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Friends of the Bitterroot, Alliance for the Wild Rockies, Gail H. Goheen and Stephen S. Goheen appreciate the opportunity to comment on the Gold Butterfly Draft Environmental Impact Statement (DEIS). The project is proposed for in the Sapphire Mountains and foothills of the Bitterroot National Forest (BNF).

We incorporate the July 11, 2017 Friends of the Bitterroot and Alliance for the Wild Rockies comments on the Gold Butterfly project proposal within these comments. We also incorporate by reference the DEIS comments of Larry Campbell, Michele Dieterich, Jeff Lonn and Van Keele.

Introduction

Since the beginning of public participation on the Gold Butterfly proposal Friends of the Bitterroot has advocated that any activities conducted in what little old growth remains on the BNF preserve all the characteristics that make old growth special or unique for wildlife.

Friends of the Bitterroot has also consistently advocated no roads be constructed, given the existing road system is already unaffordable to maintain, leading to chronic and repeated unacceptable environmental damage such as the Spring 2017 landslide of the Willow Creek Road #969.

Yet the Forest Service (FS) continues to push for commercial logging in old growth (witness the project silviculturist opaque justifications on the July 20 field trip) and failed to fully analyze and consider in the DEIS an action alternative that constructs no new roads.

If the FS believes the Healthy Forests Restoration Act (HFRA) allows you to analyze in the Final EIS (and select in your Decision) a modified Alternative 3 which combines features of Alternatives 1 (no action) and the DEIS's Alt. 3, we urge you to include such an alternative in the FEIS and select it for implementation. Such an alternative was strongly advocated for by the public prior to the DEIS being released but illogically excluded from full and fair analysis.

If the FS If the FS believes the HFRA does not allow you to analyze in the Final EIS such a modified Alternative 3 in the FEIS, the agency has no choice but to prepare a Supplemental Draft EIS (SDEIS) that does so. In fact, we believe this would be the best course of action, given so many DEIS deficiencies, as described in these comments), which inhibit informed public review of the proposal.

The DEIS states "The modification of the analysis process under NEPA limits the range of alternatives to the proposed action, the No Action and an additional alternative proposed during scoping or the collaborative process." However Alternative 3 as described in the DEIS is NOT an alternative "proposed during scoping or the collaborative process." It is one designed by the FS based on misinterpretation of major issues, and certainly not one we support as is.

Portraying the proposal as "restoration" is disingenuous—this project is all about tree farming for timber production. One of the touted "restoration" benefits, repeated many times in the DEIS, is to increase the growth rate of the remaining trees, as if having large trees on the landscape for ecological benefits is the FS's long term priority. Yet we find no plan that designates specific areas as <u>recruitment</u> old growth—for retention of any specified number of large trees across a wide landscape for an extended period of time into the future. Even the non-commercial treatments are largely tailored to maximize wood production.

As far as the "restoration" being alleged to address the impacts of long-term fire suppression, likewise there is no cogent plan for integrating wildland fire back into this ecosystem. The Forest Plan and this DEIS are all about continuing a repressive and suppressive regime, however the FS has never conducted an adequate cumulative effects analysis of its forestwide fire suppression despite the vast body of science that has arisen since the Forest Plan ROD was signed in 1987. The "plan" is clearly to log now, suppress fires continuously, and log again in the future based on the very same "need" to address the ongoing results of fire suppression.

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

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

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

<u>Compliance with National Environmental Policy Act (NEPA)</u>

The DEIS fails to include a full range of action alternatives, as required by NEPA. The FS must fully analyze a Modified Alternative 3 as introduced above and explained in further detail in these comments. This is needed to comply with NEPA regulations at 40 CFR § 1502.14: "(a) Rigorously explore and objectively evaluate all reasonable alternatives;" § 1500.2 "Federal agencies shall to the fullest extent possible: (e) Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment;" and § 1502.2 (e) "The range of alternatives discussed in environmental impact statements shall encompass those to be considered by the ultimate agency decisionmaker."

In numerous places, the DEIS exhibits highly prejudicial analysis against action Alternative 3, simply because it does not log enough acres. For example, where the DEIS discloses the impacts of "Old growth units are dropped in alternative 3" the DEIS recognizes no environmental benefits. The DEIS reveals this same bias in analyses for old-growth associated species such as the fisher and marten, where not logging any old growth in Alternative 3 is not painted in any positive terms as compared to the immediate loss of old growth under Alternative 2. Such bias violates NEPA regulations at 40 CFR § 1502.2 (g), "Environmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made." The DEIS subverts the purpose of NEPA expressed in regulations at 40 CFR § 1502.1: "provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment."

The DEIS states, "Title VI provides for the designation of insect and disease treatment areas to increase forest resilience to insect or disease infestations." Has there been NEPA or other analysis concerning this designation?

The DEIS states:

> When deciding the appropriate level of environmental analysis to conduct for the project, the responsible official chose to use an environmental impact statement due to concerns around a potential significant impact to fisheries. A notice of intent (NOI) to prepare an EIS was published in the federal register informing the public of this. However, initial analysis showed there would be no significant impact to any resources from proposed project activities. The responsible official decided to continue utilizing an EIS as the analysis document since the NOI had already been published.

For most resources considered in the DEIS, there is limited or no analysis, consistent with the FS's pre-analysis analysis that determined "there would be no significant impact to any resources from proposed project activities." Perhaps that is why the DEIS resorts to mentioning other reports where the analysis allegedly appears, but itself the DEIS does not explain how it arrives at many of its determinations and conclusions, let alone disclose environmental impacts. The DEIS fails to comply with NEPA's requirements to take a hard look so that the public or a decision maker can understand such impacts.

The FS is obligated to prepare a Supplemental Draft EIS. The NEPA regulations at 40 CFR § 1502.9 state, "If a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion."

The DEIS is unable to properly analyze and disclose cumulative impacts from past management activities because monitoring information is incomplete or unavailable.

The Gold Butterfly DEIS cites few or no results of the monitoring required in the Forest Plan. Also, the Forest Plan Monitoring and Evaluation Reports published are not as frequent and detailed as the Forest Plan requires.

There is apparently no connection between the Gold Butterfly project and what the FS should have learned from decades of monitoring required by the Forest Plan. Major purposes of Forest Plan monitoring is for the agency and public to understand cumulative impacts of management activities and to inform later management in an adaptive management paradigm. The lack of Forest Plan monitoring means the FS must compensate in project analyses, but from reviewing this DEIS, that hasn't happened. A proper cumulative effects analysis would include:

- A list of all past projects (completed or ongoing) implemented in the proposed project area watersheds.
- A list of the monitoring commitments made in all previous NEPA documents covering the project area.
- The results of all that monitoring.
- A description of any monitoring, specified in those past project NEPA documents or the Forest Plan for proposed project area, which has yet to be gathered and/or reported.
- A summary of all monitoring done in the project area as a part of the Forest Plan monitoring and evaluation effort.
- A cumulative effects analysis which includes the results from the monitoring required by the Forest Plan.

The Gold Butterfly DEIS fails to include an analysis of how well past projects met the goals, objectives, desired conditions, etc. stated in their respective NEPA documents, how well the projects conformed to forest plan standards and guidelines. It is informative for the public to know, in the NEPA process, if the impacts of past projects were correctly anticipated by their respective NEPA documents, and how well the statements of Purpose and Need in those NEPA documents were served.

Without such items being a part of the NEPA analysis, the validity of many DEIS statements and assumptions lack proper support. If predictions and analyses made in previous NEPA processes were inaccurate, and the agency is making similar decisions, then the process will fail. Also, if there have been problems with meeting past monitoring commitments, the DEIS is wrong to rely on monitoring this time.

The DEIS represents the analysis of the no action alternative as addressing cumulative effects. But Alternative 1 also includes "activities such as public firewood gathering, dispersed recreation use, fire protection, and scheduled road maintenance (which) would continue within the project area." The DEIS fails to conduct an adequate analysis of the cumulative effects of those activities on Forest resources and users.

The DEIS is poorly edited. In multiple places it refers to entities that don't exist, such as non-existent tables, or other such things (e.g., "See the Biological Evaluation/Assessment Summary (Section 3.X.X) for documentation of the effects determination for this species." The Biological Assessment has not been written. There is no excuse for rushing such a poor quality NEPA document for public review. This violates NEPA regulations at 40 CFR § 1502.9: "The draft statement must fulfill and satisfy to the fullest extent possible the requirements established for final statements in section 102(2)(C) of the Act."

The DEIS does not analyze and disclose the impacts of livestock grazing on any resource, although it was happening recently on national forest land and is ongoing on private land.

The DEIS doesn't even mark the project area boundary on a map, obscuring the meaning of the term "project area."

The DEIS has no Glossary defining the technical terms the rest of the text leaves obscure.

The DEIS includes many objectives and design specifications said to "reduce" some impact. However the DEIS misleadingly says "reduce" when it really means, "increase but not as much as if we don't mitigate." Here's a rather blatant example: "The application of BMPs (including dewatering and sediment capturing structures such as straw bales) would substantially reduce sediment released into streams as a result of the work." That is stated falsely; sediment would be increased by the project and—although we recognize mitigation measures are included—the FS must depict impacts accurately to comply with NEPA. So the FS creates a nagging concern that wherever the DEIS says "reduce" (even correctly)—it may be soft-pedaling the level of impacts.

The maps it does include reveal very little of the resources analyzed—nothing on fuel conditions, fire risk, past management, old growth, the different analysis areas for various resources, weed infestations, visual quality objectives, suitable wildlife habitat, past fires, problem culvert or other erosion sites, or even watershed boundaries.

The DEIS states:

> The purpose and need was developed, in part, from **recommendations made** in two ecosystem analyses at the watershed scale (EAWS): the Burnt Fork EAWS (2004) and the Daly-Gold EAWS (2008) (PF-REF-001). These documents assessed the existing and desired resource conditions and, where the existing condition was undesirable, **made recommendations on management actions to take**. The Gold Butterfly Interdisciplinary Team (IDT) reviewed the recommendations made in these analyses and defined the purpose and need for the project. (Emphases added.)

Why did the FS fail to disclose the entire set of recommendations from those EAWS in defining the scope of actions to take? Those documents don't appear on the project website.

The DEIS states, "Travel Planning identified changes in travel management as documented in the MVUM[1]. These changes (such as the Burnt Fork Trailhead relocation) will be implemented over the next few years as funding is available." Does the Gold Butterfly proposal include all such project area travel management changes in the action alternatives? If not, why not? If not, please disclose the other project area changes that will remain unimplemented.

The DEIS states, for Alternative 2:

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[1] It seems the DEIS means the recent Travel Planning ROD—not the MVUM.

> A separate decision was made during Travel Planning (USDA Forest Service 2016) to close the FR 312 road to motorized vehicles between the Gold Creek Campground and the existing Burnt Fork Trailhead at the end of the road. The current proposal is to implement the closure, remove culverts along the FR 312 road, and obliterate and move the old trailhead to the Gold Creek Campground.

Yet the DEIS does not attribute these benefits to the No Action alternative. Since the Travel Planning FEIS has already attributed those benefits to its Selected Alternative, it violates NEPA for the Gold Butterfly DEIS to take credit for these benefits for the logging alternatives only. IT DOES NOT REQUIRE A MASSIVE TIMBER SALE TO TAKE A FEW STEPS TO A SUSTAINABLE ROAD SYSTEM.

Old Growth

The FS is unable to demonstrate it is managing the BNF consistent with Forest Plan Wildlife and Fish Standard *numero uno*: "The amount and distribution of old growth will be used to ensure sufficient habitat for the maintenance of viable populations of existing native and desirable non-native vertebrate species, including two indicator species, the pine marten and pileated woodpecker."

What is the scientific basis for the Forest Plan "amount and distribution of old growth"?

There is no analysis of how the spread of noxious weeds will impact wildlife habitat in old growth.

The DEIS states, "historic logging dramatically reduced the amount of old growth in the Bitterroot drainage." Also, "The amount of old growth habitat that existed in the project area or on the Forest prior to logging is not known." Recognizing those facts, and for aesthetic, scientific, social and ecological reasons, we have consistently advocated that any activities conducted in what little old growth remains on the BNF preserve all the characteristics that make old growth special and unique for wildlife. The DEIS's analysis and discussion of old growth is narrowly framed from within the FS's tree-farming, manipulate-and-control world view, which has contributed to the situation where at least one old-growth associated species—the fisher—no longer has a viable population on the Forest.

The DEIS claims, "Treatments prescribed …would encourage progress of many existing mature and immature stands towards old growth conditions." The FS has been making similar claims in BNF NEPA documents for years, yet the FS maintains absolutely no inventory—forestwide or otherwise—of stands so claimed to be "encouraged … towards old growth." The agency is highly insincere. It is interested in growing trees more quickly for harvest, without all those pesky insects and tree diseases to contend with—not in maintaining the kind of decadence characterized by trees in old growth which makes it especially vital for so many wildlife species.

The DEIS old growth analysis includes such statements as:

- The risk of losing existing ponderosa pine and/or Douglas-fir old growth habitat stands to mortality caused by intense competition for moisture making them more susceptible to insects and disease.

- The risk of losing existing ponderosa pine -dominated old growth stands to mortality caused by the ongoing mountain pine beetle epidemic;
- The risk of losing existing Douglas-fir -dominated old growth stands to mortality caused by Douglas-fir dwarf mistletoe and/or another outbreak of Douglas-fir beetle;

Please reconcile those statements with the following best available science concerning forests:

> "(A)ttributes such as decadence, dead trees …are important…" (Green et al., 1992).
> "Accumulations of large-size dead standing and fallen trees that are high relative to earlier stages." (Id.)
> "Decadence in the form of broken or deformed tops or bole and root decay." (Id.)
>
> "The big trees were subsidizing the young ones through the fungal networks. Without this helping hand, most of the seedlings wouldn't make it." (Suzanne Simard: http://www.ecology.com/2012/10/08/trees-communicate/)
> "Disrupting network links by reducing diversity of mycorrhizal fungi… can reduce tree seedling survivorship or growth (Simard et al, 1997a; Teste et al., 2009), ultimately affecting recruitment of old-growth trees that provide habitat for cavity nesting birds and mammals and thus dispersed seed for future generations of trees." (Simard et al., 2013.) (Also see the YouTube video "Mother Tree" embedded within the Suzanne Simard "Trees Communicate" webpage at: https://www.youtube.com/watch?v=-8SORM4dYG8&feature=youtu.be) and also this one on the "Wood Wide Web" on Facebook: https://www.facebook.com/BBCRadio4/videos/2037295016289614/.
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> Gorzelak et al., 2015:
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>> …found that the behavioural changes in ectomycorrhizal plants depend on environmental cues, the identity of the plant neighbour and the characteristics of the (mycorrhizal network). The hierarchical integration of this phenomenon with other biological networks at broader scales in forest ecosystems, and the consequences we have observed when it is interrupted, indicate that underground "tree talk" is a foundational process in the complex adaptive nature of forest ecosystems.

