further exacerbating adverse ecological impacts, public safety concerns, and maintenance needs. (Strauch et al., 2015.) At bottom, climate change predictions affect all aspects of road management, including planning and prioritization, operations and maintenance, and design. (Halofsky et al., 2011.)

The FS fails to analyze in detail the impact of climate change on forest roads and forest resources. It should start with a vulnerability assessment, to determine the analysis area's exposure and sensitive to climate change, as well as its adaptive capacity. For example, the agency should consider the risk of increased disturbance due to climate change when analyzing this proposal. It should include existing and reasonably foreseeable climate change impacts as part of the affected environment, assess them as part of the agency's hard look at impacts, and integrate them into each of the alternatives, including the no action alternative. The agency should also consider the cumulative impacts likely to result from the proposal, proposed road activities, and climate change. In planning for climate change impacts and the proposed road activities, the Forest Service should consider: (1) protecting large, intact, natural landscapes and ecological processes; (2) identifying and protecting climate refugia that will provide for climate adaptation; and (3) maintaining and establishing ecological connectivity. Schmitz and Trainor, 2014.)

"Many of the roads and trails within the project area are currently in need of maintenance activities and some require surface work and drainage improvements to reduce or prevent sediment from entering streams." Please disclose the intensity or thoroughness of the alleged surveys for inventorying sediment sources in the project area. See Fly et al. 2011, which describes a thorough survey in the Boise National Forest. Please disclose the metrics you are using to estimate elevated, unnatural sources of sediment yield into streams.

Log hauling itself adds sediment to streams. From an investigation of the Bitterroot Burned Area Recovery Project, hydrologist Rhodes (2002) notes, "On all haul roads evaluated, haul traffic has created a copious amounts of mobile, non-cohesive sediment on the road surfaces that will elevate erosion and consequent sedimentation, during rain and snowmelt events." USDA Forest Service, 2001a also presents an analysis of increased sedimentation because of log hauling, reporting "Increased traffic over these roads would be expected to increase sediment delivery from a predicted 6.30 tons per year to 7.96 tons per year."

U.S. Fish and Wildlife Service, 2015 states:

> Culverts that remain in the road behind gates and berms that are not properly sized, positioned, and inspected …have an increased risk for failure by reducing awareness of potential maintenance needs. The accumulation of debris has the potential to obstruct culverts and other road drainage structures. Without maintenance and periodic cleaning, these structures can fail, resulting in sediment production from the road surface, ditch, and fill slopes. The design criteria to address drainage structures left behind gates and berms require annual monitoring of these structures.

Does the FS conduct annual monitoring of **ALL** drainage structures left behind gates and berms in the project area?

"Though the potential for road failures increases with road density during the project implementation phase…" What is the definition of "road failure" meant here?

"When roads are put into storage, their impact on watershed function would be minimal, and are no longer considered part of the road density calculations. Stored roads would be stabilized and have a low probability of failure when in storage, but **the risk would not be eliminated**." How often does the FS conduct monitoring or inspection of each stored road in the project area?

USDA Forest Service, 2016b states, "Increased heavy-truck traffic related to log hauling can increase rutting and displacement of road-bed material, creating conditions conducive to higher sediment delivery rates (Reid and Dunne, 1984)." The abstract from Reid and Dunne, 1984 states:

> Erosion on roads is an important source of fine-grained sediment in streams draining logged basins of the Pacific Northwest. Runoff rates and sediment concentrations from 10 road segments subject to a variety of traffic levels were monitored to produce sediment rating curves and unit hydrographs for different use levels and types of surfaces. These relationships are combined with a continuous rainfall record to calculate mean annual sediment yields from road segments of each use level. A heavily used road segment in the field area contributes 130 times as much sediment as an abandoned road. A paved road segment, along which cut slopes and ditches are the only sources of sediment, yields less than 1% as much sediment as a heavily used road with a gravel surface.

USDA Forest Service, 2017e states:

> Potential sediment delivery from roads used for log haul was evaluated using three methods: road encroachment, stream crossings, and sediment modeling. … Roads within 300 feet of a water body are the most probable to deliver sediment (Belt et al. 1992). … Road/stream crossings have a high potential to deliver sediment directly into streams. … Sediment delivery to streams from existing roads and from project-related road activities was modeled using the Roaded WEPP module of the Water Erosion Prediction Project (WEPP).

So despite the fact that increased sediment impacts from log hauling would likely be significant, the Buckskin Saddle EA fails to quantify, estimate, analyze or disclose such impacts.

Objective FW-OBJ-WTR-01 prioritizes management (logging, fuel reduction) in the watersheds in best condition on the Forest, because of use of vague language "toward a better condition" and "risk factors."

Objective FW-OBJ-WTR-02 prioritize managements (logging, fuel reduction) because of its language "improve… across **acres** of subwatersheds…"

"The Johnson Creek and Twin Creek drainages are listed as impaired waters by the State of Idaho with one reason being high levels of sediment." Guideline FW-GDL-WTR-01 offers little to no protection to the impaired waters on the IPNF. Even with an approved TMDL, there is no legal authority to enforce a violation of the TMDL. The EA does not disclose all reasons for these waters' status as impaired. The EA does not demonstrate the proposed actions would be consistent with addressing the sources of impairment. Please explain how the timber sale would comply with the Clean Water Act and all state water quality laws and regulations.

"The Forest Plan (pp. 22-29) contains a number of goals, objectives and desired conditions that emphasize the need to decrease sediment sources in streams and other waterbodies, especially in listed streams where the pollutant of concern is sediment. Consequently, there is a need to identify and reduce road and trail sediment sources to streams in the project area." Again, the EA guarantees little but road work being done on proposed haul routes. There is no guarantee that the full set of watershed restoration activities as described in the EA will be performed, because funding is uncertain.

In Guideline FW-GDL-WTR-02 the meaning of "hydrologic stability" is unclear.

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

Kappesser, 2002 discusses an assessment procedure used on the IPNF:

> The RSI [Riffle Stability Index] addresses situations in which increases in gravel bedload from headwaters activities is depositing material on riffles and filling pools, and it reflects qualitative differences between reference and managed watersheds…it can be used as an indicator of stream reach and watershed condition and also of aquatic habitat quality.

Peak flows can be altered by forest harvest activities after removal of canopy through less interception, which results in more snow accumulation and snowmelt available for runoff (Troendle and King 1985). Please disclose the potential for the project to damage channel morphology and aquatic habitat.

Please conduct an analysis of water flow alteration effects on stream bank erosion and channel scouring during spring runoff and/or rain-on-snow (ROS) events. Most segment altering and channel forming events occur during instantaneous flows.

Openings accumulate much more snow than in a forested areas that are not as "open," thus provide a significant contribution to water yield especially during ROS and spring runoff events. The number, mileage and proximity of the roads to the proposed logging units and streams are important because they will also have a significant effect on peak flows and the resultant impact on fish, steam channels and possible flooding.

According to Kappesser, 1992:

> The stability condition of a watershed may be broadly determined by evaluating the level of harvest activity (ECA), its spatial distribution with regard to headwater harvest and rain on snow risk and the density of roading in the watershed with consideration of road location relative to geology and slope. Each of these four factors may [be] evaluated

against "threshold" levels of activity characteristic of watersheds on the IPNF that are known to be stable, unstable, or on a threshold of stability.

ROS events can be the most channel changing, sediment producing events and can have a significant adverse effect on fish and their habitat (Kappesser, 1991b):

> Filling of pools by bedload sediment is seen as a significant factor in the reduction of rearing and overwintering habitat for fish such as West Slope Cutthroat Trout (Rieman and Apperson, 1989). Bedload increases have traditionally been interpreted as the result of channel scour in response to increased peak flows created by timber harvest.

(Also see Kappesser, 1991a.) The Inland Northwest frequently gets at least one mid-winter chinook which is often accompanied by windy and rainy conditions. The warm wind blowing across the snow, especially in relatively open areas on south and southwestern facing slopes between 2,500 to 4,500 feet elevation results in rapid snow melt and high levels of instantaneous water flows.

King, 1994 explains that small headwaters areas are particularly sensitive to the increased water yields due to removal of tree canopy:

> Timber removal on 25-37% of the area of small headwater watersheds increased annual water yield by an average of 14.1 inches, prorated to the area in harvest units and roads. Increases in streamflow occurred during the spring snowmelt period, especially during the rising portion of the snowmelt hydrograph. These forest practices also resulted in large increases in short duration peakflows, greatly increasing the sediment transport capacity of these small streams. The cumulative effects of these activities on streamflow in the Main Fork, with only 6.3% of its area in roads and harvest units, were not detectable.

Ziemer, 1998 observed the same phenomenon in his study on flooding and stormflows. Also, King, 1989 observed that "Current procedures for estimating the hydrologic responses to timber removal of third to fifth order streams often ignore what may be hydrologically important modifications in the low-order streams."

USDA Forest Service 1994b states:

> It is important to recognize that the Equivalent Clearcut Area model uses tree growth (canopy density) to estimate Spring peak flows and that channels do not recover immediately in response to tree growth. There is a lag time between hilltop recovery (growth) and channel recovery. The length of the lag time is difficult to predict and is likely to be influenced by factors other than simply canopy density (e.g. the role of culvert failures, in-stream activities, geology, etc.).

USDA Forest Service 1994b states "It is important to realize that all models greatly simplify complex processes and that the numbers generated by these models should be interpreted in light of field observations and professional judgement." (III-77.) Harr, 1987 states:

> Perhaps the most basic of the erroneous beliefs is the idea that <u>simplicity can be willed on the forest hydrologic system</u>. This belief encourages the implementation of simplistic guidelines, the adoption of arbitrary thresholds of concern, and the search for all-encompassing methodologies to predict consequences of forest activities on water resources. These actions occur sometimes with the blessings of hydrologists or soil

> scientists but other times over their objections. The belief in simplicity has been nurtured by the rapid increase in the use of computer simulation models in forest planning and the desire to accept the output from such models. Another reason for pursuit of simplicity is the current emphasis on planning called for by NFMA; such planning is often conducted under strict time and budgetary constraints.
>
> I must point out that, on the average, the simplistic methodologies may have resulted in fairly prudent forest management. But rather than being viewed as merely a first attempt at solving a problem, they often seem to inhibit further investigation and development. Also, they tend to lead forest managers and some specialists to believe that hydrologic systems really do function in the manner described by the simplistic methodologies.
>
> Forest hydrologic systems are more complex than one would believe after reading some of the methodologies and procedures that have been proposed to predict cumulative effects of logging on water resources. For example, many of these procedures state that a threshold of harvest activity or intensity will be determined, without specifying how it will be determined or whether it really exists or can be measured. Similarly, implementing a methodology for estimating cumulative effects of harvest operations on water resources does not mean that such cumulative effects either exist or can be measured.
>
> (I)n our desire to simplify, to create a methodology that will predict consequences of harvest activities everywhere or in the average situation, we usually expend considerable energy creating a methodology that predicts reasonably accurately virtually nowhere. We may implement procedures without providing for testing or monitoring the results to see whether the procedures are, in fact, working. In the process, we may even develop a false sense of security that our methodology can really protect soil and water resources.

Please conduct an analysis of forest plan Riparian Management Objectives (RMOs), including current values of all RMOs for all stream reaches, and trends toward or away from meeting those RMOs for all stream reaches. This is an issue of forest plan compliance.

There is a lack of scientific justification for logging and/or burning in RHCAs. The Forest Plans allows for vegetation management to occur in RHCAs to meet desired conditions, so long as project activities do not prevent attainment of desired conditions. A large body of scientific research shows that logging near streams can have long-term and devastating consequences for stream ecological integrity and water quality. Logging in RHCAs can cause degradation of water quality such as stream temperature increases, changes to stream temperature patterns, increased fine sediment inputs, stream bank instability, and other problems. The EA and Forest Plan ignore and downplay the well-documented negative effects and ecological risks associated with logging within streamside corridors. Even non-commercial thinning in RHCAs is, at best, a large scale and ecologically risky experiment in which little is known about the outcome. Risks are considerable, and the outcome can have unintended negative consequences. Rieman et al. (2001) noted: **"…vulnerable aquatic species could be impacted in the short term in ways from which they could not easily recover, even if long-term benefits eventually became evident in later years."**

Studies have found even selective logging may be associated with increases of instream fine sediments (Kreutzweiser et al. 2005, Miserendino and Masi 2010), changes in macroinvertebrate community structure or metrics (Flaspohler et al. 2002, Kreutzweiser et al. 2005), alterations in nutrient cycling and leaf litter decomposition rates (Lecerf and Richardson 2010), and increases in stream temperatures (Guenther et al. 2012). Flaspohler et al. (2002) noted that changes to biota associated with selective logging were found decades after logging. These studies strongly suggest that alterations caused by logging within RHCAs may result in significant changes in water quality parameters and stream biota in many areas; these results are likely tied to dynamics that may be common to many forested streams to varying degrees.

Guenther et al. (2012) found increases in stream temperature in relation to selective logging. They found increases in bed temperatures and in stream daily maximum temperatures in relation to 50% removal of basal area in both upland and riparian areas. Increases in daily maximum temperatures varied within the logged area from 1.6 to 3 degrees Celsius.

In the draft Forest Plan Revision for the Blue Mountains, the FS discloses: "Research has shown that effective vegetated filter strips need to be at least 200 to 300 feet wide to effectively capture sediment mobilizing by overland flow from outside the riparian management area." It is logical that logging or thinning within 50 to 100 feet from streams (or closer) would cause fine sediment production and allow for sediment delivery into streams, and potentially contribute to stream temperature increases, increased variability in waters quality and aquatic habitat parameters, alterations to stream hydrology, and other negative impacts.

Furthermore, headwater streams and non-fish bearing streams need more, not less, protection (Rhodes et al., 1994; Moyle et al., 1996; Erman et al., 1996; Espinosa et al., 1997). Both Erman et al., 1996 and Rhodes et al., 1994 conclude, based on review of available information, that intermittent and non-fish-bearing streams should receive stream buffers significantly larger than those afforded by PACFISH/ INFISH. The revised forest plan should have fully protected buffers of at least 300 feet for all waterbodies.

Please disclose the results of surveys for native fish occurrence and abundance in project area streams.

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

US Fish and Wildlife Service, 2010 provides a discussion of biological effects of sediment on bull trout and other fish.

USDA Forest Service, 2017c explains that native westslope cutthroat trout have declined due to habitat degradation:

> The distribution and abundance of westslope cutthroat trout has declined from historic levels (less than 59 percent of historically occupied stream habitat) across its range, which included western Montana, central and northern Idaho, a small portion of Wyoming, and portions of three Canadian provinces (Liknes and Graham 1988, Shepard et al. 2005).

> Westslope cutthroat trout persist in only 27 percent of their historic range in Montana. Due to hybridization, genetically pure populations are present in only 2.5 percent of that range (Rieman and Apperson 1989). Introduced species have hybridized or displaced westslope cutthroat trout populations across their range. Hybridization causes loss of genetic purity of the population through introgression. Within the planning area, genetically pure populations of westslope cutthroat trout are known to persist in Ruby Creek (MFISH 1992, 2012). Some of these remaining genetically pure populations of westslope cutthroat trout are found above fish passage barriers that protect them from hybridization, but isolate them from other populations.
>
> Brook trout are believed to have displaced many westslope cutthroat trout populations (Behnke 1992). Where the two species co-exist, westslope cutthroat trout typically predominate in higher gradient reaches and brook trout generally prevail in lower gradient reaches (Griffith 1988). This isolates westslope cutthroat trout populations, further increasing the risk of local extinction from genetic and stochastic factors (McIntyre and Rieman 1995).
>
> Habitat fragmentation and the subsequent isolation of conspecific populations is a concern for westslope cutthroat trout due to the increased risk of local and general extinctions. The probability that one population in any locality will persist depends, in part on, habitat quality and proximity to other connected populations (Rieman and McIntyre 1993). Therefore, the several small, isolated populations left in the project area are at a moderate risk of local extirpation in the event of an intense drainage-wide disturbance.
>
> Habitat degradation also threatens the persistence of westslope cutthroat trout throughout their range. Sediment delivered to stream channels from roads is one of the primary causes of habitat degradation. Sediment can decrease quality and quantity of suitable spawning substrate and reduce overwintering habitat for juveniles which reduces spawning success and increases overwinter mortality. Roads can also alter the drainage network of a watershed and thereby increase peak flows. The end result of increased peak flows is decreased channel stability and accelerated rates of mass erosion. Across their range the strongest populations of westslope cutthroat trout exist most frequently in the wilderness, Glacier National Park, and areas of low road densities or roadless areas (Liknes and Graham 1988, Marnell 1988, Rieman and Apperson 1989, Lee et al. 1997).

The Kootenai NF's Flower Creek Forest Health project EA states:

> Fine sediment can greatly reduce the capability of winter and summer rearing habitats and decrease survival to emergence when sediment levels reach 30% or greater (Shepard et al. 1984). Fine sediment may have the greatest impact on winter rearing habitat for juvenile salmonids. Fine sediments can cap or fill interstitial spaces of streambed cobbles. When interstitial rearing space is unavailable, juvenile salmonids migrate until suitable wintering habitat can be found (Hillman et al. 1987). Fine sediment can also alter macroinvertebrate abundance and diversity.

The Watershed Disturbance Rating strongly suggests forestwide direction to attain watershed restoration. Yet, there are no forestwide standards for those parameters, which is needed to provide much stronger prioritization towards meeting forestwide Watershed and Water Quality Desired Conditions.

Viability and Diversity

What is the best available science for sustaining viable populations of ESA-listed, management indicator species and all sensitive species on the Forest? Past timber harvest activities, roads, mining and related activities (OHV use, including closed roads and trails illegally accessed) must be analyzed in the context of the importance of habitat capability and suitability, as well as connectivity.

"**Seedtree and Shelterwood Harvest with Precommercial Thinning.**" The FS proposes to "remove most of the larger trees that were left to provide shelter and/or seed production in previously harvested areas…" This ignores the wildlife and other values that would be served by instead retaining those trees. The EA fails to analyze and disclose the structural diversity that would be lost by removing these previously retained larger trees. As the Forest Vegetation Report admits, "Over time, these ever-larger trees would provide a source of snags and eventually coarse woody debris." The EA doesn't even say how many of these larger trees are planned for retention in these "previously harvested areas." It would be consistent with the EA if all of those large trees were logged off.

"**Seedtree Harvest** …is designed to encourage the growth and regeneration of white pine and larch by cutting most of the trees except those needed for seed production. About 4,699 acres are proposed utilizing this silviculture treatment prescription." The EA fails to state how many trees would be retained. It would be consistent with the EA to log all but a single tree/acre on average over those 4,699 acres.

"**Shelterwood Harvest with Reserves** …would appear moderately open with an average of 10 to 20 trees per acre and include "reserves" of tree groups in various areas of the stand. Under the proposed action about 7,897 acres would be proposed utilizing this silviculture treatment." It would be consistent with this prescription to completely clearcut every one of the 7,897 acres while drawing circles around adjacent stands not planned to be cut, and calling them the "reserves" that would make up the "average of 10 to 20 trees per acre." There is nothing in the prescription that prohibits this. In fact Appendix C encourages this, saying both seedtree and shelterwood prescriptions "may also include leave areas **adjacent to unit boundaries**" (emphasis added). There is no size of "reserves" nor a specified way of identifying them.

Appendix C also states, "These leave trees would have an irregular or uneven distribution and can range from individual trees to groups of trees one quarter to 3 acres in size and may also include leave areas adjacent to unit boundaries. … Leave trees provided to satisfy the wildlife project design features will fulfill the intent of this feature." The trouble is Appendix C IS the "wildlife project design features" but it fails to REQUIRE anything, leaving huge loopholes with such language as "can range from" something or "may also include" something else. In regards to leave trees, there is simply no mechanism for accountability in the EA.

Numerical specifications for "**Improvement Cut**" "**Commercial Thinning**" and sadly enough, "**Whitebark Pine Restoration**" are similarly missing from the EA. There is little or nothing distinguishing them from clearcutting—certainly no mechanism for accountability in the EA exists if these areas end up resembling clearcuts.

"(D)esirable within-stand structural elements (**particularly existing large trees**) would be maintained…" (emphasis added). And, "These large openings are representative of stand-replacement disturbance events and are abundant in physical and biological resources, contain legacies from the pre-disturbance ecosystem…" And, "Within old growth and recruitment potential old growth stands (Table 15), improvement harvest would result in the retention of the larger size classes…" Again, there's no factual basis for these statements in the EA, with the prescriptions lacking solid commitments for retention of large trees.

The EA doesn't present an analysis of population abundance or trends, nor of habitat abundance or trends, for the flammulated owl, pygmy nuthatch, or fringed myotis which are alleged to need the logging.

The FS must address the case law requirement that the FS insure that there exists the quantity and quality of habitat necessary to insure viability of …species of concern. The Ninth Circuit Court of Appeals ruled that the FS "must both describe the quantity and quality of habitat that is necessary to sustain the viability of the species in question and explain its methodology for measuring this habitat." (*Lands Council v. McNair*). Assuring viability of most wildlife species is forestwide issue. The Forest Plan is not based upon scientific research regarding the forestwide amount and distribution of habitat needed to insure viability of vertebrate species of concern. Furthermore, the FS maintains an inaccurate old-growth inventory. What is the FS's way of describing the quantity and quality of habitat that is necessary to sustain the viability of the species in question on the IPNF? Also, please "explain (the) methodology for measuring this habitat."

That Sensitive species are administratively designated by the regional forester highlights a weakness of the biodiversity provisions of the Forest Plan. At any time, the Regional Forester may change or even eliminate the Sensitive species list for the IPNF, without any public process.

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

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

> 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.

The Forest Plan and FEIS do not include scientific justification for the adoption of the landbird assemblage (olive-sided flycatcher, hairy woodpecker, chipping sparrow, Hammond's flycatcher and dusky flycatcher) as MIS representing other wildlife (including old-growth associated wildlife species) on the IPNF. In fact the EIS contains an explicit assumption that its implementation cannot possibly affect viability of its chosen indicator species: "These MIS, elk and insectivores, were not selected because of a viability concern."

Please provide an analysis for the Forest Plan MIS "Landbird Assemblage." Please disclose the specific habitat needs of all of these bird species, and analyze cumulative impacts.

Please evaluate impacts on species that are affected by human activity including the fisher, pine marten, wolverine, Canada lynx, native trout and other fish, elk, woodpeckers, pygmy nuthatches, northern goshawks, flammulated owls and other raptors, fringed myotis, Townsend's big-eared bats, amphibians (such as western toad and Coeur d'Alene salamander), and reptiles. Please disclose data and the best available science concerning biological relationships and population trends of these species on the IPNF.

The Forest Plan FEIS concludes that implementation of the Forest Plan "may impact individuals or habitat, but is not likely to result in a trend towards federal listing or loss of viability" for each species. However, it does not disclose the minimum viable population of any of the Sensitive species (plant, wildlife, or aquatic), nor does it describe the quantity and quality of habitat needed to maintain viable populations of any of the Sensitive species. The Forest Plan lacks science-based habitat Standards based upon the needs of Sensitive species. The Forest Plan does not even include criteria for measuring a viable population in its Glossary.

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

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

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

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

Please disclose statistically robust estimates of population trends of each Sensitive species. Please disclose the intensity of surveys for Sensitive species that have been conducted in the project area. Please provide a sound scientifically-based explanation for any species' apparent absence from the project area.

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

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

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 IPNF makes it imperative that population viability be assessed at least at the forestwide scale (Marcot and Murphy, 1992). Also, temporal considerations of the impacts on wildlife population viability from implementing something with such long duration as a Forest Plan must be considered (id.) but this has never been done by the IPNF. It is also of paramount importance to monitor population during the implementation of the Forest Plan in order to validate assumptions used about long-term species persistence i.e., population viability (Marcot and Murphy, 1992; Lacy and Clark, 1993).

The FS has stated: "Well distributed habitat is the amount and location of required habitat which assure that individuals from demes, distributed throughout the population's existing range, can interact. Habitat should be located so that genetic exchange among all demes is possible." (Mealey 1983.)

The FS relies upon unpublished reports by Samson alleged to prove viability is being maintained for various wildlife species of concern on the IPNF. 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.

A FS timber sale EIS (USDA Forest Service, 2007a) notes the limitations of modeling methodology the EA relies upon for wildlife analyses (by Samson):

> In 2005, the Regional Office produced a Conservation Assessment of the Northern goshawk, black-backed woodpecker, flammulated owl, and pileated woodpecker in the Northern Region (Samson 2005). This analysis also calculated the amount of habitat

> available for these species, but was based on forest inventory and analysis (FIA) data. FIA data is consistent across the Region and the state, but **it was not developed to address site-specific stand conditions for a project area.** In some cases, these two assessments vary widely in the amount of habitat present for a specific species. (P. 116, emphasis added.)

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

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

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

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

The use of VMap base data causes unacceptable inaccuracy in the Forest Plan EIS wildlife analysis.

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

IN FW-DC-WL-06, the provision directing management to promote large-diameter trees in eagle nesting territories is not based upon any information source from the IPNF that demonstrates it is needed, or on recommendations of any scientific research on managing for bald eagles.

Desired Condition FW-DC-WL-07 encourages occupancy of woodland caribou only within the currently designated Recovery Zone, far less than its historic range. The Recovery Zone is also not a FS established geographic area, which means the DC could be changed without public process.

It is unclear if the word "should" in Forestwide Wildlife Guidelines is intended to render these entire Guidelines to be discretionary.

In FW-GDL-WL-01, 03, 04, 05, 11, 14, 19, 20, 21, 22, 23, 24, and 25 the words "or minimize" are not objectively defined and basically nullify these guidelines.

In order to meet Forest Plan requirements in the Elk Management Unit, the project "should maintain existing levels of elk security" (Forest Plan guideline FW-GDL-WL-13).

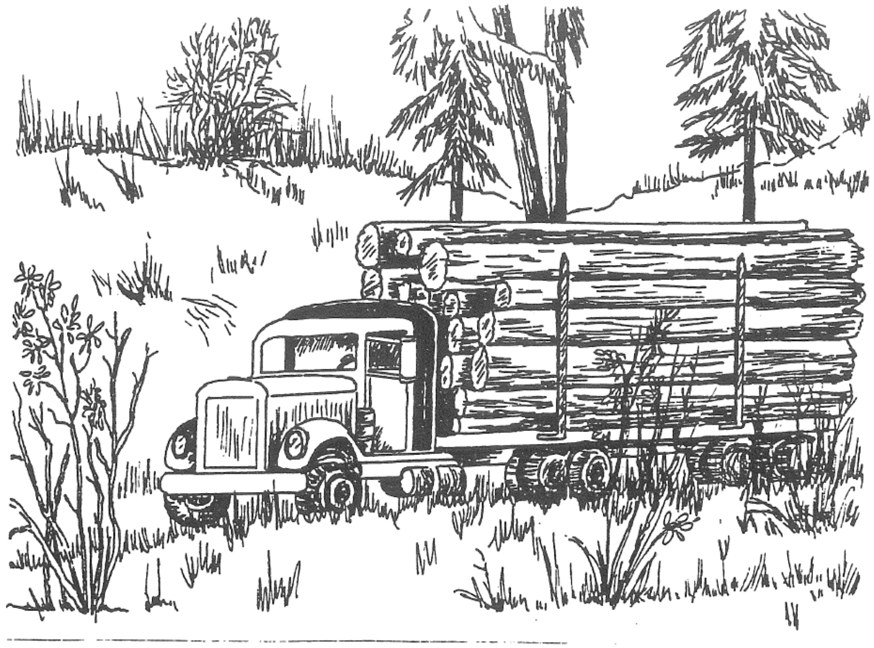
Guideline FW-GDL-WL-08 can be read to provide direction to log areas that scientific consensus recognizes as some of the worst places to do so, because of the ecological sensitivity and often rarity of intact post-fire habitats.

Desired Condition FW-GDL-WL-20 states, "(Raptors) that establish nests near pre-existing human activities are assumed to be tolerant of that level of activity." There is no scientific research that validates the inclusion of this assumption for all raptors.

Desired Condition FW-GDL-WL-25 states, "Individual animals that establish nests and den sites near areas of pre-existing human use… are assumed to be accepting…" There is no scientific research that validates this assumption for the remaining species "not covered under other forestwide guidelines."

The FS must conduct surveys for wildlife, or their dens or nests, in the project area.

Old Growth



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

-USDA Forest Service, 1987d

The EA claims "There is …a need to protect, maintain and improve conditions within and around old growth stands in the project area and protect them from the negative effects of severe landscape fires." Also, "Paradoxically, continued fire suppression that would contribute greatly to an increase in mature and old growth forests, would also increase the long-term risk of stand-replacing fire, insect and disease susceptibility, and the eventual loss of some existing allocated old growth and potential old growth." From reading the EA we know the FS refuses to attempt any enlightened approaches to management of fire, which means old growth is doomed despite proposed treatments.

Or else, logging is the only way old growth can be maintained or created. That sounds like a recipe for long-term disaster.

"No moist forest old growth would be treated or affected by the proposed activities." The EA doesn't have enough information other than Table 15 claims that logging old growth is "Dry Site Improvement" to back up that claim. There are no maps of forest types. Which biophysical setting do these units fall into?

Why can't the FS sacrifice some of its timber goals and set diameter limits to compensate for the deficiency compared to the historic range of large diameter trees (regardless of species) to serve wildlife habitat needs? How will the FS emphasize retention of the largest snags and live trees if you don't provide details on how this is to be accomplished?

The Forest Plan FEIS includes a "Large/Very Large" size class (20"+ dbh). It states, "The very large size class (stands that are dominated by 20"+ diameters)… Please explain why none of the

EA's analyses utilize the "Very Large" size class metric. Please disclose how many stands in the project area fall within that Large/Very Large size class, and how many acres of those would be logged. Please estimate how many total trees ≥ 20" dbh would be cut in each unit.

The Forest Plan contains no minimum acreage or distribution requirements for maintaining old growth, ignoring 36 CFR 219.19 viability provisions that would prevent large areas of the IPNF becoming devoid of old growth or old-growth associated wildlife. The FS has not analyzed the wildlife viability implications of managing the IPNF well outside the HRV for old growth, based upon the best available scientific information.

Please compare patch size of the old-growth areas to scientific information on minimum size needed for utilization by old-growth associated wildlife.

