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Title:
Comments: I'm sending these comments as an attachment. I will also separately transmit the comment attachments to this same website.

This letter is comments on the Draft Revised Forest Plan (DFP), and accompanying Draft Environmental Impact Statement (DEIS) for the Custer Gallatin National Forest. Those documents have been prepared under the National Forest Management Act (NFMA) requirement that forest plans [ldquo]be revised [hellip] at least every fifteen years[rdquo] and National Environmental Policy Act (NEPA) requirements that include [ldquo]provide full and fair discussion of significant environmental impacts and [hellip]inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.[rdquo] These comments are being submitted on behalf of the Alliance for the Wild Rockies.

Alliance for the Wild Rockies (AWR), headquartered in Helena, Montana, is a non-profit member-based alliance of citizens and organizations working to secure the ecological integrity of the Northern Rockies bioregion. AWR has been actively participating in public land management in Washington, Oregon, Montana, Idaho, and Wyoming for over 25 years. AWR has members who reside on private land within and close to the Custer Gallatin National Forest (CGNF), and many members who recreate in the Forest.

In pursuit of conservation goals, AWR has commented on countless Custer National Forest and Gallatin National Forest projects and appealed many decisions since the original 1986 and 1987 Custer and Gallatin Land Management Plans (1980s forest plans) were adopted, and have also gone to court several times. We are very familiar with ecological principles and regulatory mechanisms, and how they converge on the national forests of the region, and we appreciate the opportunity to comment on this Draft Forest Plan.

These comments incorporate by reference, and with permission, the comments on the DFP and DEIS by Western Watersheds Project (WWP), and also WWP[rsquo]s March 5, 2018 scoping comments on revision.

Text in quotes is from the DFP unless indicated otherwise.

INTRODUCTION

A recent Media Release entitled [ldquo]Nature[rsquo]s Dangerous Decline [lsquo]Unprecedented[rsquo]; Species Extinction Rates [lsquo]Accelerating[rsquo][rdquo] from the Intergovernmental Science-Policy Platform on

Biodiversity and Ecosystem Services accompanies their latest Global Assessment report. The Media Release (Attachment 1) states, [ldquo]Nature is declining globally at rates unprecedented in human history[mdash]and the rate of species extinctions is accelerating, with grave impacts on people around the world now likely[hellip][rdquo] IPBES Chair, Sir Robert Watson states, [ldquo]The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide.[rdquo]

The Global Assessment report is also the subject of an article in The Guardian entitled [ldquo]Human society under urgent threat from loss of Earth[rsquo]s natural life.[rdquo]

Within this context, the U.S. Forest Service continues with business as usual, refusing to throw off the politically installed shackles of resource extractive industries.

FAILURE OF DRAFT FOREST PLAN DIRECTION

The set of DFP statements on which we comment exemplify how the Forest Service is lifting lofty goals and nice-sounding words and ideas found in the 2012 Planning Rule and writing them into documents that don[rsquo]t set meaningful direction to actually implement these words.

The language found in [ldquo]Determining Consistency[rdquo] results in very weak Forest Plan direction. Generally, Plan Components lack strong, binding direction to compel managers to accomplish measurable outcomes in a specified timetable, and feature little constraint on management discretion and a lot of improper prioritization. For [ldquo]Goals, desired conditions, and objectives[rdquo]:

The project or activity contributes to the maintenance or attainment of one or more goals, desired conditions, or objectives, or does not foreclose the opportunity to maintain or achieve any goals, desired conditions, or objectives, over the long term.

That means it[rsquo]s fine to deviate further from goals, desired conditions, or objectives in the short- term. Although not defined, it is suggested that [ldquo]short-term[rdquo] could be over the entire lifespan of the revised Forest Plan. Clearly, goals, desired conditions, and objectives don[rsquo]t compel sound management action, don[rsquo]t constrain unwise management, nor hold managers accountable to the public.

The DFP also uses other vague terms within supposedly constraining standards and guidelines, including [ldquo]minimize.[rdquo] E.g., [ldquo]New temporary road construction should minimize long-term loss of topsoil material along road prisms[hellip][rdquo] Also, [ldquo]Short-term effects from activities in source water protection areas may be acceptable when those activities support long-term benefits to source water protection areas and aquatic resources.[rdquo] The failure to explicitly state what is meant by terminology such as [ldquo]short term[rdquo], [ldquo]long term[rdquo] and [ldquo]minimize[rdquo] is pervasive throughout the DFP. This renders many forest plan desired conditions, objectives, standards and guidelines effectively unenforceable and meaningless.

The DFP states, [ldquo]Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined[hellip][rdquo] Yet the DFP fails to provide any specifics or direction on how anyone can objectively measure this [ldquo]progress.[rdquo] Forest Plan Goals are similarly flawed. In fact the DFP even admits, [ldquo]desired conditions [hellip]may not be achieved for many decades.[rdquo]

The DFP states [ldquo]An objective (OBJ) is a concise, measurable, and time-specific statement of a desired rate of progress toward a desired condition or conditions. [hellip]Objectives will occur over the life of the forest plan, considered to be over the first 15 years of plan implementation, unless otherwise specified.[rdquo] The meaning of progress toward Objectives is highly subjective and discretionary, and could well be judged by the agency only at the end of the 15 years, rendering determination of [ldquo]progress toward[rdquo] irrelevant. Also, [ldquo]Objectives should be based on reasonably foreseeable budgets (36 Code of Federal Regulations 219.7(e)(1)(ii))[rdquo] but the DFP and DEIS don[rsquo]t make this crucial link between reasonably expected Congressional appropriations or other funding sources and each Objective.

A Guideline is [ldquo]a constraint on project and activity decision-making that allows for departure from its terms, so long as the purpose of the guideline is met[rdquo] or [ldquo]designed in a way that is as effective in achieving the purpose of the applicable guidelines.[rdquo] Whereas guidelines could theoretically set limitations on management actions, since the DFP is not explicit about the purpose of most guidelines, this allowance is a huge loophole.

A Standard is a [ldquo]mandatory constraint on project and activity decision making[hellip][rdquo] Unfortunately, the DFP has little in the way of meaningful Standards, so protections for the various resources and ecological and economic sustainability are not assured. Few standards actually constrain anything.

This weak management direction results in a DFP that fails to comply with the 2012 Planning Rule. As stated above, the DEIS and DFP use a lot of good words, but implementing the DFP will not in any way, shape or form achieve ecological, social, or economic sustainability in any meaningful timeframe.

This situation also results in a DEIS that cannot analyze and disclose impacts of DFP implementation with any accuracy or integrity. There is so much manager discretion that the impacts on major resources could be far worse than anticipated and, as we discuss below, the agency effectively dons blinders to the situation for the entire life of the Forest Plan.

The last Plan Component is Suitability. The DFP proclaims, [ldquo]Generally, the lands on the forest are suitable for all uses and management activities appropriate for national forests, such as outdoor recreation, grazing, or timber harvest, unless identified as not suitable.[rdquo] Unsurprisingly, the DFP fails to disclose any objective criteria by which the Forest Service has determined suitability as per NFMA and planning regulations. And, the DFP states, [ldquo]Final suitability determinations for specific authorizations occur at the project or activity level

decision making process.[rdquo] So the Forest Service punts the suitability question to the project level, complicating the NEPA process for the latter if the agency genuinely wants to determine suitability, which we don[rsquo]t believe they will. Such a displacement of responsibility to project teams violates the 2012 Planning Rule anyway. At the point when a project is being analyzed, the bias toward defining proposed actions as suitable would drown out any reasonable questioning otherwise.

In addition, although to the casual or unsuspecting reader the DFP might seem to limit commercial logging because large areas of the CGNF would be classed as unsuitable, the DFP writes the agency big loopholes to log everywhere outside of Wilderness or Recommended Wilderness areas. The DFP states, [ldquo]Unless prohibited by other plan components, timber harvest may occur on lands unsuitable for timber production to meet other resource objectives.[rdquo] For example, Riparian Management Zone Suitability 01 states:

Riparian management zones are not suitable for timber production, but timber harvest, including by commercial means, may be allowed for purposes such as public safety, fuels reduction, riparian and riparian ecotone habitat restoration, and wildlife habitat enhancement.

So all the Forest Service needs to do is claim commercial logging in riparian zones is for [ldquo]public safety[rdquo] (which the agency routinely does for anywhere a few hundred feet from a road where a tree might eventually fall) or for [ldquo]fuel reduction[rdquo] or fits into one of the other several vaguely written loopholes designed into the forest plan. These loopholes are on clear display in FW- GDL-TIM-03:

On lands not classified as suitable for timber production, timber harvest should only be used as a tool to assist in achieving or maintaining one or more applicable desired conditions or objectives of the plan in order to protect other multiple-use values, and for salvage, sanitation, or public health or safety. Examples of using timber harvest to protect other multiple use values may include improving wildlife or fish habitat, thinning to reduce fire risk, or restoring meadow or savanna ecosystems where trees have invaded. (Emphasis added.)

The general public is unaware that 100% of the logging project NEPA documents on these two Forests for at least the last 20 years included Purpose and Need statements that claim logging is needed to [ldquo]restore[rdquo] something or for making the forest [ldquo]more resilient[rdquo] or made some similarly vague justifications that read like one or more of the FW-GDL-TIM-03 clauses. [ldquo]Unsuitability for timber[rdquo] is a meaningless concept.

In reality, as applied in this revision process the determination of what areas are [ldquo]suitable[rdquo] for most uses is a meaningless exercise and the Forest Service is disingenuous for pretending it isn[rsquo]t.

The Desired Conditions, however vaguely worded they are, are not innocuous. The DFP says they are to [ldquo]help frame the purpose and need during project-level planning[rdquo] and [ldquo]describe the vision for the Custer Gallatin National Forest.[rdquo] But how will it be determined which of the dozens of Desired Conditions are to be prioritized? This will continue to be highly politicized, subject to Congressional budgetary allocations.

Roger Sedjo, member of the Committee of Scientists convened to advise the Forest Service for the design of a new planning rule, expressed his concerns about the discrepancy between forest plans and Congressional allocations, imbalanced and unsustainably implemented forest plans: (A)s currently structured there are essentially two independent planning processes in

operation for the management of the National Forest System: forest planning as called for in the legislation; and the Congressional budgeting process, which budgets on a project basis. The major problem is that there are essentially two independent planning processes occurring simultaneously: one involving the creation of individual forest plans and a second that involves congressionally authorized appropriations for the Forest Service.

Congressional funding for the Forest Service is on the basis of programs, rather than plans, which bear little or no relation to the forest plans generated by the planning process. There is little evidence that forest plans have been seriously considered in recent years when the budget is being formulated. Also, the total budget appropriated by the Congress is typically less than what is required to finance forest plans. Furthermore, the Forest Service is limited in its ability to reallocate funds within the budget to activities not specifically designated. Thus, the budget process commonly provides fewer resources than anticipated by the forest plan and often also negates the [ldquo]balance[rdquo] across activities that have carefully been crafted into forest plans. Balance is a requisite part of any meaningful plan.

Finally, as noted by the GAO Report (1997), fundamental problems abound in the implementation of the planning process as an effective decision making instrument. Plans without corresponding budgets cannot be implemented. Thus forest plans are poorly and weakly implemented at best. Major reforms need to be implemented to coordinate and unify the budget process. (Committee of Scientists, 1999 Appendix A, emphases added.)

Brown and Nie, 2019 were members of the Federal Advisory Committee to assist the Forest Service with early implementation[ndash][ndash]troubleshooting[ndash][ndash]of the 2012 Rule. They make criticisms of forest plans drafted under the 2012 Planning Rule to date, which could easily be made of the CGNF[rsquo]s DFP:

A tension is evident in the plan revisions we have reviewed thus far. Much of the public expect components that are unambiguous, enforceable, and measurable, as a way to provide for monitoring and a degree of regulatory certainty and accountability. But the Forest Service tends to write components in a more ambiguous fashion, either to account for the scientific uncertainty and rapidly changing nature of forest management, or to preserve its administrative discretion.

[hellip]ambiguously written plan components will also make it difficult to measure and monitor them, thus impeding the Rule[rsquo]s objective of adaptive planning.

Because of the failure to include meaningful plan component direction, management actions would for all intents and purposes be directed by the political whims reflected in Congressional budget allocations, by local politicians, and by other entities with vested financial interests.

Citizens whose legitimate public interests contrast with those of the political and financially vested would have little recourse, except the courts. Land managers and members of project interdisciplinary teams, who would by far hold the most sway against political and financial interests during forest plan design and implementation have, unfortunately, little career incentive to intervene on behalf of other values, and much incentive to go along with

resource extraction. And the DFP reflects this [ldquo]go along[rdquo] attitude, reflected by how science is applied selectively and in a very biased manner.

The DFP states, [ldquo]It is important to note that this plan does not authorize site-specific prohibitions or activities; rather it establishes overarching direction, similar to zoning in a community.[rdquo] To state the Forest Plan does not [ldquo]authorize[rdquo] site-specific prohibitions is confusing. It[rsquo]s nonsense to suggest the Forest Plan does not prohibit activities in specified areas.

The DFP lays out a management strategy of [ldquo]adaptive management[rdquo] which it defines as: The general framework encompassing the three phases of planning: assessment, plan development, and monitoring (36 Code of Federal Regulations 219.5). This framework supports decision-making that meets management objectives while simultaneously accruing information to improve future management by adjusting the plan or plan

implementation. Adaptive management is a structured, cyclical process for planning and decision-making in the face of uncertainty and changing conditions with feedback from monitoring, which includes using the planning process to actively test assumptions, track relevant conditions over time, and measure management effectiveness.

The National Forest Management Act requires periodic revision of forest plans in order to facilitate adaptive management with public involvement. While the planning rule has been changed, there is still the need pursuant to the statute to provide continuity between plans to the extent that adaptive management requires. NFMA is very clear that forest plans are to be revised periodically based upon lessons learned from continuous monitoring and evaluation in the field of the environmental impacts from forest plan implementation. Whatever was learned from nearly three decades of monitoring the implementation of the original 1980s forest plans is not disclosed as such in the Assessment.

Since a major purpose of Forest Plan implementation monitoring is to inform management in an adaptive management paradigm, the DFP[rsquo]s reliance on adaptive management is disconcerting.

For many years the Forest Service has said its forest plan monitoring inadequacies are due to funding shortfalls. Regarding Congressional allocations, the DFP states, [ldquo]Objectives should be based on reasonably foreseeable budgets.[rdquo] Is the Forest Service claiming that the proposed forest plan monitoring program in DFP Chapter 4 is similarly based on reasonably foreseeable budgets? If so, what are the specific dollar amounts the CGNF is anticipating?

The DFP states, [ldquo]It is possible that objectives could either exceed or not meet a target based upon a number of factors including budget and staffing increases/decreases, increased/decreased

planning efficiencies, unanticipated resource constraints, etc.[rdquo] To us this means that Congress will not

fund the monitoring plan outlined in the DFP (or frankly, the kind of robust monitoring program needed but lacking in the DFP), and so we expect [ldquo]adaptive management[rdquo] will be a failure under the revised forest plan, as it was under the 1980s plans.

In many ways and to various degrees in comments below we suspend disbelief, pretending that the various management emphases of the alternatives might actually lead to different management outcomes. We also pretend that the Forest Service might be open to other scientific perspectives and applications of logic and reason. And we also hope[mdash]against better judgment[mdash] that managers and members of project interdisciplinary teams will buck management political pressure to find ways to influence project design in ways that are truly sustainable and in harmony with the natural world.