The scientists involved in research on ectomycorrhizal networks have discovered connectedness, communication, and cooperation between trees, traditionally viewed as separate competing organisms. Such connectedness is usually studied within single organisms, such as the interconnections in humans among neurons, sensory organs, glands, muscles, other organs, etc. necessary for individual survival. The tree farmers writing the Gold Butterfly DEIS fail to consider the ecosystem impacts from industrial management activities on this mycorrhizal network—or even acknowledge they exist. The industrial forestry management paradigm destroys what it refuses to see.

The DEIS old growth analysis decries the situation where there is "the lack of disturbance, especially fire" leading to a "composition shift …outside historic ranges" yet the FS uses an all-out fire suppression management strategy in the project area, and wants to suppress other natural disturbances such as insects, root diseases, and mistletoe which create important characteristics of old growth (Green et al., 1992). The DEIS's mechanistic explanation of old growth is extremely irrational.

The Gold Butterfly DEIS also utilizes a confusing old-growth analysis area. It states, “Currently, old growth distribution **within the project area** meets the applicable Forest Plan Standards for old growth habitat in eleven of the twelve 3rd order drainages…” (Emphasis added). Above that, it discusses “in the third order drainages that are **wholly or partially within the Gold Butterfly project area**” (emphasis added). So we cannot tell if Tables 3.4-1 and 3.4-2 acres and percentages refer to entire 3rd order drainages or to only those portions of 3rd order drainages that fall within the project area.

The public understanding of old growth issue is also hampered by the fact that there’s no map in the DEIS showing the analysis area being utilized for old growth, showing the various Management Areas (MAs) and all existing old growth.

What is the purpose of the Forest Plan old growth standards? What is the scientific basis the FS relied upon for the percentages the Forest Plan sets as standards, in the various MAs? Were those standard percentages based the range of historical conditions for old growth on the BNF? If so, what was the source of the historical information?

Since old growth is partly an issue of maintaining viability of old-growth associated wildlife including Management Indicator Species (MIS) pileated woodpecker and pine marten, and viability is a forestwide issue, the FS must disclose forestwide compliance with percentage standards in all MAs forestwide for any claimed demonstration of viability to be meaningful. Table 3.4-3 is a start, if the data are reliable, but it does not indicate how well old growth is currently distributed across the BNF and in each of the applicable MA units.

The DEIS mentions “regional old growth definitions (Green et al. 1992, errata 2005).” Are the Tables 3.4-1 and 3.4-2 percentages based on those criteria, or on the Forest Plan criteria set at Wildlife and Fish Standard 2, which begins, “Stand conditions that qualify as old growth will vary by habitat type and landform. Criteria to consider for identifying old growth include…”? We are also concerned that the DEIS is conflating old growth with “the over-mature tree component, as defined by size class” without providing a specific, quantitative definition of the latter, or the relationship between “over-mature tree component” and old-growth forests.

The DEIS mentions “Old growth habitat inventories …during the summers of 2016 and 2017 when the latest data were collected…” Were these <u>on-the-ground surveys</u> to document the comparison of stands to old-growth criteria? For its forestwide analysis the DEIS clearly indicates FIA plot data are being used.

The DEIS doesn’t disclose if all areas proposed for “treatment” which the FS claims are not old growth were field reviewed. If not, it also doesn’t explain what screening procedures were used to assure those areas don’t meet old-growth criteria.

How old is the FIA data that the old growth analysis (forestwide or project level) relies upon? How many FIA plots fall within the Gold Butterfly old growth analysis area, and how many of those are classified as old growth?

Does the FS use a minimum stand size for designating old growth? In other documents (USDA Forest Service 1987a) considers smaller patches of old growth to be of lesser value for old-growth associated wildlife:

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

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

Defining characteristics of old growth described by Green et al., 1992 include:

> 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.

The Kootenai National Forest 1987 Forest Plan included Appendix 17 and other direction (USDA Forest Service 1987a). We incorporate that appendix as well as USDA Forest Service

1987b which contains a list of "species …(which) find optimum habitat in the "old" successional stage…" Another Kootenai NF document ("Old Growth validation) 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." We also incorporate an Idaho Panhandle NF forestwide old-growth planning document (USDA Forest Service, 1987d) and the original IPNF Forest Plan old-growth standards (USDA Forest Service, 1987c) because they provide biological information concerning old growth and old-growth associated wildlife species.

USDA Forest Service, 1987a states:

> Richness in habitat translates into richness in wildlife. Roughly 58 wildlife species on the Kootenai (about 20 percent of the total) find optimum breeding or feeding conditions in the "old" successional stage, while other species select old growth stands to meet specific needs (e.g., thermal cover). Of this total, **five species are believed to have a strong preference for old growth and may even be dependent upon it for their long-term survival** (see Appendix I[2]). While individual members or old growth associated species may be able to feed or reproduce outside of old growth stands, **biologists are concerned that viable populations of these species may not be maintained without an adequate amount of old growth habitat.**
>
> Wildlife richness is only a part of the story. Floral species richness is also high, particularly for arboreal lichens, saprophytes, and various forms of fungus and rots**. Old growth stands are genetic reservoirs for some of these species, the value of which has probably yet to be determined.** (Bold emphases added.)

The DEIS includes an objective of old-growth logging: "Removal of dead, dying and high risk trees to improve stand health, and recover value however, maintaining appropriate numbers of snags, broken live topped trees and down logs for wildlife and future coarse woody debris needs… We recognize that some large trees would be cut and removed." The FS wants to make old growth on the Bitterroot NF to be a simple numbers game, logging the old growth down to a specific number of large, old trees to supposedly meet the criteria. The FS systematically fails to recognize what's unique about old growth—the decadence, rot, snags, down logs, patchy irregular canopy layers which can't be created by the agency's regime of "encouraging" but would be harmed by proposed management actions even though they are habitat characteristics critical for maintaining wildlife species viability.

The DEIS states, "In some cases, the death of many or most of the larger trees in a stand reduces the number of large green trees to the point that the stand no longer qualifies as old growth under the regional old growth definitions (Green et al. 1992, errata 2005)." Please disclose where the Forest Plan provides ANY protection or ecological recognition of the special wildlife habitat values exhibited by a former old growth stand having one or two too few large, old live trees to meet the criteria.

The DEIS decries "the high stocking densities of younger trees present in many of those (old-growth) stands" and the fact that insects and diseases are killing a few trees here and there.

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[2] USDA Forest Service 1987b.

Please disclose where in the old-growth criteria the presence of younger trees disqualifies a stand from designation as old growth. Please disclose where in the old-growth criteria the presence of "diseased and less desirable species" disqualifies a stand from designation as old growth.

Project activities are said to be "focused on removing non-vigorous intermediate trees that will likely never qualify as old growth…" The old-growth criteria say nothing about "non-vigorous intermediate trees" as qualifying anything, because old-growth is an ecological condition, not just a condition of trees.

Have all the stands making up the "6,714 acres of old growth habitat on Bitterroot National Forest lands in the third order drainages that are wholly or partially within the Gold Butterfly project area" been field surveyed for this project analysis, to determine if the conditions that are apparently giving the FS so much heartburn exist there?

The DEIS sets absolutely no diameter limit on trees to be cut in old growth. It would be consistent with the DEIS if the FS were to log off some of the largest, oldest trees in the stand because they don't meet the FS's vague "desirable" criteria or might stand in the way of a proposed new road. As an aside, the DEIS sets no diameter limits on logging any stand (not just old growth), instead making vague statements such as "Larger live trees would be preferred for retention, but some would be removed." The DEIS fails to explain how any of this meets HFRA requirements.

Please include in the SDEIS a Modified Alternative 3 which prohibits logging of any large, old trees. Setting a scientifically based diameter limit such as 12" would allow areas not meeting old growth criteria to naturally develop old growth character as quickly as possible under natural processes.

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.
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> 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.
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> …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.

Also, Lesica (1996) states, "Results of this study and numerous fire-history studies suggest that **old growth occupied 20-50% of many pre-settlement forest ecosystems in the Northern Rockies**." (Emphasis added.) Lesica, 1996 (also cited in Gautreaux, 1999) stated forest plan standards of maintaining approximately 10% of forests as old-growth in the Northern Region **may extirpate some species**. This is based on his estimate that 20-50% of low and many mid-elevation forests were in old-growth condition prior to European settlement. This should be considered some of the best science on historic range of old growth necessary for insuring viability of old-growth associated species.

The Gold Butterfly DEIS also does not properly analyze and disclose the natural historic range vs. current conditions regarding patch size, edge effect, and amount of interior forest old growth in the Bitterroot NF.

The FS 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. Nor of the habitat you claim you have been "encouraging toward old growth conditions." Biologically speaking, the FS refuses to check in with the real experts to see if logged old growth is still functioning as habitat.

Green et al. 1992 was never intended to set hard thresholds for old-growth criteria. The numbers were intended to be minimum screening criteria for possible old-growth stands from the timber stand database. According to the Green et al. 1992 the final determination of old growth status was to be made by a qualified ecologist or wildlife biologist. Further explanation is in USDA Forest Service, 1990a. Strict reliance on data base queries from the timber stand database has been shown to give unreliable results in past court cases (Iron Honey Timber Sale, Idaho Panhandle National Forests – 9th Circuit Court of Appeals, 2004) and is no substitute for field investigation by qualified professionals.

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

In regards to snag numbers, the FS considers them to be non-essential for old-growth designation. Forest Plan Wildlife and Fish Standard #3 says: "All snags that do not present an unacceptable safety risk will be retained." Has the FS ever been able to demonstrate it is managing consistent with this Standard?

Green et al. 1992 arrived after the Bitterroot Forest Plan was adopted. In preparing and adopting these 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 pointed out the inadequacy of maintaining merely "minimum" amounts of habitat such as snags and old growth.

The Gold Butterfly DEIS does not cite any science to support its assumption that the FS management will result in snags and down logs in abundance to support viable populations. What is the best available science the DEIS relies on for its snag retention guidelines? The guidelines are inconsistent with the scientific opinion and recommendations found in Bull et al., 1997 and other scientific information on snag habitat discussed in these comments.

No monitoring is cited to support the DEIS claims of benefits to snag and down log-dependent species' population numbers or distribution.

The DEIS does not say how statistically robust the project area surveys are for making accurate estimates and analyses.

"Snags are probably more abundant now on the Bitterroot National Forest than at any time since the Forest was created." The DEIS makes other forestwide statements in an attempt to bolster its inadequate project area snag analysis, similarly unsupported by any data or discussion of cumulative impacts of logging, firewood gathering, roads. etc.

The Ninth Circuit Court of Appeals has 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*).

Lehmkuhl et al. (1991) state:

> Competition between interior and edge species may occur when edge species that colonize the early successional habitats and forest edges created by logging (Anderson 1979; Askins and others 1987; Lehmkuhl and others, this volume; Rosenberg and Raphael 1986) also use the interior of remaining forest (Kendeigh 1944, Reese and Ratti 1988, Wilcove and others 1986, Yahner 1989). Competition may ultimately reduce the viability of interior species' populations.
>
> Microclimatic changes along patch edges alter the conditions for interior plant and animal species and usually result in drier conditions with more available light (Bond 1957, Harris 1984, Ranney and others 1981).
>
> Fragmentation also breaks the population into small subunits, each with dynamics different from the original contiguous population and each with a greater chance than the whole of local extinction from stochastic factors. Such fragmented populations are metapopulations, in which the subunits are interconnected through patterns of gene flow, extinction, and recolonization (Gill 1978, Lande and Barrowclough 1987, Levins 1970).

In terms of "quality of habitat" the fragmentation of the Bitterroot NF 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.

The FS provides no assurance its old-growth "encouragement" management scheme will accelerate forest conditions toward old growth at some unspecified time in the future. There is no science or monitoring cited to support such claims. As 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**. (Emphasis added).

Excessive road system, access management, and travel management

The DEIS takes the position that there's basically only one source of water quality degradation in the project area, which would be fixed by the action alternatives: "The primary source of sedimentation in the project area is in the lower FS section of Willow Creek, where NFSR (National Forest System Road) 364 parallels the creek for several miles. In some locations, road drainage is not functioning properly and sediment is being delivered into the stream." Yet the DEIS frequently hedges on its lower Road 364 "primary source" focus. For example, "Risk of failure due to poor road drainage is also an issue in some upper sections of NFSR 364 and NFSR 969…" And it hedges even more: "The major drainage issues are found on roads that are open to the public and receive heavy traffic and insufficient maintenance."

As the DEIS explains, "Poor road drainage increases the risk of catastrophic road failure during high precipitation and runoff events. Risk of failure due to poor road drainage …although not directly adjacent to a stream, could wash downslope, as occurred in the spring of 2017." Note that this describes two separate issues: currently identifiable (on the ground) sediment sources to streams, and the risk of undiscovered (or not yet occurring) sediment sources, such was the case with the Spring 2017 landslide caused by the Willow Creek Road #969.

"Alternative 2 is the only alternative to include road construction." Also, "the final proposed action has no new road crossings proposed over perennial streams." The DEIS is misleading because it doesn't consider construction over presently recovered road templates ("undetermined" roads) to be "new" yet such construction has practically all the adverse impacts of new road construction. Please disclose how many sites within riparian areas will experience the road work disturbance of any kind. Also please specify how many culverts will be installed in locations where there are presently none.

A design feature is "Historic roads will not be widened or narrowed by the project." The DEIS does not define historic roads, or disclose their locations.

The FS's management paradigm mainly provides short-term fixes when roads are not fully decommissioned: "The proposed action focuses on improving the drainage and implementing Best Management Practices on the main travel routes that are currently open to public use and pose the highest risk to water quality and fisheries." The problem with this approach is—implementing Best Management Practices (BMPs) and other drainage improvements are short-lived, and after a few short years the situation reverts back to what it is now—insufficient maintenance funding resulting in chronic watershed damage. <u>This fact is conveniently ignored by the DEIS's analysis of post-project impacts.</u>

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 BMP approach.

This inadequacy of BMPs is also perfectly illustrated by the DEIS's admission: " ML 3 routes, all of which are open year-long or seasonally to public motorized use, will receive a higher degree of maintenance than other routes, due to the higher degree of long-term use these roads receive. These roads are the highest risk for erosion and **substantial work is planned to improve their condition and drainage and meet Best Management Practice requirements**. (Emphasis added.)