Standard FW-STD-VEG-01 allows active mechanical treatments in old growth but ignores scientific information that such active management is the very antithesis of old growth. The Forest Plan cites no scientific research or monitoring results from the IPNF that demonstrate management manipulations will create net ecological benefit rather than harm old growth and old-growth associated wildlife.

The IPNF's recent Halfway Malin EA states, "there are currently an estimated 11.8 percent of forested lands allocated as old growth on the Idaho Panhandle National Forests…" Is the inventory of "allocated old growth" on the IPNF maintained for public review? Also, that statement refers to "allocated" old growth, but how much actually meets the IPNF's old-growth criteria?

The EA has no estimates for the amount of old growth either in the project area or forestwide. Why does the FS consider this irrelevant? The FS should analyze and disclose amounts across Old Growth Analysis Areas, which has meaning for viability (amount and distribution of habitat) of old-growth associated species.

An analysis from the adjacent Kootenai National Forest (Gautreaux, 1999) indicates 22% old growth is near the bottom of "reference conditions" on that Forest, and the present situation is far below 22%. Also, Dueker and Sullivan, 2001 "recognize that historical conditions probably provided a higher level of old forest habitat through time than what is provided by the (KNF) Forest Plan direction (a mean of 27.7% as opposed to 10%)."

Gautreaux, 1999 states:

> …research in Idaho (Lesica 1995) of stands in Fire Group 4, estimated that over 37% of the dry Douglas-fir type was in an old growth structural stage (>200 years) prior to European settlement, approximately the mid 1800's.
>
> Based on research of Fire Group 6 in northwest Montana (Lesica 1995) it was estimated that 34% of the moist Douglas-fir type was in an old growth structural stage (>200 yrs.) prior to European settlement, approximately the mid 1800's.

> Based on fire history research in Fire Group 11 for northern Idaho and western Montana (Lesica, 1995) it was estimated that an average of 26% of the grand fir, cedar, and hemlock cover types were in an old growth structural stage prior to European settlement.
>
> …fire history research in Fire Group 9 for northern Idaho and western Montana (Lesica, 1995) estimated that 19-37% of the moist lower subalpine cover types were in an old growth structural stage (trees > 200 yrs.) prior to European settlement. While this estimate is lower than suggested by Losensky's research…
>
> Lesica found an estimated 18% of the cool lodgepole pine sites was in an old growth structural stage (>200 years) prior to European settlement, approximately the mid 1800's. … This same research in Fire Group 8 in drier, lower subalpine types of Montana had over 25% of the stands in an old growth structural stage during the same historical period.

Please provide an **estimate** of how much old growth in the project area has been destroyed by logging. What is the HRV for old growth forestwide?

How many FIA plots (locations in the project area) show the plot is old growth?

The FS Region 1 report Bollenbacher, et al., 2009 (cited in the KNF's Black Ram EA) states concerning the FIA inventory: "All northern Idaho plots utilized a primary sample unit (PSU) composed of four fixed radius plots with trees 5 – 20.9 inches tallied on a 1/24th acre plot and trees 21.0 inches DBH and larger tallied on a ¼ acre plot." Also, Czaplewski, 2004 states, "Each FIA sample location is currently a cluster of field sub-plots that collectively cover an area that is nominally one acre in size, and FIA measures a probability sub-sample of trees at each sub-plot within this cluster." In addition, Bollenbacher and Hahn, 2008 under "Defining Old Growth" state: "There are no specific criteria for minimum patch size for OG in the Northern Region definitions" but recognize "There are, however, some Forest Land Management Plans that may include guidance for a minimum map unit for OG stands." Despite that, Bollenbacher and Hahn, 2008 try to make a case for smaller minimum stand sizes, saying "The regional vegetation minimum map unit of 5 acres for a stand polygon would be a reasonable lower limit for all vegetation classes of forest vegetation including OG stands." Clearly, whether the FS is using a ¼-acre, one-acre, or five-acre minimum map unit, none conform to the Forest Plan old-growth minimum stand size criteria. Furthermore, it would be ludicrous to propose that any old-growth associated MIS, Sensitive, or ESA-listed species could survive on even a five-acre old-growth stand—there is no scientific evidence to support such a premise.

Please disclose the natural historic range vs. current conditions regarding patch size, edge effect, and amount of interior forest old growth in the project area and forestwide.

Has the FS compared all stands proposed for logging to old growth criteria? Did the FS considered retaining such stands to be as best-closest to old-growth conditions, recruitment to compensate for deficits compared to the historic range?

USDA Forest Service, 1990 uses an index of the "Number of potential nesting trees >30" dbh per acre" for the pileated woodpecker, and McClelland and McClelland (1999) found similar results in their study in northwest Montana, with the average nest tree being 73 cm. (almost 29") dbh." Given this highly specialized habitat need of the pileated woodpecker, how does the FS insure that species' viability without any quantitative direction in Forest Plan for trees of that size? Because the Forest Plan omitted adoption of old growth MIS, the FS has no viability strategy. The 1987 Kootenai National Forest Plan states that "(U)nits of 50-100 acres are the smallest acceptable size in view of the nesting needs of pileated woodpeckers… (McClelland, 1979)," and that "managing for a minimum size of 50 acres will preclude the existence of species which have larger territory requirements."

The Scoping Notice states, "The proposed vegetation treatments occur in some old growth stands and within some recruitment potential old growth" This is another erratic characteristic of the Forest Plan; although the Glossary mentions some "goal" of meeting the old growth definition in the future, the Forest Plan actually contains no such goal. Does the IPNF have an inventory of forestwide and project area "recruitment potential old growth?" If so, please display these areas on a map and provide links on the Forest website to the forestwide spreadsheet of stands which are designated or otherwise considered to be "recruitment potential old growth."

Please disclose the best available science the IPNF uses to manage recruitment potential old growth stands.

What exactly is accomplished by identifying forest stands suitable for future old growth? How does the IPNF maintain such a commitment to the future, if indeed such a commitment is being documented or followed at all? In other words, how can the public monitor the agency's commitment to these old-growth "goals" or desired conditions, or whatever?

Please disclose the wildlife species the IPNF considers to be strongly associated with old growth, which must be a meaningful relationship.

The IPNF's 1987 Forest Plan 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. Please explained what it is about the IPNF's 1987 Forest Plan's old growth standards, and its Appendix 27 which is inconsistent with the best available science.

Likewise the adjacent Kootenai National Forest's 1987 Forest Plan included standards for protection of old growth and associated wildlife, along with Appendix 17 (USDA Forest Service 1987a, USDA Forest Service 1987b). Please explained what it is about the KNF's 1987 Forest Plan old growth standards and its Forest Plan Appendix 17 which is inconsistent with the best available science.

After forest plan revision the IPNF has greatly weakened protections for old growth, and in fact the Forest Plan provides direction for logging old growth that lacks scientific support. We incorporate USDA Forest Service, 1987a as well as USDA Forest Service, 1987b which contains a list of "species …(which) find optimum habitat in the "old" successional stage…" We also incorporate the KNF document (USDA Forest Service, 1990a) which states that "we've recognized its (old growth) importance for vegetative diversity and the maintenance of some wildlife species that depend on it for all or part of their habitat." USDA Forest Service 1987a, and USDA Forest Service 1987b also provides biological information concerning old growth and old-growth associated wildlife species.

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

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

> Old growth forests encompass the late stages of stand development and are distinguished by old trees and related structural attributes. These attributes, such as tree size, canopy layers, snags, and down trees generally define forests that are in and old growth condition.
>
> Definition
> Old growth forests are ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function.
>
> (O)ld growth is typically distinguished from younger growth by several of the following attributes:
>
> 1. Large trees for species and site.
> 2. Wide variation in tree sizes and spacing.
> 3. Accumulations of large-size dead standing and fallen trees that are high relative to earlier stages.
> 4. Decadence in the form of broken or deformed tops or bole and root decay.
> 5. Multiple canopy layers
> 6. Canopy gaps and understory patchiness.

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

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

> As a result of Washington Office directives, Region 1 established an Old-Growth Committee. In April 1992, Region 1 issued a document entitled "Old-Growth Forest Types of the Northern Region," which presented Old-Growth Screening Criteria for specific zones on Western Montana, Eastern Montana, and North Idaho (U.S.D.A. Forest Service 1992). This was an attempt to standardize criteria for classifying the variety of old-growth types across the Region. …The committee, however, executed this task without the benefit of outside scientific peer review or public input, either during or after the process (Yanishevsky 1990, Shultz 1992b). Moreover, the methodology used by the committee was

> unscientific and did not even include gathering field data to verify the characteristics of old-growth stands as a basis for the definition (*id.*). A former member of the Region 1 Old-Growth Committee described a "definition process" that relied heavily upon the Committee members' pre-conceived notions of the quantifiable characteristics of old-growth forests (Schultz 1992b).
>
> > The old-growth definition in its present state, without field verification of assumptions, and without addressing the issue of quality, is inadequate to scientifically describe, define, delineate, or inventory old-growth ecosystems.
>
> (*id.*) Not only did the Committee fail to obtain new field data on old-growth forest characteristics, it failed even to use existing field data on old-growth definition and classification previously collected for Region 1 (Pfister 1987). Quality of old growth was not addressed during the definition process. The Committee did not take into account the legacy of logging that has already destroyed much of the best old growth. This approach skewed the characteristics that describe old-growth forests toward poorer remaining examples. …It's premature for the Forest Service to base management decisions with long-term environmental effects on its Region 1 old-growth criteria, until these criteria are validated by the larger scientific community.

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

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

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

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

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

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

Please disclose the natural historic range vs. current conditions regarding patch size, edge effect, and amount of interior forest old growth in the IPNF.

Snags and dead tree habitat

Please disclose how much snag loss would be expected because of safety concerns and also from the proposed methods of log removal.

The Forest Plan does not cite the scientific basis for the minimum amounts of snags to be retained under Guideline FW-GDL-VEG-04. Also the scientific basis for the delineation of snags into two diameter groups using 15" d.b.h. as the division point is not disclosed.

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).

The implications are that managers know little about how many snags per acre are needed to sustain populations of cavity nesting species. Only the birds themselves have the ability to decide if a tree is suitable for excavating. The FS and Forest Plan fails to recognize this scientific finding.

On the same subject, Hutto 2006, notes from the scientific literature: "The most valuable wildlife snags in green-tree forests are relatively large, as evidenced by the disproportionate number of cavities in larger snags (Lehmkuhl et al. 2003), and are relatively deteriorated (Drapeau et al. 2002)."

Spiering and Knight (2005) examined the relationship between cavity-nesting birds and snag density in managed ponderosa pine stands and examined if cavity-nesting bird use of snags as nest sites was related to the following snag characteristics (DBH, snag height, state of decay, percent bark cover, and the presence of broken top), and if evidence of foraging on snags was related to the following snag characteristics: tree species, DBH, and state of decay. The authors state:

> "Many species of birds are dependent on snags for nest sites, including 85 species of cavity-nesting birds in North America (Scott et al. 1977). Therefore, information of how many and what types of snags are required by cavity-nesting bird species is critical for wildlife biologists, silviculturists, and forest managers."
>
> "Researchers across many forest types have found that cavity-nesting birds utilize snags with large DBH and tall height for nest trees (Scott, 1978; Cunningham et al., 1980;

Mannan et al., 1980; Raphael and White, 1984; Reynolds et al., 1985; Zarnowitz and Manuwal, 1985; Schreiber and deCalesta, 1992)."

Spiering and Knight (2005) found the following.

> Larger DBH and greater snag height were positively associated with the presence of a cavity, and advanced stages of decay and the presence of a broken top were negatively associated with the presence of a cavity. Snags in larger DBH size classes had more evidence of foraging than expected based on abundance.
>
> Percent bark cover had little influence on the presence of a cavity. Therefore, larger and taller snags that are not heavily decayed are the most likely locations for cavity-nesting birds to excavate cavities.
>
> The association of larger DBH and greater height of snags with cavities is consistent with other studies (Scott, 1978; Cunningham et al., 1980; Mannan et al., 1980; Raphael and White, 1984; Reynolds et al., 1985; Zarnowitz and Manuwal, 1985; Schreiber and deCalesta, 1992).

Spiering and Knight (2005) state that the "lack of large snags for use as nest sites may be the main reason for the low densities of cavity-nesting birds found in managed stands on the Black Hills National Forest. ...The increased proportion of snags with evidence of foraging as DBH size class increased and the significant goodness-of-fit test indicate that large snags are the most important for foraging."

Please disclose the cumulative snag loss in areas previously logged or subject to other causes of snag loss.

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).

Other literature has also indicated the potential for reduced snag abundance due to human influence (Wisdom et al. 2000). And Bate and Wisdom, 2004 investigated management and other human influences on snag abundance. Some findings include:

> 1. Stands far from roads had almost three times the density of snags as stands adjacent to open or closed roads. No difference in snag density existed for stands adjacent to open versus closed roads. Rather, snag density declined with increasing proximity to nearest road. Consequently, the presence of any road near or adjacent to a stand is an important predictor of substantially reduced density of snags. Ease of access for firewood cutting and other forms of timber harvest is the most likely explanation for reduced snag density near roads.
>
> 2. Stands closer to the nearest town had a lower density of snags than those farther from nearest town. This finding implies that stands closer to town, and therefore more accessible to human activities, also are likely areas where firewood cutting is concentrated, resulting in reduced snag density.

3. Stands in the late-seral stage had three times the density of snags as stands in the mid-seral stage, and almost nine times that of stands in the early-seral stage. Stands in the late-seral stage provide essential snag habitat for wildlife that does not appear to be consistently present in younger stands.

4. Stands with no history of timber harvest had three times the density of snags as stands that were selectively harvested, and 19 times the density as that in stands that had undergone a complete harvest. These results suggest that past timber harvest practices have substantially reduced the density of snags, and that snag losses have not been effectively mitigated under past management.

5. Stands adjacent to private land had a lower density of snags within mid- and late-seral stages, in contrast to a higher density in stands surrounded by Forest Service land. These results are likely explained by safety and fire management policies, which call for removal of snags along property boundaries, where such snags often are deemed to pose safety or fire hazards. In addition, increased human access likely contributes to lower snag densities in stands adjacent to private land.

The EA does not ***quantify*** the degree of snag loss expected because of safety concerns and also from the proposed methods of log removal.

The EA does not cite in the analysis the science that supports the FS assumption that the management will result in snags and down logs in abundance to someday, maybe, several decades later, support viable populations. Is there monitoring to support any claims of benefits to snag and down log-dependent species' population numbers or distribution?

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.

Habitat fragmentation and connectivity

The Forest Plan lacks meaningful direction maintaining Landscape Connectivity for wildlife.

An accurate ecological analysis of the IPNF and project area would reveal too much forest and habitat fragmentation.

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

> Competition between interior and edge species may occur when edge species that colonize the early successional habitats and forest edges created by logging. Competition may ultimately reduce the viability of interior species' populations.
>
> Microclimatic changes along patch edges alter the conditions for interior plant and animal species and usually result in drier conditions with more available light.
>
> 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. (Internal citations omitted.)

The FS has still not sufficiently dealt with the issue of fragmentation, road effects, and past logging on old-growth species' habitat. The EA doesn't disclose the natural historic range vs. current conditions regarding patch size, edge effect, and amount of interior forest old growth in the project area and forestwide.

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

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

Timber harvest patterns across the Interior Columbia River basin of eastern Washington and Oregon, Idaho, and western Montana have caused an increase in fragmentation of forested lands and a loss of connectivity within and between blocks of habitat. This has isolated some wildlife habitats and reduced the ability of some wildlife populations to move across the landscape, resulting in long-term loss of genetic interchange (Lesica 1996, U.S. Forest Service and Bureau of Land 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 "key components in metapopulation functioning" for numerous species (Lidicker and Koenig 1996, Witmer et al. 1998). Harvest or underburning of some late and mid seral/structural stage stands could accelerate the eventual creation of old growth in some areas (Camp, et al. 1996). The benefit of this approach depends on the degree of risk from natural disturbances if left untreated.

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

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

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

(Id., internal citations omitted.) Harrison and Voller, 1998 further discuss these mechanisms:

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

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

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

Harris, 1984 discusses habitat effectiveness of fragmented old growth:

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

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

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

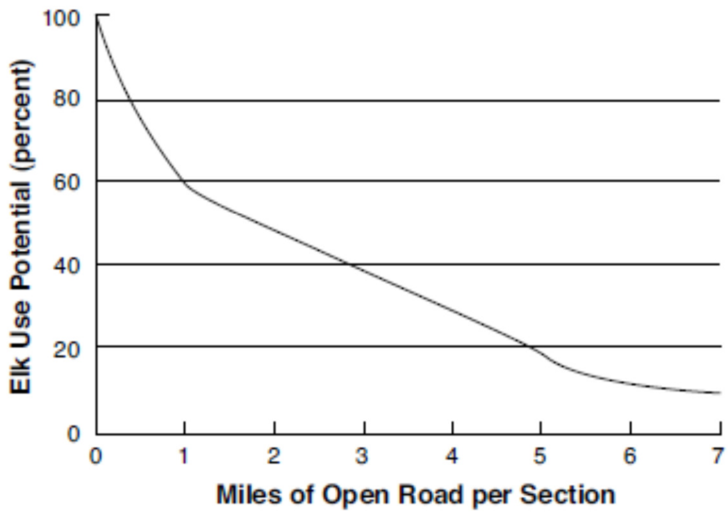
Big Game Species

The EA says, "we want to … increase the amount of browse for elk." The EA doesn't justify this, lacking measurements for browse. And increases are said to only last 10 years, which means security issues are more of a concern here.

The EA states, “Much of the project area lies within Idaho Fish and Game’s big game management unit 4A, where elk and elk hunting are a priority for management by the state.” Why is the FS not improving elk security in the unit, as per the Forest Plan?

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

5. Levels of habitat effectiveness:



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

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

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

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

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

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

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

Thomas et al., 1988a also state:

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

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

Lyon et al, 1985 also discuss the adverse impacts of roads and clearcuts on elk.

Grizzly bear

The EA doesn’t mention grizzly bears, even though the Wildlife Report cites a statement of the USFWS indicating they may be present in the project area. The Wildlife Report doesn’t provide an analysis justifying its “no effects” conclusion.

GA-DC-WL-PR-02 allows “low levels of human disturbance” in grizzly and caribou habitat, but this is too vague to be based upon best available science.

“Approximately 67 miles of stored system roads would be maintained to facilitate log haul and then returned to a stored status after implementation of the proposed action. These routes would be unavailable (closed) for use by the general public. Sandpoint Ranger personnel would need to increase their presence in the project area to insure the 67 miles of additional roads remain closed to the general public upon project completion." The EA provides no assurance the FS can adequately enforce such road closures, so wildlife security would be questionable.

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

Please disclose if adverse project or cumulative impacts are consistent with the requirement to prioritize the needs of the grizzly bear for the applicable Management Situation(s).

Schwartz et al. (2010) noted that management for grizzly bears requires not only the provision of security area, but control of open road densities between security areas. Otherwise, grizzly bear mortality risks will be high as bears attempt to move across highly roaded landscapes to another security area. Please disclose existing road densities located outside of and between Bear Management Units (BMUs), both at present and during project implementation.

Please disclose the FS strategy and best available science to provide habitat protections outside Recovery Zones (RZs) that would allow for a larger protected zone and/or natural augmentation from outside the RZs. The FS has no effective strategy to provide scientifically defensible habitat protections inside the RZ that would facilitate functional connectivity between and among BMUs.

The Forest Service is aware of the best Plan direction it has adopted to date, established in Flathead Forest Plan Amendment 19.[6] It established Open Motorized Route Density (OMRD)/Total Motorized Route Density (TMRD)/Security Core indices. These are based upon the scientific information concerning security from roads and road density requirements for grizzly bears as found in Mace and Manley, 1993 and Mace et al., 1996. Also see McLellan, et al., 1988.

Please disclose the impacts of late-season snowmobile use on grizzly bear spring range.

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

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

"Our analysis shows that grizzly bears have little or no opportunity to select home ranges with lower road density or higher percentages of core… Because grizzly bears could not have selected

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

home ranges having more core area and lower road densities, and there has been no growth in the population, there is no basis to conclude the proposed access standards are sufficient to insure the recovery of the Cabinet-Yaak and Selkirk grizzly bear populations" (Merrill 2003).

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

The Forest Plan is not consistent with best available science on road density in grizzly bear habitat outside of Bear Management Units.

Fisher

Please disclose the FS's strategy and best available science for insuring viable populations of the fisher. Please conduct a scientifically-based analysis on the spatial and structural requirements for fisher survival and successful reproduction. There is no sound, scientifically-based analysis for the Forest Plan or entire IPNF comparing forestwide conditions with habitat metrics required to insure fisher viability. The analyses for other wildlife must address these same flaws.

Sauder (2014) suggests that five national forests (Clearwater, Nez Perce, Coeur d'Alene, Kaniksu, and Kootenai) hold the key to recovery of the species in the Northern Region. As with most of the Sensitive wildlife, fishers receive little habitat protection emphasis in the Forest Plan—mostly just move it (via logging) toward desired conditions. Please 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.

Ruggiero et al. 1994b state, "(T)he fisher is unique to North America and is valued by native and nonnative people as an important member of the complex natural communities that comprise the continent's northern forests. Fishers are an important component of the diversity of organisms found in North America, and the mere knowledge of the fisher's existence in natural forest communities is valued by many Americans." Ruggiero et al. 1994b discuss fisher habitat disruption by human presence:

> …The fisher's reaction to humans in all of these interactions is usually one of avoidance. Even though mustelids appear to be curious by nature and in some instances fishers may associate with humans (W. Zielinski, pers. obs.), they seldom linger when they become aware of the immediate presence of a human. In this regard, fishers generally are more common where the density of humans is low and human disturbance is reduced. Although perhaps not as associated with "wilderness" as the wolverine (V. Banci, Chapter 5), the fisher is usually characterized as a species that avoids humans (Douglas and Strickland 1987; Powell 1993).

Also Jones, (undated) recognizes:

> Roads are directly correlated with trapper access, and consequently, fisher vulnerability. Even in areas where fishers cannot be legally trapped, trapping pressure for other furbearers (i.e., marten) may contribute significantly to fisher mortality. Roads bisecting or

> adjacent to preferred habitats (i.e., drainage bottoms) have the greatest potential of increasing a trapper's probability of encountering fishers."

And Witmer et al., 1998 state, "The range and population levels of the fisher have declined substantially in the past century, primarily the result of trapping pressure and habitat alteration through logging (Powell and Zielinski 1994)."

Jones and Garton, 1994 noted "Fishers seemed to prefer large-diameter Engelmann spruce trees and hollow grand fir logs as resting sites in north-central Idaho (Jones 1991)." Yet the proposal would reduce grand fir incidence on the IPNF. Where's the analysis of cumulative effects?

Heinemeyer and Jones, 1994 state:

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

Forest Plan protections for the fisher revolve entirely around the rather random likelihood of a fisher den site being detected, so that measures might be taken: "Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened, or endangered species not covered under other forestwide guidelines." (FW-GDL-WL-25.) The Forest Plan provides no further direction on how motorized activities would be avoided or minimized other than vaguely stating, "Use the best available information to set a timeframe and a distance buffer around active nests or dens." (Id.) Please disclose this best available science.

The EA does not include a quantitative cumulative effects analysis for fisher considering trapping and use of the road and trail networks in the project area. Hayes and Lewis, 2006 state "The two most significant causes of the fisher's decline were over-trapping by commercial trappers and loss and fragmentation of low to mid-elevation late-successional forests." Hayes and Lewis, 2006 also present a science synthesis in the context of a recovery plan for fisher in the state of Washington. Hayes and Lewis, 2006 state:

> Trapping reduced populations quickly. Despite decades of protection from harvest, fisher populations never recovered in Washington. Fishers use forest structures associated with late-successional forests, such as large live trees, snags and logs, for giving birth and raising their young, as well as for rest sites. Travel among den sites, rest sites, and foraging areas occurs under a dense forest canopy; large openings in the forest are avoided. Commercial forestry removed the large trees, snags and logs that were important habitat features for fishers, and short harvest rotations (40-60 years) didn't allow for the replacement of these large tree structures. Clearcuts fragmented remaining fisher habitat and created impediments to dispersal, thus isolating fishers into smaller populations that increased their risk of extinction.

The EA does not disclose the direct, indirect or cumulative impacts on important habitat components, such as snags, logs, foraging habitat configuration, connectivity, cover, prey species impacts, etc.

Schultz (2010) concludes that "the lack of management thresholds allows small portions of habitat to be eliminated incrementally without any signal when the loss of habitat might constitute a significant cumulative impact."

In the absence of meaningful thresholds of habitat loss and no monitoring of fisher populations at the Forest level, projects will continue to degrade fisher habitat across the IPNF over time. (Also see also Schultz 2012, who identified these problems in analyses for many wildlife species.)

The Forest Plan/FEIS fail to describe the quantity and quality of habitat that is necessary to sustain the viability of the fisher.

Scientific research strongly suggests that fishers are heavily associated with older forests throughout the year. (Aubry et al. 2013, Olsen et al. 2014, Raley et al. 2012, Sauder 2014, Sauder and Rachlow 2014, Schwartz et al. 2013, Weir and Corbould 2010).

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. 2014, Sauder 2014, Sauder and Rachlow 2014, Weir and Corbould 2010). Both Sauder and Rachlow (2014) and Weir and Corbould (2010) predicted the influence of openings on fisher habitat occupancy based on their data. For example, Weir and Corbould predicted that a 5% increase in forest openings would decrease the likelihood of fisher occupancy by 50%. Sauder and Rachlow (2014) suggested that an "increase of open area from 5% to 10% reduces the probability of occupation by fishers by 39%. Sauder and Rachlow (2014) reported that the median amount of open area within fisher home ranges was 5.4%. This was consistent with "results from California where fisher home ranges, on average, contained < 5.0% open areas" (Raley et al. 2012).

Pine marten

The EA doesn't mention pine marten, even though they may be present. Please disclose the FS's strategy and best available science for insuring viable populations of the pine marten, a species whose habitat is significantly altered by thinning and other active forest management (Moriarity et al., 2016; Bull and Blumton, 1999; Hargis et al., 1999 and Wasserman et al., 2012).

Northern goshawk

The EA doesn't mention goshawks, even though the Wildlife Report indicates they may be present. The EA doesn't disclose the FS's strategy and best available science for insuring viable populations of the goshawk.

Please disclose the FS's strategy and best available science for insuring viable populations of the northern goshawk, a species whose habitat is significantly altered by logging and other active forest management.

The FS must utilize goshawk survey methodology consistent with the best available science. For example the recent and comprehensive protocol, "Northern Goshawk Inventory and Monitoring Technical Guide" by Woodbridge and Hargis 2006. Also, USDA Forest Service 2000b state:

> A common thread in the interviews was the lack of a landscape approach in providing goshawk habitat well distributed across the Forest (Squires, Reynolds, Boyce). Reynolds was deeply concerned that both alternatives focus only on 600 acres around known goshawk nests. He was concerned that this direction could be keeping the goshawk population artificially low**. Because goshawks move around within their territories, they are very difficult to find (Reynolds). There might be more goshawks on the Forest than currently known (Squires). One or two years of goshawk surveys is not enough (Reynolds). Some pairs may not lay eggs for five years (Reynolds). To get confidence in identifying nesting goshawk pairs, four to six years of surveys are needed (Reynolds).** (Emphasis added.)

Reynolds et al. 1992 goshawk guidelines recommend ratios of (20%/20%/20%) each in the mid-aged forest, mature forest, and old forest Vegetative Structural Stage (VSS) classes for post-fledging areas (PFA)s and foraging areas. Reynolds et al. 1992 calls for 100% in VSS classes 5 & 6 and 0% in VSS classes 1-4 in nest areas.

In addition, Reynolds et al. 1992 recommend logged openings of no more than 2 acres in size or less in the PFAs, depending on forest type, and logged openings of no more than 1-4 acres or less in size in the foraging areas, depending on forest type. Clough (2000) noted that in the absence of long-term monitoring data, a very conservative approach to allowing logging activities near active goshawk nest stands should be taken to ensure that goshawk distribution is not greatly altered. This indicates that the full 180-acre nest area management scheme recommended by Reynolds et al. (1992) should be used around any active goshawk nest. Removal of any large trees in the 180-acre nesting area would contradict the Reynolds et al. (1992) guidelines.

Crocker-Bedford (1990) noted:

> After partial harvesting over extensive locales around nest buffers, reoccupancy decreased by an estimated 90% and nestling production decreased by an estimated 97%. Decreases were probably due to increased competition from open-forest raptors, as well as changes in hunting habitat and prey abundance.

Moser and Garton (2009) reported that all goshawk nests examined in their study area were found in stands whose average diameter of overstory trees was over 12.2 inches and all nest stands had $\geq$ 70% overstory tree canopy. They described their findings as being similar to those described by Hayward and Escano (1989), who reported that nesting habitat "may be described as mature to overmature conifer forest with a closed canopy (75-85% cover)…."

The FS's Samson (2006) reports says that 110 breeding individuals (i.e. 55 pairs) are necessary for a viable goshawk population in R1. USDA Forest Service, 2005e is a map showing the results from the 2005 R1 region-wide goshawk survey using the FS's Woodbridge and Hargis goshawk monitoring protocol. That 2005 detection map says there were 40 detections in 2005 in Region 1. So the results of this survey essentially show that the population in Region 1 has not been viable according to the agency's own science (only 40 instead of 55). And some of the detections may have been individuals using the same nest, so the number of nests (and therefore number of breeding pairs) could be even lower than 40.

White-headed woodpecker
Please disclose the FS's strategy and best available science for insuring viable populations of the white-headed woodpecker.

Flammulated owl
Please disclose the FS's strategy and best available science for insuring viable populations of the flammulated owl.

Wright, et al. (1997) point out that habitat restoration for the flammulated owl must be carefully targeted to the correct habitat types. The FS can't simply cut and/or burn forest land and expect flammulated owls to start or continue using it as habitat. Wright, et al. (1997) state:

> (W)e never detected Flammulated Owls in mesic old-growth ponderosa pine stands with a Vaccinium understory. Thus, within suitable landscapes, it may be most effective to conserve and restore stand structural characteristics within suitable habitat types (e.g., xeric ponderosa pine/ Douglas-fir stands in our study area), rather than within any stand containing ponderosa pine trees.