AMBIGUOUS, CONFUSING OR OTHERWISE ILLEGITIMATE INCORPORATION OF OTHER FORESTWIDE DECISIONS

The DFP fails to fully explain how previous forestwide decisions, including those made under a NEPA process, would integrate with the revised forest plan. The DEIS states, [ldquo]Forest Service planning takes place at different organizational levels and geographic scales. Planning occurs at three levels[mdash]national strategic planning, National Forest System unit planning, and project or activity planning.[rdquo] Yet the CGNF is attempting to inject a fourth level of planning[mdash][ldquo]Resource Plans.[rdquo] For example, the DFP states, [ldquo]Resource plans (example travel management plans) developed by the Custer Gallatin that apply to the resources or land areas within the planning area must be consistent with the plan components. Resource plans developed prior to this plan decision will be evaluated for consistency with the plan and updated if necessary.[rdquo] (Emphasis added.) The aforementioned travel management plans provide forestwide direction, based upon previous NEPA and Supervisor level Decisions. By claiming that consistency with the revised forest plan will be determined, vaguely, at some later date[mdash]perhaps involving [ldquo]updates[rdquo][mdash]does not resolve the inherent conflict and confusion.

The Forest Service states that true [ldquo]projects[rdquo] decided under previous forest plans need not be evaluated for consistency with the new/revised forest plan. This is on display in the Record of Decision for the revised forest plan for the Flathead National Forest, which states: [ldquo]Previously approved and ongoing projects and activities are not required to meet the direction of the land management plan and will remain consistent with the direction in the 1986 plan, as amended (USDA, 1986).[rdquo]

So the agency is obligated to fully and explicitly adopt the direction in previous forestwide [ldquo]Resource Plans[rdquo] into the revised forest plan. Along with that obligation is the evaluation of alternative courses of action from those adopted in previous [ldquo]Resource Plan[rdquo] decisions. The Forest Service is not meeting this obligation.

Also, with a revised forest plan and e.g. a separate Resource Plan such as a Travel Management Plan, the NFMA requirement for [ldquo]one ...integrated ...plan[rdquo] is not satisfied. NFMA Sec. 6 states, [ldquo](f) Plans developed in accordance with this section shall[hellip] (1) form one integrated plan for each unit of the National

Forest System, incorporating in one document or one set of documents,

available to the public at convenient locations, all of the features required by this section[hellip][rdquo] It appears the Forest Service is making some prohibitions or other Decisions with the DFP, especially in regards to suitability, but is avoiding explicitly making other prohibitions while doing so anyway by letting stand or incorporating other forestwide decisions which, in the above example of Travel Management Plans, ban or authorize some kinds of travel on specific routes or areas.

Although Travel Management Plans might be construed to make only site-specific decisions on travel routes all across the two Forests, by adopting restraints in specific areas in the revised forest plan the Forest Service would be doing the same. And the Custer National Forest Noxious Weed Management plan and the Gallatin National Forest Noxious and Invasive Weed Treatment plan provide forestwide direction.

Also, is the oil and gas leasing environmental impact statement and record of decision for the South Dakota portion of the Sioux District one of these [ldquo]Resource Plans[rdquo]?

INADEQUATE FOREST PLAN MONITORING

The DFP states:

The monitoring program is designed to test assumptions used in developing plan components and to evaluate relevant changes and management effectiveness of the plan components. Typically, monitoring questions seek additional information to increase knowledge and understanding of changing conditions, uncertainties, and risks identified in the best available scientific information as part of an adaptive management framework. (Emphasis added.)

The DFP states:

The forest plan is an integral part of an adaptive management cycle that guides future management decisions and actions. Forest plan-level adaptive management includes:

* Assessing information relevant to the Custer Gallatin;
* Developing land management direction to respond to social, economic, and ecological conditions;
* Monitoring management outcomes and changing circumstances; and
* Revising or amending management strategies accordingly.

This adaptive management cycle enables the Custer Gallatin to identify and respond to changing conditions, changing public desires, and new information, such as that obtained through research and scientific findings. The forest[rsquo]s monitoring program is an integral part of this adaptive management cycle, consisting of monitoring questions and performance measures. The monitoring evaluation report will indicate whether a change to the forest plan may be warranted, based on new information.

Yet despite the importance of monitoring as so stated in the DFP, a major public concern is the Forest Service[rsquo]s demonstrably pervasive and ongoing inability to implement adaptive management. Although the 1980s forest plans didn[rsquo]t necessarily call the process of forest plan

implementation monitoring [ldquo]adaptive management,[rdquo] that is exactly what it is. For example, the Gallatin Forest Plan states:

Monitoring and evaluation comprises the management control system for the Forest Plan. They will provide information to the decision maker and the public on the progress and results of implementation of the Forest Plan.

Monitoring and evaluation compare the actual results to those projected in the Plan. Costs, outputs, and environmental effects (experienced and projected) will be considered. This comparison will be made on a sample basis on the progress of implementation and the overall relationships on which the Plan is based. When changes occur, their significance will be evaluated and appropriate amendments or revisions made.

The agency[rsquo]s compliance with 1980s forest plans[rsquo] mandates for monitoring, evaluation, and reporting has been extremely poor. The most recent Monitoring and Evaluation Report on the Forest website for the Custer National Forest is dated April 18, 2001. And for the Gallatin National Forest, the most recent is for Fiscal Years 2007 [ndash] 2011.

Brown and Nie, 2019 state:

Rather than using adaptive management at the project level, or as an ad hoc management response to a single conflict or issue, the 2012 Rule provides a more strategic adaptive framework. For it to work, a shift in organizational culture is necessary. The Forest Service must identify, at the assessment phase of planning, key assumptions, risks, and areas of uncertainty that are relevant to decision-making. It must then commit itself to finding the answers through a more purposeful system of monitoring that is tied back into decision-making. The best chance of success will be conducting this monitoring with the public and other stakeholders. The public must be provided clear expectations of what management actions will be taken in response to monitoring information and how this information will be used to make better decisions in the future. (Emphasis added.)

What are the odds that funding as necessary to conduct the Monitoring Program will be sufficient on an annual basis? Where does the DEIS estimate the annual costs of the Monitoring Program?

The DFP[rsquo]s inadequate Monitoring Program (Chapter 4) is a specific example of DFP noncompliance with Planning Rule direction.

The Monitoring Program assigns Monitoring Questions to a subset of Plan Components. It also assigns an interval of data collection. For many resources, the interval is 5 years or more, which is large portion of the expected life of the forest plan. Even where the interval is shorter, based upon recent experience with the way the agency treats monitoring as optional or unaffordable, the Forest Service will fail to monitor and report as directed. Yes, we have a hard time taking the DFP Monitoring Program seriously.

[ldquo]The monitoring guide will provide detailed information on the monitoring questions, indicators, frequency and reliability, priority, data sources and storage, and cost.[rdquo] If such a monitoring guide

is needed, then it must be written into the revised forest plan, not punted to some non-public process.

[ldquo]Data sources and frequency of updates may change, so the specifics will be included in a monitoring guide.[rdquo] This seems to be an attempt to place an action requiring a formal forest plan amendment away from the proper public process.

[ldquo]Modifying a plan[rsquo]s monitoring program does not require any other change to the plan; that is, a plan need not be amended nor revised simply to facilitate monitoring pursuant to the Rule.[rdquo] Yet the DFP admits that [ldquo]Monitoring and evaluation are separate, sequential activities required by the National Forest Management Act[rdquo] and are critical for the many reasons expressed. This again reveals the extremely low priority the Forest Service places on monitoring and evaluation, and the false promise of [ldquo]adaptive management.[rdquo]

[ldquo]A change to a monitoring question or an indicator may be made administratively, but only after the public has had an opportunity to comment.[rdquo] Which specific regulation/legal process would the Forest Service be conforming to with this comment opportunity?

[ldquo]A change to a monitoring guide or annual monitoring work plan does not require public notification. In addition, because the broader-scale monitoring strategy is comprised of questions and indicators from plan monitoring programs, a change of the broader-scale monitoring strategy questions and indicators would require a change of the relevant plan monitoring programs.[rdquo] The DFP makes confusing, contradictory statements perhaps to avoid agency accountability when monitoring [ldquo]requirements[rdquo] are not followed.

Indicator(s) and Measure(s): Detrimental Soil Disturbance (DSD) and Coarse Woody Debris (CWD). These indicators exemplify most of those in the Monitoring Plan; vague on how many sites are to be monitored, how they are to be monitored, how often results are reported to the public, and what the agency response would be if results are unsatisfactory. A general lack of accountability is reflected.

Indicator(s) and Measure(s): Stream and habitat conditions (reported by managed vs. unmanaged sites). Again, this doesn[rsquo]t specify adequate sampling[mdash]one day[rsquo]s data gathering would be consistent with this Indicator/Measure.

The Monitoring Plan provides little direction for how the Indicators and Measures are to inform adaptive management.

PUBLIC CONTRIBUTIONS OF BEST AVAILABLE SCIENCE

As the DFP states, [ldquo]The 2012 planning rule requires the responsible official to use the best available scientific information to inform the development of the proposed plan, including plan components, the monitoring program, and plan decisions.[rdquo] The DFP says its foundation was [ldquo]provided by the Assessment Report of Ecological, Social, and Economic Conditions on the Custer Gallatin National Forest (February 2017) and associated resource reports, and the best available scientific information and analyses therein[rdquo] and that [ldquo]Resource specialists considered

what is most accurate, reliable, and relevant in their use of the best available scientific information.[rdquo] We do not agree the Assessment is in fact based on the best available science. The range of scientific information considered and cited in the Assessment suggests the agency is willing to ignore scientific viewpoints which contradict its status quo resource extraction regime. We[rsquo]re aware that it[rsquo]s Forest Service policy for the Forest Supervisor to delay final determination on best available science until the Record of Decision is signed: [ldquo](O)ther information

[hellip]presented to us [hellip]up until a decision may be found to be (best available science).[rdquo]

As we are keenly interested in seeing the revision process and management be genuinely guided by best available science, with these comments and in the years to come we will be providing the Forest Service with scientific information which should be considered best available science.

We request that the references cited in our comments be included as best available scientific information for informing this revision process. If the Forest Service does not agree with any of these references being best available scientific information, we ask that you provide an explanation, as the 2012 Planning Rule requires at 36 CFR [sect] 219.3:

The responsible official shall document how the best available scientific information was used to inform the assessment, the plan decision, and the monitoring program as required in

[sect][sect] 219.6(a)(3) and 219.14(a)(4). Such documentation must: Identify what information was determined to be the best available scientific information, explain the basis for that determination, and explain how the information was applied to the issues considered.

AIR QUALITY

The DEIS states, [ldquo]The Forest Service is required to monitor and protect several resources on public lands, including air quality. Air quality is dependent on the type and amount of pollutants emitted into the atmosphere, the location and topography of an airshed, and the prevailing meteorological and weather conditions.[rdquo]

So why are carbon dioxide (CO2) and other greenhouse gases which are emitted by forest management actions not considered pollutants?

CLIMATE CHANGE AND CARBON SEQUESTRATION

DEIS: [ldquo]Climate change is expected to continue and have profound effects on the Earth[rsquo]s ecosystems in the coming decades (IPCC 2007).[rdquo] As alarming as that might sound, perhaps the planning team members should familiarize themselves with the most recent report from the Intergovernmental Panel on Climate Change, which makes that 2007 report seem optimistic.

The Committee of Scientists, 1999 recognize the importance of forests for their contribution to sustainability and contributing to global carbon cycles. And the 2011 draft NFMA regulations recognize that forests provide [ldquo]Benefits[hellip] including[hellip] Regulating services, such as long term storage of carbon; climate regulation[hellip][rdquo]

The Final Climate Report in the Assessment contains a mere two pages of text and the words [ldquo]carbon dioxide[rdquo] don[rsquo]t even appear. Clearly, the Forest Service is not considering best available science on this topic.

The DEIS (147 [ndash] 149) present so much contradiction in its discussion on climate change effects on vegetation that it effectively nullifies all conclusions and apparently justifies continued institutional denial. (E.g., [ldquo]increased temperatures, when coupled with increased carbon dioxide, actually improve plant water relations[hellip][rdquo] vs. [ldquo]warmer temperatures will exacerbate the impacts of drought on forests and rangelands in the future[hellip]) The DEIS does a grave disservice on the topic.

The Forest Service apparently concludes that all this contradiction means they can assume vegetation DCs based on the NRV are scientifically credible. Perhaps you should get some independent peer review on the topic.

The DEIS indicates the Forest Service is choosing to miss the point, which is that we already have too much CO2 in the atmosphere, and any more management-induced short-term increases which might be balanced out over the medium-term are still disastrous.

The DEIS cites Hansen et al., 2018 as proceedings from workshops on what government could do to adapt to the facts of climate change. However, it quotes recommendations that require the Forest Service to have bureaucratic flexibility never before exhibited by this agency. So the DFP retreats back into an emphasis on [ldquo]resilience[rdquo] (i.e., controlling and manipulating vegetation via logging and burning), which is current Plan direction anyway.

[ldquo]M)anagers and the public should expect climate change to drive profound and often surprising changes on ecosystem structure, function and composition in the coming decades.[rdquo] Yet the DFP applies DCs based on the NRV in denial of climate change.

DEIS: [ldquo]It is possible that over the very long term, climate changes may alter site conditions and disturbance patterns on the Custer Gallatin National Forest to a degree that substantially impacts forest regrowth or vegetation types.[rdquo] (Emphasis added.) This is strongly contradicted by science we cite[mdash]and science the DEIS cites elsewhere[mdash]which indicates these effects are already substantial.

DEIS: [ldquo]Direction in the current plans aimed at promoting the sustainability of vegetation could trend the Custer Gallatin towards greater resiliency, and thus enable the national forest to provide carbon sequestration over both the short and long term.[rdquo] There is no scientific evidence that increasing any metric the Forest Service MIGHT be using to show [ldquo]increasing resilience[rdquo] from implementing the DFP would improve carbon sequestration over the only relevant time frame[mdash] the immediate future within which there is already great urgency to reduce emissions.

The bias in the [ldquo]scientific[rdquo] discussions in Revision documents concerning climate change is far more troubling than the agency[rsquo]s bias on other topics, because consequences of unchecked climate change will be disastrous for food production, water supplies, and would thus lead to complete turmoil for all human societies. In other words, climate chaos. This is an issue as

serious a nuclear annihilation (although at least with the latter we[rsquo]re not already pressing the button).

DEIS [ldquo]wildfire and extensive forest mortality as a result of insect and disease are primary sources of unintentional carbon emissions from forests in western United States [hellip]lead(ing) to widespread loss of centuries[rsquo] worth of carbon storage.[rdquo] This has also been widely debunked by best available science.

[ldquo]Carbon stored in harvested wood products contributes to the total forest carbon storage associated with national forests in the Northern Region.[rdquo] (DEIS) This myth of carbon storage in wood products has been widely debunked. Since the primacy of logging is so strong in the agency culture, it[rsquo]s not surprising the

DEIS fails to identify conflicting science on these topics. Perhaps only the Forest Service and its enabling profiteers would see the benefit of wood products stored in landfills.

It is clear that the management of the planet[rsquo]s forest is a nexus for addressing this huge crisis of our times. Yet the DEIS fails to even disclose the amount of carbon dioxide (CO2) emissions created by Forest Plan implementation, or consider the best available science on the topic. This is immensely unethical.