And what the DEIS calls "maintenance" is quite substantial: "spot graveling to improve existing gravel surfaces …new gravel surfacing at stream crossings, as well as ditch armoring, new ditch outlets, sediment traps at ditch outlets, drain dips, and surface blading and shaping."

"The interdisciplinary team examined existing roads in the project area, including undetermined roads, to determine the risks and benefits associated with each." How did the IDT examination compare to Fly et al., 2011 (a comprehensive inventory of erosion and sediment sources for a project on the Boise National Forest) for thoroughness?

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. (Emphasis added.)

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."

Yet the Gold Butterfly DEIS resorts to such statements as "the **majority** of road miles in the project area … are **generally** not generating sediment to streams" (emphases added) and then neglects to fully analyze and disclose all the ongoing damage where project funding cannot address the full scope of insufficient maintenance issues. The DEIS violates NEPA.

The Gold Butterfly DEIS fails to recognize that "continual monitoring and maintenance" is necessary following project completion. The DEIS fails to disclose the temporary effectiveness of all the road maintenance and upgrading, merely assuming that the proposed actions will forever mitigate the problems they now exhibit. It fails to properly analyze and disclose the impacts of its continuously failing, undermaintained road system.

The FS has been, and under this project would continue to manage the project area inconsistent with Forest Plan Road System Standards, in violation of NFMA. These include:

1. Roads will be maintained to design standards.
2. Roads will be closed to public use if adequate road maintenance funds are not available.

Since the DEIS includes no alternative to bring the FS into compliance with the above standards, it violates NEPA.

We appreciate that road decommissioning is proposed: "For both action alternatives, 22.3 miles of roads are to be decommissioned; this includes 5.8 miles of existing system roads as well as 16.5 miles of undetermined roads deemed unnecessary for future management." However, to a large degree the proposed decommissioning means little or nothing in terms of reducing watershed damage, since "It may or may not require physical treatment on the ground. …Only .9 miles will require actual work on the ground to prevent erosion." Not even a mile of decommissioning is proposed to reduce erosion at problem sites to prevent ongoing sediment inputs to streams.

The DEIS is also misleading as to how much decommissioning would actually be accomplished; since "Decommissioning a road removes it from the NF Transportation system" it follows that the 16.5 miles of undetermined roads cannot be removed from the road system because they are not on the system to begin with. In other words, they will not really be decommissioned. It may be the case that the FS decommissioned some of these roads previously, but since they're not on any inventory mentioned in the DEIS, how could the public know if the FS is trying to take credit for "decommissioning" again? And to the degree that the work on these undetermined roads "may include noxious weed treatment, culvert removal, decompaction, scarification, revegetation, and entrance closure" this reveals the FS has failed to account for these issues for a long time prior to this timber sale being proposed.

The DEIS defines undetermined roads as "Roads that exist on the ground but are not currently a part of the Forest Service road system." There are so many implications for fishy FS accounting inherent in that definition. Is there a comprehensive database of those roads in the project area? For the entire BNF? At what point does the FS believe the agency is obligated to either take responsibility for them and put them on the system, or fully decommission them so they are no longer an entity called "undetermined road"?

The DEIS also states of undetermined roads "Most of these are effectively stored due to Kelly humps and/or vegetation. These will be managed as ML 1 roads." Does this mean those particular roads will be put <u>on the system</u> (implied by ML 1 status)?

What does the FS do in project analyses to make sure they are aware of all "undetermined" roads in a project area? Or do you simply not attempt to locate all that exist? If the latter, what is your guesstimate of the percentage of the length of project area "undetermined" roads you've identified?

Please disclose on a map ALL of the roads in the project area the FS is aware of, distinguishing between the various Maintenance Levels or Undetermined status, or other nonsystem status such as County or private. Please disclose closure status on this map.

Please include in the SDEIS a Modified Alternative 3 which includes no new road building, including any utilization of the rediscovered "undetermined" roads. This alternative would be consistent with the Travel Management Regulations Subpart A requiring a science-based Travel Analysis Process identify the minimum road system and so would guarantee all roads would receive timely, proper maintenance after project completion in recognition there is no increase in regular road maintenance dollars foreseeable.

The Gold Butterfly DEIS does not demonstrate the project area is being managed consistent with Travel Management Regulations. The Travel Management Regulations (36 CFR 212) Subpart A requires the FS to identify the minimum road system needed to manage the Forest sustainably. The DEIS does not demonstrate how it is minimizing the forestwide road system in compliance with the Travel Management Regulations and related Directives.

The main ecological and financial problem facing the Bitterroot NF, and national forests throughout the Inland Northwest and U. S. Northern Rocky Mountains, 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 ongoing revision of the Forest Plan, in the design of projects, and in the systematic avoidance of conducting 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.

The Gold Butterfly DEIS does not present the proper economic or financial analysis to allow anyone to understand how well or how deficiently all the post-project system roads will be maintained, in light of the well-demonstrated inadequacy of annual appropriations or other funding sources. Therefore, it is impossible to discern the resultant ecological damage from putting watersheds in a "press" type condition which can never recover largely because of insufficient road maintenance.

And although the FS never likes to conduct an analysis of or disclose the forest-wide ecological impacts of its road maintenance funding shortfalls, projecting from discussion in Gucinski et al. 2001 helps to start imagining the scale of the impacts.

Gucinski et al., 2001 also 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.

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.) We also incorporate The Wilderness Society (2014) which discusses best available science on the ecological impacts of roads.

The Gold Butterfly DEIS does not consider the fact that roads increase the efficiency of water transport during storm or snowmelt events, elevating water yields well above natural, with damaging effects. Without explanation the DEIS ignores water yield and peak flows as factors. FS hydrologist Johnson, 1995 discusses many forms of road-related and other cumulative impacts the DEIS fails to consider.

Frissell, 2014 states:

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

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

The FS touts management projects as "restoration," but such claims are mostly overhyped because of their primary focus on "vegetation" (i.e., logging) misses what really needs restorative action—the overbuilt road system. Wisdom et al., 2000 point out issues the Bitterroot NF wants to ignore:

> Our analysis also indicated **that >70 percent of the 91 species are affected negatively by one or more factors associated with roads.** Moreover, maps of the abundance of source habitats in relation to classes of road density suggested that road-associated factors hypothetically may reduce the potential to support persistent populations of terrestrial carnivores in many subbasins. Management implications of our summarized road effects include the potential to mitigate a diverse set of negative factors associated with roads. **Comprehensive mitigation of road-associated factors would require a substantial reduction in the density of existing roads as well as effective control of road access in relation to management of livestock, timber, recreation, hunting, trapping, mineral development, and other human activities.**
>
> **...Efforts to restore habitats without simultaneous efforts to reduce road density and control human disturbances will curtail the effectiveness of habitat restoration, or even contribute to its failure; this is because of the large number of species that are simultaneously affected by decline in habitat as well as by road-associated factors.**

(Emphases added.) So we have a situation where the Bitterroot NF continuously and programmatically promotes "restoration" without acknowledging the major source of ecological damage—its excessive and failing road network.

Have all changes to project area Forest roads, trails, and over-snow (winter) access authorized under the Bitterroot National Forest Travel Management Planning Project Record of Decision been implemented? If not, please disclose what actions are yet to occur, and a timeline.

More on BMPs. The FS relies heavily upon BMP to address the issues associated with logging roads (again, only within a project context). 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). Stanford and Ward (1993) termed this phenomenon the "illusion of technique."

The Bitterroot NF participated in a sham Region 1-directed Travel Analysis Process (TAP) 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 Gold Butterfly DEIS does not analyze or disclose the project area road system's needed long-term financial investments, nor the associated ecological impacts due to inadequate maintenance funding. The DEIS rests on the assumption 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 FS officials are aware this is not the case (USDA Forest Service, 2010t, Lolo National Forest, 1999).

Have all changes to project area Forest roads identified in the forestwide Travel Analysis Report been implemented? If not, please disclose what actions are yet to occur, and a timeline.

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

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

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

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

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

The Travel Management Regulations at 36 CFR § 212.5 state:

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

The Gold Butterfly DEIS does not disclose the Project Area Road Management Objectives, which were to be developed using the Travel Management Regulations.

The Gold Butterfly DEIS does not incorporate the required science-based transportation analysis, and so there was no assessment that comprehensively identified the unneeded or most damaging roads. The process the FS used is not consistent with requirements to involve the public in a science-based Travel Analysis Process, create a Travel Analysis Report, and identify roads likely not needed to manage the forest, as required under the Regulations and in the Directives. The

DEIS doesn't even state how the Gold Butterfly project might or might not be implementing the forestwide minimum road system.

Does the FS maintain that the Gold Butterfly decision will be consistent with the Travel Management Regulations (36 CFR 212) Subpart A?

Scientific information from government studies conducted for the Interior Columbia Ecosystem Management Project reveals a highly 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 CLIMATE 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).

The Gold Butterfly DEIS does not disclose if the FS has surveyed the project area with the detail needed to determine if all non-system (e.g., "undetermined") roads existing in the project area have been identified, so their ecological liabilities can be accounted for.

The Gold Butterfly DEIS does not present an analysis of the ongoing adverse impacts of the roads in the project area which will not be maintained or upgraded by the project. It ignores their cumulative impacts. As indicated by the limited range of alternatives, the FS refuses to properly address the issue.

Wildlife viability

The FS fails to set meaningful thresholds and assumes without scientific basis that project-caused habitat losses will not threaten population viability. Of such analyses, 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 wildlife populations at the Forest level, projects will continue to degrade habitat across the Bitterroot NF over time. (See also Schultz 2012.)

Traill et al., 2010 and Reed et al., 2003 are published, peer-reviewed scientific articles addressing how "minimum viable populations" can be estimated, and how they have been drastically underestimated in past. The FS has not identified the best available science to make quantitative minimum viable population determinations for wildlife species on the Bitterroot NF.

Traill et al., 2010 state:

> To ensure both long-term persistence and evolutionary potential, the required number of individuals in a population often greatly exceeds the targets proposed by conservation management. We critically review minimum population size requirements for species

> based on empirical and theoretical estimates made over the past few decades. This literature collectively shows that thousands (not hundreds) of individuals are required for a population to have an acceptable probability of riding-out environmental fluctuation and catastrophic events, and ensuring the continuation of evolutionary processes. The evidence is clear, yet conservation policy does not appear to reflect these findings, with pragmatic concerns on feasibility over-riding biological risk assessment. As such, we argue that conservation biology faces a dilemma akin to those working on the physical basis of climate change, where scientific recommendations on carbon emission reductions are compromised by policy makers. There is no obvious resolution other than a more explicit acceptance of the trade-offs implied when population viability requirements are ignored. We recommend that conservation planners include demographic and genetic thresholds in their assessments, and recognise implicit triage where these are not met.

Assuring viability of most wildlife species is forestwide issue. The cumulative effects of carrying out multiple projects simultaneously across a national forest makes it imperative that population viability be assessed at least at the forestwide scale (Marcot and Murphy, 1992; also see Ruggiero et al., 1994a).

The Gold Butterfly DEIS fails to consider and use the best available science and fails to insure population viability in violation of NFMA and additionally, violating NEPA's requirements that the FS demonstrate scientific integrity. *See* 36 C.F.R. 219.3; 40 C.F.R. 1502.24.

Canada Lynx (Threatened Species)

The Gold Butterfly project would impact the Burnt Fork-Willow and Willow-Skalkaho Lynx Analysis Units (LAUs). With the Gold Butterfly timber sale, the FS fails to consider, apply, and incorporate best available science and fails to demonstrate consistency with all Forest Plan/NRLMD direction, in violation of the Endangered Species Act (ESA). The project will result in unauthorized take as defined by Section 9 of the ESA.

The Gold Butterfly DEIS does not include an analysis comparing the historic range of lynx habitat components with current conditions.

The DEIS indicates that neither logging alternative complies with the NRLMD prohibition on destroying mature multistory lynx habitat. Alternative 2 would destroy 1230 acres. The Project will result in unauthorized take under Section 9 of the ESA. The FS has duties under the ESA, 16 U.S.C. Section 1531 *et seq.,* to ensure that its actions do not jeopardize threatened and endangered species, that their actions do not result in unauthorized take of these species of wildlife, and that their actions promote recovery of these species.

The Forest Plan/NRLMD Amendment allows essentially the same level of industrial forest management activities which occurred prior to Canada lynx listing under the ESA.

The Gold Butterfly DEIS does not apply the best available science regarding the Canada lynx. Lynx subsist primarily on a prey base of snowshoe hare, and survival is highly dependent upon snowshoe hare habitat, forest habitat where young trees and shrubs grow densely. In North

America, the distribution and range of lynx is nearly coincident with that of snowshoe hares, and protection of snowshoe hares and their habitat is critical in lynx conservation strategies.

Lynx are highly mobile and generally move long distances [greater than 60 mi. (100 km.)]; they disperse primarily when snowshoe hare populations decline; subadult lynx disperse even when prey is abundant, presumably to establish new home ranges; and lynx also make exploratory movements outside their home ranges. 74 Peg. Reg. at 8617.

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

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.) Openings, whether small in uneven-aged management, or large with clearcutting, remove lynx winter travel habitat on those affected acres, since lynx avoid openings in the winter. (Squires et al. 2010.) Existing openings such as clearcuts not yet recovered are likely to be avoided by lynx in the winter. (Squires et al. 2010; Squires et al. 2006a) 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.

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

The Lynx Conservation Assessment and Strategy (LCAS 2000) 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.

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. Young regenerating forest should occur only on 10-15% of a female lynx home range, i.e. 10-15% of an LAU. This renders inadequate the agency's assumption in the Forest Plan/NRLMD that 30% of lynx habitat can be open, and that no specific amount of mature forest needs to be conserved. Kosterman, 2014 demonstrates that Forest Plan/NRLMD standards are not adequate for lynx viability and recovery.

Other recent science also undermines the adequacy of the Forest Plan/NRLMD. The FS 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.

And the Gold Butterfly DEIS and Forest Plan/NRLMD erroneously assume clearcutting/regeneration logging have basically the same temporal effects as stand-replacing fire as far as lynx re-occupancy. Also conflicting with Forest Plan/NRLMD assumptions is a study by Vanbianchi et al., 2017, who found, "Lynx used burned areas as early as 1 year postfire, which is much earlier than the 2–4 decades postfire previously thought for this predator." The DEIS demonizes the effects of the No Action Alternative: "(T)he risk of moderate to severe fire would increase. Eventually, a large fire would regenerate many stands that currently provide poor habitat for snowshoe hares, which are the primary prey species for lynx. These **burned areas would be not be suitable for hares or lynx for about 30 years**…" (Emphasis added.)