The EA states, "we want to: …Improve the dry site stand conditions for Flammulated owl habitat…" The EA states: "Wright (1996) found that suitable microhabitats may not be occupied by flammulated owls unless these conditions occurred across larger suitable landscapes. Nonetheless, treatment of smaller areas may provide habitat for other members of this habitat group (pygmy nuthatch and fringed myotis) even if it remains unused by flammulated owls." So much for the flammulated owl justification for logging.

Hayward and Verner, 1994 provide a conservation assessment for flammulated owls, and make management recommendations.

Great gray owl
Please disclose the FS's strategy and best available science for insuring viable populations of the great gray owl. Hayward and Verner, 1994 provide a conservation assessment for the great gray owl, and make management recommendations.

Pileated woodpecker
Please disclose the FS's strategy and best available science for insuring viable populations of the pileated woodpecker. Bull et al. 2007 represents over 30 years of investigation into the effects of logging on the pileated woodpecker and is the latest information on such effects.

The preference for large diameter of nesting trees for the pileated woodpecker is known (McClelland and McClelland, 1999) but because the Forest Plan omitted adoption of old growth MIS, the FS has no viability strategy.

The 1987 Forest Plan's old-growth standards were largely built around the habitat needs of its indicator species, the pileated woodpecker. Bull and Holthausen 1993, provide field tested management guidelines. They recommend that approximately 25% of the home range be old growth and 50% be mature forest.

USDA Forest Service, 1990 indicates measurements of the following variables are necessary to determine quality and suitability of pileated woodpecker habitat:

- Canopy cover in nesting stands
- Canopy cover in feeding stands
- Number of potential nesting trees >20" dbh per acre
- Number of potential nesting trees >30" dbh per acre
- Average DBH of potential nest trees larger than 20" dbh
- Number of potential feeding sites per acre
- Average diameter of potential feeding sites

This preferred diameter of nesting trees for the pileated woodpecker recognized by R-1 is notable. McClelland and McClelland (1999) found similar results in their study in northwest Montana, with the average nest tree being 73 cm. (almost 29") dbh. The pileated woodpecker's strong preference for trees of rather large diameter is not adequately considered in the Forest Plan. Effectively, the IPNF provides absolutely no commitments for leaving specific numbers and sizes of largest trees favored by so many wildlife species.

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

The Idaho Panhandle NF's original Forest Plan old-growth standards (USDA Forest Service, 1987c) were largely built around the habitat needs of its indicator species, the pileated woodpecker. Bull and Holthausen 1993, provide field tested management guidelines. They recommend that approximately 25% of the home range be old growth and 50% be mature forest. Also see Bull et al., 1992, Bull and Holthausen, 1993, and Bull et al., 1997 for biology of pileated woodpeckers and the habitats they share with cavity nesting wildlife.

Hutto 2006, notes from the scientific literature: "The most valuable wildlife snags in green-tree forests are relatively large, as evidenced by the disproportionate number of cavities in larger snags (Lehmkuhl et al. 2003), and are relatively deteriorated (Drapeau et al. 2002)."

B.R. McClelland has extensively studied the pileated woodpecker habitat needs. McClelland, 1985 (a letter to the Flathead NF forest supervisor) states:

> Co-workers and I now have a record of more than 90 active pileated woodpecker nests and roosts, …the mean dbh of these trees is 30 inches… A few nests are in trees 20 inches or even smaller, but the minimum cannot be considered suitable in the long-term. Our only 2 samples of pileateds nesting in trees <20 inches dbh ended in nest failure… At the current time there are many 20 inch or smaller larch, yet few pileateds selected them. Pileateds select old/old growth because old/old growth provides habitat with a higher probability of successful nesting and long term survival. They are "programmed" to make that choice after centuries of evolving with old growth.

McClelland (1977), states:

> (The Pileated Woodpecker) is the most sensitive hole nester since it requires old growth larch, ponderosa pine, or black cottonwood for successful nesting. The Pileated can be considered as key to the welfare of most hole-nesting species. If suitable habitat for its perpetuation is provided, most other hole-nesting species will be accommodated.
>
> Pileated Woodpeckers use nest trees with the largest dbh: mean 32.5 inches;
>
> Pileated Woodpeckers use the tallest nest trees: mean 94.6 feet;
>
> The nest tree search image of the Pileated Woodpecker is a western larch, ponderosa pine, or black cottonwood snag with a broken top (status 2), greater than 24 inches dbh, taller than 60 feet (usually much taller), with bark missing on at least the upper half of the snag, heartwood substantially affected by Fomes laracis or Fomes pini decay, and within an old-growth stand with a basal area of at least 100 sq feet/acre, composed of large dbh classes.
>
> A cluster analysis based on a nine-dimensional ordination of nest tree traits and habitat traits revealed close association between Yellow-bellied Sapsuckers, Mountain Chickadees, and Red-breasted Nuthatches. These three species plus the Pileated Woodpecker and Hairy Woodpecker are relatively grouped by coincident occurrence in old growth. Tree Swallows, Black-capped Chickadees, and Common Flickers are separated from the above five species by their preference for more open areas and their frequent use of small dbh nest trees.
>
> (Most) species found optimum nesting habitat in stands with a major component of old growth, particularly larch. Mean basal area for pileated woodpecker nest sites was 150 square feet per acre. (McClelland. B.R. and others, 1979)
>
> 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.

Wolverine

The EA doesn't mention wolverine, even though the Wildlife Report cites the USFWS who indicate they may be present in the project area. The Wildlife Report fails to justify its "no effects" conclusion.

Please disclose the FS's strategy and best available science for insuring viable populations of the wolverine. 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).

Logging and road activities may affect wolverines; published, peer-reviewed research finds: "Roaded and recently logged areas were negatively associated with female wolverines in summer." Fisher et al., 2013. The "analysis suggests wolverines were negatively responding to human disturbance within occupied habitat. The population consequences of these functional habitat relationships will require additional focused research." Id.

There has been no project formal or informal consultation regarding the wolverine. The FS didn't include its Biological Assessment (the document submitted to the U.S. Fish & Wildlife Service in consultation or concurrence stages) on the project website. The project is in violation of the Endangered Species Act.

Results from Scrafford et al., 2018 "show that roads, regardless of traffic volume, reduce the quality of wolverine habitats and that higher-traffic roads might be most deleterious. We suggest that wildlife behavior near roads should be viewed as a continuum and that accurate modeling of behavior when near roads requires quantification of both movement and habitat selection. Mitigating the effects of roads on wolverines would require clustering roads, road closures, or access management."

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

May et al. (2006) cite: "Increased human development (e.g. houses, cabins, settlements and roads) and activity (e.g. recreation and husbandry) in once remote areas may thus cause reduced ability of wolverines to perform their daily activities unimpeded, making the habitat less optimal or causing wolverines to avoid the disturbed area (Landa & Skogland 1995, Landa et al. 2000a)."

Ruggiero, et al. (2007) state: "Many wolverine populations appear to be relatively small and isolated. Accordingly, empirical information on the landscape features that facilitate or impede immigration and emigration is critical for the conservation of this species."

Roads result in direct mortality to wolverines by providing access for trappers (Krebs et al., 2007). Trapping was identified as the dominant factor affecting wolverine survival in a Montana study (Squires et al. 2007). Female wolverines avoid roads and recently logged areas, and respond negatively to human activities (Krebs et al., 2007)

Ruggiero et al. (1994b) recognized that "Over most of its distribution, the primary mortality factor for the wolverines is trapping." Those authors also state, "Transient wolverines likely play a key role in the maintenance of spatial organization and the colonization of vacant habitat. Factors that affect movements by transients may be important to population and distributional dynamics."

Roads and human density are important factors influencing current wolverine distribution (Carroll et al. 2001b); and wolverine habitat selection is negatively correlated with human activity – including roads (Krebs et al. 2007). Wolverine occurrence has shown a negative relationship with road densities greater than 2.8 mi/mi^2 (1.7 km/km^2) (Carroll et al. 2001b).

(T)he presence of roads can be directly implicated in human-caused mortality (trapping) of this species. Trapping was identified as the dominant factor affecting wolverine survival in a Montana study (Squires et al. 2007).

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

Wisdom et al. (2000) state:

> Carnivorous mammals such as marten, fisher, lynx, and wolverine are vulnerable to over-trapping (Bailey and others 1986, Banci 1994, Coulter 1966, Fortin and Cantin 1994, Hodgman and others 1994, Hornocker and Hash 1981, Jones 1991, Parker and others 1983, Thompson 1994, Witmer and others 1998), and over-trapping can be facilitated by road access (Bailey and others 1986, Hodgman and others 1994, Terra-Berns and others 1997, Witmer and others 1998).
>
> …Snow-tracking and radio telemetry in Montana indicated that wolverines avoided recent clearcuts and burns (Hornocker and Hash 1981).
>
> Copeland (1996) found that human disturbance near natal denning habitat resulted in immediate den abandonment but not kit abandonment. Disturbances that could affect wolverine are heli-skiing, snowmobiles, backcountry skiing, logging, hunting, and summer recreation (Copeland 1996, Hornocker and Hash 1981, ICBEMP1996f).

Carroll et al. (2001b) state:

> The combination of large area requirements and low reproductive rate make the wolverine vulnerable to human-induced mortality and habitat alteration. Populations probably cannot sustain rates of human-induced mortality greater than 7–8%, lower than that documented in most studies of trapping mortality (Banci 1994, Weaver et al. 1996).
>
> … (T)he present distribution of the wolverine, like that of the grizzly bear, may be more related to regions that escaped human settlement than to vegetation structure.

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

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

The Forest Plan includes no coherent viability strategy for wolverine protection. Forest Plan protections for the wolverine revolve entirely around the rather random likelihood of a wolverine den site being detected, so that measures might be taken: "Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened, or endangered species not covered under other forestwide guidelines." (FW-GDL-

WL-25.) The Forest Plan provides no further direction on how motorized activities would be avoided or minimized other than vaguely stating, "Use the best available information to set a timeframe and a distance buffer around active nests or dens." (Id.) What is this best available science?

The Forest Plan/FEIS fail to describe the quantity and quality of habitat that is necessary to sustain the viability of the wolverine.

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

> Direct mortality (related to access) from trapping, legal hunting, and illegal shooting has impacted all wide-ranging carnivores (e.g. lynx, wolverine, grizzly and black bears, wolves)…
>
> …Wolverine populations may have declined from historic levels, as a result of over-trapping, hunting, habitat changes, and intolerance to human developments. As the amount of winter backcountry recreation increases, wolverine den sites may become more susceptible to human disturbance.

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

Fringed Myotis, Long-eared Myotis, Long-legged Myotis, Townsend's Big-eared Bat

Please disclose the FS's strategy and best available science for insuring viable populations of these species. The EA doesn't state if these Sensitive native species are found in the project area, or if surveys have been conducted. The EA doesn't quantify suitable habitat for these species.

Fringed myotis bats are associated with drier forest types particularly Ponderosa Pine (Keinath 2004, Lacki and Baker, 2007). Lacki and Baker (2007) demonstrated that most roost snags extended above the existing canopy by an average of 33.8 feet and were larger than random snags (32.5 inches for roost trees and 20.8 inches for random snags). Random snags generally had heights that did not extend above the existing canopy (-8.2 feet). Roost trees occurred in stands with more trees per acre (239 vs 119 per acre) and higher basal areas of trees over 9.8 inches in diameter (125.5 ft^2/acre vs 69.7 ft^2/acre).

For long-legged myotis bats, intact snags were preferred over broken topped snags, since they were more likely to extend above the canopy. In Oregon, bats preferred areas with high snag basal area and a diversity of stands within 250 meters of the roost tree. Bats in Oregon also preferred trees without broken tops. In Idaho, bats preferred roost trees in stands with lessor amounts of edge and fewer stand types within 750 meters of the roost tree.

Black-backed woodpecker

The EA doesn't mention black-backed woodpeckers, even though they may be present in the project area. The Wildlife Report justifies its non-analysis: "No immediate post-fire habitat or areas of extensive insect infestation proposed for treatment." This ignores basic biological factors of this species. For example, the FS' own Fire Science Brief, 2009 states, "Hutto found that Black-backed Woodpeckers fared best on sites unharvested before fire and poorest in the heavily harvested sites." Indirect effects must be taken into account.

Please disclose the FS's strategy and best available science for insuring viable populations of the black-backed woodpecker. Hutto, 1995 states: "Fires are clearly beneficial to numerous bird species, and **are apparently necessary for some**." (p. 1052, emphasis added.) Hutto, 1995 whose study keyed on forests burned in the 1988 season, noted:

> Contrary to what one might expect to find immediately after a major disturbance event, I detected a large number of species in forests that had undergone stand-replacement fires. Huff et al. (1985) also noted that the density and diversity of bird species in one- to two-year-old burned forests in the Olympic Mountains, Washington, *were as great as adjacent old-growth forests*…
>
> …Several bird species seem to be relatively *restricted* in distribution to early post-fire conditions… I believe it would be difficult to find a forest-bird species more restricted to a single vegetation cover type in the northern Rockies than the Black-backed Woodpecker is to early [first 6 years] post-fire conditions. (Emphasis added).

USDA Forest Service 2011c states:

> Hutto (2008), in a study of bird use of habitats burned in the 2003 fires in northwest Montana, found that within burned forests, there was one variable that exerts an influence that outstrips the influence of any other variable on the distribution of birds, and that is fire severity. Some species, including the black-backed woodpecker, were relatively abundant only in the high-severity patches. . **Hutto's preliminary results also suggested burned forests that were harvested fairly intensively (seed tree cuts, shelterwood cuts) within a decade or two prior to the fires of 2003 were much less suitable as post-fire forests to the black-backed woodpecker and other fire dependent bird species. Even forests that were harvested more selectively within a decade or two prior to fire were less likely to be occupied by black-backed woodpeckers.** (Emphasis added.)

Hutto, 2008 states, "severely burned forest conditions have probably occurred naturally across a broad range of forest types for millennia. These findings highlight the fact that severe fire provides an important ecological backdrop for fire specialists like the black-backed woodpecker, and that the presence and importance of severe fire may be much broader than commonly appreciated."

Cherry (1997) states:

> The black-backed woodpecker appears to fill a niche that describes everything that foresters and fire fighters have attempted to eradicate. For about the last 50 years, disease and fire have been considered enemies of the 'healthy' forest and have been combated relatively successfully. We have recently (within the last 0 to 15 years) realized that disease and fire have their place on the landscape, but the landscape is badly out of balance with the fire suppression and insect and disease reduction activities (i.e. salvage logging) of the last 50 years. Therefore, the black-backed woodpecker is likely not to be abundant as it

> once was, and **continued fire suppression and insect eradication is likely to cause further decline.** (Emphasis added.)

The FS continues to manage against severely burned forests, as evident from the Buckskin Saddle project Purpose and Need.

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

> Woodpeckers play critical roles in the forest ecosystem. Woodpeckers are primary cavity nesters that excavate at least one cavity per year, thus making these sites available to secondary cavity nesters (which include many species of both birds and mammals). Black-backed and three-toed woodpeckers can play a large role in potential insect control. The functional roles of these two woodpecker species could easily place them in the 'keystone' species category—a species on which other species depend for their existence.
>
> Wickman (1965) calculated that woodpeckers may eat up to 50 larvae per day that were each about 50 mm in length. The predation on these larvae is significant. It has been estimated that individual three-toed woodpeckers may consume thousands of beetle larvae per day, and insect outbreaks may attract a many-fold increase in woodpecker densities (Steeger et al. 1996). The ability of woodpeckers in to help control insect outbreaks may have previously been underestimated.

Cherry (1997) also notes:

> Black-backed woodpeckers preferred foraging in trees of 34 cm (16.5 in) diameters breast height and (63 ft) 19 m height (Bull et al. 1986). Goggans et al. (1987) found the mean dbh of trees used for foraging was 37.5 cm (15 in) and the mean dbh of trees in the lodgepole pine stands used for foraging was 35 cm (14 in). Steeger et al. (1996) found that both (black-backed and three-toed) woodpecker species fed in trees from 20-50 cm (8-20 in) dbh.
>
> Black-backed woodpeckers excavate their own cavities in trees for nesting. Therefore, they are referred to as primary cavity nesters, and they play a critical role in excavating cavities that are later used by many other species of birds and mammals that do not excavate their own cavity (secondary cavity nesters). Black-backed woodpeckers peel bark away from the entrance hole and excavate a new cavity every year. Other woodpeckers sometimes take over their cavities (Goggans et al. 1987).

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

FS biologists Hillis et al., 2002 note that "In northern Idaho, where burns have been largely absent for the last 60 years, black-backed woodpeckers are found amid bark beetle outbreaks, although not at the densities found in post-burn conditions in Montana." Those researchers also state, "The greatest concerns for this species, however, are decades of successful fire suppression and salvage logging targeted at recent bark beetle outbreaks." Hillis et al., 2002 also state:

> Black-backed woodpeckers occupy forested habitats that contain high densities of recently dead or dying trees that have been colonized by bark beetles and woodborer beetles (Buprestidae, Cerambycidae, and Scolytidae). These beetles and their larvae are most abundant within burned forests. In unburned forests, bark beetle and woodborer infested trees are found primarily in areas that have undergone natural disturbances, such as wind-throw, and within structurally diverse old-growth forests (Steeger and Dulisse in press, Bull et al. 1986, Goggans et al. 1987, Villard 1994, Hoffman 1997, Weinhagen 1998).

The viability of black-backed woodpeckers is threatened by the FS's fire suppression and other "forest health" policies such as that promoted in the Buckskin Saddle Scoping Notice, which specifically attempt to prevent its habitat from developing. "Insect infestations and recent wildfire provide key nesting and foraging habitats" for the black-backed woodpecker and "populations are eruptive in response to these occurrences" (Wisdom et al. 2000). A basic purpose of the Buckskin Saddle project is to negate the natural occurrence 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. This emphasis also occurs on a large portion of the IPNF. Viability of a species cannot be assured, if habitat suppression is a forestwide policy.

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

In the Sierra Nevada, Black-backed Woodpeckers preferentially foraged in severely burned stands with larger snags and higher snag densities (Hanson and North 2008).

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

> In California, the Black-backed Woodpecker's strong association with recently burned forest, a habitat that is ephemeral, spatially restricted, and often greatly modified by post-fire logging, as well as the species' relative rarity, may make the woodpecker vulnerable to declines in the state. Additionally, Black-backed Woodpeckers in California are affected by the management of unburned forests – both because pre-fire stand conditions affect the suitability of post-fire habitat for the species, and because a substantial proportion of California's Black-backed Woodpeckers nest and forage at a low population density in unburned forests. Conserving the Black-backed Woodpecker in California likely requires appropriate management and stewardship of the habitat where this species reaches its highest density – recently burned forest – as well as appropriate management of 'green' forests that have not burned recently.

The Boise National Forest adopted the black-backed woodpecker as a management indicator species (MIS) in its revised forest plan in 2010:

> The black-backed woodpecker depends on fire landscapes and other large- scale forest disturbances (Caton 1996; Goggans et al. 1988; Hoffman 1997; Hutto 1995; Marshall

> 1992; Saab and Dudley 1998). It is an irruptive species, opportunistically foraging on outbreaks of wood-boring beetles following drastic changes in forest structure and composition resulting from fires or uncharacteristically high density forests (Baldwin 1968; Blackford 1955; Dixon and Saab 2000; Goggans et al.1988; Lester 1980). Dense, unburned, old forest with high levels of snags and logs are also important habitat for this species, particularly for managing habitat over time in a well-distributed manner. These areas provide places for low levels of breeding birds but also provide opportunity for future disturbances, such as wildfire or insect and disease outbreaks (Dixon and Saab 2000; Hoyt and Hannon 2002; Hutto and Hanson 2009; Tremblay et al. 2009). Habitat that supports this species' persistence benefits other species dependent on forest systems that develop with fire and insect and disease disturbance processes. The black-backed woodpecker is a secondary consumer of terrestrial invertebrates and a primary cavity nester. Population levels of black-backed woodpeckers are often synchronous with insect outbreaks, and targeted feeding by this species can control or depress such outbreaks (O'Neil et al. 2001). The species physically fragments standing and logs by its foraging and nesting behavior (Marcot 1997; O'Neil et al. 2001). These KEFs influence habitat elements used by other species in the ecosystem. Important habitat elements (KECs) of this species are an association with medium size snags and live trees with heart rot. Fire can also benefit this species by stimulating outbreaks of bark beetle, an important food source. Black-backed woodpecker populations typically peak in the first 3–5 years after a fire. This species' restricted diet renders it vulnerable to the effects of fire suppression and to post-fire salvage logging in its habitat (Dixon and Saab 2000).
>
> … Black-backed woodpeckers are proposed as an MIS because of their association with high numbers of snags in disturbed forests, use of late-seral old forest conditions, and relationship with beetle outbreaks in the years immediately following fire or insect or disease outbreaks. Management activities, such as salvage logging, timber harvest, and firewood collection, can affect KEFs this species performs or KECs associated with this species, and therefore **its role as an MIS would allow the Forest to monitor and evaluate the effects of management activities on identified forest communities and wildlife species.** (Emphasis added.)

The Forest Plan/FEIS fail to describe the quantity and quality of habitat that is necessary to sustain the viability of the black-backed woodpecker.

Canada lynx

The EA doesn't mention lynx, even though the Wildlife Report cites the USFWS who indicate they may be present in the project area. The Wildlife Report fails to justify its "no effects" conclusion.

The USFWS listed the Canada lynx as a threatened species under the Endangered Species Act in 2000 due to "lack of guidance for conservation of lynx and snowshoe hare habitat..." and subsequent authorization of actions that may cumulatively adversely affect the lynx. Relatively little is known about lynx in the contiguous United States. Historically, lynx inhabited states spanning from Maine to Washington, but it is unknown how many lynx remain.

Lynx are highly mobile and generally move long distances [greater than 60 mi. (100 km.)]; they disperse primarily when snowshoe hare populations decline; subadult lynx disperse even when prey is abundant, presumably to establish new home ranges; and lynx also make exploratory movements outside their home ranges. 74 Peg. Reg. at 8617. The contiguous United States is at the southern edge of the boreal forest range, resulting in limited and patchy forests that can support snowshoe hare and lynx populations.

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

Please disclose if the FS conducted surveys of all the lynx suitable habitat in the LAUs. 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 take a few steps backward and consider that its range-wide Canada lynx suitable habitat estimations were too high.

Please disclose if surveys target snowshoe hare occurrence data in these stands newly considered unsuitable for lynx. Please disclose if the FS conducted surveys of Canada lynx "unsuitable" habitat in the project area to find out if such habitat might in fact be suitable after all.

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

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

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

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

Openings, whether small in uneven-aged management, or large with clearcutting, remove lynx winter travel habitat on those affected acres, since lynx avoid openings in the winter. (Squires et al. 2010.)

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

Squires and Ruggiero, 2007 found that "lynx in western Montana prey almost exclusively on snowshoe hares during the winter with little use of alternative prey. Thus, reductions in horizontal cover for hares would degrade lynx habitat."

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

As early as 2000, the LCAS noted that lynx seem to prefer to move through continuous forest (1-4); lynx have been observed to avoid large openings, either natural or created (1-4); opening and open forest areas wider than 650 feet may restrict lynx movement (2-3); large patches with low stem densities may be functionally similar to openings, and therefore lynx movement may be disrupted (2-4). Squires et al. 2006a reported that lynx tend to avoid sparse, open forests and forest stands dominated by small-diameter trees during the winter. Squires et al. 2010 again reported that lynx avoid crossing clearcuts in the winter; they generally avoid forests composed of small diameter saplings in the winter; and forests that were thinned as a silvicultural treatment were generally avoided in the winter.

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

Kosterman, 2014 finds 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. This renders inadequate the agency's assumption in the NRLMD that 30% of lynx habitat can be clearcut, and that no specific amount of mature forest needs to be conserved. Kosterman, 2014 demonstrates that the NRLMD standards are not adequate for lynx viability and recovery, as is assumed by the FS.

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

> First, we demonstrated that lynx clearly use silviculture treatments, but there is a ~10 year cost of implementing any treatment (thinning, selection cut, or regeneration cut) in terms of resource use by Canada lynx. This temporal cost is associated with lynx preferring advanced regenerating and mature structural stages (Squires et al., 2010; Holbrook et al., 2017a) and is consistent with previous work demonstrating a negative effect of

> precommercial thinning on snowshoe hare densities for ~10 years (Homyack et al., 2007). Second, if a treatment is implemented, Canada lynx used thinnings at a faster rate post-treatment (e.g.,~20 years posttreatment to reach 50% lynx use) than either selection or regeneration cuts (e.g., ~34–40 years post-treatment to reach 50% lynx use). Lynx appear to use regeneration and selection cuts similarly over time suggesting the difference in vegetation impact between these treatments made little difference concerning the potential impacts to lynx (Fig. 4c). Third, Canada lynx tend to avoid silvicultural treatments when a preferred structural stage (e.g., mature, multi-storied forest or advanced regeneration) is abundant in the surrounding landscape, which highlights the importance of considering landscape-level composition as well as recovery time. For instance, in an area with low amounts of mature forest in the neighborhood, lynx use of recovering silvicultural treatments would be higher versus treatments surrounded by an abundance of mature forest (e.g., Fig. 3b). This scenario captures the importance of post-treatment recovery for Canada lynx when the landscape context is generally composed of lower quality habitat. Overall, these three items emphasize that both the spatial arrangement and composition as well as recovery time are central to balancing silvicultural actions and Canada lynx conservation.

So Holbrook et al., 2018 fully contradict Forest Plan assumptions that clearcuts/regeneration can be considered useful lynx habitat as early as 20 years post-logging.

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

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

The Forest Plan/FEIS fail to describe the quantity and quality of habitat that is necessary to sustain the viability of the Canada lynx.

Western (boreal) toad

The EA doesn't mention boreal toads, even though the Wildlife Report indicates they may be present in the project area. The Wildlife Report fails to justify its "no effects" conclusion.

Please disclose the FS's strategy and best available science for insuring viable populations of the boreal toad. USDA Forest Service, 2003a states:

> Little quantitative data are available regarding the boreal toad's use of upland and forested habitats. However, boreal toads are known to migrate between the aquatic breeding and terrestrial nonbreeding habitats (TNC Database 1999), and that juvenile and adult toads are capable of moving over 5 km between breeding sites (Corn et al. 1998). It is thought than juveniles and female boreal toads travel farther than the males (Ibid). A study on the Targhee National Forest (Bartelt and Peterson 1994) found female toads traveled up to 2.5 kilometers away from water after breeding, and in foraging areas, the movements of toads were significantly influenced by the distribution of shrub cover. Their data suggests that

toads may have avoided macro-habitats with little or no canopy and shrub cover (such as clearcuts). Underground burrows in winter and debris were important components of toad selected micro-sites in a variety of macro-habitats. The boreal toad digs its own burrow in loose soil or uses those of small mammals, or shelters under logs or rocks, suggesting the importance of coarse woody debris on the forest floor. …(T)imber harvest and prescribed burning activities could impact upland habitat by removing shrub cover, down woody material, and/or through compaction of soil.

Montana Fish, Wildlife & Parks, 2005 (a more recent version of the above cite "TNC Database, 1999") also discuss boreal toad habitat:

> Habitats used by boreal toads in Montana are similar to those reported for other regions, and include low elevation beaver ponds, reservoirs, streams, marshes, lake shores, potholes, wet meadows, and marshes, to high elevation ponds, fens, and tarns at or near treeline (Rodgers and Jellison 1942, Brunson and Demaree 1951, Miller 1978, Marnell 1997, Werner et al. 1998, Boundy 2001). Forest cover in or near encounter sites is often unreported, but toads have been noted in open-canopy ponderosa pine woodlands and closed-canopy dry conifer forest in Sanders County (Boundy 2001), willow wetland thickets and aspen stands bordering Engelmann spruce stands in Beaverhead County (Jean et al. 2002), and mixed ponderosa pine/cottonwood/willow sites or Douglas-fir/ponderosa pine forest in Ravalli and Missoula counties (P. Hendricks personal observation).
>
> Elsewhere the boreal toad is known to utilize a wide variety of habitats, including desert springs and streams, meadows and woodlands, mountain wetlands, beaver ponds, marshes, ditches, and backwater channels of rivers where they prefer shallow areas with mud bottoms (Nussbaum et al. 1983, Baxter and Stone 1985, Russell and Bauer 1993, Koch and Peterson 1995, Hammerson 1999). Forest cover around occupied montane wetlands may include aspen, Douglas-fir, lodgepole pine, Engelmann spruce, and subalpine fir; in local situations it may also be found in ponderosa pine forest. They also occur in urban settings, sometimes congregating under streetlights at night to feed on insects (Hammerson 1999, P. Hendricks personal observation). Normally they remain fairly close to ponds, lakes, reservoirs, and slow-moving rivers and streams during the day, but may range widely at night. Eggs and larvae develop in still, shallow areas of ponds, lakes, or reservoirs or in pools of slow-moving streams, often where there is sparse emergent vegetation. Adult and juvenile boreal toads dig burrows in loose soil or use burrows of small mammals, or occupy shallow shelters under logs or rocks. At least some toads hibernate in terrestrial burrows or cavities, apparently where conditions prevent freezing (Nussbaum et al. 1983, Koch and Peterson 1995, Hammerson 1999).

Maxell et al., 1998 state:

> We believe that the status of the Boreal toad is largely uncertain in all Region 1 Forests. …Briefly, factors which are a cause for concern over the viability of the species throughout Region 1 include: (1) a higher degree of genetic similarity within the range of Region 1 Forests relative to southern or coastal populations; (2) a general lack of both historical and current knowledge of status in the region; (3) indications of declines in areas which do have historical information; (4) low (5-10%) occupancy of seemingly suitable habitat as detected in recent surveys; (5) some evidence for recent restriction of breeding to

low elevation sites and; (6) recent crashes in boreal toad populations in the southern part of its range which may indicate the species' sensitivity to a variety of anthropogenic impacts.

Travel Management

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

Please disclose the funding or other meaningful distinctions between "road maintenance" and "road reconstruction" (Scoping Notice at 29-30) to explain why the FS is saying major actions such as replacing culverts and installing rolling dips are not "reconstruction."

We ask the Forest Service 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

Please disclose the itemized costs for each of the following: new temporary roads, project-related road maintenance, road decommissioning, all other road-related work, sale preparation and administration, project-related weed treatment, other project mitigation, post-project monitoring, environmental analyses and reports, public meetings and field trips, publicity, consultation with other government agencies, responding to comments.

Please disclose the cumulative effects of recreational activities and motorized/mechanic access on wildlife populations.