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

KEY MESSAGES

* Annual average temperatures, including daily minimums, maximums, and averages, have risen across the state between 1950 and 2015. The increases range between 2.0-3.0[deg]F (1.1-1.7[deg]C) during this period. [high agreement, robust evidence]
* Winter and spring in Montana have experienced the most warming. Average temperatures during these seasons have risen by 3.9[deg]F (2.2[deg]C) between 1950 and 2015. [high agreement, robust evidence]
* Montana[rsquo]s growing season length is increasing due to the earlier onset of spring and more extended summers; we are also experiencing more warm days and fewer cool nights. From 1951-2010, the growing season increased by 12 days. In addition, the annual number of warm days has increased by 2.0% and the annual number of cool nights has decreased by 4.6% over this period. [high agreement, robust evidence]
* Despite no historical changes in average annual precipitation between 1950 and 2015, there have been changes in average seasonal precipitation over the same period. Average winter precipitation has decreased by 0.9 inches (2.3 cm), which can mostly be attributed to natural variability and an increase in El Ni[ntilde]o events, especially in the western and central parts of the state. A significant increase in spring precipitation (1.3-2.0 inches

[3.3-5.1 cm]) has also occurred during this period for the eastern portion of the state. [moderate agreement, robust evidence]

* The state of Montana is projected to continue to warm in all geographic locations, seasons, and under all emission scenarios throughout the 21st century. By mid century, Montana temperatures are projected to increase by approximately 4.5-6.0[deg]F (2.5-3.3[deg]C) depending on the emission scenario. By the end-of-century, Montana temperatures are projected to increase 5.6-9.8[deg]F (3.1-5.4[deg]C) depending on the emission scenario. These state-level changes are larger than the average changes projected globally and nationally. [high agreement, robust evidence]
* The number of days in a year when daily temperature exceeds 90[deg]F (32[deg]C) and the number of frost-free days are expected to increase across the state and in both emission scenarios studied. Increases in the number of days above 90[deg]F (32[deg]C) are expected to be greatest in the eastern part of the state. Increases in the number of frost-free days are expected to be greatest in the western part of the state. [high agreement, robust evidence]

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

USDA Forest Service, 2017b discusses some effects of climate change on forests, including [ldquo]In many areas, it will no longer be possible to maintain vegetation within the historical range of variability. Land management approaches based on current or historical conditions will need to be adjusted.[rdquo] The DEIS has no scientific basis for its claims that vegetation [ldquo]treatments[rdquo] will result in sustainable vegetation conditions under likely climate change scenarios.

Carbon sequestration may be defined as the process by which atmospheric carbon dioxide is taken up by vegetation through photosynthesis and stored as carbon in biomass (tree trunks, branches, foliage and roots) and soils. The DFP grossly misleads the public in promoting the idea that logging increases carbon sequestration when in fact a vast body of science demonstrates that such tree farming is a net source of greenhouse gas emissions[mdash]regardless of the eventuality of fire and other natural processes.

The DEIS and DFP ignore the large body of science on forest management[rsquo]s adverse effects on carbon sequestration. The Forest Service has never analyzed and disclosed the cumulative effects of overall agency management contributions to the reduction in stored carbon and thus, to climate change.

We incorporate the Battle Creek Alliance et al., 2017 comments on the January 20, 2017 Draft California Forest Carbon Plan as comments on the DFP (Attachment 3). It contains headings such as [ldquo]The Plan[rsquo]s assertion that increased thinning/logging will increase carbon storage in forests is unsupported by the best available science.[rdquo]

The DEIS fails to provide comprehensive estimates of the total amount of CO2 or other greenhouse gas emissions caused by Forest Service management actions and policies[mdash] forestwide, regionally, or nationally. Instead, the agency makes selective use of science to suggest its agency actions and policies would be net neutral or would even help carbon sequestration, flying in the face of science and common sense. Forest Service policymakers seem comfortable maintaining a position that they need not take any leadership on this issue, and obfuscate via this DEIS to justify their failure of leadership.

The best scientific information strongly suggests that management that involves removal of trees and other biomass is a strong net source of atmospheric CO2[mdash]unsurprisingly the DEIS doesn[rsquo]t state that simple fact. If the Forest Service really believes its carbon modeling can provide meaningful information, it should model the carbon flux over time for all of its proposed stand management scenarios for each of the forest types found on the CGNF.

FW-DC-CARB: This is the only direction in the DFP on the subject of carbon storage and sequestration: [ldquo]Carbon storage and sequestration potential is sustained by biologically diverse and resilient forests, woodlands, shrublands, and grasslands that are adapted to natural disturbance processes and changing climates.[rdquo] Since the DEIS, Assessment, and DFP misinterpret or ignore best available science on the topic, this DC means nothing.

The DEIS fails to quantify CO2 and other greenhouse gas emissions from several other common human activities related to forest management and recreational uses. These include emissions associated with machines used for logging and associated activities, vehicle use for administrative actions, recreational motor vehicles, and most emissions associated with livestock grazing. The Forest Service is simply ignoring the impacts of these management and other authorized activities.

Such greenhouse gas sources can be quantified. Kassar and Spitler (2008) for example, provide an analysis of the carbon footprint of off-road vehicles in California. They determined that:

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

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

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

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

Also, Sylvester, 2014 provides data on the amount of fossil fuel being consumed by snowmobiles in Montana, from which one can calculate the carbon footprint. The study finds that resident snowmobilers burn 3.3 million gallons of gas in their snowmobiles each year and a

similar amount of fuel to transport themselves and their snowmobiles to and from their destination. Non-residents annually burn one million gallons of gas in snowmobiles and about twice that in related transportation. So that adds up to 9.6 million gallons of fuel consumed in the pursuit of snowmobiling each year in Montana alone. Multiply that by 20 pounds of carbon dioxide per gallon of gas (diesel pickups spew 22 pounds per gallon) and snowmobiling releases 192 million pounds (96 thousand tons) of climate-warming CO2 per year into the atmosphere.

The DEIS also ignores the cumulative CO2 emissions from forest management on other ownerships in the region or beyond. Clearly timber management continues to be a net source of CO2. Omitting such a cumulative effects analysis allows the agency to avoid describing the opportunity found on national forests to counterbalance some CO2 emissions from other forest ownerships, resulting in a range of alternatives where none really address climate change. This violates NEPA, as well as the public trust.

The Assessment and DEIS do not analyze or disclose the body of science that implicates logging activities as reducing carbon stocks in forests and increasing greenhouse gas (GHG) emissions. The agency misleads the public, distracting from the emerging scientific consensus that removing wood or any biomass from the forest only makes the problem worse. The science on climate change strongly indicates that forest policies must shift away from logging if carbon sequestration is a genuine emphasis. All old-growth forest areas, other unlogged or lightly logged forests, and healthy grasslands must be preserved indefinitely for their carbon storage value. Forests that have been logged should allowed to eventually revert to old-growth condition. This type of management has the potential to double the current level of carbon storage in some regions. (Harmon et al., 2002; Harmon, 2001; Harmon et al., 1990; Homan et al., 2005; Solomon et al., 2007; Turner et al., 1995; Turner et al., 1997; Woodbury et al., 2007.)

Kutsch et al., 2010 provide an integrated view of the current and emerging methods and concepts applied in soil carbon research. They use a standardized protocol for measuring soil CO2 efflux, designed to improve future assessments of regional and global patterns of soil carbon dynamics. The authors state:

Excluding carbonate rocks, soils represent the largest terrestrial stock of carbon, holding approximately 1,500 Pg (1015 g) C in the top metre. This is approximately twice the amount held in the atmosphere and thrice the amount held in terrestrial vegetation. Soils, and soil organic carbon in particular, currently receive much attention in terms of the role they can play in mitigating the effects of elevated atmospheric carbon dioxide (CO2) and associated global warming. Protecting soil carbon stocks and the process of soil carbon sequestration, or flux of carbon into the soil, have become integral parts of managing the global carbon balance. This has been mainly because many of the factors affecting the flow of carbon into and out of the soil are affected directly by land-management practices.

(Emphasis added.) That leads to the following scientific discussion of the effect of [ldquo]land- management practices[rdquo] (ignored in the DEIS) because the latter are contributing to increased atmospheric CO2 and thus climate change. Van der Werf, et al. 2009 state:

(T)he maximum reduction in CO2 emissions from avoiding deforestation and forest degradation is probably about 12% of current total anthropogenic emissions (or 15% if peat

degradation is included) - and that is assuming, unrealistically, that emissions from deforestation, forest degradation and peat degradation can be completely eliminated.

...reducing fossil fuel emissions remains the key element for stabilizing atmospheric CO2 concentrations.

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

Keith et al., 2009 state:

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

Harmon, 2009 reviews how the forest ecosystem stores carbon, the issues that must be addressed when assessing any proposed course of action, and some common misconceptions that need to be avoided. He also reviews and assesses some of the more common proposals as well as his general scientific concerns about the forest system as a place to store carbon.

Hanson, 2010 addresses the false notion, presented in the DEIS, that wildland fires should be managed against:

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

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

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

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

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

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

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

How can our national forest be considered [ldquo]suitable[rdquo] for activities that contribute to[mdash]rather than reduce[mdash]the greatest threat to the Earth[rsquo]s biosphere? The present level of carbon dioxide (CO2) in Earth[rsquo]s atmosphere is already dangerous and not sustainable under any definition of the word. The DFP[rsquo]s direction towards unnecessary activities that would worsen the problem violates the 2012 Planning Rule[rsquo]s mandate to [ldquo]provide for social, economic, and ecological sustainability.[rdquo]

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

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

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

The authors found that if greenhouse gas emissions continue at the current rate, the atmosphere will warm up by as much as 2.7 degrees Fahrenheit (1.5 degrees Celsius) above preindustrial levels by 2040, inundating coastlines and intensifying droughts and poverty. Previous work had focused on estimating the damage if average temperatures were to rise by a larger number, 3.6

degrees Fahrenheit (2 degrees Celsius), because that was the threshold scientists previously considered for the most severe effects of climate change.

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

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

Global climate change is caused by excess CO2 and other greenhouse gases transferred to the atmosphere from other pools. Human activities, including combustion of fossil fuels and bioenergy, forest loss and degradation, other land use changes, and industrial processes, have contributed to increasing atmospheric CO2, the largest contributor to global warming, which will cause temperatures to rise and stay high into the next millennium or longer.

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

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

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

ignored in climate policies at the international, national, state, and local levels.

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

for processing and transportation are accounted for, carbon emissions can actually exceed carbon stored in wood products.

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

Global climate change is caused by the cumulative buildup of greenhouse gases, including CO2, in the atmosphere. Logging only adds to the cumulative total carbon emissions so it must be minimized. Logging will not only transfer carbon from storage to the atmosphere but future regrowth cannot make up for the effects of logging, because carbon storage in logged forests will lag behind carbon storage in unlogged forests for decades or centuries.

Global warming and its consequences may be effectively irreversible, which implicates certain legal consequences under the National Environmental Policy Act (NEPA), the National Forest Management Act (NFMA) and the Endangered Species Act (ESA) (e.g., 40 CFR [sect] 1502.16; 16 USC [sect]1604(g); 36 CFR [sect]219.12; ESA Section 7; 50 CFR [sect][sect]402.9, 402.14) which must be analyzed and disclosed in the upcoming revised forest plan Environmental Impact Statement (EIS). All net carbon emissions from logging represent [ldquo]irretrievable and irreversible commitments of resources.[rdquo]

Respected experts say that the atmosphere might be able to safely hold 350 ppm of CO2.1 So when we were at pre-industrial levels of about 280 ppm, we had a cushion of about 70 ppm which represents millions of tons of greenhouse gas (GHG) emissions. Well, now that cushion is completely gone. We are already at about 400 ppm CO2 and rising, so what[rsquo]s the safe level of additional emissions (from logging or any other activity)? It[rsquo]s negative. There is no safe level ofadditional emissions that our earth systems can tolerate. In fact, we need to be removing carbon, not adding carbon to the atmosphere.2 How could we do that? By growing forests. Logging moves us away from our objective while conservation moves us toward our objective.

Depro, et al., 2008 found that ending commercial logging on U.S. national forests and allowing forests to mature

instead would remove an additional amount of carbon from the atmosphere equivalent to 6 percent of the U.S. 2025 climate target of 28 percent emission reductions.

Forest recovery following logging and natural disturbances are usually considered a given. But forests have recovered under climatic conditions that no longer exist. Higher global temperatures and increased levels of disturbance are contributing to greater tree mortality in many forest

1 http://www.350.org/about/science.

2 [ldquo]To get back to 350 ppm, we[rsquo]ll have to run the whole carbon-spewing machine backwards, sucking carbon out of the atmosphere and storing it somewhere safely. [hellip] By growing more forests, growing more trees, and better managing all our forests, [hellip][rdquo] http://blog.cleanenergy.org/2013/11/26/exploring-biocarbon-tools/comment-page-1/#comment-375371

ecosystems, and these same drivers can also limit forest regeneration, leading to vegetation type conversion. (Bart et al. 2016.)

The importance of trees for carbon capture will rise especially if, as recent evidence suggests, hopes for soils as a carbon sink may be overly optimistic. (He et al., 2016.) Such a potentially reduced role of soils doesn[rsquo]t mean that forest soils won[rsquo]t have a role in capture and storage of carbon, rather it puts more of the onus on aboveground sequestration by trees, even if there is a conversion to unfamiliar mixes of trees.

Law and Harmon, 2011 conducted a literature review and concluded [hellip]

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

Best available science supports the proposition that forest policies must shift away from logging if carbon sequestration is prioritized. Forests must be preserved indefinitely for their carbon storage value. Forests that have been logged should allowed to convert to eventual old-growth condition. This type of management has the potential to double the current level of carbon storage in some regions. (Also see Harmon and Marks, 2002;

Harmon, 2001; Harmon et al., 1990; Homann et al., 2005; Law, 2014; Solomon et al., 2007; Turner et al., 1995; Turner et al., 1997; Woodbury et al., 2007.)

Moomaw and Smith, 2017 state:

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

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

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

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

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

The [carbon neutrality] bills[rsquo] assumption that emissions do not increase atmospheric concentrations when forest carbon stocks are stable or increasing is clearly not true

scientifically. It ignores the cause and effect basis of modern science. Even if forest carbon stocks are increasing, the use of forest biomass energy can reduce the rate at which forest carbon is increasing. Conservation of mass, a law of physics, means that atmospheric carbon would have to become higher as a result of this action than would have occurred otherwise. One cannot legislate that the laws of physics cease to exist, as this legislation suggests.

Nitrous oxide, a by-product generated by the microbial breakdown of nitrogen in livestock manure, is a potent greenhouse gas completely ignored by the Assessment. Also, the digestion of organic materials by livestock is a large source of methane emission[mdash]another GHG not even mentioned in the Assessment. Methane is a far more potent substance than CO2 causing climate change.