Kosterman, 2014, Vanbianchi et al., 2017 and Holbrook, et al., 2018 each demonstrate that the Lynx Amendment standards are not adequate for lynx viability and recovery, as the FS assumes.

Squires et al. (2013) noted that long-term population recovery of lynx, as well as other species as the grizzly bear, require maintenance of short and long-distance connectivity. The importance of maintaining lynx linkage zones for landscape connectivity should be maintained to allow for movement and dispersal of lynx. Lynx avoid forest openings at small scales, however effects on connectivity from project-created or cumulative openings were not analyzed in terms of this smaller landscape scale. And connectivity between project area LAUs and adjacent LAUs was not analyzed or disclosed.

The allowance of "exemptions" from Forest Plan direction is another issue of scientific controversy. The NRLMD allows for reduction of lynx foraging habitat within the wildland-urban interface. The problem with this approach is, the boundary of the wildland-urban interface is a changing geographical feature independent of FS or USFWS influence. As explained in the Flathead NF"s Hungry Lion Draft DN Responses to comments, "The Flathead County CWPP …identifies the wildland-urban interface (WUI) boundary for the area covered by the plan.…" In other words, the area exempt from Forest Plan standards is potentially ever-growing along with human population and development, and may be changed at any time by Ravalli County without any forest plan amendment, NEPA analysis, or ESA consultation.

The Gold Butterfly DEIS fails to analyze and disclose how much lynx habitat is affected by snowmobiles and other recreational activities. As the Kootenai NF's Galton FEIS states, "The temporal occurrence of forest uses such … winter (skiing and snowmobiling) … may result in a temporary displacement of lynx use of that area…"

How the Canada lynx Environmental Baseline was quantified does not appear in the Gold Butterfly DEIS.

The Gold Butterfly DEIS states that the Project "May affect, but is unlikely to adversely affect" the Canada lynx. However the Gold Butterfly DEIS does not present adequate analysis of Project activities' adverse effects on lynx, rendering any assumption of insignificance without sufficient analytical basis. The DEIS states, "See the Biological Assessment for Terrestrial Wildlife Species (currently in process) and USFWS concurrence letter (following completion of USFWS review)." That is absurd. How can the public "see" what is yet to be written?

Because the FS does not consider the best available science and for the reasons stated herein, the FS is unable to demonstrate it is managing consistent with NFMA, the Forest Plan and the Endangered Species Act. The inadequacy of cumulative effects analysis violates NEPA.

Wolverine (Sensitive; also Proposed for listing under the ESA)

The status of the wolverine is Proposed for listing under the ESA, and the FS must undergo formal consultation with the U.S. Fish & Wildlife Service.

Wolverines are known to occur in the Sapphire Mountains, yet the BNF has no science-based conservation strategy, only a "model." The DEIS fails to explain how the model is applied, consistent with best available science.

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

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

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

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

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

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

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

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

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

Wisdom et al. (2000) state:

> Carnivorous mammals such as marten, fisher, lynx, and wolverine are vulnerable to over-trapping (Bailey and others 1986, Banci 1994, Coulter 1966, Fortin and Cantin 1994, Hodgman and others 1994, Hornocker and Hash 1981, Jones 1991, Parker and others 1983, Thompson 1994, Witmer and others 1998), and over-trapping can be facilitated by road access (Bailey and others 1986, Hodgman and others 1994, Terra-Berns and others 1997, Witmer and others 1998).
>
> …Snow-tracking and radio telemetry in Montana indicated that wolverines avoided recent clearcuts and burns (Hornocker and Hash 1981).

> Copeland (1996) found that human disturbance near natal denning habitat resulted in immediate den abandonment but not kit abandonment. Disturbances that could affect wolverine are heli-skiing, snowmobiles, backcountry skiing, logging, hunting, and summer recreation (Copeland 1996, Hornocker and Hash 1981, ICBEMP1996f).

Carroll et al. (2001b) state:

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

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

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

Nowhere in the Forest Plan or Gold Butterfly DEIS can be found a description of the quantity and quality of habitat that is necessary to sustain the viability of the wolverine.

The Gold Butterfly DEIS fails to analyze and disclose cumulative impacts of recreational activities on wolverine.

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

The Gold Butterfly DEIS claims the action alternatives are "not likely to jeopardize wolverines across their range" but it fails to provide scientific basis for conducting a viability analysis "across their range." Cumulative effects are not adequately analyzed. The FS's illogical wolverine determination is based in part upon a 2013 memo from the Regional Office (USDA

Forest Service 2013c). It appears that FS district level specialists are not allowed to arrive at effects conclusions based upon their own expertise and judgment.

<u>Grizzly Bear</u>

The Threatened grizzly bear is a resident species here in the Sapphire Mountains, yet the BNF has not adopted nondiscretionary habitat protection standards that match those found in other forest plans. The FS has no scientifically robust conservation strategy for protecting the species and its habitat in the project area or Forest. And again, there is no Biological Assessment or Biological Opinion for the public to review.

What is the scientific basis for the statement, "the Gold Butterfly project area …is an appropriate scale for a grizzly bear analysis unit"? Then again, the DEIS hedges, stating "The defined cumulative effects area for grizzly bears is the BNF portion of the Sapphire Mountains north of the East Fork Bitterroot River (PF-WILD-043)."

The DEIS fails to conduct the proper analysis of total road density, and its open road density calculations incorrectly ignore undetermined roads which are presently accessible.

For the elk analysis, "roads that are closed to full-sized motorized vehicle use all year are counted as closed roads, even though we know that some level of unauthorized OHV use occurs on some of those roads." This is not considered in the grizzly bear analysis. We incorporate the Amended Complaint for case CV-18-67-DWM for the purposes of explaining how roads affect wildlife and how widespread are the ineffective closures on national forest land.

The Gold Butterfly DEIS states that the Project "May affect, but is unlikely to adversely affect" the grizzly bear. However the Gold Butterfly DEIS does not present adequate analysis of the significance of Project activities' adverse effects on grizzly bears, rendering any assumption of insignificance without sufficient analytical basis. There is no Biological Assessment or USFWS concurrence letter for the public to review. Why did the FS rush this DEIS without finalizing these essential steps?

<u>Fisher (Sensitive)</u>

The Gold Butterfly DEIS indicates fisher have been detected in the project area, but has no reliable historic data on fisher populations.

The DEIS states that forestwide, the BNF now has 95% of the habitat necessary to maintain a minimum viable population of fisher. Yet the proposed logging would destroy up to 2,880 acres of fisher habitat, and increase damaging habitat fragmentation. The DEIS's cumulative effects analysis has no analysis of present vs. pre-management baseline habitat conditions. The implications of the loss of old growth due to project logging was not analyzed or disclosed for this, an old-growth associated species.

The Gold Butterfly DEIS fails to adequately analyze the cumulative effects on fisher due to trapping or from use of the road and trail networks. Heinemeyer and Jones, 1994 stated:

> Fishers are susceptible to trapping, and are frequently caught in sets for other furbearers. Additionally, populations are vulnerable to trapping, as even light pressure may cause local

> extinction. Western fisher populations may have lower natality and higher natural mortality rates as compared to eastern populations. Consequently, western populations may be more susceptible to over-trapping. It has been suggested that incidental captures may limit population growth in some areas.

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)."

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. They also 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 analysis for the fisher, as for most wildlife, doesn't disclose the direct, indirect or cumulative impacts on important habitat components, such as snags, logs, foraging habitat configuration, connectivity, cover, prey species impacts, etc.

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

Sauder, 2014 found that "fishers selected landscapes for home ranges with larger, more contiguous patches of mature forest arranged in connected, complex shapes with few isolated patches and open areas comprising $\leq$ 5% of the landscape" (Sauder and Rachlow 2014).

Most studies have found that fishers are reluctant to stray from forest cover and that they prefer more mesic forests (Buskirk and Powell 1994, Olson et al. 2014, Schwartz et al. 2013, Sauder 2014, Sauder and Rachlow 2014, Weir and Corbould 2010). Both Sauder and Rachlow (2014) and Weir and Corbould (2010) predicted the influence of openings on fisher habitat occupancy based on their data. For example, Weir and Corbould predicted that a 5% increase in forest openings would decrease the likelihood of fisher occupancy by 50%. Sauder and Rachlow (2014) suggested that an "increase of open area from 5% to 10% reduces the probability of occupation by fishers by 39%. Sauder and Rachlow (2014) reported that the median amount of open area within fisher home ranges was 5.4%. This was consistent with "results from California where fisher home ranges, on average, contained <5.0% open areas" (Raley et al. 2012).

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

From Ruggiero et al. 1994b:

> (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 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).

The Gold Butterfly DEIS doesn't disclose the FS's strategy and best available science for insuring viable populations of the fisher, including limiting human access and therefore trapping. The DEIS cites no 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 Forest comparing forestwide conditions with habitat metrics required to insure fisher viability. The analyses for other wildlife show these same flaws.

Pine Marten (Management Indicator Species)

The Gold Butterfly DEIS fails to consider 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. (See Moriarty et al., 2016; Bull and Blumton, 1999; Hargis et al., 1999 and Wasserman et al., 2012).

Alternative 2 would destroy about 3,000 acres of marten habitat. The DEIS fails to conduct an analysis of the historic range of marten habitat on the BNF, thus it also fails to conduct the proper cumulative effects analysis.

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

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

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

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

The Gold Butterfly DEIS does not disclose the quantity and quality of habitat necessary to sustain the viability of the marten.

Pileated Woodpecker (Management Indicator Species)

The Gold Butterfly DEIS indicates the proposed logging would deplete forest that provides habitat for species needing the kind of habitat features found in mature and old-growth forests, such as the pileated woodpecker. The DEIS discloses that Alternative 2 would destroy 12% of what little high quality habitat exists in the project area, and another 2,300 acres of moderate quality habitat.

Since the average size of pileated woodpecker territories would increase, the FS is obligated to analyze impacts on survivability of nestlings. It fails to do so.

"The reduction in carrying capacity is not quantifiable, but is likely to be small." This statement is vague and self-contradictory. What is "carrying capacity"? How does this relate, cumulatively, across the BNF?

The DEIS states, "Pileated woodpeckers …live primarily in old growth habitat characterized by warm and dry habitat types. These are habitats that characteristically had low severity, high frequency or mixed severity fire (Bull and Jackson 1995)." Such a narrow habitat association misrepresents the biology of the species. In fact, the BNF's own Westside Environmental

Assessment describes pileated habitat as "Mature and older lower to mid-elevation conifer forests or cottonwood gallery forests with large snags and down logs. …Suitable habitat typically includes dry to moderately moist forests in older seral stages, and usually contains old growth or mature forest, or multi storied structures." The FS must remove inaccurate and misleading information before preparing its SDEIS.

The DEIS states, "This low overall habitat quality is largely due to the high percentage of the project area that is over 6800' elevation." What is the percentage of the project area above 6,800 feet elevation? How much of the proposed logging is over 6,800 feet elevation?

"The defined cumulative effects area for pileated woodpeckers is the Bitterroot National Forest between Ambrose Creek and Skalkaho/Daly Creeks. This area totals about 96,338 acres of mostly forested habitat." This obviously dilutes project impacts on pileated woodpeckers. Where is the scientific support for the DEIS's chosen cumulative effects analysis area for pileated woodpeckers?

"(S)hort-term viability of pileated woodpeckers across the Region is not an issue (Samson 2005)." 2005 is thirteen years ago. What is meant by "short-term"? And why doesn't the DEIS disclose Samson's conclusions for the longer term, for any wildlife species?

The Gold Butterfly DEIS doesn't 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 recent research information on such effects, and contrast the effects of natural disturbance with large-scale logging on Pileated Woodpeckers. Also see Bull et al., 1992, Bull and Holthausen, 1993, and Bull et al., 1997 for biology of pileated woodpeckers and the habitats they share with cavity nesting wildlife.

The Idaho Panhandle NF'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.

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

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

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

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

B.R. McClelland extensively studied pileated woodpecker habitat needs. McClelland, 1985 states:

> Co-workers and I now have a record of more than 90 active pileated woodpecker nests and roosts, …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.

What is the scientific basis the FS relied upon for the Forest Plan snag retention guidelines? Were those guidelines based the range of historical conditions for snags on the BNF?

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

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

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

The FS's Vizcarra, 2017 notes that researchers "see the critical role that mixed-severity fires play in providing enough snags for cavity-dependent species. Low-severity prescribed fires often do not kill trees and create snags for the birds."

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

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

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

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

Spiering and Knight (2005) found the following.

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

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

The Gold Butterfly DEIS fails to <u>quantify</u> the cumulative snag loss in previously logged areas or subject to other management-caused snag loss such as road accessed firewood cutting.

Bate et al. (2007), found that snag numbers were lower adjacent to roads due to removal for safety considerations, removal as firewood, and other management activities. Other literature has also indicated the potential for reduced snag abundance along roads (Wisdom et al. 2000).

The Gold Butterfly DEIS fails to <u>quantify</u> snag loss would be expected because of safety concerns which vary with different methods of log removal.

The Gold Butterfly DEIS does not cite any science to support its assumption that the FS management will result in snags and down logs in abundance to continuously support viable populations. No monitoring is cited to support claims of benefits to snag and down log-dependent species' population numbers or distribution.

No estimates of snags for the project area state how statistically robust the project area surveys are for making accurate estimates and analyses.

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

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

The Gold Butterfly DEIS fails to apply the best available science to describe the quantity and quality of habitat that is necessary to sustain the viability of the pileated woodpecker.

Northern Goshawk

The Gold Butterfly DEIS doesn't disclose the FS's strategy and best available science for insuring viable populations of the northern goshawk, a species whose habitat is adversely affected by logging and other forest management. The DEIS presents no analysis at all.

The DEIS includes a design feature, "Implement recommendations in the Northern Goshawk Northern Region Overview in goshawk nest stands." However there is no indication the FS has searched for goshawk nest stands in the project area. 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.)

Scientific information indicates analysis must be conducted for adverse impacts in a roughly 6,000-acre northern goshawk home range or the post-fledging area (PFA). Reynolds et al. 1992 goshawk guidelines recommend ratios of (20%/20%/20%) each in the mid-aged forest, mature forest, and old forest Vegetative Structural Stage (VSS) classes for PFAs and foraging areas. Reynolds et al. 1992 calls for 100% in VSS classes 5 & 6 and 0% in VSS classes 1-4 in nest areas.

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

Crocker-Bedford (1990) noted:

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

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

The Forest Plan and FEIS, and the Gold Butterfly DEIS fail to describe the quantity and quality of habitat necessary to sustain the viability of the northern goshawk.