Please provide a map of the entire road system in the watersheds affected by the proposal, including all national forest system roads, the nonsystem roads, all existing road templates, and all existing unauthorized roads—not just those the FS plans to use for this timber sale.

To address its unsustainable and deteriorating road system, the FS promulgated the Roads Rule (referred to as "subpart A") in 2001. The rule directs each national forest to conduct "a science-based roads analysis," generally referred to as the "travel analysis process." The Forest Service Washington Office, through a series of directive memoranda, instructed forests to use the Subpart A process to "maintain an appropriately sized and environmentally sustainable road system that is responsive to ecological, economic, and social concerns." These memoranda also outline core elements that must be included in each Travel Analysis Report.

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

- A TAP must analyze all roads (maintenance levels 1 through 5);

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

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

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

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

The EA doesn't even say if a Travel Analysis Report has been prepared.

The Travel Management Regulations at 36 CFR § 212.5 state:

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

Please disclose if the project area is being managed in compliance with the Travel Management Regulations at 36 CFR 212 (Subparts, A, B, and C) and the Executive Orders related to Subpart B. Subpart A requires the FS to involve the public in a scientifically based process which designates the Minimum Road System both in the analysis area and forestwide, so that unnecessary or ecologically damaging roads are targeted for decommissioning and the economic liabilities of roads are minimized.

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

> For the IPNFs, the annual maintenance budget would need to be approximately $6.6 million dollars and the cost to bring all roads up to their assigned maintenance level is estimated at $520 million dollars.

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

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

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

(AMS Technical Report, 115.) It is important to note that the $6.6 million estimated annual maintenance costs far exceed all published estimates of road maintenance funding the IPNF has received annually at least since the AMS was published. This is glaringly obvious from the EA's statement, "Most of the roads in the project area have not received any maintenance for over a decade."

Although the FS never likes to conduct an analysis of—nor disclose the forest-wide ecological impacts of—its road maintenance funding shortfalls, projecting from discussion in Gucinski et al. 2001 (cited in the AMS) helps for imagining the scale of the impacts.

It is also important to recognize the ongoing ecological damage of roads—regardless of the adequacy of maintenance funding:

> Undesirable consequences include adverse effects on hydrology and geomorphic features (such as debris slides and sedimentation), habitat fragmentation, predation, road kill, invasion by exotic species, dispersal of pathogens, degraded water quality and chemical contamination, degraded aquatic habitat, use conflicts, destructive human actions (for example, trash dumping, illegal hunting, fires), lost solitude, depressed local economies, loss of soil productivity, and decline in biodiversity. (Gucinski et al., 2001)

"The desired condition described in the Forest Plan (p. 34) for trails indicates that they be designed and maintained for the given users." That is a misleading interpretation of the Forest Plan. The "given" users are to be determined in a public process, not just accepted as they are.

Has the FS issued a Motor Vehicle Use Map (MVUM) for lands covering all of the project area? If so, what was the process the FS used to designate the routes open to the currently authorized motorized uses, as per the MVUM? Why did the FS designate so many trails for motorcycle use, if "Most of the trails in the Buckskin Saddle project area were not originally designed for motorcycle use and are now eroding"?

"About 9.6 miles of currently closed roads would be decommissioned." Are all those 9.6 miles of roads currently system roads? How many miles of those roads are currently accessible by motorized users?

"All of the trails will be brought up to motorcycle standards with two exceptions. The exceptions being that trails #66 (Derr Creek) and #77 (Twin Creek) which would be reconstructed to accommodate all terrain and side-by-side (UTV) standards." Please disclose how this complies with the minimization requirements of 36 CFR 212 Subpart B and the Executive Orders related to Subpart B.

The EA's analysis of the impacts of roads on wildlife doesn't distinguish between roads "often undrivable because of thick brush and small trees growing in the road prism" and those same roads after being reconstructed for use hauling logs, despite the fact that the latter can and will be used as access—illegally via motorize travel or legally by nonmotorized travel.

The EA's analysis similarly generally fail to admit chronic impacts of "stored" roads. To "store" these roads the FS would "install additional drainage at frequent intervals, such as waterbars and relief swales" allegedly "to render the road stable and hydrologically inert." Is the FS really claiming that waterbars don't erode and lose effectiveness?

Please disclose compliance with motorized route restrictions, and if violations exist, perform an analysis of the resultant harm to wildlife habitat, soil, and water.

How many miles of nonsystem "undetermined" roads exist in the project area? The EA provides no accounting.

"(R)oad densities would increase during the implementation phase of the project when 65 miles of currently-stored roads are opened…" Please provide the date when each project area "stored" road segment now proposed for reopening was last put into storage. We want to understand the duration of open-and-use vs. closed-and stored.

Roads influence many processes that affect aquatic ecosystems and fish: human behavior (poaching, debris removal, efficiency of access for logging, mining, or grazing, illegal species introductions), sediment delivery, and flow alterations (Trombulak and Frissell 2000). (Also see: Gucinski et al. 2001; Wisdom et al., 2000; Pacific Rivers Council, 2010.)

Frissell, 2014 states:

> Roads are ecologically problematic in any environment because they affect biota, water quality, and a suite of biophysical processes through many physical, chemical, and biological pathways (Trombulak and Frissell 2000, Jones et al. 2000). The inherent contribution of forest roads to nonpoint source pollution (in particular sediment but also nutrients) to streams, coupled with the extensive occurrence of forest roads directly adjacent to streams through large portions of the range of bull trout in the coterminous US, adversely affects water quality in streams to a degree that is directly harmful to bull trout

> and their prey. This impairment occurs on a widespread and sustained basis; runoff from roads may be episodic and associated with annual high rainfall or snowmelt events, but once delivered to streams, sediment and associated pollutant deposited on the streambed causes sustained impairment of habitat for salmon and other sensitive aquatic and amphibian species. Current road design, management of road use and conditions, the locations of roads relative to slopes and water bodies, and the overall density of roads throughout most of the Pacific Northwest all contribute materially to this impairment. This effect is apart from, but contributes additively in effect to the point source pollution associated with road runoff that is entrained by culverts or ditches before being discharged to natural waters.

The Forest Plan includes inadequate direction to designate the minimum road system. The Forest Plan is inconsistent with the Travel Management Regulations.

How does the FS propose to afford maintaining the road system in this project area when the funding doesn't exist, and as a result watershed conditions will continue to deteriorate from naturally increasing erosion?

The main ecological (as well as budgetary) problem facing the IPNF is the existing excessive network of roads. Although the main focus of the Travel Management Rule Subpart A was to be this excessive road network, the FS sidesteps the issue at every juncture—in the design of the Forest Plan, in the design of projects implementing the Forest Plan, and in the systematic avoidance of fully performing its duties under Subpart A, which requires the agency to minimize the ecological and economic liabilities of the excessive road network by significantly downsizing it.

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

> The revised Forest Plans need to be in compliance with new laws, regulations, and management direction. Forest Plans also need to incorporate new research and science that has been developed. The new strategies have been developed to aid in the sustainability of all native and desired non-native species.
>
> In January of 2001, a new Forest Roads Rule and Policy was issued which revised regulations concerning the management, use, and maintenance of the National Forest Transportation System. Forest Plan Revision provides the opportunity to incorporate this direction into the Forest Plans (USDA 2001b).
>
> **Possible Strategies in Revising Management Direction for Access and Recreation:**
> • Provide management direction for Access and Travel Management Planning, including criteria for developing access strategies by appropriate modes and season of use.

On the verge of taking bold, necessary strides towards reforming its roads and access management into something ecologically sustainable, the FS issued the revised Forest Plan and FEIS which failed to analyzed or address the problem, and then followed that up with a sham

Region 1-directed Travel Analysis Process that failed to follow the Travel Management Rule Subpart A requirements for involving the public in a science-based effort to identify the forestwide minimum road system. The FS is obligated to disclose the project area road system's long-term financial liabilities, and the associated ecological impacts due to inadequate maintenance funding.

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

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

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

> Roads have well-documented, significant and widespread ecological impacts across multiple scales, often far beyond the area of the road "footprint". Such impacts often create large and extensive departures from the natural conditions to which organisms are adapted, which increase with the extent and/or density of the road network. Road density is a useful metric or indicator of human impact at all scales broader than a single local site because it integrates impacts of human disturbance from activities that are associated with roads and their use (e.g., timber harvest, mining, human wildfire ignitions, invasive species introduction and spread, etc.) with direct road impacts. Multiple, convergent lines of empirical evidence summarized herein support two robust conclusions: 1) no truly "safe" threshold road density exists, but rather negative impacts begin to accrue and be expressed with incursion of the very first road segment; and 2) **highly significant impacts (e.g., threat of extirpation of sensitive species) are already apparent at road densities on the order of 0.6 km per square km (1 mile per square mile) or less.** Therefore, restoration strategies prioritized to reduce road densities in areas of high aquatic resource value from low-to-moderately-low levels to zero-to-low densities (e.g., <1 mile per square mile, lower if attainable) are likely to be most efficient and effective in terms of both economic cost and ecological benefit. By strong inference from these empirical studies of systems and species sensitive to humans' environmental impact, with limited exceptions**, investments that only reduce high road density to moderate road density are unlikely to produce any but small incremental improvements in abundance, and will not result in robust populations of sensitive species.**

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

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

> **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.**

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

Desired Condition FW-DC-AR-04 is a Forest Plan **Decision** prioritizing vast but unspecified acreage of the IPNF for motorized recreation, in the absence of the travel planning required by the Travel Management Regulations.

Objectives FW-OBJ-AR-04, and 05 are Forest Plan **Decisions** designating unspecified mileages of the IPNF for motorized recreation, in the absence of the travel planning required by Travel Management Regulations and completed by 2015. In addition, because of the existing degraded condition of many motorized travel routes this Desired Condition conflicts with FW-DC-AR-07 and 08.

<u>Fire Ecology</u>

Nothing in the Scoping Notice informs the public about wildland fire ecology. The FS seems institutionally incapable of recognizing the highly restorative and beneficial effects of wildland fire, irrationally maintaining a position that management alone restores forests.

The EA states, "we want to… Decrease the quantity and modify the arrangement of hazardous fuels to create a lower intensity and lower severity fire environment." Since the EA fails to provide any estimates of the costs of conducting 5,091 acres of noncommercial "natural fuel burns" and the other noncommercial fuel reductions deemed by the EA to be so essential for "increasing resilience" and to "create a lower intensity and lower severity fire environment" there's no guarantee the burning would be conducted in a timely manner—if at all. To shine some light on this subject, please disclose the acreage of authorized but unfunded ecosystem burning and other non-logging related fuel reduction actions on the IPNF at the end of the last fiscal year.

"From a wildfire standpoint, these overcrowded stand conditions create more of a continuous fuel bed across the landscape, generally placing the area at a higher risk of succumbing to a large severe fire, which can burn more easily through continuous stands of trees that have decades of accumulated dead branches and forest debris." First of all, the FS has no data reflecting the alleged "decades of accumulated dead branches and forest debris" and whatever data it does have doesn't reflect a departure from HRV. Second of all, "areas" do not "succumb" to severe fires. The FS is attempting to invoke fear to drum up support for its logging scheme.

Hutto, 2006 addresses the latter 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.

The FS also likes to trot out the premise that tree mortality from native insect activity and other agents of tree mortality increase risk of wildfire. Again, this is not supported by science. Meigs, et al., 2016 found "that insects generally reduce the severity of subsequent wildfires. … By dampening subsequent burn severity, native insects could buffer rather than exacerbate fire regime changes expected due to land use and climate change. In light of these findings, we recommend a precautionary approach when designing and implementing forest management policies intended to reduce wildfire hazard and increase resilience to global change."

The way the subject of severe tree mortality from fire is treated in the EA and Forest Plan fails to recognize the large body of science on post-fire forest landscapes that has arisen in recent years—science not acknowledged in the Forest Plan. The FS ignores overwhelming evidence that post-fire forests represent uniqueness and biological diversity, as explained by news reporters and the scientists, FS experts, and other people interviewed for the articles displayed below.

We incorporate the words in the *Missoulian* article below. We highlight a few here:

- Burned forests play a critical role in the health and diversity of the Western landscape.
- Black-backed woodpeckers only gather in substantial numbers in areas hit hard by wildfire.
- Western tanagers …thrive in low-severity fires. Juncos prefer medium-severity burns. Black-backed woodpeckers, mountain bluebirds, and olive-sided flycatchers like their forests well done.
- The species that really like severely burned forests tend to be species that are tough to find, species whose populations are not what you'd call robust.
- It came as a part of a professional recognition that sometimes fire is good, that it's a necessary and natural process in healthy forests.
- Fire is …critical for red-stemmed ceanothus, a plant whose seeds can lay dormant for centuries while waiting for the flames. It's a favorite of deer and elk and moose…
- Spirea loves fire, as does fireweed and arnica and dragontail mint and pine grass. Bicknell's geranium …only appears in burns.
- (Boreal) toads like to bask in the sun and tend to produce bumper crops of tadpoles once the canopy is burned away. Researchers studying the toads think that fire suppression might be a major cause of the toad's decline in recent decades.
- Some bugs, like some birds, prefer low-intensity fires. Others want a more charred wood. It means all the fire types are important.
- A burned landscape …is no less fragile a habitat type than is a wetland. …A burned area is probably the most sensitive place you could be working in.
- We talk about forest restoration after a fire, but it just got restored. That's what fire does.

Outdoors

Birds in the black: Through following avian wildlife, a UM scientist has discovered that burned forests play a critical role in the health and diversity of the Western landscape
By MICHAEL JAMISON of the Missoulian

University of Montana professor of ornithology and research scientist Richard Hutto began studying fire's effect on birds soon after the 1988 fires blackened thousands of acres in Montana and Yellowstone National Park. Of particular interest was the black-backed woodpecker's reliance on hotly burned forests.
Photographed by MICHAEL GALLACHER of the Missoulian

WEST GLACIER - Back in the summer of 1988, when research scientist Richard Hutto started asking questions about the possible benefits of wildfires, the time wasn't exactly ripe for a reasoned discussion.

Yellowstone National Park was going up in smoke, national forests looked like war zones, and the public was clamoring for more wildland firefighters, more firefighting dollars and more protection from blazes. Headlines nationwide screamed out adjectives such as "torched," "blackened" and "destroyed."

"What I wanted to know," Hutto said, "was what in the world is a burned forest worth? Is there any value at all in all that destruction?"

With support from the National Geographic Society, Hutto set off on his search for answers, a search that would follow the unlikely path of the black-backed woodpecker. After visiting some three dozen sites burned in 1988, "one of the most interesting things that popped up right away was the fact that there was a whole lot of life out there," he said. "It wasn't the biological desert we were told it would be."

Hutto, like most of America, "was raised to believe all fires are bad."

The problem, he said, is that science and society never made the distinction between a fire that claims lives and property and a fire that burns across the West's wild landscapes.

"We use the same language for both," he said, and generally it's the language of the negative - fire as foe, not friend.

But it didn't take long for Hutto to find 100 separate species booming the year after the burn. Surprisingly, many of those were found only in severely burned forests - the blacker the better.

He focused his work on black-backed woodpeckers, birds that seemed to flock to fire like moths to the flame.

"I'd never seen them anywhere else, essentially," said Hutto, a professor of fire ecology and ornithology at the University of Montana.

And so for the next 15 years, he tracked the birds through forests - and through the scientific literature. He pored over studies of vegetation types, looking for lists of birds that appeared frequently in certain sorts of habitats. In all, he found 15 avian species that seemed to prefer recent burns to all other forest types.

But again, the most extreme was the black-backed woodpecker, "which actually seemed to require burned areas," Hutto said.

All the studies were anecdotal, though. What he needed was hard evidence.

For a decade and then some, Hutto helped craft and conduct systematic bird surveys on Forest Service lands, "in every kind of vegetative type out there."

The results supported his suspicions: Black-backed woodpeckers only gather in substantial numbers in areas hit hard by wildfire.

The next step, he said, was to figure out what sort of burn the birds need. He considered what sort of forest was on the ground before the burn, computed the severity of the fire, crunched data on whether the land was logged or left to nature after the burn.

Again, he was surprised.

"We found the severity issue is really interesting," Hutto said. "Severity is a big, big deal. A fire is not a fire is not a fire. There are species that are very particular about what kind of fire they like."

Western tanagers, for instance, thrive in low-severity fires. Juncos prefer medium-severity burns. Black-backed woodpeckers, mountain bluebirds and olive-sided flycatchers like their forests well done. And the woodpeckers generally prefer thick-barked trees, ponderosa pine and Douglas fir, trees that withstand all but the hottest fires.

Perhaps not surprisingly, the species that really like severely burned forests tend to be species that are tough to find, species whose populations are not what you'd call robust.

Hutto suspects that might have something to do with national wildfire policy, beginning with the big burns of 1910. Some three million acres went up in smoke that year throughout Montana and Idaho, prompting an aggressive firefighting policy aimed at snuffing every blaze.

Species that for millennia had evolved with fire, were actually dependent upon fire, did not fare so well under the post-1910 policy, Hutto suspects. It's tough enough to live in a narrow niche. It's even tougher when forest management eliminates that niche.

It wasn't until about the time that Hutto first started asking questions about fire and ecology that the scientific community was willing to give fire its due. It was, they concluded, a natural force that could be used as a tool for managing forests on the landscape level.

In 1983, the first fire was quietly left to burn in the Bob Marshall Wilderness, a lightning strike that grew finally to 230 acres.

"It was a huge moment for people who had been taught for decades that all fires are bad and should be put out immediately," Dale Luhman told the Missoulian last year. Luhman is resource assistant for the Forest Service. "But it came as part of a professional recognition that sometimes fire is good, that it's a necessary and natural process in healthy forests."

Most folk know about lodgepole pine and their serotinous cones that open only under the heat of wildfire. But beyond the lodgepole, almost all Western landscapes are fire-adapted to some degree, from the soil beneath to the plants and animals above.

Western larch, for instance, hate the shade. They need a fire to create a clearing, and then they have about three to five years to take root before the window of opportunity is shaded over by competitors.

Fire is also critical for red-stemmed ceanothus, a plant whose seeds can lay dormant for centuries while waiting for the flames. It's a favorite of deer and elk and moose, popular big-game species that gobble it down like so much leafy ice cream.

Spirea loves fire, as does fireweed and arnica and dragontail mint and pine grass. Bicknell's geranium, like ceanothus, only appears in burns.

Then there's the mysterious boreal toad, which some scientists believe might be another in the growing list of known fire-dependent species. Turns out, the toads like to bask in the sun and tend to produce bumper crops of tadpoles once the canopy is burned away.

Researchers studying the toads think that fire suppression might be a major cause of the toad's decline in recent decades. It is an argument not lost on Hutto, who believes his woodpeckers and other species might be few and far between in part because their blackened habitat has been greatly diminished by way of fire suppression.

For the black-backed woodpecker, Hutto figures it all comes down to beetles, particularly beetles that specialize in burned areas.

"Their biology is amazing," he said. Some bugs have infrared detectors built into their thorax, detecting the heat of a wildfire from 100 miles away. Others have antennae that can sniff out smoke.

"They evolved that way because fire has been a natural part of the process for so long," he said. "The world is built around these big fires. The diversity of life needs wildfire."

The beetles generally move into trees killed or weakened by the blaze, and the birds move in to eat the beetles.

Some bugs, like some birds, prefer low-intensity fires. Others want a more charred wood. It means all the fire types are important, Hutto said, including the red-hot, high-intensity burns that run fast across the forest, scorching everything in their path.

"The birds," he said, "that's just scratching the surface. If the public knew how special these burned areas are, our perception might change. We might change the way we think about fire."

Hutto's been convinced by the "big mixed flocks of woodpeckers you see in the winter. You only see that after a fire. We still have no idea how important these areas are for supporting the wintering population."

He figures they're migrating to the wildland fires even as the flames create their future habitat, drawn by the towering columns of smoke that can spiral 30,000 feet into the sky. They work the bugs for a few years, until another smoke column appears on the horizon, following the flames like so many morel mushroom pickers.

To help pin down where they live when fire is absent, other scientists are sampling blood from black-backed woodpeckers, hoping to map the birds' genetic distribution by way of DNA analysis.

"We know they're semi-nomadic, in a sense," Hutto said, "but we don't really know how far they range or how much overlap there is between populations."

The more he understands the woodpeckers, he said, the more science will understand the role of fire. His woodpeckers are a tool, he said, a way to tease out the mysteries of habitat and life cycles.

Hutto hopes the answers to his questions might someday inform the way we log burned areas after a fire - the way we value a burned landscape. It is no less fragile a habitat type than is a wetland, he said.

"Personally, I've come to think we need to change our thinking on salvage logging," he said. "There are other values in the forest. In fact, a burned area is probably the most sensitive place you could be working in."

And yet current forest policies often exempt fire salvage logging from rigorous environmental review.

"The public really hasn't caught on to this yet," Hutto said. "People still want to get the cut, get the trees they see as wasting away. They want the economic value."

But there are values, he said, far older and more fundamental that are too often ignored.

"We talk about forest restoration after a fire," he said, "but it just got restored. That's what fire does. We know that, but we can't seem to get the message out.

"Until you start thinking like a black-backed woodpecker, you just ain't going to get it."

Reporter Michael Jamison can be reached at 1-800-366-7186 or at mjamison@missoulian.com.

We incorporate the words in the following *Billings Gazette* article as comments on your proposal. We highlight a few here:

- As fire burns across the landscape, it releases huge amounts of nutrients tied up in slowly decomposing plants, leaves, twigs and trees. When those nutrients settle into the soil and slow, steady rains come - as they have recently - the underground roots get a charge and life springs from the ground.
- It's doing exactly what it should be doing. It's the epitome of how the system should work.
- The regrowth of plants not only is the first step toward revegetating the landscape but also plays an important role in stabilizing the soil, reducing erosion and lessening runoff.
- Fire …reinvigorates the environment.

Billings Gazette
Published on Wednesday, October 11, 2006.

Out of fire's destruction comes new growth

By MIKE STARK
Of The Gazette Staff

For all of a wildfire's smoke, heat and bluster, it doesn't always leave behind death and destruction.

In recent weeks, carpets of bright green grass have sprung up in places charred and blackened by this summer's largest fires, including the Derby Mountain, Pine Ridge and Bundy Railroad complexes.

"That stuff is coming on pretty fast," said Chuck Roloff, with the Natural Resources Conservation Service in Big Timber, who has been tracking the aftermath of the Derby Mountain fire.

As fire burns across the landscape, it releases huge amounts of nutrients tied up in slowly decomposing plants, leaves, twigs and trees. When those nutrients settle into the soil and slow, steady rains come - as they have recently - the underground roots get a charge and life springs from the ground.

This year, in the aftermath of Montana's large fires, it has been textbook.

"It's doing exactly what it should be doing," said Larry Padden, a rangeland management specialist for the Bureau of Land Management in Billings. "It's the epitome of how the system should work."

The regrowth of plants not only is the first step toward revegetating the landscape but also plays an important role in stabilizing the soil, reducing erosion and lessening runoff.

In most cases, what was growing on a patch of land before the fire is what will return, usually in greater abundance. In many places, cool-weather annual grasses tend to come on fast, but then they have to fight for sunlight, nutrients and moisture with longer-lived perennial grasses.

"There's a real big competition game going on right now," Padden said.

In the area of the Derby Mountain fire, 3 to 5 inches of rain have fallen in recent weeks that, unlike gullywashers that roll roughshod over the ground, have been steady and slow enough to percolate into the soil, Roloff said.

Some of the grasses now are 2 to 3 inches tall. One of the most visible examples is near Reed Point, where the Derby Mountain fire burned up to Interstate 90.

"That looked pretty nuked about a month ago," he said. "But it's coming back."

Some species, such as sagebrush, are much slower to return. And in heavily timbered forests, places where sunlight rarely reached the ground in the first place, the recovery can take longer.

Padden looked at one of those spots late last week and saw hardly anything growing.

"It's pretty bleak under there, and it'll take some time," he said.

A few weedy species will crop up next year, perhaps with some native forbs and grasses. Land managers keep an eye for opportunistic invasive species, such as cheatgrass or leafy spurge, that move into disturbed areas - including those hit by firefighting bulldozers - and crowd out native species.

Despite the vigorous post-fire growth this fall, much progress remains to be made, Padden said. Although the growing plants help provide grazing fodder for wildlife and stock, erosion remains a concern.

"We're not out of the woods yet. We're hoping for an average or above-average winter," Padden said.

A good snowpack and freeze in the winter, along with spring rains, will help keep the plant roots from dehydrating and will promote further growth.

Fire may exact an economic toll - that was certainly the case this year in terms of property damage and millions of dollars spent on firefighting - but it has for eons been a source for recycling nutrients and spurring new life.

"It reinvigorates the environment," Padden said.

We incorporate the words in the below *Spokesman Review* article as comments on your proposal. We highlight a few here:

- Waters in Idaho and Montana are famous for their thriving native populations of bull trout and westslope cutthroat trout because of—and despite—major forest fires. …(They) are well adapted to big 100-year or even 500-year fire events.

- While hot fires can bare the ground, change soil composition and temporarily foul stream sections with sediment, they also tend to add a lot of large woody debris to stream channels. The logs create scour areas that expose the clean and larger gravels important for spawning, incubation, and fry rearing as well as for insect production. Large wood also provides lots of cover and channel complexity that fish such as bull trout and cutthroat trout have an affinity for. A lot of deadfall can provide a fair bit of shade to protect stream temperatures. And fire often delivers nutrient pulses that can stimulate primary productivity, making more bugs and other fish food.

Wildfires can be a boon to fisheries

Rich Landers richl@spokesman.com, (509) 459-5508

Fishermen need not fear the impact of fire on their sport.

But they need to keep their guard up when humans want to fiddle in their favorite mountain streams.

The St. Joe River, Kelly Creek, Fish Creek and other waters in Idaho and Montana are famous for their thriving native populations of bull trout and westslope cutthroats because of – and despite – major forest fires.

Idaho Fish and Game Department research confirms that native fishes, especially those that can migrate, are well-adapted to big 100-year or even the 500-year fire events.

While hot fires can bare the ground, change soil composition and temporarily foul stream sections with sediment, "they also tend to add a lot of large woody debris to stream channels," said Chip Corsi, Idaho Fish and Game Department regional manager in Coeur d'Alene.

The logs create scour areas that expose the clean and larger gravels important for spawning, incubation, and fry rearing as well as for insect production, he said.

"Large wood also provides lots of cover and channel complexity that fish such as bull and cutthroat trout have an affinity for," he said. "A lot of deadfall can provide a fair bit of shade to protect stream temperatures.

"And fire often delivers nutrient pulses that can stimulate primary productivity, making more bugs and other fish food."

Intense fires, such as those in 1910, can kill fish in some areas by raising water temperatures.

But if the fish have a history of migrating, and the drainage is not otherwise impaired, fish will return to spawn in following years, he said, citing the most recent fisheries studies following the intense 1990s fires near Boise.

Native fisheries – more specifically "healthy" native fisheries – are adapted and resilient to natural events such as intense forest fires, he said.

"Had the migratory component of those fish populations been impaired for other reasons – migration barriers, over-fishing, de-watering, pollution, and so on – the likelihood of recolonization, and hence resiliency, goes way down."

We also incorporate the words in the following *Washington Post* article as comments on your proposal. We highlight a few here:

- Life doesn't end with a forest fire. The trees of the forest may be destroyed, but the forest community isn't destroyed—it's rejuvenated.

- Although crown fires killed the trees in July and August 2000, seeds often survived in the cones, which were saturated with water. A rapid crown fire may singe a cone, but the seeds will be protected. After the fire, as the cones dry out, the seeds will drop out. Undamaged cones will open with dry wind and be carried away. During the ensuing fall, seeds were dispersed upslope by afternoon winds formed by hot air rising from the valleys. Seeds may also have been pushed in any direction by strong winds generated by cold fronts.

- Once the seeds hit the ground and germinated, the plants thrived in nutrient-rich ash. With fall and spring rains, plus melting snow, the nutrients seeped into the mineral soil. It's gourmet city for coniferous tree seedlings.

- Up to 70 percent of the plant species in some forests in the northern Rocky Mountains are well adapted to survive severe burning.

- Standing dead trees …played an important role by providing transitory shade that helped moderate the ground surface temperature during the heat of the day.

- Fires also ushered in surprise plants that can show up by the thousands that weren't there before. The seeds of these plants can lay dormant from 200 to 400 years, and they only germinate after a fire.

By Mark Matthews
Special to The Washington Post
Monday, September 16, 2002; Page A09

During the summer of 2000, the biggest fires since 1910 burned through the Bitterroot and Lolo forests that surround the college town of Missoula, Mont., charring about 370,000 acres and destroying 70 homes.

During the past two summers, while fires have raged in other parts of the country, those seemingly dead forests have had a chance to burst back to life, offering a clear picture of how forests recover from fire--and scientists an exceptional arena for study.

“Life doesn't end with a forest fire,” said Peter Stickney, a retired U.S. Forest Service plant ecologist. “The trees of the forest may be destroyed, but the forest community isn't destroyed—it's rejuvenated.”

While seedlings were planted in some of the charred areas, more than 19,000 acres at Ninemile remained untouched, and officials wanted to know how the most intensely burned drainages—about 7,000 acres worth—were faring.

Because the fires burned cooler in some spots and hotter in others—incinerating everything down to mineral soil—recovery could occur in a mosaic pattern. Not a bad thing, per se, but natural regeneration—if it occurred too slowly—could adversely affect wildlife diversity and future logging operations. A slow recovery might also lead to erosion on steep slopes, which could jeopardize water quality and native fisheries.

Steve Slaughter, a Ninemile silviculturist, hired a half-dozen seasonal workers to count the number of trees that had germinated in the past two years in the eerie, sun-baked forests. As the workers made their way through narrow canyons and up to alpine ridges, ranging in elevation from 3,500 feet to 7,500 feet, crew members routinely stopped to measure random plots of 1/100th acre in size—an 11.8-foot radius on flat ground—and count every tree by species within the circle. Some germinants barely peeped out of the gray, ashy soil, while others stretched up to six inches in height.

Glen Teeters, a crew member and retired teacher from Alberton, Mont., said the rebirth looked pretty good. “I'd say about 90 percent of the units we surveyed were coming back adequately.”

On a few steep slopes where the fire burned so hot it did not even leave any ash, the baked soil remained barren. But in many other areas, Teeters tried not to tread on the germinants that carpeted the slopes for acres on end.