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

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

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

* At present non-CO2 greenhouse gases contribute about a third of total anthropogenic CO2 equivalent (CO2e) emissions and 35[ndash]45% of climate forcing (the change in radiant energy retained by Earth owing to emissions of long-lived greenhouse gases) resulting from those emissions.
* Methane (CH4) is the most abundant non- CO2 greenhouse gas and because it has a much shorter atmospheric lifetime (~9 years) than CO2 it holds the potential for more rapid reductions in radiative forcing than would be possible by controlling emissions of CO2 alone.
* We focus on ruminants for four reasons. First, ruminant production is the largest source of anthropogenic CH4 emissions (Fig. 1c) and globally occupies more area than any other land use. Second, the relative neglect of this greenhouse gas source suggests that awareness of its importance is inappropriately low. Third, reductions in ruminant numbers and ruminant meat production would simultaneously benefit global food security, human health and environmental conservation. Finally, with political will, decreases in worldwide ruminant populations could potentially be accomplished quickly and relatively inexpensively.
* Worldwide, the livestock sector is responsible for approximately 14.5% of all anthropogenic greenhouse gas emissions3 (7.1 of 49 Gt CO22e yr[ndash]1). Approximately

44% (3.1 Gt CO2e yr[ndash]1) of the livestock sector[rsquo]s emissions are in the form of CH4 from enteric fermentation, manure and rice feed, with the remaining portions almost equally shared between CO2 (27%, 2 Gt CO2e yr[ndash]1) from land-use change and fossil fuel use, and nitrous oxide (N2O) (29%, 2 Gt CO2e yr[ndash]1) from fertilizer applied to feed-crop fields and manure.

* Globally, ruminants contribute 11.6% and cattle 9.4% of all greenhouse gas emissions from anthropogenic sources.
* Lower global ruminant numbers would have simultaneous benefits for other systems and processes. For example, in some grassland and savannah ecosystems, domestic ruminant grazing contributes to land degradation through desertification and reduced soil organic carbon. Ruminant agriculture can also have negative impacts on water quality and availability, hydrology and riparian ecosystems. Ruminant production can erode biodiversity through a wide range of processes such as forest loss and degradation, land- use intensification, exotic plant invasions, soil erosion, persecution of large predators and competition with wildlife for resources.
* Roughly one in eight people in the world are severely malnourished or lack access to food owing to poverty and high food prices. With over 800 million people chronically hungry, we argue that the use of highly productive

croplands to produce animal feed is questionable on moral grounds because this contributes to exhausting the world[rsquo]s food supply.
* In developed countries, high levels of meat consumption rates are strongly correlated with rates of diseases such as obesity, diabetes, some common cancers and heart disease. Moreover, reducing meat consumption and increasing the proportion of dietary protein obtained from high-protein plant foods [mdash] such as soy, pulses, cereals and tubers [mdash] is associated with significant human health benefits.
* The greenhouse gas footprint of consuming ruminant meat is, on average, 19[ndash]48 times higher than that of high-protein foods obtained from plants (Fig. 2), when full life cycle analysis including both direct and indirect environmental effects from [lsquo]farm to fork[rsquo] for enteric fermentation, manure, feed, fertilizer, processing, transportation and land-use change are considered.
* In terms of short-term climate change mitigation during the next few decades, if all the land used for ruminant livestock production were instead converted to grow natural vegetation, increased CO2 sequestration on the order of 30[ndash]470% of the greenhouse gas emissions associated with food production could be expected.
* (D)ecreasing ruminants should be considered alongside our grand challenge of significantly reducing the world[rsquo]s reliance on fossil fuel combustion. Only with the recognition of the urgency of this issue and the political will to commit resources to comprehensively mitigate both CO2 and non- CO2 greenhouse gas emissions will meaningful progress be made on climate change. For an effective and rapid response, we need to increase awareness among the public and policymakers that what we choose to eat has important consequences for climate change.

See more explanation: https://www.facebook.com/DavidAvocadoWolfe/videos/10153860126441512/

Moomaw and Smith, 2017 conclude:

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

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

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

Achieving the scale of forest protection and restoration needed over the coming decades may be a challenging concept to embrace politically; however, forests are the only option that can operate at the necessary scale and

within the necessary time frame to keep the world from going over the climate precipice. Unlike the fossil fuel companies, whose industry must be replaced, the wood products industry will still have an important role to play in providing the wood products that we need while working together to keep more forests standing for their climate, water, storm protection, and biodiversity benefits.

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

THE DFP FAILS TO PROPERLY ADDRESS A MAJOR CAUSE OF ONGOING ECOLOGICAL DAMAGE ON THE FOREST[mdash]EXCESSIVE ROADS

The Forest Service cannot afford to properly maintain the entire National Forest Road system at current operational maintenance levels. Unfortunately, the DEIS downplays the huge ecological liability of this excessive forest road network. DFP Objectives (FW-OBJ-RT) propose to maintain only a subset of roads, yet the DEIS fails to provide an analysis of the chronic ecological damage accruing from delays of maintaining all roads as needed every year. The DEIS states, for Alternatives B, C, and D [ldquo]Road maintenance is expected to continue at similar levels or slightly decreased levels compared to more recent management.[rdquo] (Emphasis added.)

Forest Service scientists Gucinski et al. (2001) identify many of the highly adverse impacts of forest roads. Concerning road density impacts on fish populations, they note:

(I)ncreasing road densities and their attendant effects are associated with declines in the status of four non-anadromous salmonid species. These species are less likely to use highly roaded areas for spawning and rearing and, if found, are less likely to have strong populations. This consistent pattern is based on empirical analysis of 3,327 combinations of known species[rsquo] status and subwatershed conditions, limited primarily to forested lands administered by the Forest Service and the Bureau of Land Management.

Scientific information from government studies conducted for the Interior Columbia Ecosystem Management Project strongly indicates the high negative correlation between road density and fish habitat conditions. USDA Forest Service & USDI Bureau of Land Management, 1996a state:

High integrity (forests) contain the greatest proportion of high forest, aquatic, and hydrologic integrity of all [hellip]are dominated by wilderness and roadless areas [and] are the least altered by management. [hellip]Low integrity (forests have) likely been altered by past management [hellip]are extensively roaded and have little wilderness. (Pp. 108, 115 and 116).

And USDA Forest Service & USDI Bureau of Land Management (1996) state [ldquo]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.[rdquo] (P. 105).

Carnefix and Frissell, 2009 state:

Roads have well-documented, significant and widespread ecological impacts across multiple scales, often far beyond the area of the road [ldquo]footprint[rdquo]. Such impacts often create large and extensive departures from the natural conditions to which organisms are adapted, which increase with the extent and/or density of the road network.

Likewise, Wisdom, et al. (2000) state:

Our analysis also indicated that >70 percent of the 91 species are affected negatively by one or more factors associated with roads. Moreover, maps of the abundance of source habitats in relation to classes of road density suggested that road-associated factors hypothetically may reduce the potential to support persistent populations of terrestrial carnivores in many subbasins. Management implications of our summarized road effects include the potential to mitigate a diverse set of negative factors associated with roads.
Comprehensive mitigation of road-associated factors would require a substantial reduction in the density of existing roads as well as effective control of road access in relation to management of livestock, timber, recreation, hunting, trapping, mineral development, and other human activities.

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

(Emphases added.) So with the DFP the Forest Service continuously and programmatically promotes [ldquo]restoration[rdquo] without properly addressing the major source of ecological damage[mdash]its excessive and failing road network.

The Forest Service could address many ecological issues on the CGNF by significantly reducing the road system, starting in riparian areas. Instead of demonstrating leadership on this issue, however, the DFP includes no direction whatsoever mandating a reduced road network, and little direction to stop its growth. None of the alternatives address this highly significant environmental issue either, in violation of NEPA.

The Assessment Final Infrastructure Report states: Travel Analysis Process

The Forest Service is using the minimum roads assessment to verify that every road on the forest has been analyzed, including their purpose and needs. The roads travel analysis process has been completed for the entire Custer Gallatin planning area. The roads travel analysis lists those roads that will be considered a part of the future NFS road system and those that may be eliminated or decommissioned. The opportunities identified within the travel analysis process support objectives of relevant land and resource management plans.

When we could not locate anything from the Forest website documenting the Travel Analysis Process, we requested the documents. After a delay[mdash]which included receiving a website address link from the Forest Plan Revision Team Leader that didn[rsquo]t work[mdash]two Word documents were emailed: Subpart A Response Final_Custer2013 and gnf_Subpart A Analysis_final. Those documents and a third, a pdf document (Forest Scale Roads Analysis December 2002) were then placed on the Forest website. The first is an undated document regarding the Custer NF, the second is a Gallatin NF document labeled [ldquo]Final Draft, 4/28/2016[rdquo] and the pdf is a Custer NF document.

We note that none of those documents contains the list of [ldquo]those roads [hellip]that may be eliminated or decommissioned[rdquo] as mentioned in the Assessment, which is what we requested. Both Word documents mention other documents, which are claimed to be in response to the Travel Management Rule and are claimed to be prepared following standard analysis procedures for determining the minimum necessary road system, but none of those other documents were provided to us, nor placed on the Forest website.

The Forest Service[rsquo]s Travel Management Regulations (TMR) at 36 CFR [sect] 212. At CFR [sect] 212.5, Subpart A the TMR states:

(b) Road system[mdash](1) Identification of road system. For each national forest, national grassland, experimental forest, and any other units of the National Forest System ([sect] 212.1), the responsible official must identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands. In determining the minimum road system, the responsible official must incorporate a science-based roads analysis at the appropriate scale and, to the degree practicable, involve a broad spectrum of interested and affected citizens, other state and federal agencies, and tribal governments. The minimum system is the road system determined to be needed to meet resource and other management objectives adopted in the relevant land and resource

management plan (36 CFR part 219), to meet applicable statutory and regulatory requirements, to reflect long-term funding expectations, to ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

The [ldquo]science-based roads analysis[rdquo] required under Subpart A of the TMR is generally referred to as the [ldquo]travel analysis process[rdquo] (TAP). The Forest Service Washington Office, through a series of directive memoranda, instructed forests to use the Subpart A process to [ldquo]maintain an appropriately sized and environmentally sustainable road system that is responsive to ecological, economic, and social concerns.[rdquo] These memoranda also outline core elements that must be included in each Travel Analysis Report (TAR).

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

*

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

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

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

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

The Custer NF Forest Scale Roads Analysis admitted, [ldquo]Over the past years the availability of funds to maintain our road system has been very low. Because of the lack of maintenance many of the roads have deteriorated to the point that road maintenance cannot be adequately accomplished to Forest Service standards.[rdquo] That report estimated deferred maintenance of forest roads to be over $26 million for roads at maintenance levels 3, 4, and 5. This means that most closed roads and many open roads weren[rsquo]t even considered in that analysis.

That Custer NF Forest Scale Roads Analysis concluded, [ldquo]The current maintenance level 3, 4, and 5 roads provide the minimum road system needed for safe and efficient travel for the administration, utilization and protection of National Forest System lands. Thus, the Forest has no plans to decommission or close objective maintenance level 3, 4, 5 roads which have been inventoried and studied in this analysis.[rdquo] But clearly, that report did not provide a comprehensive analysis to determine the Minimum Road System pursuant to the Travel Management Rule at 36 C.F.R. [sect] 212.5(b) Subpart A. Rather, that report stated [ldquo]This forest scale

roads analysis has been completed in accordance with FS-643[rdquo] which is 1999 Forest Service guidance.

Furthermore, for the Gallatin NF the Forest Service has apparently not performed ANY forestwide roads analysis.

So now we have a DFP which proposes adequate direction to improve the problems of an unaffordable, chronically undermaintained road system.

The Forest Service planning regulations establish substantive requirements related to roads, infrastructure, and access that the agency clearly cannot meet without changing current management direction. The intent of the regulations is that the Forest Service establish plan direction for transportation infrastructure that will result in sustainable (fiscal and ecological) access and the restoration and maintenance of healthy aquatic and terrestrial systems and water resources (See 36 CFR 219.8(a) and (b)). It also requires that plan components ensure implementation of national best management practices for water quality (36 CFR 219.8(a)(4)), and take into account [ldquo]Appropriate placement and sustainable management of infrastructure, such as recreational facilities and transportation and utility corridors.[rdquo] (36 CFR 219.10(a) and (b).)

The associated draft Forest Service Handbook provides additional direction on addressing transportation infrastructure in the plan revision process. It directs that the forest plan provide a framework for future road system management:

The central consideration in forest planning for infrastructure is that the integrated desired conditions and other plan components set a framework for the management of the plan area[rsquo]s infrastructure.

For forest roads, the desired conditions should clarify the intended nature of the road system for the plan area and for management areas and geographic areas. The forest plan should identify the major arterial road systems that provide primary access to, and within, the plan area. Determining the desired conditions, including the intended desired uses for management areas or geographic areas within the plan area, helps identify what type of road system is needed for access to and within these management areas or geographic areas.

Based on the desired conditions, other plan components can be developed for the road system. These include objectives either for modifying the road system such as decommissioning and restoring roads in areas where existing roads are no longer desired, or improving roads in areas where the road system needs improvement. The objectives should recognize fiscal limitations and relative urgencies in determining objectives for the road system. Suitability can include identifying what types of roads are suitable or not suitable for certain management areas and geographic areas. Standards or guidelines for road management may restrict road management activities in certain situations such as in riparian zones or sensitive scenic areas.

(Forest Service Handbook 1909.12, 23.22o, February 14, 2013 draft.) The DFP direction falls drastically short of this regulatory direction. It does not address the future needs of the road system or include direction around decommissioning roads, moving towards a system that is fiscally and environmentally sustainable, or addressing climate change effects. DFP direction does not offer direction on maintaining a minimum necessary road system that is affordable under current and projected budgets, removing unneeded roads as an important landscape restoration strategy, or otherwise achieving a sustainable transportation system. Moreover, DFP direction does not consider the effects of climate change, which will likely be dominant in road management decision-making over the life of the revised forest plan.

The sustainability of the road system and transportation infrastructure is a challenging issue for the CGNF even without the specter of climate change. However, when climate change and its potential impacts on infrastructure are considered, achieving sustainability is a much more daunting task. As a general matter, it is expected that climate change will be responsible for more extreme weather events, leading to increasing flood severity, more frequent landslides, changing hydrographs (peak, annual mean flows, etc.), and changes in erosion and sedimentation rates and delivery processes. Many roads in the CGNF have not been designed to current engineering standards. And those designed for storms and water flows typical of past decades may fail under future storms. The likelihood of failure is higher for facilities in high-risk settings[mdash]such as rain- on-snow zones and landscapes with unstable geology.3

This new reality argues for a forest-wide systematic review and modification of transportation infrastructure so that they can withstand future storm events and be sustainable for the long-term.

Activities must include: addressing fish passage, replacing undersized culverts with larger ones, prioritizing maintenance and upgrades (e.g., installing drivable dips and more outflow structures), and obliterating roads that are no longer needed and pose erosion hazards. The only way that this significant body of work will get done in a relatively short amount of time is if the Forest Service proactively plans to do it in a coordinated and prioritized way. The place to make those recommendations about how to achieve this goal is in the revised forest plan. Moreover, because the previous forest plans did not consider the hydrologic impacts of climate change on infrastructure, or how the ecological effects of infrastructure would be exacerbated by a changing climate, there is clearly a need to change management direction for transportation infrastructure in the plan revision.

As the draft handbook 1909.12,20 states, the forest plan is the logical place to establish a framework for the future management of the road system. It is a 10-20 year comprehensive document that enables managers to consider the road system in the context of the other aspects of forest management, including restoration, protection and utilization, and to identify an appropriate sized road system given current fiscal realities. In addition, forest plans should be the place where all existing regulatory direction (including external direction related, for instance, to the Clean Water Act and Endangered Species Act) is compiled in one place, taking national direction and identifying how it is to be best implemented at the forest level. By doing this, forest

3 USDA Forest Service. 2010. Water, Climate Change, and Forests: Watershed Stewardship for a Changing Climate, PNW-GTR-812, June 2010, p. 72 (available at: http://www.fs.fed.us/pnw/pubs/pnw_gtr812.pdf)

managers and the public will clearly understand the management expectations regarding the road system and develop strategies accordingly. With frequent turnover in decision-making positions at the forest level, it is even more important that the revised forest plan clearly articulate direction related to the road system and

transportation infrastructure. In other words, the revised forest plan should be the one-stop shop where management priorities, requirements, and direction are clearly articulated.