Black-Backed Woodpecker (Sensitive)

The viability of black-backed woodpeckers is threatened by fire suppression and other "forest health" policies which specifically attempt to prevent its habitat from developing. "Insect infestations and recent wildfire provide key nesting and foraging habitats" for the black-backed woodpecker and "populations are eruptive in response to these occurrences" (Wisdom et al. 2000). A basic purpose of the FS's management strategies is to negate the natural processes that the black-backed woodpecker biologically relies on; the emphasis in reducing the risk of stand loss due to stand density coupled with the increased risk of stand replacement fire events. Viability of a species cannot be assured, if habitat suppression is a forestwide policy.

The action alternatives would "cause a minor reduction in the number of black-backed woodpeckers the project area is capable of supporting in the short term. Over the long term, this alternative would reduce the risk of a large, high-to-moderate intensity fire and intense beetle outbreaks, thereby reducing the availability of suitable habitat (snags) that would potentially attract and support large numbers of black-backed woodpeckers for several years." The significance of these effects (including risk to viability) cannot be determined in the absence of a forestwide cumulative effects analysis of the BNF fire suppression policies.

Please see Hanson Declaration, 2016 for an explanation of what a cumulative impact is with regard to the backed woodpecker, how the FS failed apply the best available science in their analysis of impacts to Black-backed Woodpeckers for a timber sale, why FS's (including Samson, 2006) 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.

Hutto, 1995 states: "Fires are clearly beneficial to numerous bird species, and **are apparently necessary for some**." (p. 1052, emphasis added.) Hutto, 1995 whose study keyed on forests burned in the 1988 season, noted:

> Contrary to what one might expect to find immediately after a major disturbance event, I detected a large number of species in forests that had undergone stand-replacement fires. Huff et al. (1985) also noted that the density and diversity of bird species in one- to two-year-old burned forests in the Olympic Mountains, Washington, **were as great as adjacent**

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

USDA Forest Service 2011c states:

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

Also see the agency's Fire Science Brief, 2009, which states, "Hutto found that Black-backed Woodpeckers fared best on sites unharvested before fire and poorest in the heavily harvested sites", raising a concern about logging for forest restoration that is not addressed in the Gold Butterfly DEIS: How does pre-fire logging affect the future suitability of these forests to post-disturbance specialists?

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 Gold Butterfly DEIS's Purpose and Need.

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

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

Cherry (1997) also notes:

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

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

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

> Black-backed woodpeckers occupy forested habitats that contain high densities of recently dead or dying trees that have been colonized by bark beetles and woodborer beetles (Buprestidae, Cerambycidae, and Scolytidae). These beetles and their larvae are most abundant within burned forests. In unburned forests, bark beetle and woodborer infested trees are found primarily in areas that have undergone natural disturbances, such as wind-

> throw, and within structurally diverse old-growth forests (Steeger and Dulisse in press, Bull et al. 1986, Goggans et al. 1987, Villard 1994, Hoffman 1997, Weinhagen 1998).

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

> In California, the Black-backed Woodpecker's strong association with recently burned forest, a habitat that is ephemeral, spatially restricted, and often greatly modified by 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 viability of black-backed woodpeckers is threatened by the FS's fire suppression and other "forest health" policies, which specifically attempt to prevent its habitat from developing. "Insect infestations and recent wildfire provide key nesting and foraging habitats" for the black-backed woodpecker and "populations are eruptive in response to these occurrences" (Wisdom et al. 2000). A basic purpose of the Gold Butterfly 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 Bitterroot NF. Viability of a species cannot be assured, if habitat suppression is a forestwide policy.

The Gold Butterfly DEIS does not disclose the quantity and quality of habitat necessary to sustain the viability of the black-backed woodpecker.

Flammulated owl (Sensitive)

The Gold Butterfly DEIS does not disclose the quantity and quality of habitat necessary to sustain the viability of the flammulated owl.

Boreal toad (Sensitive)

The FS has no scientifically-based viability strategy for this Sensitive species, no metrics for describing the quantity and quality of habitat need to assure viability, and no way of quantifying cumulative effects. USDA Forest Service, 2011c:

> According to historical records, the western (boreal) toad … was widely distributed and very common in Montana and other western states, but the species may have undergone severe population decreases in the past 25 years (Currim 1996).

The FS doesn't really know why western toad populations have declined so drastically in Montana, except that it is associated with activities such as those approved by the Gold Butterfly DEIS: "Timber harvest, increased vehicle use, road maintenance, and road construction may kill individual adult and juvenile boreal toads using upland habitats." (USDA Forest Service, 2011c at 3-304.)

The DEIS states, Alternative 2 "would not change the amount of suitable habitat for western toads within the Project Area…" It is impossible to agree or disagree with that statement, since "suitable habitat" is not defined.

The Lolo NF's Sunrise Fire Salvage EA states, "The critical factor in whether toads can exploit open habitats appears to be the presence of adequate retreat sites [refugia] where toads can escape predators and maintain water balance (Guscio et al. (2007)." The Gold Butterfly DEIS doesn't consider this science.

The DEIS states that Alternatives 2 and 3 "May Impact Individuals or Habitat" but cites no reliable population numbers or trends for the project area or Bitterroot NF.

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.

The Gold Butterfly DEIS fails to describe the quantity and quality of habitat necessary to sustain the viability of the boreal toad, and has no explanation of FS methodology for measuring this habitat.

Bighorn sheep

Although considered a resident of the project area, the Gold Butterfly DEIS contains insufficient analysis supporting its "no effects" conclusion. Does the analysis for the MIS elk also "represent" impacts on bighorn sheep?

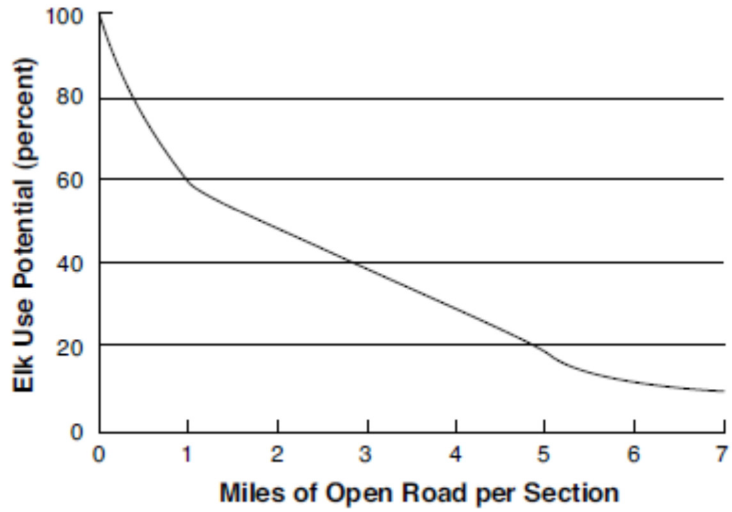
Elk and other Big game

The Gold Butterfly DEIS does not present an adequate quantitative or qualitative analysis of security and thermal cover.

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.

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:



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.

Fragmentation and Corridors

The analysis of this issue treats logged openings such as clearcuts and other regeneration, roads, etc. the same as natural openings such as meadows, burned areas. Where's the scientific support?

“Corridors comprised of suitable habitat for the species in question work best for allowing dispersal.” The DEIS fails to provide a robust analysis of habitat suitability connectivity for any species, and any relevant landscape level.

Water quality and fisheries

The DEIS states “More than any other watershed in the Gold Butterfly analysis area, excessive sediment has affected the abundance and quality of aquatic habitats in Willow Creek.” Why are reliable numbers reporting measurements of instream sediment (i.e., cobble embeddedness) not reported in the DEIS?

“Willow Creek is a water quality impaired stream with a designated impairment for sediment / siltation (Montana DEQ 2011).” The DEIS does not disclose if a TMDL has been prepared, nor explain how project activities would be consistent with it. The vast sediment increases from this project would be inconsistent with the Clean Water Act.

The DEIS does not distinguish in its estimates of sediment percentage increases the amounts attributable to purely restorative actions such as decompacting roads in RHCAs or removing culverts, from those other road maintenance and construction activities including installing culverts. The DEIS has little quantitative sediment analysis.

Furthermore, how the FS arrived at the percent sediment increase and decrease figures is not explained in the DEIS. The lack of any discussion of the accuracy of such predictions further creates the impression the numbers come practically out of thin air.

“Sediment inputs from project elements high in the watershed (installation of new crossings, road decommissioning, and low levels of road use) are not expected to contribute measurable quantities of sediment into fish bearing waters.” Does this mean the prediction from whatever estimation methods are used is zero? Also, how did the FS “measure” sediment?

“The new roads … were designed to have limited contact with water.” Again, without a quantitative analysis, such statements come off as false assurances.

“Other than culvert removals, the project element most likely to deliver sediment to fish bearing streams is log hauling on project area roads and the maintenance activities needed to facilitate hauling.” Once again, a major flaw of this DEIS is that it doesn’t present itemized, numerical data of such impacts. The total percentages figures, as we said above, look made up. Instead of data, we get “indicators of sediment delivery” which is a very rough proxy for data.

Additionally, “percent increases” is a rough and misleading proxy for tons of sediment. The FS often discloses tons of sediment in NEPA documents; not doing so makes it look like the FS is hiding something.

“Substantially fewer …” “Substantially lower…” Lacking real quantification, the analysis is insubstantial.

"Although higher numbers of log truck loads under Alternative 2 would degrade the water quality-protecting BMPs faster, the requirement that maintenance of BMPs would be 'commensurate with use,' enforceable with the timber sale contract, would mitigate much of this risk. Under this design feature, more maintenance would be carried out at higher levels of use to keep the road surface BMPs effective." The FS has not data to support of such assurances.

The DEIS fails to support it claims of net improvement in long-term sediment amounts in streams. It lacks statistical rigor and scientific integrity.

"It is not possible to draw specific, quantitative conclusions about how much a given amount of sediment will affect fishes, either individuals or populations, because a variety of complex interrelated factors determine how vulnerable an individual fish or a population may be to sediment inputs." However, if the FS would have made good on its Forest Plan monitoring commitment #21…

21	Validation of aquatic habitat quality and fish population assumptions used to predict effects of activities	Evaluate aquatic insect density/diversity, fish populations intergravel sediment, channel structure and streambank vegetation changes	High	Moderate	6 streams representing major geologic types	Annually	A decline in aquatic habitat and/or fish population for more than 1 year

…then the FS would be able to draw valid conclusions. And if the above DEIS statement makes sense, then the following is nonsense: "neither alternative is expected to contribute sediment in an amount or rate that would result in substantial, measurable population level effects to either bull trout or westslope cutthroat trout in Willow Creek."

"(M)onitoring indicates that the number of both bull trout and westslope cutthroat trout have either been holding stable or slightly increasing over time, at least since monitoring began in 1990 (see Figures 3 and 5, above)." The DEIS fails to present any fish population trend information. There is no Figure 3, there is no Figure 5.

"This begs the question: why have these sediment-sensitive fish persisted so long in this situation?" Perhaps the answer is—because the FS has not carried out massive clearcutting and road sediment increase projects in the watershed, as you now propose.

"The Fisheries Cumulative Effects analysis includes a discussion of the combined, incremental effects of proposed activities with consideration of past, present, proposed, and reasonably foreseeable actions, regardless of land ownership, for each watershed unit." False—such an analysis cannot be found in the DEIS.

The DEIS doesn't disclose the effect that large clearcuts have as far as increasing water temperatures in streams. It pretends RHCAs are 100% of the protection—and without even disclosing the existing level of artificial openings in project area RHCAs.

Riggers, et al. 2001 state:

> (T)he real risk to fisheries is not the direct effects of fire itself, but rather the existing condition of our watersheds, fish communities, and stream networks, and the impacts we impart as a result of fighting fires. Therefore, attempting to reduce fire risk as a way to reduce risks to native fish populations is really subverting the issue. If we are sincere about wanting to reduce risks to fisheries associated with future fires, we ought to be removing barriers, reducing road densities, reducing exotic fish populations, and re-assessing how we fight fires. At the same time, we should recognize the vital role that fires play in stream systems, and attempt to get to a point where we can let fire play a more natural role in these ecosystems.

Those FS biologists emphasize, "the importance of wildfire, including large-scale, intense wildfire, in creating and maintaining stream systems and stream habitat. ...(I)n most cases, proposed projects that involve large-scale thinning, construction of large fuel breaks, or salvage logging as tools to reduce fuel loading with the intent of reducing negative effects to watersheds and the aquatic system are largely unsubstantiated."

The DEIS states:

> The actions proposed under both Alternatives 2 and 3 were determined as "likely to adversely affect the bull trout and designated bull trout critical habitat." Primary issues impacting bull trout and designated critical habitat are discussed in Section 3.3 of this Chapter. A Biological Assessment is being submitted to the USFWS under a separate cover.

Yet the DEIS hardly analyzes bull trout critical habitat. It does state:

> (A) new recreation site along the Burnt Fork RHCA as well as re-location of the existing Willow Creek trailhead at the end of the 312 road …would contribute to both positive and negative cumulative effects. …These effects would combine with the effects of dispersed recreation and fuelwood gathering in the 3.7 mile long recreation corridor in the Forest Service managed reaches of the lower Burnt Fork to contribute to **a cumulative, chronic diminishment of riparian habitat values in designated bull trout critical habitat.** (Emphasis added.)

The public is unable to review the not-yet-available Biological Assessment—yet another barrier to public participation. How the FS portrays the full set of impacts to bull trout and its critical habitat (including Primary Constituent Elements) remains a mystery.

The FS is unable to demonstrate it is managing consistent with Forest Plan Wildlife and Fish Standard #7, which is: "Cutthroat trout populations will be used as an indicator of fisheries habitat changes."

The DEIS does not demonstrate it is managing consistent with Forest Plan Wildlife and Fish Standard #9, which is: "Fish passage shall be provided where roads cross fisheries streams." The DEIS doesn't disclose how many fish passage barriers will remain after project implementation.

Forest Plan Standard #RF-2 requires development and implementation of a Road Management Plan or a Transportation management Plan, which must address, among other items, "Criteria that govern road …maintenance and management." What are the project area criteria? Also, "Requirements for pre-, during, and post storm inspection and maintenances. " What are these requirements?

The DEIS fails to include any analysis of the trends toward attainment of Riparian Management Objectives, especially of those not currently being met.