Ray Shearer, a plant ecologist with a U.S. Forest Service lab in Missoula, isn't surprised by the bounty. “Nature is absolutely amazing,” he said.

Although crown fires killed the trees in July and August 2000, seeds often survived in the cones, which were saturated with water.

“A rapid crown fire may singe a cone, but the seeds will be protected,” Shearer said. “After the fire, as the cones dry out, the seeds will drop out. Undamaged cones will open with dry wind and be carried away.”

During the ensuing fall, seeds were dispersed upslope by afternoon winds formed by hot air rising from the valleys. Seeds may also have been pushed in any direction by strong winds generated by cold fronts.

Trees in the Ninemile area had produced a good cone crop right before the 2000 fires, Slaughter said. Once the seeds hit the ground and germinated, the plants thrived in nutrient-rich ash. With fall and spring rains, plus melting snow, the nutrients seeped into the mineral soil. “It's gourmet city for coniferous tree seedlings,” Stickney said. In another year or two, most of the ash will disappear.

Other benefits for the trees included more moisture in the soil, more light and less competition from brush and forbs, broad-leafed herbaceous plants. Standing dead trees also played an important role by providing transitory shade that helped moderate the ground surface temperature during the heat of the day.

But the Ninemile crew saw much more than trees.

“In truth, fire is a force of transition that modifies a forest community of plants and animals,” Stickney said. “It allows certain types of plants to be there that wouldn't be there otherwise.”

Plants that root in the duff—such as twinflower, kinnikinnik and prince's pine—perished, but others “you couldn't kill with the fires we had that summer,” Stickney said. “Up to 70 percent of the plant species in some forests in the northern Rocky Mountains are well adapted to survive severe burning.”

During his surveys in the spring and summer, Teeters recalled seeing slopes covered with mass flowerings—sheets of golden arnica, rose-purple fireweed, lavender-blue aster, purple lupine, white spirea, and straw-colored pine grass. Where the fire had not burned severely, the four-foot, white-flowered stalks of bear grass waved in breezes like giant bottle cleaners.

Many of the plants, such as lupine, aster and arnica, survived because their root crowns or rhizomes were protected from the fire's heat by mineral soil.

Other plants, such as fireweed and pearly everlasting, colonized the area after drifting in as light, feathery seeds from unburned sites.

Some plants flowered in mass only the first year following the fires; others, only the second. Some species, such as Bicknell's geranium—a delicate, stringy plant with tiny, pink flowers—and dragonhead, will quickly disappear after this second summer, and be unseen until the next fire event. Some perennials, such as fireweed and wild hollyhock, will flower in mass several more years.

Fires also ushered in surprise plants that “can show up by the thousands that weren't there before,” Stickney said. “The seeds of these plants can lay dormant from 200 to 400 years, and they only germinate after a fire.”

The most studied surprise plant is shiny leaf ceanothus, commonly known as snowbrush for its masses of small white flowers. “The seed of ceanothus has to go through two doors of treatment before it can germinate,” Stickney said. “First, it cannot absorb moisture until it is treated with heat. Second, the seed then has to go through a cold treatment before it can germinate.”

Stickney believes that dragonhead, of the mint family, and Bicknell's geranium follow the same process. “When you see the same thing happening 20 or 30 times in various places, you start to figure that those seeds are doing the same thing."

Herbs now dominate the regenerating forest at Ninemile, but shrubs will take over during the next few summers. In a couple of decades, trees will again be the dominant species.

It will take a few more years for most forest visitors to note that the trees have returned to the charred forests. Teeters, for one, thinks the charred landscape will become more inspirational as time passes.

"I recently visited Yellowstone National Park," where crown fires charred thousands of acres of lodgepole pine forests in 1988, he said. "I think the fires made the park even better. They opened up the woods and made the park much more interesting to drive through. Plus, those trees are growing back like crazy—everywhere you look."

Next, we incorporate the words in another *Missoulian* article, as comments on your proposal. We highlight a few here:

- It came as part of a professional recognition that sometimes fire is good, that it's a necessary and natural process in healthy forests.

- It's an excellent complex of fires. It's going to create a whole lot of different resource benefits. The benefits, are quite extensive and complex, and it's very hard to list them all.

- Most of the region's big stands of larch are more than 200 years old, and many are between 400 and 800 years old. That means that when you look at the autumnal mosaic of green and gold - created by stands of evergreens and golden larch - you're really looking at the patchwork of a historic fire.

- The outfitting community understands that the short-term loss could, in fact, be a long-term gain. The fires will open up more browse for deer and elk and moose, which are, of course, the outfitters' bread and butter. It's part of that complex connection of resource benefits.

- Fire is the only way we have to manage Western ecosystems at the landscape level. If we're patient enough to let nature work, the benefits to the future will be huge. Tomorrow's forests will be healthier, and tomorrow's fires will be smaller. There's a tremendous value in fire. We need to remember, all these lands have burned before, and they're all going to burn again. It's nothing new.

What in the blazes?

By MICHAEL JAMISON of the Missoulian

Official says letting fires burn sometimes can have great benefits

HUNGRY HORSE - Two decades back, in the summer of 1983, the unthinkable happened deep in the heart of the Bob Marshall Wilderness.

Lightning struck, a tree burst into flame, a wildfire crept up a mountainside - and firefighters simply sat back, waiting and watching.
No hand crews, no helicopters, no smokejumpers. Eventually, left to roam where fuel and wind would take it, the fire burned across some 230 acres.

"It was a huge moment for people who had been taught for decades that all fires are bad and should be put out immediately," said Dale Luhman. "But it came as part of a professional recognition that sometimes fire is good, that it's a necessary and natural process in healthy forests."

Today, Luhman is resource assistant on the Forest Service's Spotted Bear Ranger District, located at the northern end of the Bob Marshall Wilderness Complex near the town of Hungry Horse.

In the years since that unthinkable event, he said, foresters have become even more convinced that wildfire should sometimes be allowed to burn.

Which is exactly why, when lightning hit Pagoda Mountain and Little Salmon Creek the night of July 19, there were, once again, no hand crews, no helicopters, no smokejumpers.

This time, the fire was joined by other fires, until more than a dozen separate starts spread into what would become known as the 88,334-acre Little Salmon Complex.

"It's an excellent complex of fires," said Steve Wirt, wilderness fire manager on the Spotted Bear District. "It's going to create a whole lot of different resource benefits."

The benefits, he said, are "quite extensive and complex, and it's very hard to list them all."

Most folk know about lodgepole pine and their serotinous cones that open only under the heat of wildfire. But Wirt points out that almost all Western landscapes are fire-adapted to some degree, from the soil beneath to the plants and animals above.

Western larch, for instance, hate the shade. They need a fire to create a clearing, Wirt said, and then they have about three to five years to take root before the window of opportunity is shaded over by competitors.

Most of the region's big stands of larch are more than 200 years old, he said, and many are between 400 and 800 years old. That means that when you look at the autumnal mosaic of green and gold - created by stands of evergreens and golden larch - you're really looking at the patchwork of a historic fire.

"It's like looking through time at a fire that happened hundreds of years ago," Wirt said.

But not everyone, of course, is happy with the Forest Service's policy of letting wilderness fires burn - a plan known as Wildland Fire Use in agency jargon.

When the Little Salmon Complex ran through the Bob Marshall this summer, it ran over outfitters' hunting grounds, as well as a few long-established outfitting camps. For people who make their money in the wilderness, a policy that allows the woods to burn can be unsettling at best.

"I can't tell you how much time we've been spending with the outfitters," said Deb Mucklow, district ranger on the Spotted Bear. "We've tried to minimize the impacts in every way possible."

That's meant allowing some wiggle room in the outfitting permits and keeping in daily contact with the 40 or so outfitters who operate in lands affected by the Little Salmon Complex.

"We really tried to keep as much of the forest open as possible," Mucklow said.

She and her staff helped outfitters get access the general public did not enjoy. She helped them find alternate routes, helped them get into the woods in time to set up fall hunting camps.

The outfitters themselves "really pulled together as a group, too," Mucklow said. Some lost business, with clients scared off by reports of fire and smoke. Those outfitters gave up their permitted camps to outfitters who still had clients but could not use their traditional camps.

"The Forest Service did a good job working with us," said Belinda Rich, whose husband is a Seeley Lake outfitter. "For a stressful event, it went pretty darn well."

The Rich family actually lost part of their traditional hunting grounds to the fires, she said, "and it almost took the whole camp."

But, she said, "we understand that allowing it to burn and get back into a normal fire process again is important."

Mick Cheff agrees. He's been outfitting for longer than he cares to recall, "and we got hit worse than anybody," he said. "We have two main camps, and we were burned out of both of them."

Still, he said, the Forest Service "did a great job working with us outfitters. It's been a real good partnership. I myself am actually in favor of the let-burn policy. This year, though, we got a little more than we'd hoped for."

Still, Cheff says, the outfitting community understands that the short-term loss could, in fact, be a long-term gain. The fires, he said, will open up more browse for deer and elk and moose, which are, of course, the outfitters' bread and butter.

"It's part of that complex connection of resource benefits," Wirt said.

Take red-stemmed ceanothus, for instance. The plant's seeds can lay dormant for 400 years or more, waiting for the heat (and subsequent freeze and thaw) that enables them to germinate.

New growth pops up only in the year after a fire. Then, the plants grow for a couple of decades, producing seeds that drop and lay dormant, waiting for another fire.

"It's the ice-cream plant for our browsers," Wirt said. "The deer, elk and moose just love it. It's a key plant on their winter range, and it really carries them through the long winters."

And so the fires that disrupt the outfitters spark the plants that sustain the big game that the outfitters rely upon.

Which may explain why the outfitters aren't screaming louder about the Wildland Fire Use program, even if they aren't entirely thrilled.

"Sure, some people will be impacted," Luhman said. "But you really can't overestimate the benefits of fire in Western forests. And if you can't allow natural processes in the wilderness, where can you?"

Which is not to say wilderness has become a hands-off, anything-goes inferno of unchecked wildfire. In fact, of the 50 or more starts sparked in the Bob this summer, only a dozen or so were classified as Wildland Fire Use fires. The others were snuffed or steered or otherwise managed by firefighters.

Within the 1.5 million-acre wilderness complex, about 90,000 acres burned, and within those 90,000 acres there remains a whole lot of green. Wirt figures that, on average, big Western wildfires usually burn hot across about 10 percent of their total acreage. Another 40 percent or 50 percent of the acres burns moderately, sweeping the underbrush out while leaving the mature trees. The remaining 30 percent or 40 percent is untouched.

"The Little Salmon created a beautiful fire mosaic," Wirt said. "From a modern land manager's view, it was very successful."

From yesterday's land manager's view, however, it was shocking.

Western wildfire policy has evolved through many years, Wirt said, beginning in the years directly following the big fires of 1910, when 3 million acres of Montana and Idaho went up in smoke.

Then came the "10 a.m." policy, when firefighters were expected to have a blaze in hand by midmorning following the evening lightning storm.

"I was fighting fire in those days," Wirt said. "You'd get a call in the middle of the night and take off, hiking into some remote wilderness."

It worked great, he said, until the 1970s, when land managers realized that all the wood they'd kept from burning had been stacking up for decades. They had missed, he said, at least two natural fire cycles, and the pile of fuel was growing.

"There was a recognition that we couldn't put all the fires out anymore," Wirt said. And, at the same time, "we were beginning to understand how to work with fire as a natural tool in the ecosystem."

The subsequent policy - known commonly as "let it burn" - smoldered along quietly until 1988, when parts of Yellowstone National Park burned. It was hard to say what was hotter, Wirt said, the policy, the politics or the fires themselves.

Land managers reassessed and set new parameters for allowing wildland fires to burn.

Today, he said, the side rails for wildland fires are set long before the fire season. A fire management unit is demarcated (such as the Bob) and within that, fire management areas are plotted. Then, parameters are set, including the time of year and the climate and the type of terrain.

When a fire starts, land managers use those designations, as well as more immediate information, to determine whether to let a fire run or to attempt to snuff it.

If it's far from the wilderness edge and doesn't look like it might run out onto private land, then it's likely to be managed under the Wildland Fire Use policy.

In the case of the Little Salmon, Luhman said, land managers figured they had about 450,000 acres of wiggle room between the fire and any potential hazards, and so they stepped back to monitor the fire.

Later fires, however, were snuffed, or at least wet down, as land managers were concerned about their location or the fact that so many acres already were burning on adjacent lands.

The idea, Luhman said, was to use fire as a management tool while still keeping some of the wilderness open. And so they let the Little Salmon Complex burn up north, while smothering other wildfires in the Bob's southern portion.

"Generally," he said, "it's a natural event, and we're going to let it run its natural course. I mean, a big reason of having wilderness in the first place is to let nature do its thing. But there are social considerations, as well, and we try to take all that into account."

And so firefighters fought wilderness fires all summer, even as the Little Salmon Complex burned largely unchecked.

That is not to say, however, that it was entirely unchecked. In fact, people were checking it every day, from the air and from the ground, monitoring growth and heat and wind and weather and a host of other variables.

"This isn't a passive thing," Luhman said. "We might not be fighting the fire, but we're very active on it."

The idea, he said, is not just to let fire run wild everywhere.

"Ecologically, that might be fine," he said. "But socially, how much fire can we handle at a time?"

That question - how much fire we can handle - is also central to the wilderness fire policy. Fires burning in the backcountry take a back seat to fires burning into subdivisions, and with resources already spread thin, Mucklow figures there weren't enough people or dollars to work the fires on her district, even if they had wanted to.

"We've known for years that we can't control all the fires everywhere all at once," she said. "There's only so much you can do."

And part of what you can do is to stand back and do nothing at all. Wirt believes that, having stood back in 1983 and watched as 230 acres of wilderness went up in smoke. Since then, he's watched thousands of acres burn, and he's seen how time and Mother Nature conspire to regenerate healthy forests.

"Fire is the only way we have to manage Western ecosystems at the landscape level," he said. "If we're patient enough to let nature work, the benefits to the future will be huge. Tomorrow's forests will be healthier, and tomorrow's fires will be smaller. There's a tremendous value in fire. We need to remember, all these lands have burned before, and they're all going to burn again. It's nothing new."

Reporter Michael Jamison can be reached at 1-800-366-7186 or at mjamison@missoulian.com

We incorporate the words in the below KCET article as comments on your proposal. We highlight a few here:

- Three weeks, $40 million in firefighting costs, five injuries, and …one lost home later, the Lake Fires quietly burned itself out, leaving a wide swath of devastation in its wake. Or so I imagined. But on this bright morning in early October, hiking through some of the worst burn, I'm surrounded by green leaves, flowing water, and the bright songs of birds. If this is devastation, it's the hopeful kind.

- The grove's aspens were hit hard by the fire: the forest is blackened… And yet this forest isn't killed. Just three months after the Lake Fire, the aspens are coming back, and they're doing so at a rate that …surprises, …new trees already three and four feet tall growing throughout the forest. Nearby willow shrubs, not be outdone, are sporting new growth five and six feet tall.

- Woodpeckers are among the first birds to arrive in a freshly burned California forest, and as they mine the snags' trunks for beetle larvae they also take time to create new real estate opportunities, in the form of cavity nests in the standing snags. A male downy or hairy woodpecker will dig out three or four cavities. His mate will select one and they'll move in. That leaves two or three perfectly good new homes for other birds, and potentially for smaller mammals.

- One Jeffrey pine after another …had been marked off as dead by the Forest Service. Most had verdant new green needles crowding out the fire-damaged brown ones. When examined by foresters, those green needles had been lurking in leaf buds, protected from the brief flash of heat that had killed the trees existing needles. Now, in a flush of new growth—the phenomenon is called "flushing"—the Jeffery pines were showing that reports of their death had been exaggerated.

FORESTS

Forest Renews Itself in the Wake of 'Devastating' Lake Fire

Chris Clarke | October 27, 2015

Behind an incinerated Wilderness sign, Chad Hanson looks at a rejuvenated aspen grove | Photo: Chris Clarke/KCET

In June, the Lake Fire near Big Bear in the San Bernardino Mountains burned an area the size of San Francisco: 31,359 acres, just shy of 49 square miles. My neighbors and I in Joshua Tree watched nervously as the bright orange flames lit the night sky to the west, and smoke hung heavy for weeks in our skies and our lungs.

It wasn't a huge fire by Californian standards, but it was intense, with individual flames so large we could see them from 35 miles away, and fire crews struggled to cover ground on the steep and broken slopes of San

Gorgonio Mountain's north face. For three weeks we watched and crossed our fingers as neighbors upslope were evacuated, and when the fire finally petered out in early July with just one dwelling burned our relief was ambiguous: that one house belonged to someone many of us in town knew. This fire was personal.

Three weeks, $40 million in firefighting costs, five injuries, and that one lost home later, the Lake Fire quietly burned itself out, leaving a wide swath of devastation in its wake. Or so I imagined. But on this bright morning in early October, hiking through some of the worst of the burn, I'm surrounded by green leaves, flowing water, and the bright songs of birds. If this is devastation, it's the hopeful kind.

I've hiked into the hills above the Heart Bar Campground, up in the headwaters of the Santa Ana River, to take a look at the forest three months after the Lake Fire went out. With me is Chad Hanson of the John Muir Project, a forest ecologist who lives in nearby Big Bear. (Full disclosure: the John Muir Project is a project of Earth Island Institute, for which I worked a decade ago.) I'm a little out of breath: we've just hiked in two miles up and over the ridge between the Santa Ana and Fish Creek. It's just a moderate climb of about 400 feet and change, but at 7,200 feet we're about 5,000 feet higher than where I woke up this morning.

Hanson's used to the altitude, so I breathe while he talks. We're in the popular Aspen Grove area, right at the north edge of the San Gorgonio Wilderness, about 1,500 acres of land designated a "high-intensity" burn area in the Lake Fire. The grove's aspens were hit hard by the fire: the forest is blackened, as is the Forest Service's wooden sign announcing the wilderness boundary.

And yet this forest isn't killed. Just three months after the Lake Fire, the aspens are coming back, and they're doing so at a rate that even surprises Hanson, new trees already three and four feet tall growing throughout the forest. Nearby willow shrubs, not to be outdone, are sporting new growth five and six feet tall.

"The fire didn't kill the aspens here," says Hanson. "It just killed the top growth. The roots came through fine. I'd guess there are about five times as many aspen trees in this grove now as there were before the fire."

A giant aspen grove can often be a single organism, a network of subterranean roots with hundreds of trees growing from it, all germinated from a single seed centuries ago. Each tree may live 100 years or less but the organism lives on, growing new trees to replace those that die. Whether the Aspen Grove here on Fish Creek is one organism or several, the fire seems to have damaged it only in the same sense that a mower damages a healthy lawn. The top portion removed, the grove is growing back.

That's not to say the fire hasn't changed the aspen grove radically. Above the last three months' new shoots, blackened aspen trunks stand stark against a flawless blue sky. Where a year ago the breeze would have raised the sound of a million aspen leaves clapping softly, it now whistles a little through bare branches. You can still smell the fire: it's faint, as though someone in the neighborhood burned some cordwood in a fireplace a few hours ago.

The smoke scent is a minor note. Mostly, there's sun, the song of birds and the busy whine of insects, and the musical passage of Fish Creek as it heads clear and cold over one blackened shelf, and then another.

I'd expected the Lake Fire's high intensity burn area to be somber, promising renewal only in the abstract for people who could spot subtle signs of recovery. Instead, the place is *cheerful*, the life in it exuberant.

We fight forest fires. It's what we do. The notion that naturally occurring fire is wholly destructive is deeply ingrained in modern American culture. It predates Bambi. It predates Smokey the Bear. Though earlier human societies had a more measured relationship with wildfire, the attitude toward wildfire in the American West has been almost uniformly negative since the so-called "Big Blowup" of August 1910, in which an estimated 3 million acres of forests burned in 11 western states, and at least 85 people killed. In the wake of that fire season, the U.S. Forest Service -- just five years old when the Big Blowup hit -- determined as an agency that prevention was its main strategy for managing forest fires, and in fact a main strategy of the agency for all aspects of forest management.

A hint of one possible reason can be gained from U.S. government's assessment of the damage done by fires in the Big Blowup. As reported by the Forest History Society,

> *Official reports after the Big Blowup estimated that 1,736 total fires burned more than 3 million acres of private and federal land and consumed an estimated 7.5 billion board feet of timber.*

A "board foot" is a standard measure of a tree destined to be cut down and then cut up for lumber. A standard two-by-four ten feet long is about 4.4 board feet. Aside from the obvious tragedy involved in the human death toll from the Big Blowup, the devastation with which that nascent Forest Service was concerned in 1910 was with the loss not of western forest ecosystems, but with the commodities that could be extracted from those ecosystems.

Here's another hint: unlike the National Park Service, the Bureau of Land Management, the U.S. Fish and Wildlife Service, and other federal agencies tasked with managing and preserving public lands and the wildlife that depends on them, the U.S. Forest Service is part of the U.S. Department of Agriculture. Our National Forests have long been seen, first and foremost, as a crop, and anything that threatens the harvest of board feet is a crisis to be fought.

For more than 70 years after the Big Blowup, fire was treated as an out and out enemy by federal agencies. During that time, though, the science marched off in a different direction. By the time the forests of Yellowstone

National Park famously caught fire in 1988, a few federal land management agencies had nuanced their position somewhat. A century of fire suppression had changed the West's forests: fuel loads were increasing because the frequent small fires that would have consumed dry brush, grasses, and small trees had been prevented. Gone were the "open, park-like" forests settlers had found in the 19th Century. Ecologists began to study the history of fires in the Western states, including a lengthy prehistoric record of Native people setting deliberate fires to manage the landscape.

Science was a few steps ahead of public awareness: the National Park Service took a huge amount of public criticism in 1988 for letting wildfires burn in parts of Yellowstone where public safety wasn't directly threatened. But with the advent of controlled fires as a fuel reduction tool, more and more members of the public have come to realize that absolute fire suppression isn't the best approach to managing fire.

Which doesn't mean, however, that high intensity wildfires have been accepted as a natural part of the larger ecosystem of western forests. The Wikipedia entry on the Yellowstone fires of 1988 contains an apt summation of land managers' ambivalence toward fire:

> *Before the late 1960s, fires were generally believed to be detrimental for parks and forests, and management policies were aimed at suppressing fires as quickly as possible. However, as the beneficial ecological role of fire became better understood in the decades before 1988, a policy was adopted of allowing natural fires to burn under controlled conditions, which proved highly successful in reducing the area lost annually to wildfires.*

In other words: We used to think fires were bad and put them out immediately. Now we know better and let them burn, because that reduces the amount of fires to which we would "lose" area. Even though we grant lip service to the benefits of fire, we still see them as a loss to be minimized. A let-burn policy isn't an acceptance of fire's value. It's merely fighting fire with fire.

The notion that even high-intensity fire can be a good thing for forest ecosystems, that forests and their denizens might suffer if not allowed to burn, still seems to go against all that is right and good. California media outlets, these days, warn of a coming cataclysm as drought-stressed trees make the state's forests more likely to catch fire, in tones alarmist enough to suggest those coming fires are a dire threat to... to something.

Here in the renewing aspen grove, those warnings seem distant indeed.

A new Aspen Grove grows in the ashes of the old | Photo: Chris Clarke/KCET

"This forest is responding like it's already next spring," says Hanson, absently petting a five-foot clonal aspen sprout. It seems true. Next spring, given a modicum of rain or snow, the Fish Creek watershed will almost certainly burst into bloom, but hints of that color to come already dot the sunnier parts of the forest. From where we stand we see purple Erigeron in full bloom, bright crimson Indian paintbrush on sunny slopes, native goldenrod with yellow flower heads nodding under their own weight, all of them attracting a startling diversity of butterflies.

Butterflies aren't the only insects that see opportunity here. Even before the Lake Fire was brought under control in July, infrared-sensing native beetles started heading toward the burn from miles around. Finding trees newly killed by the fire, they lay their eggs under the bark. Those eggs hatch out and larvae begin tunneling through the wood.

That process causes distress to those who measure standing trees in board feet: the boring can reduce or destroy a tree's value to lumber mills. But from the perspective of other users of the forest, the beetles greatly increase the trees' value. Woodpeckers are among the first birds to arrive in a freshly burned California forest, and as they mine the snags' trunks for beetle larvae they also take time to create new real estate opportunities, in the form of cavity nests in the standing snags.

"A male downy or hairy woodpecker will dig out three or four cavities," says Hanson. "His mate will select one and they'll move in." That leaves two or three perfectly good new homes for other birds, and potentially for small mammals.

Downy and hairy woodpeckers, flickers, and (farther north in the Sierra Nevada) black-backed woodpeckers move into a burned forest within weeks of the fire to carve out new homes. Other birds, so-called "secondary cavity nesters" such as sapsuckers, can only use snags once they've been dead for a few years, after the wood has weathered a bit and become softer.

As for mammals, you might expect a huge amount of carnage during a large fire such as the Lake Fire. But even those mammals too small to cover ground quickly and escape the fire have an escape route: they go down. "Burrowing animals can easily weather even a high-intensity fire," says Hanson. "Soil temperatures don't change much once you get farther down than a couple inches."

"Pocket gophers do really well in the wake of a fire," Hanson adds. " They have networks of burrows that keep them safe from fires, and then" -- Hanson gestures at the exuberant regrowth of aspen and willow -- "well, they eat roots and shoots. There are a lot of roots and shoots here right now."

There are a few pocket gopher burrow entrance holes here and there throughout the aspen grove; little mounds of lighter soil against the charcoal-enhanced topsoil. I wonder how much carbon those gophers will sequester over the next few years, tilling the remains of the Lake Fire down into the soil a foot or three deep.

Some larger mammal has been sampling the aspen leaves: I see a few shoots that have had their leaves trimmed off up 14 inches or so off the ground. Was a rabbit responsible, or a woodrat? Hard to say, and the newly blackened mud in Fish Creek is so crisscrossed with animal tracks it's hard to identify any of the smaller ones.

"This is just a great example of how the environment can thrive after a high-intensity burn," says Hanson. "The soil has this sudden infusion of nutrients, from the ash from the trees and shrubs. There's more sunlight now, and more opportunities for plant growth. And the animal population responds to that."

A month ago this Jeffrey pine might have been written off for dead. Now, a flush of healthy needles attests to its survival. | Photo: Chris Clarke/KCET

We hike back up over the ridge to our vehicles, through a stretch of mixed medium- and low-intensity burn. On our way in, Hanson had pointed out one Jeffrey pine after another that he guessed had been marked off as dead by the Forest Service. Most had verdant new green needles crowding out the fire-damaged brown ones. When examined by foresters, those green needles had been lurking in leaf buds, protected from the brief flash of heat that had killed the trees' existing needles. Now, in a flush of new growth -- the phenomenon is called "flushing" -- the Jeffrey pines were showing that reports of their death had been exaggerated.

Other native plants show similar patchy damage. Many of the hillside's black oaks had been killed to the ground; of those, most of the blackened trunks sport new growth from the soil level, grown three or four feet in three months. Manzanitas, with a reputation for being among the most flammable of native plants, had burned profusely in some places, halfheartedly in others. A few manzanitas along the road are half consumed, the other half as green as pampered garden specimen plants.

I'm struck, once again, by how cheerful the scene seems. Far from being a scene of devastation, just three months after the Lake Fire the general feel of the landscape is one of exuberant renewal.

A study published some years back in the journal Forest Ecology and Management suggested that before 1800, about 1.8 million hectares of California -- 4.4 million acres and change -- burned in an average year. The total California acreage burned in 2015, in a year widely regarded as a serious fire year, was 814,485 acres -- less than 20 percent of that prehistoric average.

I begin to wonder, as Hanson and I stop halfway to our cars to watch a female hairy woodpecker probe a new snag for beetle larvae, whether the state of California doesn't actually suffer from a fire deficit. A century of fire suppression has created an artificial forest, one with fewer of the patchy, regenerating high-intensity burn areas. It's a truism in ecological sciences that boundaries between habitats are especially rich in biodiversity. By suppressing fires for a century, have we reduced California's forest biodiversity?

The answer may partly lie in how a forest like this changes in the first decade after a burn. Fortunately for me, I don't need to wait around for a decade to find out: Hanson and I reach our cars and head off for the site of the Butler Fire, which burned about 14,000 acres not far from here in 2007. He wants to show me what happens when a burned forest is allowed to regrow without post-fire logging or other interventions.

I'll describe that hike in Part 2 of this series.

ABOUT THE AUTHOR
CHRIS CLARKE
Chris Clarke is KCET's Environment Editor. He is a veteran environmental journalist and natural history writer currently at work on a book about the Joshua tree. He lives in Joshua Tree.

We incorporate the words in the following *Mail Tribune* article below as comments on your proposal. We highlight a few here:

- Fires have been burning across this landscape for tens of thousands of years. As fire moves across the landscapes, it selectively kills trees and thins the forest. Species most adaptive to frequent fire events survive. Over time, these landscapes become fire adaptive ecosystems. They are not only fire adaptive, but fire dependent.
- As ecologists, we don't look at a forest as recovering from a fire but as a succession. It's not good or bad. We are monitoring it so we will have a better understanding over the long term. We are learning from this.
- With some plants or animals, a fire doesn't make any difference to them. Others, it does matter. For instance, hermit warblers have no habitat here now because they are in the trees. But they will be back eventually.

Rogue River-Siskiyou National Forest rebuilding after massive 2002 Oregon fire

9:28 AM, Jul 9, 2012 |
Written by
PAUL FATTIG
Mail Tribune

MEDFORD, Ore. (AP) — Like silent sentinels guarding the legacy of the 2002 Biscuit fire, blackened trees tower over the budding bright green conifers growing up from the forest floor.

The stark contrast is in the Babyfoot Lake Botanical Area in the Rogue River-Siskiyou National Forest, a site where the Biscuit-fire blowtorch burned particularly hot.

"But with plants and animals after a fire, there are winners, losers and spectators," explained Lee Webb, biologist for the forest during the 2002 Biscuit fire.

"A wildfire is not bad or good," he added of a naturally caused blaze. "It just is."

Webb was a member of the Burned Area Emergency Rehabilitation team that began a scientific assessment of the fire's impact even before the fire was out.

He had been studying the Babyfoot Lake area since the mid-1970s.

Now retired after working 30 years in the forest, he continues to keep tabs on the aftermath of the fire in the Babyfoot Lake area.

The glacially formed lake is tucked just inside the eastern edge of the 183,000-acre Kalmiopsis Wilderness Area.