Beyond that, the 2012 planning rule and other regulations set out specific requirements that the Forest Service must meet related to the road system. For example, if the new plan does not incorporate the minimum road system and set standards/guidelines to achieve it, then it will never happen, as evidenced by the lack of direction in existing forest plans and the inability of forests to achieve an environmentally and fiscally sustainable road system to date. Forests need forest-specific direction on how to achieve that desired road system considering the other multiple uses of the forest. That is the job of the forest plan. It would be arbitrary for the Forest Service to not provide clear direction on how it intends to meet these requirements in the revised forest plan.

Creating an environmentally and fiscally sustainable road system involves removing unneeded system or unauthorized roads to reduce fragmentation, total area of road affected zone, and costs of long-term road system maintenance. Noss, R.F. 2001b states that [ldquo]Among the land-use and management practices likely to maintain forest biodiversity and ecological functions during climate change are [hellip]avoiding fragmentation and providing connectivity[hellip][rdquo] This means that reconnecting unroaded lands is one of the best actions land managers can take to enhance the Forests[rsquo] ability to adapt to climate change. Hence, the revised forest plan should, as part of its overall road management strategy, make it a priority to reclaim unauthorized and unneeded system routes in roadless areas (2001 roadless rule areas and other inventoried areas pursuant to FSH 1909.12, 70), important watersheds especially for imperiled fish and wildlife, and other important conservation areas.

We recommend a number of plan components that together would provide guiding road management direction in the revised forest plan:

Provide in a background section information on the requirements in subpart A, related implementing memoranda, and other regulatory requirements (Forest Service and external) related to travel management (e.g., critical habitat requirements from the U.S. Fish & Wildlife Service, Best Management Practices, etc.). Explain that the Forest Service is required to complete a science-based analysis to identify a minimum necessary road system (MRS) and unneeded roads for decommissioning or conversion to other uses, and implement the findings through subsequent projects and plans.

In the Desired Conditions, state that the intention is to make the Forest road system sustainable by adequately maintaining needed roads and reclaiming unneeded roads, including non-system roads, especially in roadless areas and other ecologically important areas. Also state that the MRS should reflect long term funding expectations, and minimize adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

Include the following standards:

* Each road and trail has approved Road Management Objectives reflective of recommendations in the Travel Analysis Report.
* Close and rehabilitate temporary roads as soon as they are no longer needed for project purposes;

* Project level decisions with road related elements implement the Travel Analysis Report recommendations and the MRS.

Include the following guideline:

* Annual progress is made toward achieving the MRS through maintenance, decommissioning, and reclamation.

Include the following objectives:

* Routes identified for decommissioning through the Travel Analysis Process or another process will be closed, decommissioned and reclaimed to a stable condition as soon as practicable.
* Watershed Restoration Action Plans identify and address road related impacts to watershed health.
* Decommissioning priorities will be based on effectiveness in reducing fragmentation, and connecting unroaded areas and fish bearing stream segments.

Include annual monitoring indicators that measure progress toward achieving the above direction.

Establish road density standards based on the best available science for wildlife and watershed health.

Forest Service Handbook at FSH 7709.55 Ch. 20 describes a [ldquo]Six Step Process[rdquo] for conducting the Travel Analysis Process (TAP). The goal under Step 6 is to produce a Travel Analysis Report that includes a minimum road system map, a list of unneeded roads, a prioritized list of actions to implement the minimum road system, and a list of proposed changes to the Forest[rsquo]s current travel management direction. The CGNF has not properly completed a TAP nor produced a Travel Analysis Report. The Forest Planning process is inadequately informed because of these failures.

The DFP states, [ldquo]Decisions for travel management on specific roads, trails, and motorized areas are addressed in the Custer National Forest and the Gallatin National Forest Travel Plan decisions[hellip][rdquo] However those Decisions were pursuant to the Travel Management Rule at 36

C.F.R. [sect] 212.5(b) Subpart B, which deals with designation of roads open for all of the various types of motor vehicles except for oversnow vehicles. Those Decisions are apparently being carried forth into the revised forest plan, so please disclose a list of the best available science the Forest Service used in preparation of those Travel Plans.

To widen the perspective on this issue, we examine a statement made in the Draft Forest Plan for the Helena-Lewis and Clark National Forest, from last year (2018). That draft revised forest plan for an adjacent national

forest mentions roads [ldquo]identified in the 2015 Travel Analysis Plan as

opportunities for change that include decommissioning, placing into intermittent stored service, or converting to other uses.[rdquo] Its accompanying Draft EIS states:

The travel analysis report is used by the Forest to prioritize maintenance needs and identify opportunities for decommissioning roads, or putting them in intermittent stored service as the Forest works to identify the minimum number of routes needed for an efficient transportation system as directed in 36 CFR 212 subpart A. The travel analysis report identified NFS roads as [ldquo]not likely needed for future use[rdquo]. These roads may be considered candidates for conversion to another use, storage for future use, or removal through decommissioning. Other roads that were rated as [ldquo]high risk[rdquo] were identified as candidates for storage for future use, reconstruction or relocation, or additional road maintenance.

Roads considered as [ldquo]low risk[rdquo] are the first to be considered for reduced road maintenance (i.e., change to a lower maintenance level).

It[rsquo]s clear the Forest Service fails to take seriously its responsibilities under the Travel Management Regulations at 36 CFR [sect] 2125, Subpart A, because the DFP contains no Plan Components that require a significant reduction in the forest road system or identification and implementation of the Minimum Road System, and takes no explicit direction from the Travel Management Regulations at 36 CFR [sect] 2125, Subpart A. The DEIS and DFP do not comply with the Travel Management Regulations.

FW-WTR-STD-04 states, [ldquo]Project-specific best management practices (including the more protective of both Federal and the states[rsquo] of Montana and South Dakota best management practices) shall be incorporated in land use and project plans as a principle mechanism for controlling non-point pollution sources, to meet soil and watershed desired conditions, and to protect beneficial uses. [rdquo] The DEIS fails to analyze and disclose the temporal effectiveness or non-effectiveness of the road maintenance and upgrading, merely assuming that the site-specific project actions will forever mitigate ecological problems they cause. 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 will only be a short term fix, and the road system will remain an ecological liability. The Forest Service 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.

The DEIS admits, [ldquo]Portions of the road system that are in particularly poor condition or are currently closed and in long-term storage, would be reconstructed periodically; particularly in connection with land management activities, such as timber harvest projects.[rdquo] (Emphasis added.)

Also, in a non-NEPA context a forest supervisor (Lolo National Forest, 1999) frankly admits that such projects

are a [ldquo]chance to at least correct some (BMP) departures rather than wait until the funding stars align that would allow us to correct all the departures at once.[rdquo]

Furthermore, the DEIS has no economic analysis that identifies sources of funds needed to maintain the road system. Following project mitigation, the trajectory for fish habitat conditions will inevitably revert back to a downward trend. Beschta et al., 2004 state:

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

The Forest Service relies on BMPs to address the issues associated with logging roads. However, comprehensive monitoring of the effectiveness of logging road BMPs in achieving water quality standards does not demonstrate that 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. (Endicott, 2008.) 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.

Furthermore, 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[rsquo]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. (Endicott, 2008.)

As discussed by Endicott, 2008, BMPs are [ldquo]largely procedural, describing the steps to be taken in determining how a site will be managed,[rdquo] but they lack [ldquo]practical in-stream criteria for regulation of sedimentation from forestry activities.[rdquo] The selection and implementation of BMPs are often [ldquo]defined as what is practicable in view of [lsquo]technological, economic, and institutional consideration.[rsquo][rdquo] The ultimate effectiveness of the BMPs are therefore impacted by the individual land manager[rsquo]s [ldquo]value system[rdquo] and the perceived benefit of protecting the resource values as opposed to the costs of operations.

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 [ldquo]illusion of technique.[rdquo]

DEIS: [ldquo]According to state of Montana audits of Forest Service best management practices were effective 96 percent of the time (Ziesak 2015).[rdquo] That is a grossly oversimplified characterization of the benefits of BMPs [ldquo]Effective[rdquo][mdash]at what? Or was this simply the percentage of BMPs merely being implemented correctly?

FW-GDL-RT-04. Whereas this seems to recognize the problems of potential ongoing watershed damage in stored or ML-1 roads, the DFP fails to explicitly mandate managers to remove culverts and recontour stream crossings. Write it as a Standard. As it currently reads, this guideline is wishy-washy at best.

FW-GDL-RT-06. The DFP must be more explicit on which landtypes or areas are [ldquo]with high mass wasting potential.[rdquo] How would [ldquo]lands with high mass wasting potential[rdquo] be determined? The DEIS says there is not a comprehensive, accurate soil type inventory for the CGNF in existence.

FW-GDL-RT-07: [ldquo][hellip]stream crossing sites should be constructed to prevent diversion of stream flow out of the channels in the event the crossing is plugged or has a flow greater than the crossing was designed.[rdquo] What is your vision of where the water would properly flow if the culvert/bridge is plugged or overtopped?

What is the CGNF[rsquo]s current road maintenance backlog? What is the CGNF[rsquo]s current deferred trail maintenance backlog?

How many stream crossings are located on administratively closed Forest Service roads with some culverts remaining that do not receive regular maintenance? Does the CGNF maintain a single, accessible record of such improper long-term storage roads? Are the culverts mapped on GIS layers? Where is the analysis of the economic and environmental impacts of those improperly (long-term) stored roads?

FW-GDL-RT-04: [ldquo]Hydrologically stable conditions[rdquo] is not properly defined. Please identify best available science that would be the guidance for implementing this guideline. It would be best if the DFP make explicit under this guideline (or better yet, write is as a Standard) to always remove culverts and recontour stream crossings for [ldquo]decommissioning roads, making roads

impassable, or putting roads into intermittent stored service.[rdquo] If necessary, the Standard would distinguish between those three categories for direction to make things [ldquo]hydrologically stable.[rdquo]

FW-GDL-RT-12: [ldquo]Streams should have crossing structures and not be routed down ditches.[rdquo] Since that is illegal anyway, why not be explicit about what is meant by [ldquo]maintain natural hydrologic flow paths to the extent practical[rdquo] beyond such an obvious common-sense case.

It is important to recognize the ongoing ecological damage of roads[mdash]regardless of the adequacy of maintenance funding:

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

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 DFP and DEIS do 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. Forest Service hydrologist Johnson 1995 discusses many forms of road-related and other cumulative impacts.

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.

While there is no law or regulation preventing the Forest Service from including strong direction to implement a safe and affordable road system in the revised Forest Plan, the agency is apparently refusing to do so.

The science demonstrating adverse ecological impacts of roads is unequivocal. From federal government Interior Columbia Basin studies, Wisdom, et al. (2000) state:

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.

[hellip]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.)

Carnefix and Frissell, 2009 make a very strong scientific case for including ecologically-based road density standards in the revised Forest Plan:

Road density is a useful metric or indicator of human impact at all scales broader than a single local site because it integrates impacts of human disturbance from activities that are associated with roads and their use (e.g., timber harvest, mining, human wildfire ignitions, invasive species introduction and spread, etc.) with direct road impacts. Multiple, convergent lines of empirical evidence summarized herein support two robust conclusions:

1) no truly [ldquo]safe[rdquo] threshold road density exists, but rather negative impacts begin to accrue and be expressed with incursion of the very first road segment; and 2) highly significant impacts (e.g., threat of extirpation of sensitive species) are already apparent at road densities on the order of 0.6 km per square km (1 mile per square mile) or less. Therefore, restoration strategies prioritized to reduce road densities in areas of high aquatic resource value from low-to-moderately-low levels to zero-to-low densities (e.g., <1 mile per square mile, lower if attainable) are likely to be most efficient and effective in terms of both economic cost and ecological benefit. By strong inference from these empirical studies of systems and species sensitive to humans[rsquo] environmental impact, with limited exceptions, investments that only reduce high road density to moderate road density are unlikely to produce any but small incremental improvements in abundance, and will not result in robust populations of sensitive species. (Emphases added.)

So as reflected in the DFP, the road system will continue to deteriorate because its extent would continue to be unaffordable. The DEIS fails to analyze or disclose the extent of the impacts from that ongoing situation. The DEIS also fails to present an economics analysis that considers the direct, indirect, and cumulative costs of roads.

The DFP and DEIS fail to consider the best available science in the formulation of alternatives and disclosure of impacts, in violation of NEPA, NFMA and the Travel Management Rule.

Much of the fisheries impact is due to a general lack of funding to maintain roads and therefore prevent erosion and sediments from damaging instream aquatic habitat features. Many more impacts are because so many existing forest roads were built prior to the accumulation of empirical and scientific evidence revealing the old road designs were ecological liabilities.

Undersized culverts are an example, which tend to blow out during flooding events which turn out to be not that unusual. Culverts have also been placed in a manner[mdash]or eroded to the point where[mdash]fish passage is blocked in one or both directions. Forest Service hydrologist Johnson (1995) identifies other significant hydrological liabilities of old forest roads.

The Final Infrastructure Report of the Assessment indicates in 2015, the CGNF plan area received $ $3.598 million for roads maintenance. Whereas this would seem to indicate the CGNF receives adequate annual funding to maintain roads, to a large but undisclosed degree such identified [ldquo]road maintenance[rdquo] funding gets siphoned off to conduct NEPA analyses for timber sales and perform other functions that aren[rsquo]t road maintenance.

In reality, the Forest Service cannot afford to properly maintain system roads at current operational maintenance levels. Unfortunately, the DEIS and Assessment barely touch on the ecological liabilities of the excessive forest road network, as they contain little in the way of [ldquo]best available science[rdquo] concerning ecological and economic impacts of roads.

The DEIS contains no alternative to reduce the system road network on the CGNF to the point there would be no annual deferred maintenance, which would minimize ongoing watershed damage. This violates NEPA.

Road Management Objectives were to be developed in implementation of the Travel Management Regulations. Does the CGNF maintain a single forestwide database/inventory of these Road Management Objectives which the public may access?

DFP AND DEIS FAIL TO MEET THE MINIMIZATION CRITERIA FOUND IN THE TRAVEL MANAGEMENT RULE (36 C.F.R. [sect] 212 SUBPARTS B AND C) AND ASSOCIATED EXECUTIVE ORDERS.

The DFP states, [ldquo][hellip]travel management plans [hellip]will be evaluated for consistency with the plan and updated if necessary.[rdquo] (Emphasis added.) The Forest Service thereby signals its intent to incorporate into the revised forest plan travel management plans providing forestwide direction, based upon previous NEPA and Supervisor level Decisions.

By incorporating earlier travel management plans the DFP includes direction authorizing or sanctioning current locations of off-road and over-snow motorized and mechanized uses, in part by incorporating Motor Vehicle Use Map(s) and implicitly adopting other previous decisions, and adopting component that in some cases allow and in other cases prohibits motorized and mechanizes uses either forestwide or in particular management areas or other geographically distinct areas.