The DEIS does not demonstrate consistency with Forest Plan water, air, soil Standard 1, which requires the FS to "Utilize equivalent road area or similar concept to evaluate cumulative effects of project involving significant vegetation removal, prior to including them on implementation schedules." Appendix D misconstrues the meaning of the standard, stating "variables of existing road system were utilized by resource specialists during project cumulative effects analysis (Chatoian, 1985)." Gordon Grant[3] explains that the Forest Plan and Chatoian, 1985 concern is peak flow increases—not addressed at all by the DEIS: "These methods are essentially accounting procedures, allowing managers to schedule harvest activities so that previously determined limitations on the percent of area harvested or compacted by logging activities and roads are not exceeded."

Climate change and carbon sequestration

Global climate change is a significant 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. Since all forests are an important part of the global carbon cycle, the agency must do its part by managing forest to maintain and increase carbon storage. Global warming is caused by the *cumulative* buildup of greenhouse gases, including carbon, in the atmosphere. Logging will add to the cumulative total carbon emissions so it is clearly part of the problem and must be minimized and mitigated. Logging will 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 will lag carbon storage unlogged forests for decades or centuries.

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

[3] Assessing Effects of Peak Flow Increases on Stream Channels—A Rational Approach. Proceedings of the California Watershed Management Conference, November 18-20, 1986, West Sacramento, California

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

Except for some discussion of fisheries and bull trout refugia, the Gold Butterfly DEIS fails to analyze and disclose how climate change is already influencing forest ecology, and even more so in the future. This has vast ramifications as to whether or not the forest in the project area will respond as the DEIS assumes. As the Kootenai NF's 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.)

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 anthropogenic greenhouse gas) emission on earth, and likewise justify inaction as does this DEIS. 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 the scale of analysis dilutes cumulative 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.

Former US Forest Service Chief Abigail Kimbell and Hutch Brown (in USDA Forest Service, 2017b) discuss some effects of climate change on forests:

> Even if global greenhouse gas buildups were reversed today, global temperatures would continue to rise for the next hundred years, bringing regional warming, changes in precipitation, weather extremes, severe drought, earlier snowmelt, rising sea levels, changes in water supplies, and other effects. As it is, global greenhouse emissions are still rising, exacerbating all of these long-term effects. The capacity of many plant and animal species to migrate or adapt will likely be exceeded. Ecosystem processes, water availability, species assemblages, and the structure of plant and animal communities and their interactions will change. 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.

Hanson, 2010 addresses some of the false notions often misrepresented as "best science" by agencies and extractive industries:

> 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.

The Forest Plan does not provide meaningful direction on climate change. Nor does the Gold Butterfly DEIS acknowledge pertinent and highly relevant best available science on climate change. This project is in violation of NEPA.

The Gold Butterfly DEIS does not analyze or 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 DEIS fails to provide estimates of the total amount of carbon dioxide (CO_2) or other greenhouse gas emissions caused by FS management actions and policies—forestwide, regionally, or nationally. Agency policymakers seem comfortable maintaining a position that they need not take any leadership on this issue, and obfuscate via this DEIS to justify their failures.

The best scientific information strongly suggests that management that involves removal of trees and other biomass increases atmospheric CO_2. Unsurprisingly the Gold Butterfly DEIS doesn't state that simple fact. The DEIS fails to present any modeling of forest stands under different management scenarios. The FS should model the carbon flux over time for its proposed stand management scenarios and for the various types of vegetation cover found on the Bitterroot NF.

Fire suppression

The DEIS states, "the buildup of fuels allowed by fire suppression suggests that if a fire occurs in the area now it could be uncharacteristically severe in size and intensity." Given that many areas of the BNF have burned in recent years, please provide documentation where those recent fires burned "uncharacteristically severe in size and intensity."

The BNF has never adequately analyzed and disclosed the forestwide impacts of its current policy of all-out fire suppression, and nothing in the Gold Butterfly DEIS indicates the management of wildland fire in the project area will be any different following project implementation.

Continuing direction for this wildfire suppression on the BNF comes from the Forest Plan, which contains the fire policy. The DEIS's Alternative 1 is the "no action" alternative required under NEPA, and fire suppression is anticipated to be reasonably foreseeable. Fire suppression doesn't imply "no action", but may be included in Alternative 1 if those actions' environmental impacts have been analyzed and disclosed at the programmatic level, such as in the Forest Plan EIS. The problem with this situation is the scale of ecological damage caused by the wide-scale fire suppression program that began almost 100 years ago wasn't recognized until after the Forest Plan was adopted in 1987. It constitutes significant new information that did not result in any new forest plan decisions or direction, which itself may be adopted properly only as an amendment or revision of the Forest Plan, following proper NEPA procedures.

The Forest Plan EIS itself did not contemplate a range of possible fire planning scenarios, there were no differences under each alternative it analyzed. Nor did the Forest Plan EIS present anything like a best available science discussion weighing the ecological and financial costs and benefits of wildland fire.

What we see nowadays are these project-level NEPA documents like the Gold Butterfly DEIS, which implement a hybrid, reactionary management scheme, continuing to replace wildland fire with logging and burning, but not in the context of an analysis of cumulative, forestwide impacts.

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."

The Gold Butterfly DEIS doesn't provide a genuine discussion of the varying amounts and levels of effectiveness of fuel changes attributable to: the varying ages of the past cuts, the varying forest types, the varying slash treatments, etc. This is true for land of other ownerships also. The DEIS simply does not disclose how the vegetation patterns that have resulted from past logging and other management actions would influence future fire behavior.

The vast majority of acres burn under weather conditions that make control impossible, and that result in fires burning through treated areas as well as untreated. The DEIS also doesn't recognize the temporal gradients in vegetative recovery following treatments, which are the natural processes acting to regrow the components of natural vegetation the FS calls "fuel."

The DEIS liberally throws around the term "uncharacteristic wildfire" however it provides no definition for how wildland fire can be—or has been—measured to be "uncharacteristic."

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). DellaSala, et al. (1995) are skeptical about the efficacy of intensive fuels reductions as fire-proofing methods. 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.

Kauffman (2004) identifies wildland fires as beneficial and suggests current FS fire suppression policies are the catastrophe:

> Large wild fires occurring in forests, grasslands and chaparral in the last few years have aroused much public concern. Many have described these events as "catastrophes" that must be prevented through aggressive increases in forest thinning. **Yet the real catastrophes are not the fires themselves but those land uses, in concert with fire suppression policies that have resulted in dramatic alterations to ecosystem structure and composition**. The first step in the restoration of biological diversity (forest health) of western landscapes must be to implement changes in those factors that have resulted in the current state of wildland ecosystems. Restoration entails much more than simple structural modifications achieved through mechanical means. **Restoration should be undertaken at landscape scales and must allow for the occurrence of dominant ecosystem processes, such as the natural fire regimes achieved through natural and/or prescribed fires at appropriate temporal and spatial scales.** (Emphases added.)

The DEIS indicates fire suppression will continue under any alternative, meaning that further timber management and fuels treatments would occur perpetually in intervals. The FS contends a high density of roads also facilitates fire suppression. These are cumulative effects issues, all across the managed portion of the BNF. Project-level NEPA documents such as the Gold Butterfly DEIS are implementing a hybrid, reactionary management scheme which continues to attempt replacing wildland fire with logging and burning, but not in the context of conducting the necessary analyses of cumulative, forestwide impacts.

Hutto (2008) states:

> (C)onsider the question of whether forests outside the dry ponderosa pine system are really in need of "restoration." While stem densities and fuel loads may be much greater today than a century ago, those patterns are perhaps as much of a reflection of human activity in the recent past (e.g., timber harvesting) as they are a reflection of historical conditions (Shinneman and Baker 1997). Without embracing and evolutionary perspective, we run the risk of creating restoration targets that do not mimic evolutionarily meaningful historical conditions, and that bear little resemblance to the conditions needed to maintain populations of native species, as mandated by law (e.g., National Forest Management Act of 1976).

There has been extensive research in forests about the ecological benefits of mixed-severity (which includes high-severity) fire over the past two decades, so much so that in 2015 science and academic publishers Elsevier published a 400-page book, *The Ecological Importance of Mixed-Severity Fires: Nature's Phoenix* which synthesizes published, peer-reviewed science investigating the value of mixed- and high-severity fires for biodiversity (DellaSala and Hanson, 2015). The book includes research documenting the benefits of high-intensity wildfire patches for wildlife species, as well as a discussion of mechanical "thinning" 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).

Ultimately the DEIS reflects an overriding bias favoring vegetation manipulation and resource extraction via "management" needed to "move toward" some selected desired conditions, along the way neglecting the ecological processes driving these ecosystems. Essentially the DEIS rigs the game, as its "desired conditions" would only be achievable by resource extractive activities. But since desired conditions must be maintained through repeated management/manipulation the management paradigm conflicts with natural processes**—**the real drivers of the ecosystem.

Also, many direct and indirect effects of fire suppression are also ignored in this DEIS 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 DEIS emphasizes actions that attempt to adapt a fire-prone ecosystem to the presence of human development, however we firmly believe the emphasis must be the opposite—assisting human communities to adapt to the fire-prone ecosystems into which they been built.

It make more sense both from a safety and financial perspective to expect homeowners to implement firewise measures on their properties so that management could focus more efficiently on safety of egress routes.

Implicit in the DEIS 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 DEIS oversells the ability of land managers to make conditions safe for landowners and firefighters. This could lead to landowner complacency—thereby increasing rather that decreasing risk. Many likely fire scenarios involve weather conditions when firefighters can't react quickly enough, or when it's too unsafe to attempt suppression. With climate change, this is likely to occur more frequently. Other likely scenarios include situations where firefighting might be feasible but resources are stretched thin because of priorities elsewhere.

We strongly support government actions which facilitate cultural change towards private landowners taking the primary responsibility for mitigating the safety and property risks from fire, by implementing firewise activities on their property. Indeed, the best available science supports such a prioritization. (Kulakowski, 2013; Cohen, 1999a) Also, see Firewise Landscaping[4] as recommended by Utah State University, and the Firewise USA website by the National Fire Protection Association[5] for examples of educational materials.

The DEIS fails to disclose the actions being taken to reduce fuels on private lands adjacent to the Project area, and how those activities (or lack of) will impact the efficacy of the activities proposed for this Project.

With perpetual fire suppression under FS management of the project area virtually assured according to the Forest Plan and Gold Butterfly DEIS, proposed management activities would occur periodically, because they would be needed to maintain vegetation in the FS's version of a "safer" condition. The DEIS fails to provide a full and detailed accounting of the costs to those who would pay for this never-ending "fuels" cycle—the American public. It is also in the FS's best interest to know what sort of long-term financial commitments it is making. Further, the

[4] https://extension.usu.edu/ueden/ou-files/Firewise-Landscaping-for-Utah.pdf
[5] http://www.nfpa.org/Public-Education/By-topic/Wildfire/Firewise-USA/The-ember-threat-and-the-home-ignition-zone

DEIS fails to disclose the inherent uncertainties of perpetually funding these activities, and the implications of their being left undone.

The FS must have a detailed long-term program for maintaining the allegedly safer conditions, including how areas will be treated in the future following proposed treatments, or how areas not needing treatment now will be treated as the need arises. The public at large and private landowners must know what the scale of the long-term efforts must be, including the amount of funding necessary, and the likelihood based on realistic funding scenarios for such a program to be adequately and timely funded.

The FS has not conducted a forestwide cumulative effects analysis of FS fire suppression policies. The FS also has not conducted ESA consultation on its forestwide fire management plan.

Regardless of DEIS claims of unnatural conditions due to fire suppression, it doesn't provide scientific support for its claims that disturbance regimes have somehow been altered to the degree that its proposed actions are justified.

Forest "vegetation" and "resilience"

The DEIS makes a big deal about the project activities supposedly achieving or moving toward vegetation related "Desired Conditions" as drivers of the project, yet where the FS gets these "desires" is unclear. For example, the DEIS states, "The desired condition is an approximation of the forest composition and structure that is within the range of historical conditions." The Forest Plan has practically no Desired Conditions resembling those of the DEIS. The Forest Plan FEIS does not evaluate a scenario of achieving "the range of historical conditions." It appears the FS is coming from NEPA never-never land.

Frissell and Bayles (1996) state:

> …The concept of range of natural variability …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.)

The FS's strategy to strive towards desired conditions focuses on achieving <u>static conditions</u>, instead of fostering the natural dynamic characteristics of ecosystems. An abundance of scientific evidence indicates the DEIS's static desired conditions must be rejected in favor of <u>desired future dynamics</u> to align with best available science. FS 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." (Emphasis 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.) Collins and Stephens (2007) suggest direction to implement <u>restoring the process</u> of wildland fire by educating the public, which means explaining the inevitability of wildland fire, teaching about fire ecology, and identifying landowners' primary responsibility for protecting their properties. Not surprisingly, since proper education conflicts with the FS's manipulate-and control management paradigm, we don't see it in the Gold Butterfly project.

The DEIS provides no explicit <u>plan</u> disclosing the details on how a restored landscape would be sustained. In other words, how often treatments will occur, how extensive they need to be, which kinds of treatments will be necessary, how many miles of roads will be needed (both permanent and temporary), etc. This means we cannot know how many acres at any given time will be suffering reduced productivity because of soil damage or infested by noxious weeds, or how many acres of wildlife will be subject to diversity impacts due to snag losses due to logger safety or firewood cutting. Also missing is an economic analysis in the DEIS, which would disclose how much managing for this regime will cost on a continuing basis—and therefore how likely such a plan could actually be implemented in order to achieve or maintain the "restored" (under the FS definition) vegetation conditions.

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."** (Emphasis added.)

The DEIS fails to consider scientific information that provides a better alternative to the FS's management paradigm.

The DEIS fails to explain how the forest areas NOT to be treated fall within their "desired conditions" management scheme. And even if "approximation of the forest composition and structure that is within the range of historical conditions" is a sound management strategy, the FS doesn't possess reliable and accurate enough data on project area historical conditions to be pursuing such a strategy.

Factors 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-reduced soil conditions, and many human-caused fires.

The FS's desired conditions scheme even fails for much of the project area, from its own perspective, with the DEIS including such statements as: "Because many of the stands on these cooler sites experience longer fire return intervals, many may still be within the historic range of variability for density and fuel loading. However, there is now a higher proportion of stands on the landscape that are approaching the fire-return interval, resulting in a higher risk of landscape-level stand replacing fire."

That last sentence reveals the FS's main public relations strategy/justification for pushing destructive and risky logging here, which is raising the specter of some sort of "catastrophe" such as fire or more tree mortality from insects or tree diseases. From a tree farming perspective, this might have some merit, but since this is a national forest where other features such as old growth and birds and predators and clean water are important to the public, the FS ought to widen its management perspective in able to hear the public and fairly weigh scientific information.