The trailhead to the lake is about a dozen air miles west of Kerby, a hamlet some 25 road miles south of Grants Pass.

A region known for its rich botanical diversity, it includes some 200 species of trees, shrubs, herbs, lichens, mosses and fungi, most of which scientists expect will return as the forest slowly rebuilds from the ground up.

"Fires have been burning across this landscape for tens of thousands of years," observed Tom Sensenig, the U.S. Forest Service's ecologist for southwestern Oregon. "As fire moves across the landscapes, it selectively kills trees and thins the forest. Species most adaptive to frequent fire events survive.

"Over time, these landscapes become fire adaptive ecosystems," he added. "They are not only fire adaptive, but fire dependent."

For instance, he noted that a stand of knob cone pine on Fiddler Mountain a few miles northeast of Babyfoot popped up after the fire's intense heat opened their cones. The cones are encased in a thick resin that can only be released when the heat reaches about 250 degrees, he explained.

When it comes to winners and losers, the rare Brewer spruce in the area was both, he said.

"When the fire burned through the Babyfoot area, it was very intense — a crown fire that was basically a stand replacement fire," he said, noting it killed many of the rare spruce in that area.

"But just over the ridge, the fire dropped to the ground, creating an environment for Brewer spruce to germinate," he said. "There is now a stand of Brewer spruce growing there."

Over the approximately 700 square miles burned by the fire, given the various factors that impacted the blaze, it burned in a variety of intensities, he said.

"There was a tremendous diversity of impacts throughout the area," said Sensenig who gave a presentation last year on fire ecology and the Biscuit fire to graduate students at Yale University's School of Forestry & Environmental Studies.

The agency continues to study the impact of the fire on 80 ecological sites it has established, which are re-measured every 10 years. Some of the sites were established prior to the fire, some as early as the 1970s.

"As ecologists, we don't look at a forest as recovering from a fire but as a succession," he explained. "It's not good or bad. We are monitoring it so we will have a better understanding over the long term. We are learning from this.

"These are long-term studies that will be continuing long after I'm gone," he added.

Back on the trail, Webb noted the mile-long path to the lake is now a scorching hike on a hot summer afternoon, thanks to the loss of the forest canopy.

"It's a little depressing to some people because they were used to walking through the shade," Webb said. "But when you start to look at it, the dead trees in their own way have their own beauty."

Some of the trees have shed their burned bark like last winter's coat, leaving a smooth buckskin.

At their feet rise young conifers, some 6 feet tall, including pine, fir and several rare Brewer spruce, also known as weeping spruce.

"All these young trees you see are post-fire," he said. "It took a few years for the conifers to really get going but they are coming back now."

"It's still not like a young forest that is closing things off, it is filling back in," he said.

Bracken fern is thriving along sections of the trail near a small stream trickling down a narrow canyon. Lady ferns step lightly from the damp but rocky soil. And red monkey flowers are about to burst forth from the damp soil.

More water is probably in the stream after the fire than before because the dead trees are no longer drawing water from the ground, Webb will tell you.

Indeed, the skeletal forest isn't sucking up anything now.

Farther along there are huckleberry bushes, although it is too early in the season to find a ripe berry. Tendrils of wild blackberry, a low bush native to the area, also can be seen along the trail.

An elderberry tree, already about five feet high, is sprouting up along the trail.

On rock outcroppings, sedum plants with pink blossoms are flourishing. The succulents often survive fire because they are farther away from vegetation that fuels a blaze, he noted.

"With some plants or animals, a fire doesn't make any difference to them," Webb said. "Others, it does matter. For instance, hermit warblers have no habitat here now because they are in the trees. But they will be back eventually."

Near the lake, most of the greenery remaining is on the north end near the outlet. That includes Brewer spruce, white fir and Port Orford cedar as well as azaleas in bloom.

"This patch somehow survived," he said.

But a hundred feet away, the trees were killed by the fire, as they were on the south and west sides of the lake.

The fire appears to have had little impact on the lake's inhabitants, including eastern brook trout, bass and rough-skinned newts.

"They were all spectators," Webb said.

Although a decade may seem a long time to humans, it is but a short time in nature, he said.

"In 10 years from now, there will more trees down," he said. "The conifers you see now that are already as tall as we are, they will be twice the size they are in another decade.

"It will start to look like a young forest at that point," he said. "There will be less forage than there is now."

But he figures it will be at least a century before the old-growth forest returns.

"Some of these big trees were probably a hundred to a couple of hundred years old when the fire came," he said. "It will take awhile before they are the size of the big ones that burned in 2002.

"It will be the 22nd century when people finally come here and think this is what it probably looked like before Biscuit," he said.

We incorporate the words in this *Crown Of The Continent* article as comments on the Proposed Action. Some highlights:

- In the Northern Rockies, …for the vast majority of forest types within the region, the predominant fire regime is one of infrequent, intense, stand-replacement fires—not one of frequent, low-intensity, understory burns. With ever-present fire in the system, we might expect that plants and animals have, over evolutionary time, not only come to survive severe fire, but to depend on severe fire for their persistence and success.
- Despite widespread death associated with fire, severely burned forest systems are neither "destroyed" nor "lifeless." As an ecologist and teacher who frequently speaks to public audiences, I have become more and more sensitive to the fact that most people have never heard that there are some plant and animal species that are hard to find anywhere outside a forest that was severely burned fewer than 10 years before. Indeed, the biological magic associated with severe disturbance events is apparently one of nature's best-kept secrets!
- Many …bird species reach their greatest abundance in burned forests. These include the Three-toed Woodpecker, Hairy Woodpecker, Olive-sided Flycatcher, Clark's Nutcracker, Mountain Bluebird, American Robin, Townsend's Solitaire, Cassin's Finch, Dark-eyed Junco, Chipping Sparrow, and Red Crossbill.
- Amazingly, within burned forest perimeters, Black-backed Woodpeckers are almost entirely absent from unburned patches within those fire perimeters, and they become more common as fire severity increases! The same pattern is true of a number of other species, including the American Three-toed Woodpecker, Hairy Woodpecker, Mountain Bluebird, and Tree Swallow.
- Conditions created by a stand-replacement forest fire are biologically unique at the very least in terms of the biomass of standing dead trees that remain, and to a much greater extent, in terms of ecosystem structure and function. While timber harvesting is a form of ecological disturbance, it is a poor substitute for fire-based disturbance because it does not result in numerous, burned, standing-dead trees. Such trees are the most critical component of a biologically diverse post-fire ecosystem and that single component contributes significantly to the production of unique successional pathways and unique wildlife communities that we see after fire.
- One of the most common management activities following forest fires is salvage logging. Perhaps we need to change our thinking when it comes to logging after forest fires. With respect to birds, no species that is relatively restricted to burned-forest conditions has ever been shown to benefit from salvage harvesting. In fact, most timber-drilling and timber-gleaning bird species disappear altogether if a forest is salvage-logged. Therefore, if we want our land-use decisions to be based, at least in part, on whether a proposed

activity affects the ecological integrity of our forest systems, burned forests should be the LAST, rather than the first places we should be going for our wood.

- For birds, standing dead trees are one of the most special biological attributes of burned forests. They house equally unique beetle larvae that become abundant because they feast on the wood beneath the bark of trees that have died and are, therefore, defenseless against attack. If we value and want to maintain the full variety of organisms with which we share this Earth, we must not only recognize that burned forests are quite "healthy," but must also begin to recognize that post-fire logging removes the very element — standing dead trees — upon which each of those special bird species depend for nest sites and food resources.
- People naturally want to harvest trees after fire because the only thing they can see is wastefulness. But there is no waste in nature. Burned forests, even severely burned forests, are forests that have been "restored" in the eyes of numerous plant and animal species and in the eyes of an informed public. The burned trees are essential for maintaining an important part of the biological diversity we value today, and are the foundation for the forests of the future. Fire (and its aftermath) should be seen for what it is: a natural process that creates and maintains much of the variety and biological diversity that we see in the Northern Rockies.


CROWN OF THE CONTINENT
THE UNIVERSITY OF MONTANA
MAGAZINE
fall 2011 issue 6

The beauty of a burned forest

The only thing that's constant in the Crown is change.

story and photos by RICHARD HUTTO

In the Northern Rockies, forests that have escaped fire are rare. In the Crown, fire is just as important as rainfall and sunlight are to plants and animals. For the vast majority of forest types within the region, the predominant fire regime is one of infrequent, intense, stand-replacement fires—not one of frequent, low-intensity, understory burns. With ever-present fire in the system, we might expect that plants and animals have, over evolutionary time, not only come to survive severe fire, but to depend on severe fire for their persistence and success. That is the story I want to tell here.

Despite widespread death associated with fire, severely burned forest systems are neither "destroyed" nor "lifeless." As an ecologist and teacher who frequently speaks to public audiences, I have become more and more sensitive to the fact that most people have never heard that there are some plant and animal species that are hard to find anywhere outside a forest that was severely burned fewer than 10 years before. Indeed, the biological magic associated with severe disturbance events is apparently one of nature's best-kept secrets!

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See next page

43

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Following the widespread fires of 1988, I was curious to see whether the forests of Yellowstone, Glacier and elsewhere between the two parks had become transformed into lifeless biological deserts, as implied by press reports at the time (and as implied still by similar reports that follow major fire events even today), or whether the actual story is something different. During the two summer seasons immediately following the 1988 fires, a number of field assistants and I visited 34 different burned-forest sites in western Montana and northern Wyoming and we recorded the bird community composition in each. Contrary to what one might expect to find immediately following a major disturbance event like wildfire, we detected a surprisingly large number of species in forests that had undergone stand-replacement fires.

More specifically, we detected an average of 45 species per site, and a total of 87 species in the sites combined. Some of the most commonly detected species included the Hairy Woodpecker, American Robin, Mountain Bluebird, and Dark-eyed Junco (Figure 1, blue bird photo on right). Further analysis showed that 15 of the 87 bird species were more abundant in the early post-fire communities than they were reported to be in any other major vegetation type within the northern Rockies. Thus, birds were not only present, but the bird communities in recently burned forests were interestingly different in composition from those that characterize other Rocky Mountain cover types (including early-successional clearcuts, which are not at all similar in bird community composition).

The most amazing finding was that one bird species, the Black-backed Woodpecker, Picoides arcticus, seemed to be nearly restricted in its habitat distribution to forests that had been burned in the recent past. How did I determine that Black-backs were relatively restricted to recently burned forests? I compiled bird survey data that were available from published studies associated with a dozen different vegetation types. The Black-backed Woodpecker was detected less than 10% of the time in unburned vegetation types, but was detected about 80% of the time in studies conducted in burned forests (Figure 2, photo on left). Because these data were derived from a literature-based meta-analysis of studies that differed in duration and survey methodology and were drawn from a relatively small number of vegetation types, I encountered some skepticism—the pattern could have been an artifact of the incomplete range of vegetation types surveyed, or an artifact of combining results from studies that used different methods used to survey birds. At about the same time, I began working with the USFS Northern Region to develop a bird monitoring program that would involve use of the identical field methods across as large a range of vegetation types as possible. Now, 20 years later, the USFS Northern Region Landbird Monitoring Program stands as one of the largest bird point-count databases of its kind in the world, with sample locations drawn from a wide range of vegetation types across northern Idaho and western Montana. By combining those data with data collected from locations distributed within more than 50 fires that had burned in western Montana during the past 20 years, I am now able to ask, once and for all, whether the Black-backed Woodpecker is relatively restricted to burned forest conditions.

After summarizing information from more than 50,000 survey locations distributed across nearly every vegetation type occurring in the northern Rockies, it is clear that the restricted distribution pattern is not an artifact of problems associated with my earlier meta-analysis. The Black-backed Woodpecker is, as my earlier study suggested, nearly restricted in its habitat distribution to burned forest conditions.

Just take the time to look carefully at a Black-backed Woodpecker—everything about it, including its jet-black coloration, seems to reflect a long evolutionary history with burned forests. As I like to point out, the black coloration against a blackened tree is no less impressive than the white coloration of a ptarmigan against snow—both coloration patterns have undoubtedly evolved over long time periods in association with their respective environmental backdrops! The Black-backed Woodpecker capitalizes on the population explosion of wood-boring beetle larvae in burned forests, as do several other woodpecker species. Because many burned trees die, they can no longer defend themselves against beetles by swamping the eggs and larvae with pitch exuded into their burrows. Consequently, the adult beetles have evolved to fly in immediately after fire to lay their eggs on now-defenseless trees that still have plenty of good wood beneath that scorched bark. Some beetle species are so specialized to live in fire-dominated systems like those here in the Crown, that they have evolved infrared sensors that allow them to detect heat from miles and miles away so that they can colonize recently burned forests as rapidly as possible. Although the Black-backed Woodpecker is the most extreme species in terms of its restriction to, and evolutionary history with, burned forests, many additional bird species reach their greatest abundance in burned forests (15 of 87 species detected in burned forests, as I noted above). These include the Three-toed Woodpecker, Hairy Woodpecker, Olive-sided Flycatcher, Clark's Nutcracker, Mountain Bluebird, American Robin, Townsend's Solitaire, Cassin's Finch, Dark-eyed Junco, Chipping Sparrow, and Red Crossbill. All the woodpeckers feed on the abundant beetle larvae beneath the bark of standing, fire-killed trees, while flycatchers and bluebirds take advantage of the open conditions for pouncing on or sallying after flying insects, and seedeaters capitalize on the increased availability of seeds from both cone-bearing trees, some of which wait for more than 150 years for fire to heat and open their cones, thereby releasing their seeds.

The story doesn't end with birds, of course.

I have barely scratched the surface of the amazing biological story behind severe fire. In addition to the specialized beetles, there are cone-bearing tree species that require severe fire for the heat needed to open their cones, and there's the fire morel, which is also relatively restricted to severely burned forests. It's no wonder that we enjoy a boom year for morel mushrooms at the local farmer's market following a severe forest fire season in western Montana. The seeds of Bicknell's geranium can wait in the soil for more than 100 years until a severe fire allows them to break from that dormancy, germinate, and complete their life cycle.

By definition, fire specialists such as the Black-backed Woodpecker or the lodgepole pine depend heavily on very specific conditions to realize their own success. Therefore, if we study the patterns of distribution and success of these fire-dependent species across the variety of burn severities within burned-forest perimeters, we can gain insight into the kinds of fires

that constitute the naturally occurring fire regime in areas that were historically occupied by the specialists. Very specific kinds of fires must have provided the environmental backdrop against which these specialized native species evolved; so what kinds of historical fires were they? Amazingly, within burned forest perimeters, Black-backed Woodpeckers are almost entirely absent from unburned patches within those fire perimeters, and they become more common as fire severity increases! The same pattern is true of a number of other species, including the American Three-toed Woodpecker, Hairy Woodpecker, Mountain Bluebird, and Tree Swallow. As I expressed in a recent publication—some like it hot! These results are profound because they imply that the very fires often regarded as "unnatural" and "destructive" are the very fires that provide the best conditions for the most fire-dependent plant and animal species.

Land managers can't create the magic through severe cutting—fire is critical.

One could argue that any loss of burned forest acreage due to past fire suppression activity has been compensated for, at least in part, by timber harvesting activities. As evidenced by letters submitted to the editors of local newspapers after any major fire event, many people believe that the conditions present after a clearcut or following one of the newer green-tree retention or forest restoration cuts are basically the same as those present after a severe fire. They are wrong. Conditions created by a stand-replacement forest fire are biologically unique at the very least in terms of the biomass of standing dead trees that remain, and to a much greater extent, in terms of ecosystem structure and function. While timber harvesting is a form of ecological disturbance, it is a poor substitute for fire-based disturbance because it does not result in numerous, burned, standing-dead trees. Such trees are the most critical component of a biologically diverse post-fire ecosystem and that single component contributes significantly to the production of unique successional pathways and unique wildlife communities that we see after fire.

"NATURAL" FIRE REGIMES IN THE CROWN

People have slowly come to accept the fact that low-severity fires burned historically, but they still view severe events as "unnatural" events. How often have you read the following? "Dry, ponderosa pine-dominated forests of the western United States are widely believed to have experienced a buildup of fuels in the past century due to a combination of over-aggressive fire suppression efforts, overgrazing, and overharvesting. As a result, those western forests suffer from more extreme fire behavior because they burn with unnatural or unprecedented intensity." Unfortunately, we may be inappropriately extrapolating results from ponderosa pine systems that are quite common the Southwest, to the more mesic ponderosa pine systems and the mixed-conifer forest types that make up the vast majority (about 85%) of forested area in the Crown.

Indeed, severe fires are routinely referred to as "catastrophic" events in the popular press regardless of forest type, and such terminology even appears in proposed congressional legislation drafted to deal with severe fire's aftermath. Given the current rate at which land managers are implementing forest restoration projects specifically designed to prevent severe fire sometimes well outside the dry, ponderosa pine system, one would hope that generalizations about the state of our forests are broadly applicable.

The ecology and life history adaptations of living organisms are greatly underused as sources of reliable information in the debate about what constitutes "natural" forest conditions and fire regimes in any forest type. This is surprising, given that the goal of forest restoration is to return forests to conditions that reflect their evolutionary past. Through their precise selection of suitable habitat, plant and animal species carry an abundance of historical information about the environments within which they evolved. Moreover, that evolutionary history is valuable because it runs much deeper than the 100- to 500-year reach of most historical (e.g., fire-scarred tree-ring) studies. The plants and animals featured here are talking through their adaptations about the importance of severe fire on our landscapes; are we listening?

Because most have not heard this story, there is considerable public pressure to "salvage" what little remains after severe fire.

One of the most common management activities following forest fires is salvage logging (Figure 8). Perhaps we need to change our thinking when it comes to logging after forest fires. With respect to birds, no species that is relatively restricted to burned-forest conditions has ever been shown to benefit from salvage harvesting. In fact, most timber-drilling and timber-gleaning bird species disappear altogether if a forest is salvage-logged. Therefore, if we want our land-use decisions to be based, at least in part, on whether a proposed activity affects the ecological integrity of our forest systems, burned forests should be the LAST, rather than the first places we should be going for our wood.

For birds, standing dead trees are one of the most special biological attributes of burned forests. They house equally unique beetle larvae that become abundant because they feast on the wood beneath the bark of trees that have died and are, therefore, defenseless against attack. If we value and want to maintain the full variety of organisms with which we share this Earth, we must not only recognize that burned forests are quite "healthy," but must also begin to recognize that post-fire logging removes the very element — standing dead trees — upon which each of those special bird species depend for nest sites and food resources.

WHY DO WE FIND IT SO HARD TO CELEBRATE SEVERE-FIRE EVENTS?

The biological facts are unambiguous and readily apparent to anyone who wants to venture out and look for him or herself, so why do we so often fail to embrace the early successional stages—burned trees and all—that follow stand-replacement fires? There are a number of reasons, but the most important is that the public continues to be told that all fires are bad, which, as I have outlined here, is patently false. Even if the public were to become convinced that severe fires are natural and necessary for ecosystem health, we now have a problem because humans have settled nearly everywhere. That human presence requires fire suppression to be a priority nearly everywhere. Wilderness, parks, and roadless areas are really our primary hope for the maintenance of naturally severe fire regimes, and we are lucky in the Crown of the Continent to have an abundance of such areas along with an abundance of non-wilderness areas far enough removed from the urban interface to allow severe fire to burn naturally.

SEVERE DISTURBANCE MAKES THE WORLD A DANGEROUS BUT INTERESTING PLACE

Burned forest habitat is one of nature's best-kept secrets because the public really hasn't been told about the magical transformation a forest undergoes after severe fire. And I barely touched on some of the more fascinating stories about plants and animals that are restricted to burned-forest conditions. Being unaware of these stories, people naturally want to harvest trees after fire because the only thing they can see is wastefulness. But there is no waste in nature. Burned forests, even severely burned forests, are forests that have been "restored" in the eyes of numerous plant and animal species and in the eyes of an informed public. The burned trees are essential for maintaining an important part of the biological diversity we value today, and are the foundation for the forests of the future. Fire (and its aftermath) should be seen for what it is: a natural process that creates and maintains much of the variety and biological diversity that we see in the Northern Rockies. The next time you are lucky enough to walk through an intact, severely burned forest, I hope you can now properly recognize it as a beauty mark rather than a scar on our magnificent Crown of the Continent landscape.

Dr. Richard L. Hutto is Professor and Director of the Avian Science Center at the University of Montana in Missoula. Hutto has conducted research on migratory landbirds in Mexico in winter, the Southwest during spring and fall, and in the Northern Rockies in summer for more than 30 years. He developed and continues to supervise the USFS Northern Region Landbird Monitoring Program, which is now in its 20th year of operation, and he has been studying the ecological effects of fire on bird communities for 20 years as well. Dr. Hutto was host of "Birdwatch," a nationally televised PBS series that ran from 1999-2001. Because he is moved by what birds have to teach us about land stewardship, Hutto established the Avian Science Center on the University of Montana campus to promote ecological awareness and informed decision making through the synthesis and dissemination of science-based information on western birds (http://avianscience.dbs.umt.edu/).

"It's no wonder that we enjoy a boom year for morel mushrooms at the local farmer's market following a severe forest fire season in western Montana. The seeds of Bicknell's geranium can wait in the soil for more than 100 years until a severe fire allows them to break from that dormancy, germinate, and complete their life cycle.**"**

Richard Hutto, professor and director of the
Avian Science Center
University of Montana

We incorporate the words in still another *Missoulian* article as comments on your Proposed Action. We highlight a few here:

- We always seem to think we need to restore the forest after a fire, but this is the restoration. Some of these plants have been waiting 100 years for this event to occur.
- If you want to maintain the diversity of life on this planet, you need fire.
- Black-backed woodpeckers and three-toed woodpeckers seem to thrive in the most severely burned forests, honing in on post-fire beetle infestations.
- Years two through four are the big years for black-backed woodpeckers. And for beetles. What I am left with, again and again, is the realization of how unique this is, and how much more we need to know.

Missoulian, Sunday, August 1, 2004

One year after fire Black Mountain is springing back to life
By SHERRY DEVLIN of the Missoulian

The mother junco scolded from a blackened tree as the young researcher made his way through the fireweed, nearing the hidden nest.

Carefully, he parted the chest-high wildflowers, revealing the nest below - mud, twigs and fluff.

Bruce Robertson's visit was brief, so as not to interrupt the feeding. He needed but one piece of information this morning: How many baby juncos remained in the little palm-sized nest?

Three fuzzy babies snuggled amid the fireweed, two fewer than on Robertson's last visit. "The chipmunk's been here," he said.

The mother junco complained louder, insistent on delivering a tiny green worm to her brood.

"Chip, chip, chip," the bird warned. "Go away."

And Robertson was gone, off to check another nest built this summer in the forest burned by the Black Mountain fire.

A year ago this week, when lightning set fire to Black Mountain, all eyes were on the neighborhoods at risk: hundreds of homes on Horseback Ridge, O'Brien Creek, Lyon Gulch and Cedar Ridge Road.

Three homes eventually burned - late on the afternoon of Aug. 16, 2003 -

when high winds blew the Black Mountain fire on a 5-mile, 5,000-acre run.

Within hours, nearly 1,000 firefighters were throwing water and dirt at hot spots all across Black Mountain and its sister to the south, Blue Mountain.

By the time the last of three incident command teams left town Sept. 15, the Black Mountain fire had burned 7,061 acres and created a black-stick forest on Missoula's western edge.

A year later, homes have been rebuilt and neighborhoods are back about their workaday routines. Now, the forest and its renewal is the story - one that University of Montana professor Dick Hutto describes as "incredible."

Careful not to downplay the fire's initial threat to homes and lives, Hutto encourages visitors to celebrate the Black Mountain fire.

"I cannot imagine anything more beautiful," he said one morning last week, surrounded by a mountainside of wildly blooming fireweed. "This is the most biologically amazing thing we have going. It is absolutely unique."

A three-toed woodpecker hammered on a blackened snag, hunting beetle larvae. Fledgling juncos flitted from branch to branch, testing their just-sprouted feathers.

Hutto and his students, Robertson among them, have counted 100 species of birds in the burned area this spring and summer. Ninety-five percent of them use the dead trees for homes or food.

The other 10 percent, including the black-eyed juncos, build their nests on the ground in a veritable forest of wildflowers: fireweed, spirea, yarrow, wild geraniums, showy asters and bluebells.

Ninebark and snowberry are thick, and tall. Finger-high larch trees stand delicately, but resolutely, alongside their burned ancestors.

"We always seem to think we need to restore the forest after a fire, but this is the restoration," Hutto said. "Some of these plants have been waiting 100 years for this event to occur."

In 1988, after the much-publicized wildfires in Yellowstone National Park, Hutto and others set out to look at the effects of fire on a forest. What happens next?

The answer came quickly: "There is a lot that you find in a burned forest that you don't find anywhere else," Hutto said. "There are birds you only find in burned forests and flowers and shrubs and other critters.

"If you take away the fires, then you lose those birds and plants and critters. If you take away the fires, where are you going to find a morel mushroom? Or a black-backed woodpecker?

"If you want to maintain the diversity of life on this planet, you need fire."

The more he looks at burned forests, the more Hutto understands their complexity. His work on the Black Mountain fire, in fact, is focused on some of those subtleties:

Are there species found only in severely burned forests? In moderately burned forests? In low-intensity burns? And what effect did the pre-fire condition have on the post-fire response? And what about salvage logging? How does that affect the fire-dependent species?

Robertson, a doctoral student at UM, is studying the burned area's booming population of juncos, which nest on the ground and in holes left by burned-out tree roots.

In three months, he has watched the forest floor transform itself: from black ash to green to a pastel rainbow. Along the way, he's seen himself change as well.

"I started out like everybody else, talking about how much acreage the fire destroyed," Robertson said. "Now I see the renewal and restoration. There's something new - something amazing - every day."

This day, he finds a chipping sparrow nest perched ever so delicately on the auburn branch of a little fire-killed Douglas fir tree.

And a dozen long, long caterpillars munching their way up 4-foot-high fireweed plants.

And baby juncos a few days from leaving the last of 70 nests he's monitored since May.

"I called this territory 'The Land of Broken Dreams,' "Robertson said, "because the male and female had three failed nests before this one finally succeeded. They just never gave up."

Juncos, chipping sparrows and western tanagers seem to prefer medium-severity burns, where the forest is a mix of standing dead and green trees.

In the burned area, juncos averaged 1.7 successful nests this summer, a reproductive boom.

Black-backed woodpeckers and three-toed woodpeckers seem to thrive in the most severely burned forests, honing in on post-fire beetle infestations.

"They'll just go through the roof next year," Hutto said. "Years two through four are the big years for black-backed woodpeckers."

And for beetles.

"What I am left with, again and again, is the realization of how unique this is," Hutto said, "and how much more we need to know."

That's why Hutto and others, including UM's Avian Science Center, the Lolo National Forest and the Montana Natural History Center, have sponsored dozens of field trips to Blue Mountain this spring and summer.

"Public land is the only hope for these burned ecosystems," he said. "These are the only places left where we can let fire play its natural role."

The education will take a while, Hutto conceded, at least in part because some of the needed fires must burn severely.

"We need the catastrophic fires," he said. "Of course, we don't want to see houses burn down or lives lost, but some of these species only live in severely burned forests. They need the toasted stuff."

And they're loving life on Blue Mountain these days, Robertson said. Just watch the junco parents tend their young, relentlessly delivering worms and ants and daddy longlegs to the nest.

"I counted six deliveries every 30 minutes," he said. "Imagine that. It's a huge job feeding those chicks, but they're really, really committed to it."

The mother junco hopped along a charcoal tree branch, chipping at Robertson and waving her latest catch at the babies.

He went about his way, carefully picking through the fireweed so as not to leave a trail for would-be predators.

A calliope hummingbird zipped by, showing off. The sun broke through the early morning haze, setting the wildflowers ablaze.

"What a paradise," Hutto said. "What a celebration."

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The EA says, "heavy fuel loading adjacent to these powerlines could pose a threat to the lines and towers under certain fire and weather conditions." Yet it also says Avista and Bonneville Power Administration will continue to clear brush and trees to maintain their powerline rights of way, which assists in reducing ignition potential from the powerlines themselves and creating areas of fuel breaks. (P. 28.) Thus the EA debunks some of its own fear mongering.

"The proposed action would see a short-term increase in risk of ignition during harvest-related activities" and the EA also admits that slash on the ground increases the risk of fire severity: "lame lengths would increase following harvest, and this is mainly due to an increase in slash." The EA doesn't adequately reconcile those facts with the claims of "reducing" risk and it fails to say how long this slash typically is left before "treatment."

Table 10 displays "Fuel characteristics by alternative, alternatives 2 and 3 assume treatments have been completed." The metrics are "canopy base height" and "canopy bulk density." As is the case with so many resource analyses, the EA omits any temporal analyses of such effects.

Same problem with "The flame lengths in treatment areas would be reduced to levels below 4 feet." The EA has nothing to say about the staying power of such project-induced changes, pretending there would be no fading of such effect over time. The idea of temporally limited effectiveness makes many EA analyses unbalanced.

The analyses presented in Tables 11, 12, and 13 exhibit the same lack of consciousness of the concept of time.

"(F)uture harvest activities by the Forest Service …will reduce fuel in the project area. … Additional vegetation treatments would be necessary to mitigate hazardous fuels and crown fire potential into the future. … The silvicultural prescriptions that include a **schedule** of future entries benefit fuels reduction into the **future**." (Emphases added.) The EA fails to disclose its future schedule or even a slightly fleshed out detail of a plan.

"Fire suppression will continue… This management strategy means that the effects of 80 years of suppression would continue on their current trend." It seems there will be no end to this damaging, reactive management scheme. As long as tree farming is allowed to dominate national forest management, enlightened approaches to fire will never happen.

"Alternative 2 proposes burning on another approximately 3,436 acres of dry-site (capable) habitat, including about 1,980 other acres of potentially suitable nesting habitat. These burns are intended to mimic mixed-severity fires such as would have occurred naturally…" The EA doesn't disclose the effects of these mixed-severity mimicking fires in terms of metrics such as openness, remaining live and dead tree structure, canopy cover, etc.