The DEIS fails to demonstrate that it implemented or applied the Travel Management Rule/Executive Orders minimization criteria in the route designation process, consistent with the

objective of minimizing impacts. The DEIS does not adequately reflect how the FS applied the minimization criteria in its motorized trail and area designations.

When designating off-road vehicle trails and areas, federal agencies are required to minimize damage to forest resources, disruption of wildlife, and user conflicts. Exec. Order No. 11,644 [sect] 3(a), 37 Fed. Reg. 2877 (Feb. 8, 1972), as amended by Exec. Order No. 11,989, 42 Fed. Reg. 26,959 (May 24, 1977). The FS must locate designated trails and areas in order to minimize the following criteria: (1) damage to soil, watershed, vegetation, and other public lands resources;

(2) harassment of wildlife or significant disruption of wildlife habitat; and (3) conflicts between off-road vehicle use and other existing or proposed recreational uses. 36 C.F.R. [sect] 212.55(b)(1)- (3). See also, WildEarth Guardians v. USFS, 790 F.3d 920 (9th Cir. 2015).

If a travel management plan decision does not adequately reflect how the FS applied the minimization criteria in its motorized trail and area designations, the agency[rsquo]s decision is in violation of the Travel Management Rule and the ORV Executive Orders. The agency must demonstrate how the minimization criteria were implemented or applied in the route designation decision process, consistent with the objective of minimizing impacts. The DEIS has failed to make such a demonstration.

The DEIS falls short of the requirements for a proper NEPA analysis, and does not provide sufficient information to allow the CGNF to comply with its obligations under the Executive Orders to minimize impacts from off-road vehicle trails and areas.

SCENERY

Are scenic integrity objectives, as nested within FW-GDL-SCENERY-01 and elsewhere, to be treated more like guidelines constraining management or are they simply a DFP Objective that [ldquo]will occur over the life of the forest plan, considered to be over the first 15 years of plan implementation[rdquo]?

And the definitions for scenic integrity objectives are highly subjective, so the DFP really doesn[rsquo]t constrain anything with them.

DRAFT FOREST PLAN IS UNRESPONSIVE TO THE 2012 PLANNING RULE

The pervasive lack of connection between the DFP and the regulations guiding the revision of the forest plan is quite remarkable. There is a disturbing overall lack of substance in the DFP for protecting, maintaining, and restoring the values expressed in the 2012 Planning Rule at 36 CFR

[sect] 219.

Let[rsquo]s take [ldquo]ecological sustainability[rdquo] as an example. The Proposed Action states:

The purpose of the Custer Gallatin National Forest Land and Resource Management Plan (hereinafter referred to as forest plan or land management plan) is to have an integrated set of plan direction (hereinafter referred to as components) to provide for social, economic, and ecological sustainability and multiple uses of the Custer Gallatin National Forest lands and resources. (Emphasis added.)

The 2012 Planning Rule includes a section at 36 CFR [sect] 219.8 entitled [ldquo]Sustainability[rdquo] under which it states, [ldquo]The plan must provide for social, economic, and ecological sustainability within Forest Service authority and consistent with the inherent capability of the plan area[hellip][rdquo]. Logic and science is clear: without ecological sustainability, the dependent social and economic systems cannot sustained. Ecological sustainability is a prerequisite for social and economic sustainability.

Under Ecological Sustainability, the planning rule states:

Ecosystem Integrity. The plan must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore structure, function, composition, and connectivity, taking into account [hellip](s)ystem drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change.

Unfortunately, the Forest Service doesn[rsquo]t identify many of these ecosystem integrity indicators of the CGNF, and so there are no plan components that specifically address many of them.

Instead, the Proposed Action (PA) offers up Vegetation [ldquo]Coarse-filter plan components [hellip] designed to maintain or restore ecological conditions and processes for ecosystem integrity and diversity within agency authority and the inherent capability of the land.[rdquo] The PA states: [ldquo]Vegetation plan components are informed by multiple data sources, with emphasis placed on the natural range of variation. Natural range of variation is used as the ecological reference to assess ecosystem integrity.[rdquo]

But the Forest Service lacks sufficient data to support even its overly simplistic coarse filter approach. The Forest Service doesn[rsquo]t disclose the sources of its data, when it was gathered, and how reliable it is for extrapolating as widely as it does. The Assessment also presents inadequate analysis of the current landscape pattern of forest landscapes so they may be compared them to reference landscape patterns.

The DFP states, [ldquo]The coarse filter aims to provide adequate representation (distribution and abundance) of ecological land units considering the historical range of variability based upon an understanding of the natural disturbance regimes of the ecological land units (Haufler, 1999).[rdquo] (Emphasis added.) Similarly, it states, [ldquo]Natural range of variation is used as the ecological reference to assess ecosystem integrity.[rdquo] (Emphasis added.) The latter is vaguely defined in the Glossary: [ldquo]The variation of ecological characteristics and processes over scales of time and space that are appropriate for a given management application.[rdquo] But whichever range of variation this overarching coarse filter approach uses, there is a certainty that the chaos of ongoing climate change renders what is [ldquo]natural[rdquo] or was [ldquo]historical[rdquo] to be of limited usefulness for setting management direction under the forest plan.

The DFP states, [ldquo]Ecological functions (for example, nutrient cycling, herbivory, natural disturbances) drive ecological conditions (for example, structure, connectivity and refugia as well as and species composition, distribution and diversity).[rdquo] (Emphasis added.) Yet DFP

direction emphasizes Desired Conditions as something that is to be maintained by active management, regardless of the scientific fact that ecological functions including natural processes are the real [ldquo]drive(rs of) ecological conditions.[rdquo]

Still, the DFP prescribes aggressive treatments, mostly logging but also other vegetative manipulations such as mechanical thinning and prescribed burning, to reduce tree density to different degrees across the landscape, without the ability to adequately demonstrate the treatments would actually mimic the reference conditions landscape. The CGNF does not use any scientifically-validated or peer reviewed metrics to describe the complex landscape patterns created predominantly by fire.

Therefore the Forest Service cannot make any assurances that its management actions result in habitat conditions for wildlife that actually insure or contribute to population viability for wildlife, and which would adequately compensate for the unavoidably adverse ecological side- effects of the aggressive vegetation manipulation regime.

Promoting this ruse is the agency[rsquo]s use of the concepts [ldquo]resilience[rdquo] and [ldquo]resistance.[rdquo] Desired Conditions FW-DC-VEGF-01 and FW-DC-VEGF-02, are templates for DFP direction:

The amount and distribution of forest cover types supports the natural diversity of seral stages, habitats, and species diversity across the landscape and allows for appropriate recruitment and responses following disturbances.

The plan area supports the natural diversity and distribution of native tree species, generally within the natural range of variation. This diversity and distribution supports the resilience and adaptive capacity of individual tree species.

The DFP defines [ldquo]resilience[rdquo] as [ldquo]The capacity of a (plant or animal) community or ecosystem to maintain or regain normal function and development following disturbance.[rdquo] And [ldquo]resistance[rdquo] as [ldquo]The ability of a community to avoid alteration of its present state by a disturbance.[rdquo] However, the Forest Service provides absolutely nothing that would allow anybody to actually measure the resilience or resistance of the ecosystem as it stands now, or measure the change in resilience following management actions. An essential component of an operational definition is measurement. A simple and accurate definition of measurement is the assignment of numbers toa variable in which one are interested. In this case, that variables are resilience and resistance, and how the agency measures it in the ecosystem. This section of the DFP also states:

(T)he natural range of variation is a guide to understanding how to maintain or restore a resilient ecosystem with structural and functional properties that will enable it to persist into the future. Although the natural range of variation is the underpinning, desired conditions also represent an integration of additional factors such as wildlife habitat needs, existing or anticipated human use patterns, potential future climate conditions, resiliency to future disturbances, and ecosystem services that may be desired (such as reduction of fire hazard or production of forest products).

So the DFP inserts other wildcards into this Desired vegetation conditions deck, including the unknown (and to the DEIS[mdash]unpredicted) effects of climate change, [ldquo]resiliency[rdquo] itself (an

exercise in circular definition) industry desires to log timber of course, and another agency propaganda tool[mdash][ldquo]fire hazard.[rdquo]

The DEIS says [ldquo]The vegetation management strategy for the Custer Gallatin is to manage the landscape to maintain or trend towards vegetation desired condition. Modeling was used to estimate extent and effects of disturbance processes, such as fire, to develop a natural range of variation to project future wildfire. Fire (planned and unplanned), insects (such as, bark beetles), disease (such as, root disease), weather events (drought, windthrow), and harvest treatments are the main drivers of vegetative change, interacting with climate, and the process of vegetative succession. The main analytical models used were the SIMPPLLE model (SIMulating

Patterns and Processes at Landscape scaLEs) (Chew et al. 2012b) and the (Plan-level foRest actIvity Scheduling Model) PRISM model (Plan-level foRest actIvity Scheduling Model) (Nguyen 2018).[rdquo]

The Helena-Lewis and Clark National Forest Plan Appendix B states: [ldquo](SIMPPLLE) modeled estimates are based on best available information, but have a high level of uncertainty.[rdquo] (Emphasis added.) Since the CGNF DEIS and DFP do not disclose this [ldquo]high level[rdquo] we must take it that SIMPPLLE modeling is not valid enough for modeling fire. The DEIS further clouds the water: [ldquo]What is meaningful from the SIMPPLLE exercise are the predicted trends, not the actual numbers generated.[rdquo]

Given the uncertainties piled on due to expected climate change effects, use of vegetation models for wildlife viability assurance is completely unjustified.

The Assessment gives another idea on how tenuous the Vegetation coarse filter approach currently is:

Determination of the natural range of variation for vegetation components utilizes an analysis using the Simulating Patterns and Processes at Landscape Scales system (SIMPPLLE) (Chew et al. 2012). Best available science and professional experience was utilized in calibrating the model and included calibrations for historic and future climate and natural disturbances. The natural range of variation for some of the key ecosystem characteristics are presented below along with a comparison against the existing conditions. The full results of the SIMPPLLE natural range of variation analysis for the Custer Gallatin National Forest is currently being compiled and will be made available for public review when finished. It should be noted, however, that the algorithms and underlying ecological assumptions informing the SIMPPLLE model are constantly being reviewed, improved and further developed. As such, the results presented below are subject to change. Moreover, the assessment of the natural range of variation for any key ecosystem characteristics is subject to change during the development and implementation of the revised Forest Plan as current science, technology and our ecological understanding improves. (Emphases added.)

So the CGNF bases Desired Conditions for vegetation on the unvalidated model[mdash]SIMPPLLE[mdash] whose outputs will be constantly changing without public notice. We have no doubt the Forest Service will take these Desired Condition numbers as drivers for timber sales and will call the logging [ldquo]restoration[rdquo] because some existing values for forest stands will fall outside these numbers. The number will be used as targets, the arrows will be timber sales. However, the real

recipients of these arrows will be fragile fish and wildlife populations, and the public which will subsidize the [ldquo]treatments[rdquo] and will have to foot the bill for fixing the inevitable unintended consequences, such as increased greenhouse gas emissions, more species at risk, etc.

And what assumptions inherent in SIMPPLLE and PRISM that would logically be negated by the inevitable chaos of climate change, we don[rsquo]t know, because the Forest Service hasn[rsquo]t explicitly considered this.

Regarding such models in consideration of best available science, 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. (Emphasis added.)

Larson et al. 2011 state some requirements for judging the validity of modeling for predicting wildlife habitat:

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. [hellip]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. (Emphasis added.)

And as the DEIS discloses, [ldquo]Although beaver are currently present in many of the stream reaches, identified by the model as being highly suitable habitat across the Custer Gallatin, occupied habitat is much less than the model projects. (Emphasis added.)

The Assessment and DEIS do not show that models relied upon have been validated scientifically.

The Draft Forest Plan states, [ldquo]The identification of plant species of conservation concern is a dynamic process. New scientific information may prompt changes in the list of plant species of conservation concern over time. Because of the dynamic nature of species additions to or removals from the list over time, the species list will not be found in the forest plan, but rather will be a referenced list which will be maintained and updated by the regional forester over time.[rdquo] (Emphasis added.) Changing management direction for any Species of Conservation Concern (plant, terrestrial, or aquatic) must involve the forest plan amendment process, which would provide a public process for reviewing a potentially arbitrary or overtly political action by the Regional Forester.

The Forest Service has a big job to do in the preparation of the Final EIS, specifically in demonstrating how the forest plan is consistent with the planning rule and best available science. We offer the above discussion on ecological integrity as exemplary of the DEIS[rsquo]s and DFP[rsquo]s

failures to be responsive to the planning rule instead of showing what is missing from this DFP, point-by-point from the planning rule.

VEGETATION MANIPULATION

The Forest Service claims the revised forest plan would improve [ldquo]resilience.[rdquo] What the Forest Service is chiefly promoting is the human control of the forest ecosystem through mechanical means and other manipulations 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.

And by the way, despite the characterization of Alternative D as [ldquo]emphasizing natural processes[rdquo] in the DEIS, it features essentially the same management regime and philosophy[mdash]including dominance over natural processes[mdash]as Alternatives, A, B, and C. E.g., the DEIS states [ldquo]Fire suppression will likely continue to alter successional processes, generally to favor shade-tolerant species, although vegetation treatments and wildfires may mitigate this influence somewhat.[rdquo]

Mostly what is stated about resilience in the DEIS and DFP is that it happens when the forest is [ldquo]managed[rdquo] (i.e., mostly logged or prescribe burned), and the more the forest is logged and burned, the more resilient it becomes. In other words, from the Forest Service[rsquo]s perspective, resilience must be manufactured, engineered, or imposed by management. The term [ldquo]resilience[rdquo] as used by the DEIS and DFP is little but a distractor, a word that sounds impressive but has little practical meaning.

In several places the DFP decries conifers or other trees [ldquo]encroaching[rdquo] into meadows or grasslands, or [ldquo]expanding[rdquo] into riparian zones as if native trees are some kind of noxious weed or invasive species. The Forest Service already has its hands full with real noxious weeds of which its management fosters continued expansion[mdash]in fact it cannot handle them at all. If native conifers and other trees are growing in areas they haven[rsquo]t before, and it[rsquo]s a real problem, please focus on ending the FS management actions that led to this situation. A side benefit will be[mdash]not as much new invasive species invasion.

DFP Tables 4 and 5 presents [ldquo]desired conditions[rdquo] for [ldquo]coniferous forest dominance types[rdquo] and [ldquo]tree species presence.[rdquo] There are no measurable metrics of [ldquo]dominance[rdquo] or [ldquo]presence[rdquo], there are no trends presented, and sources of historic data to define the [ldquo]natural range of variability[rdquo] are obscure at best. Likely climate change scenarios are given little but lip service. Therefore, [ldquo]desired conditions[rdquo] are not scientifically sound. Yet this will set the stage for Purpose and Need statements for site-specific projects. Manipulation of tree densities, species balance, and age classes is not managing in harmony with natural processes, rather it[rsquo]s tree farming. There are no DFP alternatives based upon the realization of how little we know, and how likely is management to create ecological destruction the more the agency attempts to hammer things into submission.

FW-GDL-VEGF-05:

Vegetation management prescriptions should retain, on average, 50 live trees per 10 acres greater than 15 inches in the warm dry broad potential vegetation type, 100 live trees per 10

acres greater than 15 inches in the cool moist broad potential vegetation type, and 80 live trees per 10 acres greater than 15 inches in the cold broad potential vegetation type.