The DEIS assumes that if natural fire regimes were operating here practically all the low and mid-elevation forests would be in open conditions with widely spaced mature and old trees—mostly ponderosa pine with a few Douglas-fir. The FS fails to acknowledge good science, such as 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 DEIS's assertion that the proposed treatments will result in predictable wildland fire effects is of considerable scientific doubt (Rhodes and Baker, 2008), which the FS fails to acknowledge.

The DEIS claims it would improve resilience with this project, but this is not the absence of natural disturbances such as wildland fire or insects, etc. 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. In other words, tree farming.

The DEIS is management hubris on a grand scale. Frissell and Bayles (1996) note:

> 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**. (Emphases added.)

In several places the DEIS uses the word "resilient" or "resilience" in terms of how the action alternatives are responding to desired conditions by increasing the resilience of the ecosystem. The Forest Plan for the Kootenai National Forest defines "resilience" as "The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change." However, the Gold Butterfly provides absolutely no operational definition of resilience that would allow anybody to actually **measure** the resilience of anything as they now stand, or measure their change in resilience following project activities. An essential component of an operational definition is **measurement**. A simple and accurate definition of measurement is the **assignment of numbers to a variable** in which we are interested. In this case, the variable in which we are interested is resilience, and how the FS measures it in these ecosystems.

The DEIS states, "Proposed actions are intended to restore habitat resiliency" but the "indicator use to measure effects" is "Not quantified." As we were saying…

Many other terms in the resilience discussion are similarly undefined or ill-defined. These terms include "high risk" "disease infested" "acceptable levels" "dominated by" and there are many more throughout the DEIS.

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

Scientific Integrity

The FS has not undertaken the task of determine the reliability of all the data used as input for the models used in the Gold Butterfly analyses. Since "an instrument's data must be reliable if they are valid" (Huck, 2000) this means data input to models must accurately measure that aspect of the world it is claimed to measure, or else the data is invalid for use by that model. 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.

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."

Data sources must be of high reliability. The document, "USDA-Objectivity of Statistical and Financial Information" is instructional on this topic.

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.

During litigation of a timber sale on the Kootenai NF, 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 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 observations of the same thing must result in numbers that are very similar to result in small "standard deviations or standard errors" and thus high reliability coefficients, which in turn provide the public and decisionmakers with an idea of how confident they can be in the conclusions drawn from the data.

The next level of scientific integrity is the notion of "validity." 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 Gold Butterfly DEIS'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.

So even if FS data input to a model is reliable, that still leaves open the question of model validity. In other words, are the models scientifically appropriate for the uses for which the Forest Service is utilizing them? The Nez Perce-Clearwater NF's 2015 Clear Creek FEIS 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 the FS acknowledges that the models are "theoretical" in nature but by calling the models "empirical" 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 the models for the way they were used to support the Gold Butterfly DEIS's analyses. There is no documentation of someone using observation or experiment to support the models' inherent hypotheses. Ziemer and Lisle, 1993 state: "For any model or evaluation procedure, independent verification is essential. First, individual modules must be tested by comparing predicted and measured values under a variety of field conditions at differing sites. Then, functioning of the entire model must be evaluated under a wide array of field conditions. Finding an adequate model verification program is rare; however, finding unverified model predictions for important management and policy decisions is common."

The validity of habitat and other modeling utilized in land management plan development and the quality of scientific research are important topics. The documents, "USDA-Objectivity of Regulatory Information" and USDA-Objectivity of Scientific Research Information are instructional on this topic.

The Kootenai NF's Elk Rice EA states, "Be aware the modeling is not an attempt to depict reality, but merely an analysis for comparison purposes." The Gold Butterfly DEIS doesn't explain how ANY comparisons would be meaningful, in the context of such limitations. That EA's statement is made about modeling the amount of particulate produced by fire, however the Gold Butterfly DEIS does no better in discussing the limitations of any modeling upon which its analyses are based.

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 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.)

A 2000 Northern Region forest plan monitoring and evaluation report (USDA Forest Service, 2000c) provides an example of the FS itself acknowledging the problems of data that is old and incomplete, leading to the limitation of models the FS typically uses for wildlife analyses:

> 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 that case, the FS expert believed the data were unreliable and thus they properly questioned the validity of model use.

Another Kootenai NF project EIS (USDA Forest Service, 2007a) notes the limitations of modeling methodology the DEIS 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.)

Beck and Suring, 2011 state:

> Developers of frameworks have consistently attained scientific credibility through published manuscripts describing the development or applications of models developed within their frameworks, but a major weakness for many frameworks continues to be a lack of validation. Model validation is critical so that models developed within any framework can be used with confidence. Therefore, we recommend that models be validated through independent field study or by reserving some data used in model development.

Larson et al. 2011 state:

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

Beck and Suring, 2011 developed several criteria for rating modeling frameworks—that is, evaluating their validity. Three of their criteria are especially relevant to this discussion:

Habitat–population linkage	Does the modeling framework incorporate vital rates (e.g., production, survival), other demographic parameters (e.g., density, population size); surrogates (e.g., quality of home ranges, habitat conditions in critical reproductive habitats, presence/absence) of population demographic parameters; or does the modeling framework model habitat conditions without specific consideration of wildlife population parameters?	0 = does not rely on population demographics or surrogates of modeled species 1 = relies on surrogates for population demographic parameters or framework; can utilize population demographics if desired, but is not dependent on them 2 = specifically relies on population demographics of modeled species
Scientific credibility	Has the framework gained credibility through publication of results, application of results, or other mechanisms to suggest acceptance by an array of professionals?	0 = limited credibility 1 = at least 1 publication of results using this framework, or other application of the modeling framework
Output definition	Is the output well defined and will it translate to something that can be measured?	1 = difficult 2 = moderate 3 = easy

A scientist from the research branch of the Forest Service, Ruggiero, 2007 states, "Independence and objectivity are key ingredients of scientific credibility, especially in research organizations that are part of a natural resource management agency like the FS. Credibility, in turn, is essential to the utility of scientific information in socio-political processes."

Ruggiero, 2007 points out that the Forest Service's scientific research branch **is distinct** from its management branch:

> The Forest Service is comprised of three major branches: the National Forest System (managers and policy makers for National Forests and National Grasslands), Research and Development (scientists chartered to address issues in natural resource management for numerous information users, including the public), and State and Private Forestry (responsible for providing assistance to private and state landowners). This article is directed toward the first two branches.
>
> The relationship between the National Forest System and the Forest Service Research and Development (Research) branches is somewhat hampered by confusion over the respective roles of scientists (researchers) and managers (policy makers and those that implement management policy). For example, some managers believe that scientists can enhance a given policy position or management action by advocating for it. This neglects the importance of scientific credibility and the difference between advocating for one's research versus advocating for or against a given policy. Similarly, some scientists believe the best way to increase funding for research is to support management policies or actions. But, as a very astute forest supervisor once told me, "Everyone has a hired gun…they are not credible…and we need you guys [Forest Service Research] to be credible."

The Forest Service Manual (FSM) provides direction on how to implement statutes and related regulations. FSM 4000 – Research and Development Chapter 4030 states: "To achieve its Research and Development (R&D) program objectives, the Forest Service shall ... maintain the

R&D function as a **separate entity** … with clear accountability through a system that **maintains scientific freedom…**" (Emphasis added). This is difficult in today's political climate ("Help Wanted: Biologists to Save the West From Trump").

Ruggiero, 2007 discusses the risk to scientific integrity if that separation is not maintained, that is, if politics overly influences the use of scientific research:

> This separation also serves to keep conducting science separate from formulating policy and the political ramifications of that process. The wisdom here is that science cannot be credible if it is politicized. Science should not be influenced by managers, and scientists should not establish policy. This logic keeps scientific research "independent" while ensuring that policy makers are free to consider factors other than scientific understandings. Thus, science simply informs decision making by land managers. As the new forest planning regulations clearly state, those responsible for land management decisions must consider the best available science and document how this science was applied (Federal Register 70(3), January 5, 2005; Section 219.11(4); p. 1059).

Sullivan et al. 2006 state that "Peer-reviewed literature ...is considered the most reliable mainly because it has undergone peer review." They explain:

> *Peer review*.—A basic precept of science is that it must be verifiable, and this is what separates science from other methods of understanding and interpreting nature. The most direct method of verification is to redo the study or experiment and get the same results and interpretations, thus validating the findings. Direct verification is not always possible for nonexperimental studies and is often quite expensive and time-consuming. Instead, scientists review the study as a community to assess its validity. This latter approach is the process of peer review, and it is necessary for evaluating and endorsing the products of science. **The rigor of the peer review is one way to assess the degree to which a scientific study is adequate for informing management decisions.**

Sullivan et al. 2006 contrast peer-reviewed literature with gray literature (such as Samson, 2005 and Samson, 2006,) which:

> ...does not typically receive an independent peer review but which may be reviewed in-house, that is, within the author's own institution. ...Gray literature, such as some agency or academic technical reports, ...commonly contains reports of survey, experimental or long-term historical data along with changes in protocols, meta-data, and the progress and findings of standard monitoring procedures.

Along with Ruggiero, 2007, Sullivan et al., 2006 discuss the dangers of the "Politicization of Science":

> Many nonscientists and scientists believe that science is being increasingly politicized. Articles in newspapers (e.g., Broad and Glanz 2003) and professional newsletters document frequent instances in which the process and products of science are interfered with for political or ideological reasons. In these cases, the soundness of science, as judged by those interfering, turns on the extent to which the evidence supports a particular policy stance or goal. ...Politicization is especially problematic for scientists supervised by administrators who may not feel the need to follow the same rules of scientific rigor and transparency that are required of their scientists.

Agency expert opinion and gray literature relied upon in the Gold Butterfly DEIS is not necessarily the same as "the best scientific information" available. Sullivan et al., 2006 discuss the concept of best available science in the context of politically influenced management:

> Often, scientific and political communities differ in their definition of best available science and opposing factions misrepresent the concept to support particular ideological positions. Ideally, each policy decision would include all the relevant facts and all parties would be fully aware of the consequences of a decision. But economic, social, and scientific limitations often force decisions to be based on limited scientific information, leaving policymaking open to uncertainty.
>
> The American Fisheries Society and the Estuarine Research Federation established this committee to consider what determines the best available science and how it might be used to formulate natural resource policies and shape management actions. The report examines how scientists and nonscientists perceive science, what factors affect the quality and use of science, and how changing technology influences the availability of science. Because the issues surrounding the definition of best available science surface when managers and policymakers interpret and use science, this report also will consider the interface between science and policy and explore what scientists, policymakers, and managers should consider when implementing science through decision making.
>
> As part of their implicit contract with society, environmental scientists are obliged to communicate their knowledge widely to facilitate informed decision making (Lubchenco 1998). For nonscientists to use that knowledge effectively and fairly, they must also understand the multifaceted scientific process that produces it.
>
> Science is a dynamic process that adapts to the evolving philosophies of its practitioners and to the shifting demands of the society it serves. Unfortunately, these dynamics are often controversial for both the scientific community and the public. To see how such controversies affect science, note that over the last decade nonscientists have exerted increasing influence on how science is conducted and how it is applied to environmental policy. Many observers find this trend alarming, as evidenced by several expositions titled "science under siege" (e.g., Wilkinson 1998; Trachtman and Perrucci 2000).
>
> To achieve high-quality science, scientists conduct their studies using what is known as the scientific process, which typically includes the following elements:
>
> 4. A clear statement of objectives;
> 5. A conceptual model, which is a framework for characterizing systems, stating assumptions, making predictions, and testing hypotheses;
> 6. A good experimental design and a standardized method for collecting data;
> 7. Statistical rigor and sound logic for analysis and interpretation;
> 8. Clear documentation of methods, results, and conclusions; and
> 9. Peer review.

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.

NEPA states that "Accurate scientific analysis... (is) essential to implementing NEPA." And the NEPA regulations at 40 CFR § 1502.24 ("Methodology and scientific accuracy") state:

> Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement. An agency may place discussion of methodology in an appendix.

The DEIS does not conform to NEPA because the FS has not insured the reliability of data relied upon by the models, and the FS has not validated the models for the way the Gold Butterfly DEIS utilizes them. The Ninth Circuit Court of Appeals has declared that the FS must disclose the limitations of its models in order to comply with NEPA. However, the Gold Butterfly DEIS has failed to disclose these limitations.

The FS has not undertaken the process of a Science Consistency Review for the Forest Plan or for the DEIS's conclusions (Guldin et al., 2003, 2003b.) Guldin et al., 2003 state:

> ...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 Gold Butterfly DEIS violates NEPA because the FS has not insured the professional and scientific integrity of its analyses.

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

Soil productivity

The Gold Butterfly DEIS fails to disclose that the FS's R-1 Soil Quality Standards (SQS) are merely a mitigation of unavoidable soil damage, and have little basis in sustained yield or sustaining soil and land productivity. The DEIS even fails to demonstrate compliance with the FS's weak SQS, presenting numbers without providing a proper basis for their accuracy.

The DEIS provides no idea of the degree of reduced soil productivity in the 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. This narrow view of the cumulative impacts on soils contradicts NEPA, FS policy, and best available science. This policy includes Soil and Water Conservation Practices Handbook (FSH 2509.22) which states:

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

How does the FS account for the amount of DSD in the "terraced plantations" the FS proposes for mechanical thinning/fuels reduction? Has the FS evaluated those terraced areas and determined they don't meet the definition of DSD?

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.

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

The FS has admitted in other places 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.

USDA Forest Service 2005d states:

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

The Bitterroot National Forest admits that subwatersheds which have high levels of existing soil damage exhibit potential hydrologic and silvicultural concerns. (USDA Forest Service, 2005b, p. 3.5-11, 12.) The Idaho Panhandle National Forests (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.)

Nothing in the Gold Butterfly DEIS's watershed analysis section specifically addresses 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 same effect from reading the scientific literature: "Studies by Dennis Harr have consistently pointed out the effects compacted surfaces (roads, skid trails, landings, and firelines) on peak flows." Elevated peak flows harm streams and rivers by increasing both bedload and suspended sediment, which are effects not adequately analyzed in the Gold Butterfly DEIS's watershed analysis.

Harr, 1987 rejects absolute thresholds for making determinations of significant vs nonsignificant levels of soil compaction in watersheds, but nevertheless he notes:

> …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.

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

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

Regarding 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.

Winter logging as proposed in the Gold Butterfly DEIS is only partially effective for mitigating logging damage. USDA Forest Service, 2005b states, "Monitoring of winter-logging soil effects conducted by the Forest Soil Scientist on the Bitterroot National Forest over the past 14 years has shown that 58% of the ground-based, winter-logged units failed to meet the R1 SQS. Winter-logging resulted in an average of 16% detrimentally damaged soil." (P. 3.5-21.)