DellaSala, et al. (1995) state:

> Scientific evidence does not support the hypothesis that intensive salvage, thinning, and other logging activities reduce the risk of catastrophic fires if applied at landscape scales ... At very local scales, the removal of fuels through salvage and thinning may hinder some fires. However, applying such measures at landscape scales removes natural fire breaks such as moist pockets of late-seral and riparian forests that dampen the spread and intensity of fire and has little effect on controlling fire spread, particularly during regional droughts. ... Bessie and Johnson (1995) found that surface fire intensity and crown fire initiation were strongly related to weather conditions and only weakly related to fuel loads in subalpine forest in the southern Canadian Rockies. . . . Observations of large forest fires during regional droughts such as the Yellowstone fires in 1988 (Turner, et al. 1994) and the inland northwest fires of 1994 . . . raise serious doubts about the effectiveness of intensive fuel reductions as "fire-proofing" measures.

Veblen (2003) states:

> The premise behind many projects aimed at wildfire hazard reduction and ecological restoration in forests of the western United States is the idea that unnatural fuel buildup has resulted from suppression of formerly frequent fires. This premise and its implications need to be critically evaluated by conducting area-specific research in the forest ecosystems targeted for fuels or ecological restoration projects. Fire regime researchers need to acknowledge the limitations of fire history methodology and avoid over-reliance on summary fire statistics such as mean fire interval and rotation period. While fire regime research is vitally important for informing decisions in the areas of wildfire hazard mitigation and ecological restoration, there is much need for improving the way researchers communicate their results to managers and the way managers use this information.

The NEPA document must disclose that most wildland fire ignitions are human-caused, and occur near roads.

Where may we find an analysis of the Forestwide cumulative effects of your fire management policies, including fire suppression policies? The Forest Plan and its EIS did not include a programmatic analysis of the cumulative effects of fire suppression. Part of the agency's mantra for more management includes mitigating the impacts of fire suppression. So to comply with NEPA, the FS must conduct a programmatic analysis of the cumulative effects of its fire suppression policies. Until it does so, the FS cannot assure viability of the black-backed woodpecker, a species that depends upon the direct effects of natural wildland fire.

Scientific information concerning fire suppression became a major theme of the Interior Columbia Basin Ecosystem Management Project (ICBEMP) in the 1990s: "Aggressive fire suppression policies of Federal land-managing agencies have been increasingly criticized as more has been learned about natural fire cycles." (USDA FS & USDI BLM 1996, p. 22.) Also, "Substantial changes in disturbance regimes—especially changes resulting from fire suppression, timber management practices, and livestock grazing over the past 100 years—have resulted in moderate to high departure of vegetation composition and structure and landscape mosaic patterns from historical ranges." (USDA FS & USDI BLM 2000, Ch. 4. P. 18.)

Many direct and indirect effects of fire suppression are must be analyzed and disclosed at the project level and as well as in the programmatic context. For example, Ingalsbee, 2004 describes the direct, indirect, and cumulative environmental impacts of firefighting:

> Constructing firelines by handcrews or heavy equipment results in a number of direct environmental impacts: it kills and removes vegetation; displaces, compacts, and erodes soil; and degrades water quality. When dozerlines are cut into roadless areas they also create long-term visual scars that can ruin the wilderness experience of roadless area recreationists. Site-specific impacts of firelines may be highly significant, especially for interior-dwelling wildlife species sensitive to fragmentation and edge effects.
>
> ...Another component of fire suppression involves tree cutting and vegetation removal. Both small-diameter understory and large-diameter overstory trees are felled to construct firelines, helispots, and safety zones.
>
> ...A host of different toxic chemical fire retardants are used during fire suppression operations. Concentrated doses of retardant in aquatic habitats can immediately kill fish, or lead to algae blooms that kill fish over time. Some retardants degrade into cyanide at levels deadly to amphibians. When dumped on the ground, the fertilizer in retardant can stimulate the growth of invasive weeds that can enter remote sites from seeds transported inadvertently by suppression crews and their equipment.
>
> ...One of the many paradoxes of fire suppression is that it involves a considerable amount of human-caused fire reintroduction under the philosophy of "fighting fire with fire." The most routine form of suppression firing, "burnout," occurs along nearly every linear foot of perimeter fireline. Another form of suppression firing, "backfiring," occurs when firefighters ignite a high-intensity fire near a wildfire's flaming edge, with or without a secured containment line. In the "kill zone" between a burnout/backfire and the wildfire edge, radiant heat intensity can reach peak levels, causing extreme severity effects and high mortality of wildlife by entrapping them between two high-intensity flame fronts.
>
> ...Firelines, especially dozerlines, can become new "ghost" roads that enable unauthorized or illegal OHV users to drive into roadless areas. These OHVs create further soil and noise disturbance, can spread garbage and invasive weeds, and increase the risk of accidental human-caused fires.
>
> ...Roads that have been blockaded, decommissioned, or obliterated in order to protect wildlife or other natural resource values are often 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's Vizcarra, 2017 notes that researchers "see the critical role that mixed-severity fires play in providing enough snags for cavity-dependent species. Low-severity prescribed fires often do not kill trees and create snags for the birds."

There has been extensive research in forests about the ecological benefits of mixed-severity (which includes high-severity) fire over the past two decades, so much so that in 2015 science and academic publishing giant Elsevier published a four hundred page book, *The Ecological Importance of Mixed-Severity Fires: Nature's Phoenix* which synthesizes published, peer-reviewed science investigating the value of mixed- and high-severity fires for biodiversity (DellaSala and Hanson, 2015). This book includes research documenting the benefits of high-intensity wildfire patches for wildlife species, as well as a discussion of mechanical "thinning" logging, approved here, and its inability to reduce the chances of a fire burning in a given area, or alter the intensity of a fire, should one begin under high fire weather conditions, because overwhelmingly weather, not vegetation, drives fire behavior (DellaSala and Hanson, 2015, Ch. 13, pp. 382-384).

Mixed-severity fires, and in particular patches of high-severity fire, benefit grizzly bears by increasing cover of berry producing shrubs (such as huckleberry) that the bears rely upon to get fat before winter, and promoting regeneration of whitebark pine— the seeds of which are an important food source for the bears (DellaSala and Hanson, 2015, Ch. 4, pp. 89, 101).

The IPNF has not conducted a thorough and complete analysis of forestwide cumulative effects of fire management policies, including fire suppression policies. The Forest Plan and its FEIS did not include a programmatic analysis of the cumulative effects of fire suppression. Part of the agency's mantra for more management includes mitigating the impacts of fire suppression. So to comply with NEPA, the FS must conduct a programmatic analysis of the cumulative effects of its fire suppression policies. Until it does so, the FS cannot assure viability of species that depend upon the effects of natural wildland fire such as the black-backed woodpecker (Hutto 1995, Hutto 2006, Hutto 2008); boreal toad, (Hutto 2006); mountain bluebird, American three-toed woodpecker, and olive-sided flycatcher (Hutto 2005, Hutto 2006).

Odion and DellaSala, 2011 describe this situation: "…fire suppression continues unabated, creating a self-reinforcing relationship with fuel treatments which are done in the name of fire suppression. Self-reinforcing relationships create runaway processes and federal funding to stop wildfires now amounts to billions of tax dollars each year."

Also see DellaSala et al., 2018 who summarize some of the latest science around top-line wildfire issues, including areas of scientific agreement, disagreement, and ways to coexist with wildfire. It is a synopsis of current literature written for a lay audience and focused on six major fire topics:

1. Are wildfires ecological catastrophes?
2. Are acres burning increasing in forested areas?
3. Is high severity fire within large fire complexes (so called "mega-fires") increasing?
4. What's driving the recent increase in burned acres?
5. Does "active management" reduce wildfire occurrence or intensity?
6. Will more wildfire suppression spending make us safer?

The premise that thinning and other mechanical treatments replicate natural fire is contradicted by science (for example see Rhodes and Baker 2008, McRae et al 2001, and Rhodes 2007).

The FS assumes that natural fire regimes would maintain practically all the low and mid-elevation forests in open conditions with widely spaced mature and old trees. The FS fails to acknowledge that mixed-severity and even low-severity fire regimes result in much more variable stand conditions across the landscape through time. Assumptions that drier forests did not experience stand-replacing fires, that fire regimes were frequent and nonlethal, that these stands were open and dominated by large well-spaced trees, and that fuel amounts determine fire severity (the false thinning hypothesis that fails to recognize climate as the overwhelming main driver of fire intensity) are not supported by science (see for example Baker and Williams 2015, Williams and Baker 2014, Baker et al. 2006, Pierce et al. 2004, Baker and Ehle 2001, Sherriff et al. 2014). Even research that has uncritically accepted the questionable ponderosa pine model that may only apply to the Mogollon Rim of Arizona and New Mexico (and perhaps in similar dry-forest types in California), notes the inappropriateness of applying that model to elsewhere (see Schoennagel et al. 2004). The EA's assertion that the proposed treatments will result in likely or predictable later wildland fire effects is of considerable scientific doubt (Rhodes and Baker, 2008).

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

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

The Hutto, 2008 Abstract states:

> I use data on the pattern of distribution of one bird species (Black-backed Woodpecker, *Picoides arcticus*) as derived from 16,465 sample locations to show that, in western Montana, this bird species is extremely specialized on severely burned forests. Such specialization has profound implications because it suggests that the severe fires we see burning in many forests in the Intermountain West are not entirely "unnatural" or "unhealthy." Instead, severely burned forest conditions have probably occurred naturally across a broad range of forest types for millennia. These findings highlight the fact that severe fire provides an important ecological backdrop for fire specialists like the Black-backed Woodpecker, and that the presence and importance of severe fire may be much broader than commonly appreciated.

The Scoping Notice primarily discusses fuel conditions **only in the areas proposed for treatment**, yet wildland fire operates beyond artificial ownership or other boundaries. In regards to the proper cumulative effects analysis area for fire risk, Finney and Cohen (2003) discuss the concept of a "fireshed involving a wide area around the community (for many miles that include areas that fires can come from)." In other words, for any given entity that would apparently have its risk of fire reduced by the proposed project (or affected cumulatively from past, ongoing, or foreseeable actions on land of all ownerships within this "fireshed")—just how effective would fuel reduction be? The Scoping Notice 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 Scoping Notice also fails to deal with the fuels issue on the appropriate **temporal** scale. How landscape-level fire behavior at any period except for very shortly after treatment would be changed or improved is ignored.

Rhodes (2007) states: "The transient effects of treatments on forest, coupled with the relatively low probability of higher-severity fire, makes it unlikely that fire will affect treated areas while fuel levels are reduced." (Internal citations omitted.) And Rhodes also points out that using mechanical fuel treatments (MFT) to restore natural fire regimes must take into consideration the root causes of the alleged problem:

> In order to be ultimately effective at helping to restore natural fire regimes, fuel treatments must be part of wider efforts to address the root causes of the alteration in fire behavior. At best, MFT can only address symptoms of fire regime alteration. Evidence indicates that primary causes of altered fire regimes in some forests include changes in fuel character caused by the ongoing effects and legacy of land management activities. These activities include logging, post-disturbance tree planting, livestock grazing, and fire suppression. Many of these activities remain in operation over large areas. Therefore, unless treatments are accompanied by the elimination of or sharp reduction in these activities and their impacts in forests where the fire regime has been altered, MFT alone will not restore fire regimes. (Internal citations omitted.)

In FW-DC-TBR-01, including the sentence that begins with "Salvage…" perpetuates the longstanding conflict between timber production and natural processes which create wildlife habitat. The Desired Condition phrase, "associated desired conditions" is too vague. And FW-DC-TBR-01 fails to recognize that market demand has no regard for ecological sustainability. Since the Forest Service fails to acknowledge the scientific and public controversy of the "salvage" issue, such statements should be excluded from the Forest Plan.

Tingley et al., 2016 note the diversity of habitats following a fire is related to <u>the diversity of burn severities:</u> "(W)ithin the decade following fire, different burn severities represent unique habitats whose bird communities show differentiation over time… Snags are also critical resources for many bird species after fire. Increasing densities of many bird species after fire—

primarily wood excavators, aerial insectivores, and secondary cavity nesters—can be directly tied to snag densities…"

Similarly, Hutto and Patterson, 2016 state, "the variety of burned-forest conditions required by fire-dependent bird species cannot be created through the application of relatively uniform low-severity prescribed fires, through land management practices that serve to reduce fire severity or through post-fire salvage logging, which removes the dead trees required by most disturbance-dependent bird species."

Hutto et al., 2016 urge "a more ecologically informed view of severe forest fires":

> Public land managers face significant challenges balancing the threats posed by severe fire with legal mandates to conserve wildlife habitat for plant and animal species that are positively associated with recently burned forests. Nevertheless, land managers who wish to maintain biodiversity must find a way to embrace a fire-use plan that allows for the presence of all fire severities in places where a historical mixed-severity fire regime creates conditions needed by native species while protecting homes and lives at the same time. This balancing act can be best performed by managing fire along a continuum that spans from aggressive prevention and suppression near designated human settlement areas to active "ecological fire management" (Ingalsbee 2015) in places farther removed from such areas. This could not only save considerable dollars in fire-fighting by restricting such activity to near settlements (Ingalsbee and Raja 2015), but it would serve to retain (in the absence of salvage logging, of course) the ecologically important disturbance process over most of our public land while at the same time reducing the potential for firefighter fatalities (Moritz et al. 2014). Severe fire is not ecologically appropriate everywhere, of course, but the potential ecological costs associated with prefire fuels reduction, fire suppression, and postfire harvest activity in forests born of mixed-severity fire need to considered much more seriously if we want to maintain those species and processes that occur only where dense, mature forests are periodically allowed to burn severely, as they have for millennia.

Bradley et al., 2016 found that areas of more intensive management tend to burn more severely than unmanaged forests:

> There is a widespread view among land managers and others that the protected status of many forestlands in the western United States corresponds with higher fire severity levels due to historical restrictions on logging that contribute to greater amounts of biomass and fuel loading in less intensively managed areas, particularly after decades of fire suppression.
>
> … On the contrary, using over three decades of fire severity data from relatively frequent-fire pine and mixed-conifer forests throughout the western United States, we found support for the opposite conclusion—burn severity tended to be higher in areas with lower levels of protection status (more intense management)… Our results suggest a need to reconsider current overly simplistic assumptions about the relationship between forest protection and fire severity in fire management and policy.

The NEPA analysis fails to reconcile this scientific perspective with the FS's own.

Despite the fact that the EA makes many statements to the effect that without the proposed treatments there is a high likelihood of highly adverse effects on various resources due to wildfire (especially in describing effects of the No Action alternative) the EA discloses essentially nothing about such effects from recent fires in the project area or vicinity.

Large fires are weather-driven events, not fuels-driven. When the conditions exist for a major fire—which includes drought, high temperatures, low humidity and high winds—nothing, including past logging, halts blazes. Such fires typically self-extinguish or are stopped only when less favorable conditions occur for fire spread. As noted in Graham, 2003:

> The prescriptions and techniques appropriate for accomplishing a treatment require understanding the fuel changes that result from different techniques and the fire behavior responses to fuel structure**. Fuel treatments, like all vegetation changes, have temporary effects and require repeated measures, such as prescribed burning, to maintain desired fuel structure.**

Fire Regime Condition Class is a metric that estimates the departure of the forest from historic fire processes and vegetation conditions. Fire regime condition class is derived by comparing current conditions to an estimate of the historical conditions that existed before significant Euro-American settlement. The EA does not disclose the limitations of this methodology. This method likely has very limited accuracy and tends to overestimate the risk of higher-severity fire posed by fuel loads, as documented by studies of recent fires (Odion and Hanson, 2006). Those researchers state:

> Condition Class, was not effective in identifying locations of high-severity fire. … In short, Condition Class identified nearly all forests as being at high risk of burning with a dramatic increase in fire severity compared to past fires. Instead, we found that the forests under investigation were at low risk for burning at high-severity, especially when both spatial and temporal patterns of fire are considered.

Another critique is found in Rhodes (2007) who states:

> Several of the biases …are embodied in the Fire Regime Condition Class (FRCC) approach (Hann and Bunell, 2001), which is widely used to provide an index of the potential for uncharacteristically severe fire and fire regime alteration. The FRCC relies on of estimates of mean fire intervals, but does not require that they be estimated on the basis of site-specific historical data. It emphasizes fire scar data, but does not require its collection and analysis on a site-specific basis. The FRCC's analysis of departure from natural fire regimes also relies on estimates of how many estimated mean fire intervals may have been skipped. The method does not require identification and consideration of fire-free intervals in site-specific historic record. Notably, a recent study that examined the correlation of FRCC estimates of likely fire behavior with actual fire behavior in several large fires recently burning the Sierra Nevada in California concluded: "[Fire Regime] Condition Class was not able to predict patterns of high-severity fire. . . . Condition Class identified nearly all forests as being at high risk of burning with a dramatic increase in fire severity compared to past fires. Instead, we found that the forests under investigation were at low risk for burning at high-severity, especially when both spatial and temporal patterns of fire are considered." (Odion and Hanson, 2006.) These results corroborate that FRCC is biased

toward overestimating the alteration of fire regimes and the likelihood of areas burning at uncharacteristically high severity if affected by fire. Therefore, in aggregate there is medium degree of certainty that the FRCC is biased toward overestimating departures from natural fire regimes and the propensity of forests to burn at higher severity when affected by fire.

Baker, 2015, states: “Programs to generally reduce fire severity in dry forests are not supported and have significant adverse ecological impacts, including reducing habitat for native species dependent on early-successional burned patches and decreasing landscape heterogeneity that confers resilience to climatic change.”

Baker, 2015 concluded: “Dry forests were historically renewed, and will continue to be renewed, by sudden, dramatic, high-intensity fires after centuries of stability and lower-intensity fires.”

Baker, 2015 writes: “**Management issues…** The evidence presented here shows that efforts to generally lower fire severity in dry forests for ecological restoration are not supported.”

In his book, “Fire Ecology in Rocky Mountain Landscapes” William Baker writes on page 435, “…a prescribed fire regime that is too frequent can reduce species diversity (Laughlin and Grace 2006) and favor invasive species (M.A. Moritz and Odion 2004). Fire that is entirely low severity in ecosystems that historically experience some high-severity fire may not favor germination of fire-dependent species (M.A. Moritiz and Odion 2004) or provide habitat key animals (Smucker, Hutto, and Steele 2005).” And on page 436: “Fire rotations equal the average mean fire interval across a landscape and are appropriate intervals at which individual points or the whole landscape is burned. Composite fire intervals underestimate mean fire interval and fire rotation (chap 5) and should not be used as prescribed burning intervals as this would lead to too much fire and would likely lead to adversely affect biological diversity (Laughlin and Grace 2006).”

Baker estimates the high severity fire rotation to be 135 - 280 years for lodgepole pine forests. (See page 162.). And on pp. 457-458: “Fire rotation has been estimated as about 275 years in the Rockies as a whole since 1980 and about 247 years in the northern Rockies over the last century, and both figures are near the middle between the low (140 years) and high (328 years) estimates for fire rotation for the Rockies under the HRV (chap. 10). These estimates suggest that since 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.”

Schoennagel et al., 2004 state: “High-elevation subalpine forests in the Rocky Mountains typify ecosystems that experience infrequent, high-severity crown fires []. . . The most extensive subalpine forest types are composed of Engelmann spruce (Picea engelmannii), subalpine fir

(Abies lasiocarpa), and lodgepole pine (Pinus contorta), all thin-barked trees easily killed by fire. Extensive stand-replacing fires occurred historically at long intervals (i.e., one to many centuries) in subalpine forests, typically in association with infrequent high-pressure blocking systems that promote extremely dry regional climate patterns."

Schoennagel et al., 2004 state:

> (I)t is unlikely that the short period of fire exclusion has significantly altered the long fire intervals in subalpine forests. Furthermore, large, intense fires burning under dry conditions are very difficult, if not impossible, to suppress, and such fires account for the majority of area burned in subalpine forests.
>
> Moreover, there is no consistent relationship between time elapsed since the last fire and fuel abundance in subalpine forests, further undermining the idea that years of fire suppression have caused unnatural fuel buildup in this forest zone.
>
> No evidence suggests that spruce–fir or lodgepole pine forests have experienced substantial shifts in stand structure over recent decades as a result of fire suppression. Overall, variation in cli-mate rather than in fuels appears to exert the largest influence on the size, timing, and se-verity of fires in subalpine forests []. We conclude that large, infrequent stand replacing fires are 'business as usual' in this forest type, not an artifact of fire suppression.
>
> Contrary to popular opinion, previous fire suppression, which was consistently effective from about 1950 through 1972, had only a minimal effect on the large fire event in 1988 []. Reconstruction of historical fires indicates that similar large, high-severity fires also occurred in the early 1700s []. Given the historical range of variability of fire regimes in high- elevation subalpine forests, fire behavior in Yellowstone during 1988, although severe, was neither unusual nor surprising.
>
> Mechanical fuel reduction in subalpine forests would not represent a restoration treatment but rather a departure from the natural range of variability in stand structure.
>
> Given the behavior of fire in Yellowstone in 1988, fuel reduction projects probably will not substantially reduce the frequency, size, or severity of wildfires under extreme weather conditions.
>
> The Yellowstone fires in 1988 revealed that variation in fuel conditions, as measured by stand age and density, had only minimal influence on fire behavior. Therefore, we expect fuel- reduction treatments in high-elevation forests to be generally unsuccessful in reducing fire frequency, severity, and size, given the overriding importance of extreme climate in controlling fire regimes in this zone. Thinning also will not re-store subalpine forests, because they were dense historically and have not changed significantly in response to fire suppression. Thus, fuel-reduction efforts in most Rocky Mountain 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.

Whereas the EA claims to be reducing risk of wildfire by reducing forest canopy density—including in old growth—the proposed action will result in increased fire severity and more rapid fire spread. This common sense is recognized in a news media discussion of the 2017 Eagle Creek fire in Oregon:

> **Old growth not so easy to burn:**
>
> Officials said the fire spread so rapidly on the third and fourth days because it was traveling across lower elevations.
>
> The forests there aren't as thick and as dense as the older growth the fire's edge is encountering now - much of it in the Mark O. Hatfield Wilderness, Whittington said.
>
> **Whittington said because** there's more cover from the tree canopy, the ground is moister -- and that's caused the fire to slow. Also, bigger trees don't catch fire as easily**, he said. (Emphasis added.)**

Cohen, 1999 recognizes "the imperative to separate the problem of the wildland fire threat to homes from the problem of ecosystem sustainability due to changes in wildland fuels" (Id.). In regards to the latter—ecosystem sustainability—Cohen and Butler (2005) state:

> Realizing that wildland fires are inevitable should urge us to recognize that excluding wildfire does not eliminate fire, it unintentionally selects for only those occurrences that defy our suppression capability—the extreme wildfires that are continuous over extensive areas. If we wish to avoid these extensive wildfires and restore fire to a more normal ecological condition, **our only choice is to allow fire occurrence under conditions other than extremes. Our choices become ones of compatibility with the inevitable fire occurrences rather than ones of attempted exclusion.** (Emphasis added.)

In support of focusing on manipulating limited areas near homes, Finney and Cohen, 2003, state:

> Research findings indicate that a home's characteristics and the characteristics of a home's immediate surroundings within 30 meters principally determine the potential for wildland-urban fire destruction. This area, which includes the home and its immediate surroundings, is termed the home ignition zone. The home ignition zone implies that activities to reduce the potential for wildland-urban fire destruction can address the necessary factors that determine ignitions and can be done sufficiently to reduce the likelihood of ignition. Wildland fuel reduction outside and adjacent to a home ignition zone might reduce the potential flame and firebrand exposure to the home ignition zone (i.e., within 30 m of the home). However, the factors contributing to home ignition within this zone have not been mitigated. Given a wildfire, wildland fuel management alone (i.e., outside the home ignition zone) is not sufficient nor does it substitute for mitigations within the home ignition zone. ...(I)t is questionable whether wildland fuel reduction activities are necessary and sufficient for mitigating structure loss in wildland urban fires.
>
> …(W)ildland fuel management changes the … probability of a fire reaching a given location. It also changes the distribution of fire behaviors and ecological effects experienced at each location because of the way fuel treatments alter local and spatial fire

behaviors (Finney 2001). **The probability that a structure burns, however, has been shown to depend exclusively on the properties of the structure and its immediate surroundings (Cohen 2000a).**

(Emphasis added.) Our take from Finney and Cohen (2003) is that there is much uncertainty over effects of fuel reduction. The authors point out:

> Although the conceptual basis of fuel management is well supported by ecological and fire behavior research in some vegetation types, the promise of fuel management has lately become loaded with the expectation of a diffuse array of benefits. Presumed benefits range from restoring forest structure and function, bringing fire behavior closer to ecological precedents, reducing suppression costs and acres burned, and preventing losses of ecological and urban values. For any of these benefits to be realized from fuel management, a supporting analysis must be developed to physically relate cause and effect, essentially evaluating how the benefit is physically derived from the management action (i.e. fuel management). Without such an analysis, the results of fuel management can fail to yield the expected return, potentially leading to recriminations and abandonment of a legitimate and generally useful approach to wildland fire management.

In their conclusion, Graham, et al., 1999a state:

> Depending on intensity, thinning from below and possibly free thinning can most effectively alter fire behavior by reducing crown bulk density, increasing crown base height, and changing species composition to lighter crowned and fire-adapted species. Such intermediate treatments can reduce the severity and intensity of wildfires for a given set of physical and weather variables. **But crown and selection thinnings would not reduce crown fire potential.** (Emphasis added.)

Please 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 speed[7] 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.

Please disclose the implications of how the fire regime is changing due to climate change.

The FS alleges a need to reduce forest fuels in the wildland-urban interface (WUI). What is it about past projects that left the project area WUI in such a needy condition? Again, the FS must provide a cumulative effects analysis that compares current project area “needs” to accomplishments (or failures) of past projects.

Implicit in the EA is an assumption that fire risk can be mitigated to a significant degree by reacting in opposition to natural processes—namely the growth of various species of native vegetation (misleadingly referred to as “fuels). We believe the FS oversells the ability of land managers to make conditions safe for landowners and firefighters. This could lead to landowner complacency—thereby increasing rather that decreasing risk. Many likely fire scenarios involve

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[7] Velocity of the wind 20 feet above the vegetation, in this case tree tops.

weather conditions when firefighters can't react quickly enough, or when it's too unsafe to attempt suppression. With climate change, this is likely to occur more frequently. Other likely scenarios include situations where firefighting might be feasible but resources are stretched thin because of priorities elsewhere.

We strongly support government actions which facilitate cultural change towards private landowners taking the primary responsibility for mitigating the safety and property risks from fire, by implementing firewise activities on their property. Indeed, the best available science supports such a prioritization. (Kulakowski, 2013; Cohen, 1999a) Also, see Firewise Landscaping[8] as recommended by Utah State University, and the Firewise USA website by the National Fire Protection Association[9] for examples of educational materials.

The forest plan definition of WUI has allowed entities other than the general public to set WUI boundaries outside of NEPA and NFMA processes, and defines it so vaguely as to expand the delineation of the WUI greatly—again outside NFMA and NEPA processes.

We want the FS and the public to be comfortable with unplanned wildland fires under some weather conditions in sensible locations, so that the ecosystem benefits can be realized. Simply stated, at the time that response to any given fire is contemplated, we want decision makers to have publicly vetted documentation—for that specific fire area—of the benefits of the process that helps create habitat conditions for wildlife, restores forest composition, recycles soil nutrients, creates large dead logs that fall into streams forming native fish habitat, as well as many others. That will provide the public, the news media, and politicians with a fully vetted set of justifications for managing with—rather than against—the native ecosystem process of fire. We believe that such planning can and must be undertaken for sustainable forest management to evolve away from the unacceptable present situation. If the FS is unwilling to perform such an analysis for projects such as Buckskin Saddle, then it must undergo programmatic analysis of its fire suppression policies, disclosing the impacts and ecological harm that the agency will subsequently claim must be later addressed by vegetation management and fuel treatment projects across the landscape. Not to mention the enormous financial costs—also never analyzed or disclosed at any planning level.

Aside from urging landowners to adopt firewise measures on their own land, there's little that "management" can accomplish in the way of reducing wildland fire risk. When weather conditions arise that are favorable to high intensity fires, which happens more and more these days due to the effects of climate change, those fires will burn regardless of suppression efforts. Please disclose the relative contribution of weather factors to fire spread, intensity, and severity.

The forest plan Glossary definition of WUI under (A) has allowed entities other than the general public to set WUI boundaries outside of NEPA and NFMA processes, and under (B) defines it so vaguely as to expand the delineation of the WUI greatly—again outside NFMA and NEPA processes.

[8] https://extension.usu.edu/ueden/ou-files/Firewise-Landscaping-for-Utah.pdf
[9] http://www.nfpa.org/Public-Education/By-topic/Wildfire/Firewise-USA/The-ember-threat-and-the-home-ignition-zone

The vague language of Desired Condition FW-DC-FIRE-03 essentially nullifies its intent that recognizes the desirability of wildland fire.

We want the FS and the public to be comfortable with unplanned wildland fires under some weather conditions in sensible locations, so that the ecosystem benefits can be realized. Simply stated, at the time that response to any given fire is contemplated, we want decision makers to have publicly vetted documentation—for that specific fire area—of the benefits of the process that helps create habitat conditions for wildlife, restores forest composition, recycles soil nutrients, creates large dead logs that fall into streams forming native fish habitat, as well as many others. That will provide the public, the news media, and politicians with a fully vetted set of justifications for managing with—rather than against—the native ecosystem process of fire. We believe that such planning can and must be undertaken for sustainable forest management to evolve away from the unacceptable present situation. If the FS is unwilling to perform such an analysis for projects such as Buckskin Saddle, then it must undergo programmatic analysis of its fire suppression policies, disclosing the impacts and ecological harm that the agency will subsequently claim must be later addressed by vegetation management and fuel treatment projects across the landscape. Not to mention the enormous financial costs—also never analyzed or disclosed at any planning level.

Rather than fire starts, FW-OBJ-FIRE-02 should specify a number of acres set by best available science and analysis. The Forest Plan needs much stronger direction and certainty for use of wildland fire for resource benefits.

The Forest Plan FEIS analysis of fire suppression fails to address the constrained budget scenario which implies the FS will not be allocated enough funding to address the problems it states are perpetuated by fire suppression.

MON-VEG-01-01 is part of the circular logic in the Forest Plan's construction, which is that vegetation manipulation is the only way areas of the Forest would be resilient, resistant, meeting Desired Conditions, etc.