Guideline applies as an average across treatment units. Large live trees need not be present on every acre; they may be clumped as appropriate for the site and species. (Emphasis added.)

This is a recipe for gerrymandering [ldquo]treatment units[rdquo] to promote massive clearcutting. Don[rsquo]t have enough total retained large live trees in the first draft of project [ldquo]treatment unit[rdquo] clearcuts to meet the minimums? Just re-draw the boundaries to include more areas of large trees you would leave anyway, so the new [ldquo]average across treatment units[rdquo] in a project conforms to the stated minimums. Come back in 10 years, repeat process. Never gather reliable field data to be able to analyze or disclose medium- or long-term trends in large trees, etc. across the any entire projectarea. Claim all logging will [ldquo]move[rdquo] conditions [ldquo]toward desired conditions[rdquo] again without sound data.

[ldquo]Broad potential vegetation types essentially represent aggregations of similar biophysical environments (such as climate, aspect, and soil characteristics) that produce plant communities of similar composition, structure, and function.[rdquo] The DFP glossary definitions for [ldquo]potential vegetation type[rdquo] refers to biophysical environments, and the definition of [ldquo]biophysical settings[rdquo] uses potential vegetation type. Such circular defining fails NEPA[rsquo]s requirements for scientific integrity and clarity. It appears the Forest Service is using a conceptual scheme for forests that not even they can make sense of.

[ldquo]Size class is the average diameter class of live trees, shown as ranges of diameter at breast height, or 4.5 feet above ground level. A stand within a particular size class may contain trees of multiple diameters, smaller or larger than the average class range.[rdquo]

The DEIS states, [ldquo]Tree size [hellip]Classes (are) based on basal area weighted diameter.[rdquo] The Helena-Lewis and Clark DFP Appendix D states, [ldquo]Forest size classes are defined based on the predominant tree diameter in the stand (basal area weighted average diameter).[rdquo] The Forest Service fails to adequately explain how size class is determined using plot data gathered in the forest, making it impossible for citizens to verify Forest Service statements and analysis methodologies regarding this key DFP metric.

The following in the DEIS indicates that tree size classes are poor metrics for estimating old growth or older forest:

Successional pathways are complex and the rate of change can be variable; simplification of the process is necessary for analysis. The evaluation of forest size classes provides a proxy to evaluate successional change of forests over time. The early successional stage is characterized by the seedling/sapling size class. As trees grow, they transition from smaller size classes into larger size classes. Mid-successional forests are associated primarily with the small and medium forest size classes, but in some cases forests in the large size class are also mid-successional, depending on tree ages and species. Late-successional forests are associated mainly with the large forest size class.

So with this scheme, a stand with 10 trees/acre of extremely large, old trees but with many more saplings could be classified into the small tree size class even though it meets (or almost meets) Green et al., old growth criteria. And yet this is part of the Forest Service[rsquo]s proxy for wildlife habitat, including those that are old-growth associated!

What historical data from the CGNF is utilized to set Desired ranges for snags (Table 8, Table 9, etc.)?

For old growth, [ldquo]Existing condition shown is the mean percent of old growth with the 90% confidence interval (see glossary) shown in parenthesis. Source is Northern Region Summary Database, Forest Inventory and Analysis data.[rdquo] Since the Forest Service itself admits that FIA data does not correlate with old growth criteria, please disclose how much existing old growth on the CGNF has been confirmed to meet Green et al., criteria.

On its surface, FW-GDL-VEGF-01 seems to be designed to protect old growth. However, the DFP includes much loophole language allowing logging and other manipulations [ldquo](t)o maintain or restore old growth habitat characteristics and ecosystem processes[rdquo] or [ldquo](t)o increase resilience to disturbances or stressors [hellip]that may have negative impacts on old-growth[hellip][rdquo] The Forest Service[rsquo]s tree farming mentality emphasizes [ldquo]managing[rdquo] (controlling) forests, not appreciating or respecting the natural processes which themselves create old-growth habitat conditions.

FW-GDL-VEGF-01 [ldquo]would not apply to lodgepole dominated forest that meets the minimum criteria of Green et al [hellip] silvicultural treatments have focused on clearcutting[hellip][rdquo] This is essentially saying [ldquo]fire mimics clearcutting, so why not get there before the fire?[rdquo] How does this honor the natural process of fire, as the DEIS claims DFP direction will do? DEIS: [ldquo]On the Custer Gallatin, most mature lodgepole pine stands range in age from 100 to 250 years old[hellip][rdquo] but all that nasty [ldquo]stagnated growth[rdquo] and [ldquo]high mortality rates[rdquo] which create large snags, down wood, denning habitat, cavity nesting habitat, and other structural diversity[mdash]of no ecological value, right?

Also, FW-GDL-VEGF-02 contains self-nullifying loophole language which doesn[rsquo]t prohibit road construction in old growth.

And whereas FW-GDL-VEGF-03 seems to have the purpose of protecting snags, [ldquo](d)ue to their rarity and high value for wildlife[rdquo] in fact it allows removal of every last snag in a given [ldquo]treatment unit[rdquo] because snags can be designated for retention someplace else because the guideline [ldquo]applies as an average of treatment units across a project area and allows for variation in snag retention among treatment units[hellip][rdquo] (Emphasis added.) FW-GDL-VEGF-03 (snags): This reveals the same gerrymandering problem as FW-GDL-VEGF-05. And as we explain in our discussions on wildlife, the guideline numbers are not based on best available science (biology).

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 have the ability to decide if a tree is suitable for excavating. The means managers know little about how many snags per acre are needed to sustain populations of cavity nesting species. This must be considered best available science to replace DFP direction for snag retention.

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.

Spiering and Knight (2005) state that the [ldquo]lack of large snags for use as nest sites may be the main reason for the low densities of cavity-nesting birds found in managed stands on the Black Hills National Forest..... The increased proportion of snags with evidence of foraging as DBH

size class increased and the significant goodness-of-fit test indicate that large snags are the most important for foraging.[rdquo]

The DFP has no Standard to protect the amount and distribution of old growth to resemble the conditions that have been the context within which old-growth associated wildlife evolved and thrived. The DFP contains no requirement to manage for the amount and distribution of old growth that has been determined by scientific research to be necessary in order to sustain old- growth associated wildlife species. The Custer Forest Plan direction for old growth is based upon this same scheme, but no monitoring has validated it.

The DEIS contains conflicting conclusions on old growth, e.g.: [ldquo]the trajectory of large tree size class and prevalence of large tree structure (discussed above) indicate that the amount of old growth should also be increasing forest-wide under all alternatives[rdquo] vs. [ldquo]increased fire is likely to shift existing forests to

younger age classes and smaller size classes.[rdquo] Batting .500 is good in baseball, but for NEPA purposes it fails miserably.

Under the DFP[rsquo]s old-growth management scenario, the Forest Service could choose to log large, old trees down to the degree that a stand might barely qualify as old growth, and that would be consistent with the Forest Plan. Detrimentally disturbed soil conditions could affect much of the treated old-growth areas, some being dedicated (essentially permanent) skid trails affecting soil productivity over the long term, and that would be perfectly consistent with the Forest Plan.

Logged old-growth stands would no longer need to remain effective habitat for any particular species of wildlife, and in fact could lose most existing snags, large logs, canopy cover, ground vegetation, and other characteristics so vital for supporting wildlife4. And if the Forest Service

4 The DFP doesn[rsquo]t even require a single snag to be retained in logged old growth, because snag retention is to be averaged over an entire project area[mdash]not in cutting units.

continues to neglect monitoring of population trends, the chance for managers to change to a wiser course ([ldquo]adaptive management[rdquo]) would be practically nil.

This DFP allowance of active mechanical treatments in old growth ignores the scientific fact that such active management is the very antithesis of old growth. The Forest Service cites no scientific research or monitoring results from the CGNF which demonstrate these management manipulations will create net ecological benefit instead of ecological harm to old growth and old- growth associated wildlife.

Furthermore, since the Glossary states, [ldquo]Old-growth habitat may or may not meet the definition for old growth forest[rdquo] then the Forest Service is free to arbitrarily define old growth as whatever remains after logging!

DEIS: [ldquo]For this analysis, old growth is estimated with Forest Inventory and Analysis plots and based on the minimum criteria found in Green et al. (2011).[rdquo] Under your analysis, how many FIA plots on the CGNF are claimed to indicate old growth conditions exist on the plot location?

Does the CGNF recognize a minimum stand size necessary for the old growth to function as [ldquo]of particular value to many wildlife species..[rdquo] (DEIS)?

The current Gallatin NF Forest Plan requires, [ldquo]Maintain at least 10% of each timber compartment containing suitable timber in old-growth condition.[rdquo] How many timber compartments on the Gallatin NF currently contain at least 10% old growth meeting Green et al conditions?

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 [ldquo]species [hellip](which) find optimum habitat in the [ldquo]old[rdquo] successional stage[hellip][rdquo] Another Kootenai NF document ([ldquo]Old Growth validation) states that [ldquo]we[rsquo]ve recognized its (old growth) importance for vegetative diversity and the maintenance of some wildlife species that depend on it for all or part of their habitat.[rdquo] We also incorporate the Idaho Panhandle NF[rsquo]s forestwide old-growth planning document (USDA Forest Service, 1987d) because it provides 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 [ldquo]old[rdquo] successional stage, while other species select old growth stands to meet specific needs (e.g., thermal cover). Of this total, five species are believed to have a strong preference for old growth and may even be dependent upon it for their long-term survival (see Appendix I5). 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.

5 USDA Forest Service 1987b.

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

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

Harris, 1984 discusses habitat effectiveness of fragmented old growth:

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

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

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

As far as we know, the Forest Service has conducted no research or monitoring comparing pre- and post-logging old growth occupancy by or abundance of the wildlife species with strong biological association with habitat components found in old growth. Biologically speaking, the FS refuses to check in with the real experts to see if logged old growth is still functioning as their habitat. If there ARE any monitoring reports or studies conducted on the CGNF that investigated abundance, presence or trends in populations of old-growth associated species following [ldquo]treatments[rdquo] in old growth, please cite those monitoring reports or studies.

USDA Forest Service 1987a acknowledges smaller patches of old growth are of lesser value for old-growth associated wildlife:

A unit of 1000 acres would probably meet the needs of all old growth related species (Munther, et al., 1978) but does not represent a realistic size unit in conjunction with most other forest management activities. On the other hand, units of 50-100 acres are the smallest acceptable size in view of the nesting needs of pileated woodpeckers, a primary cavity excavator and an old growth related species (McClelland, 1979). However,

managing for a minimum size of 50 acres will preclude the existence of species which have larger territory requirements. In fact, Munther, et al. (1978), report that units of 80 acres will meet the needs of only about 79 percent of the old growth dependent species (see Figure 1). Therefore, while units of a minimum of 50 acres may be acceptable in some circumstances, 50 acres should be the exception rather than the rule. Efforts should be made to provide old growth habitat in blocks of 100 acres or larger. [hellip]Isolated blocks of old growth which are less than 50 acres and surrounded by young stands contribute very little to the long-term maintenance of most old growth dependent species. (Bold emphasis added.)

USDA Forest Service, 2004a states:

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

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

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

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

For Grassland, Shrubland, Woodland, Riparian, and Alpine Vegetation areas, FW-GDL- VEGNF-07 requires the Forest Service to [ldquo]retain trees with signs of cavity nesting, cavities, or loose or cracked bark on the tree trunk or branches[hellip][rdquo] The logistics of these protection measures makes it unlikely that adequate

surveys across entire treatment units would occur.

The DEIS indicates that numbers of large trees are well below historic levels, yet the DFP fails to provide firm direction to save what[rsquo]s left. If the agency were genuinely interested in protecting such trees or concentrations of trees, it would write firm, clear nondiscretionary standards into the forest plan. Some National Forests in the Pacific Northwest Region utilize standards that set a 21[rdquo] diameter limit on trees to be logged, for example.

FW-DC-VEGF-10 (Table 13) states: [ldquo]Old growth is resilient to impacts that might result in the loss of old growth characteristics, such as insect infestations, wildfire, and drought.[rdquo] The Forest Service thus demonizes natural processes in old growth, the very stage of forest succession most defined by decadence, tree mortality, and therefore structural diversity. The DFP and DEIS fail to reconcile those statements with what the DFP considers best available science concerning old- growth forests (Green et al., 1992):

[ldquo](A)ttributes such as decadence, dead trees [hellip]are important[hellip][rdquo]

[ldquo]Accumulations of large-size dead standing and fallen trees that are high relative to earlier stages.[rdquo] (Id.)

[ldquo]Decadence in the form of broken or deformed tops or bole and root decay.[rdquo]

The Forest Service will use fire suppression as a dominant wildland fire management strategy, 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 DFP pretends that tree farmers can guess what stands might lack a few large, live old trees/acre to meet Green et al. criteria in ten years. The DFP direction for old growth is obviously to encourage as much logging as possible. This also doesn[rsquo]t reconcile the DFP definition of old-growth forests, which strongly implies that falling slightly short of Green et al., 1992 criteria doesn[rsquo]t disqualify it as old growth.

Frissell and Bayles, 1996 reinforce our skepticism about the heavy emphasis on vegetative Desired Conditions the DFP proposes, providing a scientific perspective like our concerns:

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

DFP components for terrestrial vegetation represent most of the coarse-filter components that are claimed to

support the persistence of native species within the plan area. So by chasing its Desired Conditions for vegetation while ignoring many aspects of 2012 planning rule direction,

the DFP fails to factor in many other factors of the landscape that have highly adverse effects on the wildlife and other elements of biological diversity. Below is a list of the historical ranges for other factors which have been heavily impacted by management. These are factors the DFP makes no commitments to significantly improve upon, in contrast to its major emphasis on vegetation (mostly logging):

Road density zero

Noxious weed occurrence zero

Miles of long-term stream channel degradation ([ldquo]press[rdquo] disturbance) zero Culverts zero

Human-induced detrimental soil conditions <1%

Maximum daily decibel level of motorized devices zero Acres significantly below the natural range of snag levels for decades zero

In short, there is inadequate scientific basis for believing the coarse filter approach using DFP vegetative direction would [ldquo]provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern within the plan area[rdquo] as required by the planning rule. The DFP claims to the fine-filter plan components provide for additional specific habitat needs, when those needs are not met through the coarse-filter components, but the DFP[rsquo]s fine-filter components are too sparse and fail to support the agency[rsquo]s claims that the Assessment forms an adequate scientific basis to protect biological diversity. The agency needs to accept the need for independent scientific peer review of its proposed management regime. Both the Sierra Nevada Forest Plan Amendments and the Boise National Forest[rsquo]s Wildlife Conservation Strategy plan amendment utilized the Guldin et al., 2003 process developed by the Forest Service in recent years.

The DFP 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.)

Since the entire basis of the DFP[rsquo]s Desired Conditions are based upon vegetation modeling that has not been validated, the DFP[rsquo]s set of vegetation management premises are a house of cards facing an imminent windstorm. Further compounding the situation is a joker in the deck, climate change, which presents so much uncertainty that the models cannot deal with it.

The DFP defines natural range of variation (NRV) as:

The variation of ecological characteristics and processes over scales of time and space that are appropriate for a given management application. The natural range of variation is a tool for assessing the ecological integrity and does not necessarily constitute a management target or desired condition. The natural range of variation can help identify key structural, functional, compositional, and connectivity characteristics, for which plan components may be important for either maintenance or restoration of such ecological conditions. (Emphasis added.)