Forest Service Timber Sales Specialist Flatten, 2003 examines the practice of wintertime ground based logging and discusses what winter conditions provide the best protection for the soil resource. He points out the complexities and uncertainties of pulling off successful winter logging that effectively avoids of soil damage, which the Gold Butterfly analysis does not consider. He concludes:

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

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

> Surface soil loss from roads through displacement and mixing with infertile substrata also has long lasting consequences for soil productivity because of the superiority of the volcanic ash surface layer over subsoils and substrata. (P. 4-76.)

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

Then there is the issue of the reliability and validity of the soil survey methods used by the FS. USDA Forest Service, 2012a states:

> The U.S. Forest Service Soil Disturbance Field Guide (Page-Dumroese et al., 2009) was used to establish the sampling protocol.
>
> …Field soil survey methodology based on visual observations, such as the Region 1 Soil Monitoring Guide used here, can produce variable results among observers, and the confidence of results is dependent on the number of observations made in an area (Page-Dumroese et al., 2006). **The existing and estimated values for detrimental soil**

> **disturbance (DSD[6]) are not absolute** and best used to describe the existing soil condition. The calculation of the percent of additional DSD from a given activity is an estimate since DSD is a combination of such factors as existing groundcover, soil texture, timing of operations, equipment used, skill of the equipment operator, the amount of wood to be removed, and sale administration. (Emphasis added.)

USDA Forest Service, 2012a admits that DSD estimates are "not absolute." 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).

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

As stated above the SQS ignores existing DSD on areas the FS maintains as part of the "suitable" or productive land base such as timber stands 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 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.

The Gold Butterfly DEIS does not explain <u>how</u> it quantifies log landings and temporary roads into activity area DSD calculations for this project.

USDA Forest Service, 2016a explains another major cumulative effect ignored by the R-1 Soil Standards, which is the indirect effect of soil damage, or DSD, on <u>sustained yield</u>. It states that

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

the R-1 Soil Standards "created the concept of 'Detrimental Soil Disturbance' (DSD) for National Forests in Region One as a measure to be used in assessing potential loss of soil productivity resulting from management activities." 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.

No matter how compacted the soils in these subwatersheds but falling outside the Gold Butterfly "activity areas", the fact that reduced water infiltration in those locations is contributing to increased water yield and erosion during storm events, the FS basically assumes—so what? And if the previous logging in those other locations has resulted in a scarcity of legacy wood that, if present, would be incorporated into the soil and hold water and transmit nutrients for the next generation's timber stand—so what?

And if those previously disturbed areas outside the Gold Butterfly activity areas have become prime growing sites for noxious weeds—many species of which are adapted well to damaged, disturbed sites and some of which actively inhibit native vegetation from recovering and therefore the sites exhibit reduced productivity—so what?

USDA Forest Service, 2009c admits, in regards to project area sites where DSD soils were not to be restored by active management: "For the …severely disturbed sites… "no action" …would **create indirect negative impacts by missing an opportunity to actively restore damaged soils**. (Emphasis added.) The Gold Butterfly DEIS fails to disclose the locations where the FS is creating indirect negative impacts by missing the opportunity to actively restore damaged soils outside of "activity areas."

The Gold Butterfly DEIS doesn't adequately explain how it arrives at its current DSD numbers, nor does it provide enough detail to indicate the intensity of soil surveys.

The Gold Butterfly DEIS does not disclose that the SQS methodology for "activity areas" inherently encourages gerrymandering areas not previously logged into project "activity areas", diluting the DSD from previously logged units by creating a more favorable average.

The Gold Butterfly DEIS does not disclose that its DSD percent limit is based upon the amount of damage that is operationally feasible, instead of limits on actual land and soil productivity losses caused by DSD. The SQS were developed internally by the FS without the use of any public process such as Forest Planning, NEPA, or independent scientific peer review.

DSD is merely a proxy for soil productivity. The FS presents no science to validate the SQS methodology for use as a soil productivity proxy.

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

> Powers (1990) cites that the rationale bulk density is largely based on collective judgment. The FS estimates that a true productivity decline would need to be as great as 15% to detect change using current monitoring methods. Thus the soil-quality standards are set to detect a decline in potential productivity of at least 15%. This does not mean that the FS tolerates productivity declines of up to 15%, **but merely that it recognizes problems with detection limits.** (Emphasis added.)

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

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

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

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 Gold Butterfly DEIS 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 Bitterroot NF.

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

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

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

Cullen et al. (1991) concluded: (M)ost compaction occurs during the first and second passage of equipment." Page-Dumroese (1993), investigating logging impacts on volcanic ash-influenced soil in the Idaho Panhandle NF, stated: "Moderate compaction was achieved by driving a Grappler log carrier over the plots twice." Also, "Large increases in bulk density have been reported to a depth of about 5 cm with the first vehicle pass over the soil." (Id.) Williamson and

Neilsen (2000) assessed change in soil bulk density with number of passes and found 62% of the compaction to the surface 10cm came with the first pass of a logging machine. In fine textured soils, Brais and Camire (1997) demonstrated that the first pass creates 80 percent of the total disturbance to the site. Adams and Froehlich (1981) state, "(L)ittle research has yet been done to compare the compaction and related impacts caused by low-pressure and by conventional logging vehicles."

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

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).

USDA Forest Service 2014a states:

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

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

One of these biological properties is represented by naturally occurring organic debris from dead trees. The SQS recognize the importance of limiting the ecological damage that logging causes due to retaining inadequate amounts of large woody debris, but set no quantitative limits on such losses caused by logging and slash burning. And nowhere does the Gold Butterfly DEIS disclose or analyze the levels of large woody debris anywhere in the project area following past management activities, consistent with its refusal to examine cumulative effects.

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

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

Recent research reveals 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.

The Gold Butterfly DEIS doesn't demonstrate consistency with all of the goals, objectives, and standards for soil resources set forth in the Bitterroot Forest Plan. The DEIS doesn't address the plain meaning of Standards such as:

> (7) Plan and conduct land management activities so that reductions of soil productivity potential caused by detrimental compaction, displacement, puddling, and severe burning are minimized.
> (8) Plan and conduct land management activities so that soil loss, accelerated surface erosion and mass wasting, caused by these activities will not result in an unacceptable reduction m soil productivity and water quality.
> (9) Design or modify all management practices as necessary to protect land productivity and maintain land stability.

The Forest Plan does not define "land productivity" but USDA Forest Service, 2007 states:

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

That statement is on point: Since the FS has no idea how much soil has been permanently impaired either within the project area or forestwide, "sustained yield" is an empty promise.

There continues to be a lack of adequate regulatory mechanisms for protecting soil productivity on the Bitterroot NF and Northern Region, as advocated for by Lacy (2001). The FS has no idea how much soil has been permanently impaired either within the Gold Butterfly project area or forestwide. The FS lacks adequate regulatory mechanisms for protecting soil productivity on the Forest.

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

The Gold Butterfly DEIS does not 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 Bitterroot NF's noxious weed treatment program is mitigation for management activities which exacerbate the spread of noxious weeds. The DEIS fails to disclose the effectiveness of this mitigation. The Lolo NF's Jam Cracker EA states:

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

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.

If there exists some study that quantifies Bitterroot NF changes in soil productivity due to past management activities, please cite it in response to these comments.

Roadless Expanse

The FS's Northern Region explains the concept of "Roadless Expanse" in a document entitled "Our Approach to Roadless Area Analysis of Unroaded Lands Contiguous to Roadless Areas" (12/2/10). The document is based on judicial history regarding the Roadless Area Conservation Rule. This 2010 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.) Logically, in this case it means the FS must conduct an analysis of the Roadless Expanse which includes the Stony Mountain Inventoried Roadless Area (IRA) and contiguous uninventoried roadless areas.

The DEIS maps show a portion of the Stony Mountain IRA, with some proposed logging in areas not separated from the IRA by any roads. So the Gold Butterfly DEIS fails to "consider the effects to the entire roadless expanse."

The Gold Butterfly DEIS fails to analyze and disclose cumulative management activities including those proposed in the Gold Butterfly DEIS, which affect the Wilderness Attributes and Roadless Characteristics of the entire Roadless Expanse. This includes any positive effects if road decommissioning were to increase the size of the Roadless Expanse beyond the bounds as described above.

The DEIS does not take a hard look at the project impacts on the Roadless Characteristics and Wilderness Attributes of the Roadless Expanse. The public must be able to understand if the project would cause irreversible and irretrievable impacts on the suitability of any portion of Roadless Expanse for future consideration for Recommended Wilderness or for Wilderness designation under forest planning.

The DEIS fails to acknowledge the best scientific information that recognizes 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.

<u>Proposed Forest Plan Amendments</u>

The proposal to amend the Forest Plan to sidestep the winter range thermal cover and elk habitat effectiveness standards has long since become routine for the BNF. Since any project proposal that invokes these standard is met by the FS with the intent to go around the standards, the agency must conduct an analysis of entirely dropping these standards completely from the Forest Plan, which is what the FS has essentially been doing for years. The DEIS fails to analyze the cumulative effects of this FS management intent, and fails to document an analysis consistent with the 2012 Planning Rule regarding amendments.

The DEIS states, "Recent research …has questioned the necessity of thermal cover for survival of wintering elk (Cook et al. 1998)." So, 11 years into forest plan implementation—science allegedly no longer supports Forest Plan direction. Twenty years later—nor forestwide analysis. This violates NEPA and NFMA.

There is no Assessment identifying best available science. If the FS has identified best available science on the elk/MIS issues (including those species on the Forest the MIS are said to represent) then please disclose your list.

One thing you've not addressed are the road issues, as we discuss above. Another issue the DEIS glosses over are cumulative effects related to the tendency of elk to flee and stay away from public land because of the security is better on private land. This affects crops on private land, which becomes an economic issue. Economics is science the DEIS fails to analyze. And reduced hunter opportunity is an issue affecting the economy, as well as a social science issue.

The highly adverse security conditions for elk that exist now, which would be made worse with the action alternatives, reveal how arbitrary and capricious the proposed Amendments are.

Weeds

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.

Controlling noxious weeds and preventing their spread is a huge issue that the FS does not have a grip on. Current methods are obviously not working, weeds spread on forest roads, in cutting units, landings, burn piles, and onto private property. The best way to prevent weeds from spreading out of control is not to disturb the native vegetation.

Alternative 2 would carry the highest risk of weed introduction, spread, establishment, and persistence due to more soil disturbance, as well as travel through infestations, proximity to known infestations and increasing available direct sunlight in the road corridors.

The noxious weed section needs to be substantially revised to eliminate or reconcile the many contradictory statements.

The "meadow restoration" would involve "herbicide and biocontrol agents applied to reduce invasive plant populations. Once invasive plant treatments have been determined effective, encroaching conifers will be felled, lopped, and scattered and the units may be underburned. The process may take several years to complete for each unit." Please disclose the projected expenditures for each of those steps, over the "several years."

The DEIS fails to present any numerical estimate of noxious weed infestations in the project area. Is there recent on-the-ground survey data?

The DEIS lacks analysis of the effectiveness of the forestwide noxious weed treatment program. The DEIS states, "Herbicide treatments along roadsides and trails on the Forest have shown measureable success in the suppression and containment of invasive/noxious weed species." That is not an accurate picture of the efficacy of weed treatment, according to Forest Plan monitoring and evaluation reports.

What is the BNF forestwide trend in noxious weed infestation, in acres or any meaningful metric?

Economics

The DEIS states, "the Forest Service does have an agreement with Ravalli County (dated May 22, 2017) to perform maintenance on 1.2 miles of Willow Creek Road within section 9; it is expected that this agreement will remain in place for the duration of the project." What is the dollar amount of benefit to the County from the U.S. taxpayers taking over this responsibility through the life of the project?

The FS has also not conducted an economics analysis of obtaining "alternative access" on other private roads. Nor a cumulative effects analysis on other resources from this log haul.

"(T)he National Forest Management act of 1976 requires consideration be given to the economic stability of communities whose economies are dependent on National Forest materials." Yet the DEIS fails to do this.

The DEIS fails to disclose the amount U.S. taxpayers are being forced to subsidize timber companies.

The DEIS fails to account for fire suppression for which taxpayers are expected to foot the bill, without having any say in the matter.

Because there is no economics analysis in the DEIS, the costs are hidden. The DEIS must disclose project-related weed treatment, prescribed fire application, NEPA costs, culvert replacement, meadow enhancement, etc.

For each alternative, please disclose the itemized costs for each of the following: new system roads, new temporary roads (including machine trails and excavated skid trails), project-related road maintenance, road decommissioning, all other road-related work, NEPA and associated pre-decisional costs, sale preparation and administration, project-related weed treatment, prescribed fire application, other project mitigation, post-project monitoring, environmental analyses and reports, public meetings and field trips, publicity, consultation with other government agencies, responding to comments and objections.

Please identify the funding sources for all proposed non-commercial activities.

Scenery

The DEIS does not demonstrate the project activities would be consistent with the forest plan visual quality standards. The DEIS makes statements such as "Both action alternatives include design features to maintain visual quality objectives (VQOs)…" yet it fails to explain how it arrived at that determination. VQOs aren't even described.

For example the DEIS fails to demonstrate the huge clearcuts will be consistent with Visual Quality Standard #2: "Openings created by timber harvest should be designed to blend with natural openings to the extent practical."

How can an area appear "moderately impacted but also naturally intact"? This is basically the entirely of the cumulative effects analysis.

The FS is proposing many clearcuts over 40 acres and many new highly visible road scars, yet devotes about one page for its "analysis—and not one word suggests all the proposed industrial activity might appear even a bit unsightly to someone wanting to enjoy nature.

The DEIS boasts, “The Action Alternatives will likely enhance scenery over the long-term” and that logging will make things “more scenically stable.” Sort of like sugar-coating sandpaper to make it taste better.

The DEIS doesn’t present any analysis to determine impacts on scenery viewed from any visually sensitive area. The DEIS fails to take a hard look at the issue.

Has the FS conduct post-project scenery monitoring to determine if past timber sales conformed to the Forest Plan and/or VQOs?

Conclusion

The problems and deficiencies of the DEIS we’ve identified in this letter show the need for the FS to prepare an SDEIS in order to take the requisite “hard look” as required under NEPA.

We ask that you please keep us fully informed of all further developments on the Gold Butterfly proposal. It is our intention that the references cited in this letter be included it in the project file. Please contact us if you need a copy of any of the cited references. Please notify us when Biological Assessment(s) and the US Fish & Wildlife Service’s Biological Opinion or letter of concurrence are available, so we can access them as soon as possible on the project website.

Sincerely,

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