Inventoried Roadless Areas and Other Unroaded Areas

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

"Within the Backcountry designation in the Buckskin Saddle project area, there are two Inventoried Roadless Areas (IRA's); Schafer Peak and Packsaddle. Actions that are proposed within IRA's in Idaho are required to comply with the Idaho Roadless Rule."

For the Schafer Peak IRA, "approximately 101 acres of forest stands have been identified for potential commercial treatments. In addition, 294 acres of natural fuel burns would occur in the General Forest portion of this IRA." For the Packsaddle IRA, "approximately 1,293 acres have been identified for natural fuel burns. In addition, approximately 331 acres of whitebark pine restoration activities are being considered…" The EA says, "This proposal was presented to the Idaho Roadless Committee and they found that the proposed action as presented in this document complies with the Idaho Roadless Rule." Who are the members of the Idaho Roadless Committee who reviewed this proposal, and what are their qualifications and authority for making such a compliance determination?

Please explain how designating, improving, and maintaining roads, motorized trails and helispots in IRAs is consistent with **minimizing** impacts on humans and wildlife who depend upon or enjoy the remoteness or solitude provided by the IRAs?

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

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

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

(Emphasis added.) The EA does not adequately analyze and disclose impacts on the Roadless Characteristics and Wilderness Attributes of the IRAs or the Roadless Expanses. The public must be able to understand if the project would cause irreversible and irretrievable impacts on the suitability of any portion of Roadless Expanse for future consideration for Recommended Wilderness or for Wilderness designation under forest planning.

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

Scientific information from government studies conducted for the Interior Columbia Ecosystem Management Project strongly indicates the high negative correlation between road density and fish habitat conditions. USDA Forest Service & USDI Bureau of Land Management, 1996a state:

> High integrity [forests] contain the greatest proportion of high forest, aquatic, and hydrologic integrity of all [] are dominated by wilderness and roadless areas [and] are the least altered by management. [] Low integrity [forests have] likely been altered by past management [] are extensively roaded and have little wilderness. (Pp. 108, 115 and 116).

And USDA Forest Service & USDI Bureau of Land Management (1996) state "Increasing road density is correlated with declining aquatic habitat conditions and aquatic integrity. [] An intensive review of the literature concludes that increases in sedimentation [of streams] are unavoidable even using the most cautious roading methods." (P. 105).

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

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 D.A. DellaSala, 2001; DeVelice and Martin, 2001; Loucks et al., 2003; Crist et al., 2005; Nott et al., 2005).

In a letter to President Clinton urging the protection of roadless areas, 136 scientists noted:

> There is a growing consensus among academic and agency scientists that existing roadless areas–***irrespective of size***–contribute substantially to maintaining biodiversity and ecological integrity on the national forests. The Eastside Forests Scientific Societies Panel, including representatives from the American Fisheries Society, American Ornithologists' Union, Ecological Society of America, Society for Conservation Biology, and The Wildlife Society, recommended a prohibition on the construction of new roads and logging within existing (1) roadless regions larger than 1,000 acres, and (2) **roadless regions smaller than 1,000 acres that are biologically significant**…. Other scientists have also recommended protection of all roadless areas greater than 1,000 acres, at least until landscapes degraded by past management have recovered…. As you have acknowledged, a national policy prohibiting road building and other forms of development in roadless areas represents a major step towards balancing sustainable forest management with conserving environmental values on federal lands. In our view, a scientifically based policy for roadless areas on public lands should, at a minimum, protect from development all roadless areas larger than 1,000 acres and ***those smaller areas that have special ecological significance because of their contributions to regional landscapes***. (Emphases added) [Scientists Roadless letter, 1997.]

Most roadless areas, particularly in the interior West are at middle to high elevations (Henjum et al. 1994). Higher elevations are cooler, receive more moisture, and have a shorter summer dry season than lower elevations. They are typically characterized by a regime of low-frequency, high-intensity fires. Roadless areas are therefore less likely to have current fire regimes that are significantly different from historical conditions (Agee 1997; Beschta et al. 2004) and are therefore of lower priority for mechanical fuels treatment. Roadless areas have a lower potential for high-intensity fires than roaded areas partly because they are less prone to human caused ignitions (DellaSala et al. 1995, USDA Forest Service, 2000e). The EA fails to acknowledge the best scientific information that recognizes the high ecological integrity and functioning of unmanaged areas.

"The wilderness attributes of naturalness, undeveloped, and solitude and primitive and unconfined recreation would all experience temporary degradation during project implementation." The FS's consideration of such impacts is ever-shifting. See the report by Friends of the Clearwater, "The Roadless Report: Analyzing the Impacts of Two Roadless Rules on Forested Wildlands" for an observation on how roadless rules are being exploited to downgrade the wilderness values and roadless characteristics of IRAs.

Monitoring

The FS has failed to monitor populations of wildlife, in favor of striving towards DCs for habitat (actually, vegetation) in project planning. The Committee of Scientists (1999) state:

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

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

> The proposal is that the Forest Service monitor those species whose status allows inference to the status of other species, are indicative of the soundness of key ecological processes, or provide insights to the integrity of the overall ecosystem. This procedure is a necessary shortcut because monitoring and managing for all aspects of biodiversity is impossible.
>
> No single species is adequate to assess compliance to biological sustainability at the scale of the national forests. Thus, several species will need to be monitored. The goal is to select a small number of focal species whose individual status and trends will collectively allow an assessment of ecological integrity. That is, the individual species are chosen to provide complementary information and to be responsive to specific conservation issues. Thus, the Committee proposed for consideration a broad list of species categories reflecting the diversity of ecosystems and management issues within the NFS.

Please address this scientific opinion (Committee of Scientists, 1999) which disagrees with Forest Plan assumptions about wildlife habitat management.

The LMP's Monitoring Program is inadequate for informing the agency and the public within any valid adaptive management framework.

Indicator MON-VEG-01-02 merely reports on acres burned, and lacks a necessary qualitative component.

Indicator MON-VEG-01-05, the annual measure of old growth and recruitment potential old growth, does not require that the old-growth definition as specified in the LMP Glossary be the measurement criteria utilized to determine if any acre is old growth.

The logic behind Indicator MON-VEG-01-06 is lacking, since annually determining old-growth acres "treated" would reveal nothing about the outcome—positive or negative—of those treatments.

The Indicator MON-VEG-01-08 lacks relevance since it would merely measure the "Number of acres influenced by insects and disease."

Indicator MON-VEG-02-01 is inadequate since annually determining acres of noxious weeds "treated" doesn't reveal the effectiveness of those treatments.

Indicator MON-VEG-02-02 is inadequate since the definition of a "site of new non-native invasive plant species" is not given.

Indicator MON-FIRE-01-01. Effectiveness of fuel treatments is not evaluated.

Indicator MON-WTR-01-01. "Number of Best Management Practices…" This Indicator is too vague to answer the Monitoring Question, "Are soil, water quality, and riparian and aquatic habitats protected and moving towards desired conditions?"

Indicators MON-WTR-02-01, MON-WTR-02-02: Measuring watersheds by "miles of restoration activities" would not be informative. It is also unclear how measuring watersheds by "acres of restoration activities" would be useful since the Forest Service definition of restoration is so lax that every acre treated would be considered restoration.

Indicator MON-WTR-02-03: The meaning of "trended toward" is too subjective. Use of these three indicators would not answer the Monitoring Question.

The Forest Plan fails to include Monitoring Plan Questions and Indicators to validate Watershed Condition Ratings and Watershed Disturbance Ratings with other measures, such as the condition or status of aquatic habitat such as attainment of INFISH RMOs, and with measures of hydrological equilibrium/streambank stability in assessed subwatersheds, and with data gathered for the 1987 Forest Plan monitoring items.

Indicator MON-AQH-01-01 lacks a baseline of unconnected stream habitat for subsequent comparison.

The monitoring program lacks Monitoring Questions and Indicators for the Sensitive westslope cutthroat trout, inland redband trout, and western pearlshell mussel.

The Monitoring Program lacks a measure for determining significant reductions in soil productivity due to land management activities in any timeframe short of forever. There is a lack of any measure of the areal extent of soil damage within any geographic scale.

There is no direction in the Forest Plan for monitoring soil restoration accomplishment.

Monitoring Question MON-FLS-01 is worded too vaguely to provide meaningful answers. The overarching goal of ESA listing is population recovery, which is omitted. A measure of population numbers of grizzly bears is essential for determining attainment of recovery, as is mortality information.

Indicator MON-FLS-01-02. Measuring population numbers of Canada lynx is essential for determining attainment of recovery, as is information on trapping mortality.

Indicator MON-FLS-01-03. Specific to the INFISH monitoring requirements that this Indicator adopts; the IPNF must use monitoring data to determining if project implementation results in attainment of riparian goals and objectives—deemed to be "critical" monitoring by the Forest Service in Forest Plan Appendix B.

The bull trout redd count data must be supplemented by fish survey data for numbers of bull trout in bull trout streams. It is also important to measure population trends of brook trout in bull trout streams for hybridization reasons.

Monitoring Question MON-MIS-01 lacks a requirement to estimate baseline elk population numbers, and measure elk population trends in response to management actions.

Indicator MON-MIS-01-02 is useless as a biological indicator because nothing is required specific to any bird species.

Indicator MON-MIS-01-03 relies upon a measurement system that is not explained anywhere in the Forest Plan, merely commits to monitoring vague "changes" measured somewhere every five years.

Indicator MON-WL-01-01 is useless as a biological indicator because nothing is required specific to any wildlife species.

Monitoring Question MON-AR-01. With the wide variety of recreation impacts on the wide variety of recreation sites throughout the Forest, this leaves unfulfilled the need for more specific monitoring and reporting.

Monitoring Question MON-AR-02: Identification of the minimum transportation system necessary is a regulatory requirement, so the IPNF must complete forestwide travel planning.

Monitoring Question MON-AR-03: Specific to motorized recreation, identification of the minimum transportation system necessary is a regulatory requirement, and the IPNF must complete its forestwide travel planning.

Monitoring Question MON-WLDN-01. The IPNF has so many acres of roadless areas deserving protection as Wilderness, so the public would be well-served with a Monitoring Question and Indicators that assess wilderness conditions and trends in roadless areas.

Indicator MON-MIN-01-01: The baseline number of unreclaimed abandoned mine sites must be disclosed. Additionally, including monitoring items for water quality and soil productivity in abandoned mine sites is important for biological resources including human health and safety.

Monitoring Question MON-SOC-01: Data on the contribution to the economy from those gathering non-timber products, hunters, anglers, and recreationists would lead to a more balanced understanding by the agency of how the IPNF sustains local and regional economies.

The Buckskin Gulch EA also fails to include anything near an adequate monitoring plan, which might verify assumptions of the EA and also assure compliance with design features, the Forest Plan, and other requirements.

Scientific Integrity

The FS is obligated to consider best available science. AWR's Objection to the Forest Plan notes that the scientific basis for its standards, guidelines, and other components/direction is not well established. Consequently if the Buckskin Saddle project is tiered to the Forest Plan, which is obviously must, then in order to consider best available science the FS must finally explain what science it has considered for all forest plan components/direction. Also, please disclose how this consideration played out in Forest Plan structure and how does it play out in project design?

Many FS analyses rely upon the use of models. The reliability of all the data used as input for these models is not disclosed. Also, the validity of the models was not established for how the FS utilizes them. Please cite the best available scientific information which establishes model validity.

Please disclose the limitations of all models the FS relies upon for the NEPA analyses.

Please disclose the statistical reliability of all data the FS relies upon for the Buckskin Saddle analysis. Since "an instrument's data must be reliable if they are valid" (Huck, 2000) this means the data that is input to a model must accurately measure that aspect of the world it is claimed to measure, or else the data is invalid for use by that model. Also, Beck and Suring, 2011 "remind practitioners that if available data are poor quality or fail to adequately describe variables critical to the habitat requirements of a species, then only poor quality outputs will result. Thus, obtaining quality input data is paramount in modeling activities." And Larson et al. 2011 state: "Although the presence of sampling error in habitat attribute data gathered in the field is well known, the measurement error associated with remotely sensed data and other GIS databases may not be as widely appreciated."

Huck, 2000 states:

> The basic idea of reliability is summed up by the word consistency. Researchers can and do evaluate the reliability of their instruments from different perspectives, but the basic

> question that cuts across these various perspectives (and techniques) is always the same: "To what extent can we say the data are consistent?" …(T)he notion of consistency is at the heart of the matter in each case.
>
> …(R)eliability is conceptually and computationally connected to the data produced by the use of a measuring instrument, not to the measuring instrument as it sits on the shelf.

During litigation of a timber sale on the Kootenai NF (CV-02-200-M-LBE, Federal Defendants Response to Motion for Preliminary Injunction), the FS criticized a report provided by plaintiffs, stating "(Its) purported 'statistical analysis' reports no confidence intervals, standard deviations or standard errors in association with its conclusions."

As Huck (2000) states, the issue of "standard deviations or standard errors" that the FS raised in the context of that litigation relates to the reliability of the data, which in turn depends upon how well-trained the data-gatherers are with their measuring tools and measuring methodology. In other words, different measurements of the same phenomenon must result in numbers that are very similar to result in small "standard deviations or standard errors" and thus high reliability coefficients, which in turn provide the public and decisionmakers with an idea of how confident they can be in the conclusions drawn from the data.

Also, the document, "USDA-Objectivity of Statistical and Financial Information" is instructional on this topic.

The next level of scientific integrity is the notion of "validity." So even if FS data input to its models are reliable, a question remains of the models' validity. In other words, are the models scientifically appropriate for the uses for which the FS is utilizing them? As Huck, (2000) explains, the degree of "content validity," or accuracy of the model or methodology is established by utilizing other experts. This, in turn, demonstrates the necessity for utilizing the peer review process.

Model results can be no better than as the data fed into them, which is why data reliability is discussed above. The Ninth Circuit Court of Appeals has declared that the FS must disclose the limitations of its models in order to comply with NEPA. The EA has failed to disclose these limitations. Unfortunately, the FS uses models without any real indication as to how much they truly reflect reality.

In the NPCNF's Clear Creek Integrated Restoration Project FEIS, the FS defines "model" as "a theoretical projection in detail of a possible system of natural resource relationships. A simulation based on an empirical calculation to set potential or outputs of a proposed action or actions." (G-14.) From www.thefreedictionary.com:

> Empirical – 1. a. Relying on or **derived from observation or experiment**: empirical results that supported the hypothesis. b. Verifiable or provable by means of observation or experiment: empirical laws. 2. Guided by practical experience and not theory, especially in medicine. (Emphasis added.)

So models are "theoretical" in nature and the agency implies that they are somehow based in observation or experiment that support the hypotheses of the models. That would be required, because as Verbyla and Litaitis (1989) assert, "Any approach to ecological modelling has little merit if the predictions cannot be, or are not, assessed for their accuracy using independent data." This corresponds directly to the concept of "validity" as discussed by Huck, 2000: "(A) measuring instrument is valid to the extent that it measures what it purports to measure."

However, there is no evidence that the FS has performed validation of any the models for the way they were used to support the EA's analyses. There is no documentation of someone using observation or experiment to support the model hypotheses.

As Huck, (2000) explains, the degree of "content validity," or accuracy of the model or methodology is established by utilizing other experts. This, in turn, demonstrates the necessity for utilizing the peer review process. The validity of the various models utilized in the EA's analyses have, by and large, not been established for how agency utilizes them. No studies are cited which establishes their content validity, and no independent expert peer review process of the models has occurred.

Larson et al. 2011 state:

> Habitat models are developed to satisfy a variety of objectives. ...A basic objective of most habitat models is to predict some aspect of a wildlife population (e.g., presence, density, survival), so assessing predictive ability is a critical component of model validation. **This requires wildlife-use data that are independent of those from which the model was developed.** ...It is informative not only to evaluate model predictions with new observations from the original study site but also to evaluate predictions in new geographic areas. (Internal citations omitted, emphasis added.)

USDA Forest Service, 2000c (a FS forest plan monitoring and evaluation report) provides an example of the agency acknowledging the problems of data that are old and incomplete, leading to the limitation of models the FS typically uses for wildlife analyses for old-growth wildlife habitats:

> Habitat modeling based on the timber stand database has its limitations: the data are, on average, 15 years old; canopy closure estimates are inaccurate; and data do not exist for the abundance or distribution of snags or down woody material… .

In the above case, the FS expert believed the data were unreliable, limiting the usefulness and applicability (validity) of the model. In other places in this objection—particularly regarding old growth—we discuss this staleness of data.

Ruggiero, 2007 (a scientist from the research branch of the FS) recognizes a fundamental need to demonstrate the proper use of scientific information, in order to overcome issues of decisionmaking integrity that arise from bureaucratic inertia and political influence. Ruggiero, 2007 and Sullivan et al., 2006 provide a commentary on the scientific integrity and agency use and misuse of science. And the Committee of Scientists (1999) recommend "independent scientific review of proposed conservation strategies…"

The EA violates NEPA because the FS has not insured the reliability of data input to the models, the FS has not validated the models for the way the EA utilizes them, and the FS has overly narrowed the information it considers to be best available science.

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

Beck and Suring, 2011 state:

> Developers of frameworks have consistently attained scientific credibility through published manuscripts describing the development or applications of models developed within their frameworks, but a major weakness for many frameworks continues to be a lack of validation. Model validation is critical so that models developed within any framework can be used with confidence. Therefore, we recommend that models be validated through independent field study or by reserving some data used in model development.

Beck and Suring, 2011 developed several criteria for rating modeling frameworks—that is, evaluating their validity. Three of their criteria are especially relevant to this discussion:

Habitat–population linkage	Does the modeling framework incorporate vital rates (e.g., production, survival), other demographic parameters (e.g., density, population size); surrogates (e.g., quality of home ranges, habitat conditions in critical reproductive habitats, presence/absence) of population demographic parameters; or does the modeling framework model habitat conditions without specific consideration of wildlife population parameters?	0 = does not rely on population demographics or surrogates of modeled species 1 = relies on surrogates for population demographic parameters or framework; can utilize population demographics if desired, but is not dependent on them 2 = specifically relies on population demographics of modeled species
Output definition	Is the output well defined and will it translate to something that can be measured?	1 = difficult 2 = moderate 3 = easy
	acceptance by an array of professionals?	application of the modeling framework

Darimont, et al., 2018 advocate for more transparency in the context of government conclusions about wildlife populations, stating:

> Increased scrutiny could pressure governments to present wildlife data and policies crafted by incorporating key components of science: transparent methods, reliable estimates (and their associated uncertainties), and intelligible decisions emerging from both of them. Minimally, **if it is accepted that governments may always draw on politics, new oversight by scientists would allow clearer demarcation between where the population data begin and end in policy formation** (Creel et al. 2016*b*; Mitchell et al. 2016). Undeniably, social dimensions of management (i.e., impacts on livelihoods and human–wildlife conflict) will remain important. (Emphasis added.)

In a news release accompanying the release of that paper, the lead author states:

> In a post-truth world, **qualified scientists are arm's length now have the opportunity and responsibility to scrutinize government wildlife policies and the data underlying**

> **them.** Such scrutiny could support transparent, adaptive, and ultimately trustworthy policy that could be generated and defended by governments. (Emphasis added.)

A Science Consistency Review is long overdue for the revised Forest Plan. (See Guldin et al., 2003, 2003b).The FS prepared Guldin et al. (2003) which:

> ...outlines a process called the science consistency review, which can be used to evaluate the use of scientific information in land management decisions. Developed with specific reference to land management decisions in the U.S. Department of Agriculture Forest Service, the process involves assembling a team of reviewers under a review administrator to constructively criticize draft analysis and decision documents. Reviews are then forwarded to the responsible official, whose team of technical experts may revise the draft documents in response to reviewer concerns. The process is designed to proceed iteratively until reviewers are satisfied that key elements are **consistent with available scientific information.**

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.

<u>Alternatives</u>

The Montana Forest Restoration Committee adopted 13 Principles, written collaboratively by a diverse set of stakeholders which included two Region 1 forest supervisors along with representatives from timber and forest products industries, conservation groups, recreation interests, and others. Principle #3 states:

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

Consistent with this principle, the agency would publicize a landscape assessment of the project area so a genuine scoping process could help determine the project Purpose and Need. Instead, the FS has apparently prioritized the project Purpose and Need based on appropriated funds and Congress's ill-informed priorities for this project area, and promoted them via "collaboration" to subsidize narrow financial interests.

Since the FS has gone out of its way to please a narrow segment of the public in the design of the project before ever notifying the public at large, the agency is also obligated to be open to this wider pool of national forest owners for suggestions concerning alternative development. We support some of the actions proposed, specifically those reducing road related impacts and restoring aquatic habitat and watersheds. However, we request the FS take a more comprehensive approach to restoring aquatic habitat and watersheds than is included in the proposal. Please design an alternative that results in a road system which is fully affordable to maintain on an annual basis, within all of the watersheds affected by the proposal. Please use expected appropriations as the yardstick to measure "affordable", based on recent years' funding levels.

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

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

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

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

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

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

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

Such an alternative would fully decommission/obliterate any unauthorized ATV/OHV routes on national forest land in the project area to restore hydrologic functioning and soil productivity, reduce spread of noxious weeds, and promote ecosystem integrity.

Such an alternative would not construct any new roads, including temporary roads because, as the Forest Service is aware, construction of temporary roads potentially creates much of the same impact as system roads.

Such an alternative would maximize the short-term sequestration of carbon in the forest, because already dangerously elevated greenhouse gases are an immediate issue that must be addressed.

Roger Sedjo, member of the Committee of Scientists, expresses his concerns in Appendix A of their 1999 Report about the discrepancy between forest plans and Congressional allocations, leading to issues not considered in forest plans such as the IPNF's:

> (A)s currently structured there are essentially two independent planning processes in operation for the management of the National Forest System: forest planning as called for in the legislation; and the Congressional budgeting process, which budgets on a project basis. The major problem is that there are essentially two independent planning processes occurring simultaneously: one involving the creation of individual forest plans and a second that involves congressionally authorized appropriations for the Forest Service. Congressional funding for the Forest Service is on the basis of programs, rather than plans, which bear little or no relation to the forest plans generated by the planning process. There is little evidence that forest plans have been seriously considered in recent years when the budget is being formulated. Also, the total budget appropriated by the Congress is typically less than what is required to finance forest plans. Furthermore, the Forest Service is limited in its ability to reallocate funds within the budget to activities not specifically designated. Thus, the budget process commonly provides fewer resources than anticipated by the forest plan and often also negates the "balance" across activities that have carefully been crafted into forest plans. Balance is a requisite part of any meaningful plan. Finally, as noted by the GAO Report (1997), fundamental problems abound in the implementation of the planning process as an effective decision making instrument. Plans without corresponding budgets cannot be implemented. Thus forest plans are poorly and weakly implemented at best. Major reforms need to be implemented to coordinate and unify the budget process.

What Sedjo is saying is that Congress's appropriations priorities subvert the Forest Plans. This is confirmed with statements in the EA such as this: "Past, present and future public activities including; OHV use, firewood cutting, driving roads, camping, snowmobiling, hunting, hiking, and berry picking would continue to slowly deteriorate the condition of the developed recreation sites. **Addressing known maintenance needs through large planning projects would minimize these effects.** (Emphasis added.) All those deteriorating conditions are to be reversed under the forest plan, but since there's inadequate appropriations, the FS promotes the idea that logging solves all management problems, in collusion with collaborators and financially vested interests and politicians who only see the forest because of the timber.

Economic Analysis

How much will it cost U.S. taxpayers have the FS implement the project?

We object to the fact that the economic analysis in the EA fails to account for many of the significant restoration activities. The analysis is inaccurate, flawed, and misleading.

The EA fails to present enough economic analysis to show this huge subsidy would be, on balance, a good investment of taxpayer subsidies.

Table 18 estimates $49,313,250 in costs and $55,200,000 in revenues, and so the EA proclaims "the proposed action would potentially provide nearly six million dollars in above base funds for additional restoration activities." First, the EA doesn't indicate how accurate the figures are for Table 18. A ten percent reduction in revenues and/or increase in costs would obliterate any claimed benefits.

Plus, Table 18 barely begins to cover the cost the taxpayers are expected to pick up. For example, it omits obvious costs such as how much it would cost to construct the 30.4 miles of new roads. And it fails to make any estimates of the costs of conducting 5,091 acres of noncommercial "natural fuel burns" and the other noncommercial fuel reductions deemed by the EA to be so essential for "increasing resilience."

The EA states, "The proposed action is predicted to generate enough stumpage value to cover all of the associated harvesting costs, plus reforestation." What are "the associated harvesting costs"? The EA doesn't explain, and neither does the Economics Report—the latter being hardly more than what's repeated in the EA.

We object to the fact that the economic analysis in the EA fails to provide a robust basis for the claimed project revenues.

We object to the fact that the economic analysis in the EA obfuscates the taxpayer subsidization required to pull off this timber giveaway.

The EA does not disclose a reasonably itemized monetary costs of the project activities. Along with the costs of those specific project actions, the costs of road maintenance proportionately attributable to this project area, and the cumulative financial impacts of carrying out fire suppression policy were not analyzed and disclosed.

The economics analysis refers to something called a "job." It says 3240 jobs will be sustained. For how long? What is the expected income from this "job" for the jobholder? No definition of job is provided.

We ask the Forest Service 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 number of miles of project area roads that fail to meet BMP standards or design standards

Please disclose the itemized costs for each of the following:

- new temporary roads
- new permanent roads
- project-related road maintenance
- road decommissioning
- road storage

- all other road-related work including culvert replacements, other drainage improvements, bridge work, etc.
- reconstruction and realignment on trails
- conduct all natural fuels burns
- biomass removal
- Permitting
- Enforcing motorized travel restrictions on the roads stored after project activities
- Responding to Objections
- Collaborative meetings and other Stakeholder Group activities which incur costs from FS participation or attendance
- develop rock pit/quarries
- Post-project monitoring
- precommercial thinning
- 135 acres of "fuel reduction" (Table 1)
- Whitebark pine restoration
- sale preparation and administration
- project-related weed treatment
- other project mitigation
- post-project monitoring
- environmental analyses and reports
- public meetings and field trips
- publicity
- consultation with other government agencies
- responding to comments
- FS employee salaries for performing project analyses and administration

Scenery
The EA says, "we want to … Improve the scenic quality as seen from Lake Pend Oreille, the town of Clark Fork, and other important viewing locations identified in the Forest Plan."

"While active logging operations are occurring visitors to the Green Monarch (#69) trailhead, Johnson Point Vista overlook and the Mosquito Creek (#244) trailhead would experience the sights and sounds of active tree harvesting. Heavy machinery associated with the ground based logging systems may be apparent. A clear increase in heavy log truck traffic would be apparent throughout project implementation." Then there's the lasting visual scars from the logging and roadbuilding itself. Does the FS really believe that thousands of acres of clearcuts, traversed by new roads gouged into the landscape, improves scenery or the recreational experiences of visitors? The EA's Scenic Resource analysis is bogus.

Collaboration
The EA states, "Idaho Panhandle National Forests staff and collaborative groups collectively identified high priority planning areas across the Forest for vegetation and fuel management projects." Also, "Consultation and collaboration has provided several design features that will aid in ameliorating …issues."

Plus, the EA says another timber sale is being developed by the FS and collaborators adjacent to this project area, "after **the Panhandle Forest Collaborative (PFC) and** the local Forest Service ID Team has **finished the NEPA process for this Buckskin Saddle project**." (Emphases added.) The qualifications of collaborators to take on their roles are missing from all discussion and analysis.

A significant danger is that private, local interests are being elevated by the magic wand of "collaboration" over and above the interests of the owners of the land in general, the American public—regardless of where those Americans live or whether or not they can attend collaborative meetings to make sure their interests are being heard.

Please disclose the financial interests of each of the entities making up the PFC, relating to the Buckskin Saddle proposal. For example, biomass utilization.

There is no mechanism for the owners of the IPNF to hold the PFC accountable if actions don't go as planned—or if they do go as planned including the likely adverse impacts we identify in these comments.

The timber-centric nature of the only action alternative contemplated in the EA is not surprising, given the "local" focus represented by the Panhandle Forest Collaborative (PFC). The much wider public interest of the owners of the IPNF, in general, is not of much concern to these narrow vested interests.

Nie and Metcalf, 2015 provide a social science analysis of the problems posed by collaboration. Among the many problems, it's clear that most environmental groups don't have the resources to participate meaningfully in long processes created by the collaborators. The authors cite an earlier inquiry in stating, "Organizational resources and capacity were found to be significant factors shaping the decision about whether to collaborate or sue. If trends in collaboration continue, says the author, '[W]e will see a marginalization of smaller, ideologically pure environmental groups [and] their values will not be included in decision making because they are unable or unwilling to collaborate…'."

Nie and Metcalf, 2015 document perceptions of several negative outcomes of collaboration, from the perspective of those skeptical of the process.

- The under-representation of conservation interests in many collaborative efforts, a perception that there is a heavy skew of the membership of the group against conservation and in favor of the folks who are impacting the environment.
- An inappropriate and often dominant role played by the Forest Service in some collaborative processes.
- Those making a profit from federal lands will dominate these processes because they have the organizational and financial capacity and resources to participate over the long haul.
- Collaboration sets up two classes of citizens, those who are part of the process and those who aren't, even if the latter participate fully in the NEPA process.
- Collaboration weeds out dissent and opposition and is most conducive to defending the status quo.

- Collaboration is undermining, subverting, and disempowering the more democratic NEPA process.
- There is a contrast between an exclusive and self-selected set of (often) paid interest groups participating in a collaborative versus a more broad-based and inclusive public participation process governed by NEPA.
- Collaborative groups having a disproportionate amount of influence with the Forest Service.
- Collaborative group recommendations precede NEPA analysis, and there is an implicit understanding the collaborative group's recommendation will be implemented, rendering the NEPA process a pro forma exercise.
- Laws such as the ESA are designed to be used and enforced by citizens, who forgo such rights by being included in collaborative groups.
- Collaborative groups do not consider the best available science on resource management.
- Collaborative groups promote logging which is a pretense or price to be paid for genuine forest restoration.

Dukes and Firehock, 2001 wrote a guide for environmental advocates which includes a set of principles. We submit this set of principles to the collaborators (to whom the EA attributes as proponents of this timber sale) to see if they would subscribe to those collaborative principles.

In conclusion, please keep AWR on the list to receive all communications concerning the Buckskin Saddle timber sale. It is our intention that the project ID Team reviews and includes in the Project Record the literature and other documents we've cited herein. Please contact us if you have problems locating any of them.

Sincerely,

/s/

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