Despite the emphasized caveat expressed in the above definition, the DEIS states that the Desired Conditions for vegetation are designed around the NRV: [ldquo](D)esired conditions for vegetation were developed to provide for the ecological integrity of Custer Gallatin National Forest ecosystems. Desired conditions were based on an analysis of the natural range of variation while also considering current and future stressors.[rdquo] (Emphasis added.) Stating that DCs also considered [ldquo]current and future stressors[rdquo] is opaque since the DEIS doesn[rsquo]t specifically explain.

Since climate change scenarios are expected lead to temperature, weather pattern, and precipitation amounts and patterns that differ from the historical disturbance regimes that are the basis of the Forest Service[rsquo]s NRV, it makes no sense for the DFP to rely on static Desired Conditions to increase resilience against climate change. The range of expected forest conditions under climate change are not known.

Because the DFP and DEIS assume that making progress toward the NRV-inspired Desired Conditions is mostly all that[rsquo]s required in order to protect, restore, and maintain terrestrial and aquatic species[rsquo] populations, it[rsquo]s easy to see how this entire management paradigm is destined to fail.

There is no analysis of the current landscape pattern of specific landscapes, comparing them to the reference conditions, using data gathered in the CGNF to describe both reference and current conditions. The Forest Service has very limited data to describe the reference condition of landscapes. Yet the DFP prescribes [ldquo]treatments[rdquo] such as logging and burning, to reduce tree density and stave off [ldquo]encroaching[rdquo] conifers to different degrees across the landscape, without adequately demonstrating that the treatment effects would actually mimic the landscape pattern of reference conditions. The Forest Service does not use any scientifically-validated or peer reviewed metrics to describe the complex landscape pattern created predominantly by fire and therefore reflective of the vegetative NRV. Therefore the Forest Service cannot make any assurances that its management actions result in habitat conditions for wildlife that actually [ldquo]contribute to[rdquo] viability for wildlife, to adequately compensate for the unavoidable adverse effects of the prescribed [ldquo]treatments.[rdquo]

In his book, Among Whales ocean biologist Roger Payne has the following to say about the same kind of hubris represented by the Forest Service[rsquo]s view that it can manipulate and control its way to a restored forest by more intensive management:

One often hears that because humanity[rsquo]s impact has become so great, the rest of life on this planet now relies on us for its succession and that we are going to have to get used to managing natural systems in the future[mdash]the idea being that since we now threaten everything on earth we must take responsibility for holding the fate of everything in our hands. This bespeaks a form of unreality that takes my breath away[hellip] The cost of just finding out enough about the environment to become proper stewards of it[mdash]to say nothing of the costs of acting in such a way as to ameliorate serious problems we already understand, as well as problems about which we haven[rsquo]t a clue[mdash]is utterly prohibitive. And the fact that monitoring must proceed indefinitely means that on economic grounds alone the only possible way to proceed is to face the fact that by far the cheapest means of continuing life on earth as we know it is to curb ourselves instead of trying to take on the proper management of the ecosystems we have so entirely disrupted.

(Payne 1995, emphasis added.) Not accompanying all the Forest Service[rsquo]s hypothetical promises of improving nature are any acknowledgments of the potential or degree of unintended side effects that pose risk or present likely damage to some other composition, structure, or function of the ecosystem.

TIMBER

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

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

Conventional wisdom dictates that forests regenerate and recover from wildfire. If that[rsquo]s true, then it[rsquo]s logical to conclude that forests can regenerate and recover from logging. And these days, [ldquo]resilience[rdquo] is a core tenant of Forest Service planning. Unfortunately, assumptions of the DEIS relating to Desired Conditions are incorrect. NEPA requires a [ldquo]hard look[rdquo] at the best available science relating to future concentrations of greenhouse gasses and gathering climate risk as we move forward into an increasingly uncertain and uncharted climate future. This has not been done.

The DEIS fails to include a legitimate climate-risk analysis in the DEIS. It dodges likely scenarios with such statements as [ldquo]Considerable uncertainties underlay these projections of vegetation under future climates.[rdquo]

Scientific research indicates that increasing CO2 and other greenhouse gas concentrations may preclude attaining the anticipated Desired Conditions across the CGNF and likewise downplays the implications across the entire Northern Rockies bioregion and beyond. The agency seems unaware of the likelihood that its Desired Conditions are at great risk.

Does the Forest Service accept this new climate-driven reality expressed in scientific literature we cite in these comments?

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

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

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

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

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

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

The Forest Service fails to analyze and disclose conditions we can realistically expect as heat trapped by

increasing greenhouse gas concentrations steadily tightens its grip[mdash]and impacts on forests accrue locally, regionally, nationally, and globally.

The DEIS fails to assess and disclose all risks associated with vegetative-manipulation as proposed DFP Appendix A in the proper climate-risk context/scenario.

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

Challenges in predicting responses of individual tree species to climate are a result of species

competing under a never-before-seen climate regime that we have not seen before[mdash]one forests may not have experienced before either.

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

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

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

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

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

The DEIS does not disclose restocking monitoring data and analysis.

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

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

Please study the scientific findings of the research presented above. Analyze the likely consequences of moving forward. Then, disclose your findings. We sincerely believe that an

overwhelming body of evidence compels us all to reconsider the assumptions, goals and expected Desired Conditions in the DFP. Plan expectations must be amended at the programmatic level. According to best available science, implementing the DFP as written will accomplish the opposite of the desired conditions unless major management adjustments are made. Getting this wrong is an irretrievable commitment of resources and a violation of NEPA for failing to analyze and disclose the (foreseeable future) climate risks as best we can by relying on what we now know to be true. We can adjust as we monitor and find out more. However, to willfully ignore what we do know and fail to disclose it to the public is a serious breach of public trust and an unconscionable act.

FW-STD-TIM-01, FW-STD-TIM-02, FW-STD-TIM-03, FW-STD-TIM-04, FW-STD-TIM-05, FW-STD-TIM-06, FW-STD-TIM-08, FW-STD-TIM-09, FW-STD-TIM-10, FW-STD-TIM-11:

These standards are basically re-statements of the statute (NFMA); so why can[rsquo]t the revised forest plan explicitly state and repeat other incorporated direction (E.g., Canada lynx/NRLMD, greater sage grouse, Weed Management plans, GYE Grizzly Bear Conservation Strategy, etc.)?

FW-STD-TIM-06: [ldquo]Even-aged stands shall reach a minimum of 95 percent of culmination of mean annual increment, as measured by cubic volume, prior to regeneration harvest, unless at least one of the following conditions have been identified during project development[hellip][rdquo] Then the conditions are described that are complete and total loopholes, being basically purpose and need statements taken from every timber sale NEPA document on the Custer and Gallatin National Forests for a couple decades. This so-called

[ldquo]standard[rdquo] would not constrain management in any way, shape or form.

FW-GDL-TIM-01: (Postfire salvage massively except for maybe a few burned areas of tiny retention.) This is so vague that trying to picture what is required to be retained is futile. How does this constrain anything, exactly? The DFP accepts [ldquo]salvage[rdquo] of timber from burned area without questioning consistency with best available science. Attachment 6 is our contribution of best available science on this topic.

FW-GDL-TIM-03: [ldquo]On lands not classified as suitable for timber production, timber harvest should only be used as a tool to assist in achieving or maintaining one or more applicable desired conditions or objectives of the plan[hellip][rdquo] Consistent with what we[rsquo]ve stated elsewhere in these comments, this is a guideline that constrains nothing and renders meaningless [ldquo]unsuitable for timber production[rdquo].

2.4.7 Special Forest and Botanical Products (FP): This would be the appropriate place to place limits on firewood gathering.

AT-RISK PLANT SPECIES

DEIS: [ldquo]There is little published information about most at-risk plant species concerning their persistence, biology, habitat, population dynamics, and occurrences.[rdquo] We appreciate there being so many 25 SCC plants being potentially protected, but how is this done in the absence of best available science?

The DEIS identifies [ldquo]improper grazing[rdquo] as a threat to some of these plants; in this context what is [ldquo]proper[rdquo] grazing?

Although the whitebark pine is declining in part because of the indirect effects of fire suppression, the DFP reflects a lack of political will to allow naturally ignited wildland fire any more than current plan direction.

The DEIS doesn[rsquo]t discuss potential indirect effects fire suppression has on white pine blister rust spreading into higher elevations where whitebark pine occur. The same can be said about pine beetle spread.

Please reconcile DEIS statements, [ldquo]the overall presence of whitebark pine is within the natural range of variation, though at the low end[rdquo] with [ldquo]Between 2004 and 2009, approximately 80 percent of large size class whitebark pine in the greater ecosystem were killed by an epidemic of mountain pine beetle[hellip][rdquo]

Since it evaluates it favorably, the DEIS should explicitly disclose the [ldquo]whitebark pine strategy[rdquo] by the Greater Yellowstone Coordinating Committee[rsquo]s Whitebark Pine Subcommittee, and incorporate direction into the revised forest plan.

DEIS: [ldquo]There are nearly 666,230 acres of primary rangelands with permitted livestock in all alternatives. [hellip] (A)t-risk plant species would be protected by revised plan alternatives plan components during project level allotment planning to prevent negative impacts associated with livestock.[rdquo] The second sentence makes no sense, because the DFP fails to mandate updating ANY allotment management plans. The agency bends over backwards to avoid doing anything to enlighten livestock management on the CGNF.

FW-STD-PRISK-01: [ldquo]Ground disturbing vegetation management activities that have potential to adversely affect the long-term persistence of at-risk plant populations shall be avoided or mitigated.[rdquo] You had something there until you said [ldquo]or mitigated[rdquo] (whatever that means).

FW-STD-PRISK-02: [ldquo]protective measures shall follow those outlined for sensitive plant species in the Gallatin and Custer National Forest Noxious Weed Management Environmental Impact Statements and Record of Decisions.[rdquo] For clarity[rsquo]s sake, the forest plan must explicitly state those protective measures this Standard vaguely incorporates.

FW-GDL-PRISK-01: What additional protection does this guideline add, over and above FW- STD-PRISK-01?

REVISED FOREST PLAN FAILS TO ASSURE ABUNDANT OR EVEN MINIMUM VIABLE POPULATIONS OF NATIVE FISH AND WILDLIFE

The DFP relies upon achieving its Vegetation direction (coarse-filter/fine-filter approach) as its main method for [ldquo]restoring[rdquo] wildlife habitat and maintaining diversity of animal communities. The DEIS fails to acknowledge the scientific controversy of this strategy. As the Forest Service began a process of revising NFMA regulations, the agency commissioned the Committee of

Scientists, 1999. These scientists find fault in a management focus that emphasizes manipulation of habitat as the primary management methodology for insuring wildlife viability in several ways, e.g., [ldquo][hellip]in recognition that focusing only on composition, structure, and processes may miss some components of biological diversity.[rdquo]

This raises the issue of monitoring. The Committee of Scientists, 1999 state:

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

Yet as can be seen from the DFP[rsquo]s Monitoring Plan for Wildlife, the [ldquo]outcome indicators[rdquo] are mostly [ldquo]Vegetation Key characteristics[rdquo]!

The Plan Components provide a few token measures for protecting and restoring wildlife and fish habitat, however they fail to address important biological needs and stress ecological relationships between key habitat components and the natural processes that create and maintain them.

Vegetative conditions simply cannot be used as a substitute or proxy for monitoring populations and maintaining diversity of animal communities, as the Forest Service[rsquo]s own science (Committee of Scientists, 1999) clearly states. The complex and subtle interplay between animals and vegetative components, structure, pattern, and processes is not well-understood, Offering Plan direction for Vegetation as wildlife viability assurance is smoke and mirrors, assuring not viable populations of wildlife but perpetual manipulation of vegetation.

The DFP defines [ldquo]viable population[rdquo] as [ldquo]a population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments. (36 Code of Federal Regulations 219.19).[rdquo]

Under the 1982 planning rule, national forests were required to manage habitat in order to maintain viable populations of existing species in planning areas. The 1982 planning rule further defines a viable population as [ldquo]one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area.[rdquo]

However, the 2012 planning rule requires the forest plan only [ldquo]include plan components, including standards or guidelines, to maintain or restore ecological conditions within the plan area to contribute to maintaining a viable population of the species within its range.[rdquo] (Emphasis added.) This is reminiscent of DFP Desired Conditions, which never need be achieved.

Apparently to the agency, viable populations of wildlife need not to be reached during the life of the revised forest plan.

Brown and Nie, 2019 state, [ldquo]Concepts such as [ldquo]known to occur in the plan area,[rdquo] or what constitutes [ldquo]substantial concern[rdquo] or [ldquo]capability to persist over the long-term,[rdquo] are often undefined, leading to differences of interpretation among forests and stakeholders.[rdquo]

The DFP fails to set meaningful thresholds for population viability. Schultz (2010) concludes that [ldquo]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.[rdquo] 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 HCNNF over time. (See also Schultz 2012.)

Traill et al., 2010 and Reed et al., 2003 are published, peer-reviewed scientific articles addressing how [ldquo]minimum viable populations[rdquo] can be estimated, and how they have been drastically underestimated in past. The DEIS and Assessment fail to identify the best available science to make quantitative minimum viable population determinations for wildlife species on the CGNF.

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.

The Ninth Circuit Court of Appeals has ruled that the Forest Service [ldquo]must both describe the quantity and quality of habitat that is necessary to sustain the viability of the species in question and explain its methodology for measuring this habitat.[rdquo] (Lands Council v. McNair). 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). Since the Forest Service fails to include strong, science-based commitments to manage the habitat for all these species in its DFP, the agency fails to comply with NFMA[rsquo]s diversity requirements.

The DFP and DEIS do not use Management Indicator Species (MIS), which the 1982 planning rule required the Forest Service to select [ldquo]because their population changes are believed to indicate the effects of management activities.[rdquo] With the DFP, the Forest Service utilizes instead [ldquo]focal species[rdquo] which are:

[hellip]a small subset of species whose status permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information regarding the

effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant

and animal communities in the plan area. Focal species would be commonly selected on the basis of their functional role in ecosystems (2012 Planning Rule at 36 Code of Federal Regulations 219.19).

The definition of focal species is similar to the definition of MIS, and the DFP and DEIS are ultimately unsuccessful in discriminating between the two concepts. The DFP proposes to use two focal [ldquo]species[rdquo]: [ldquo]Aquatic invertebrates[rdquo] and [ldquo]Land bird species and assemblage.[rdquo] Nowhere does the DFP list any actual species, however. The DEIS states, [ldquo]Currently there are 349 species of aquatic invertebrates known to occur on the Custer Gallatin.[rdquo] The DFP fails to explain which aquatic invertebrates the agency is planning to utilize to comply with the 2012 Planning rule [ldquo]focal species[rdquo] mandate. It also fails to identify the best available science on the subject, and fails to propose even the most rudimentary monitoring methodology.

For the focal [ldquo]species[rdquo] identified in the DFP as [ldquo]Land bird species and assemblage[rdquo] the Forest Service is nearly as vague. The DFP proposes to monitor [ldquo]presence, habitat affiliation, and population trend (status of) avian species associated with forested vegetation at a forest wide scale[rdquo] but again, the Forest Service DFP fails to explain which actual species the agency is planning to utilize to comply with the 2012 Planning rule [ldquo]focal species[rdquo] mandate. It also fails to identify the best available science on the subject, and fails to propose even the most basic monitoring methodology.

And so, whereas for MIS the 1982 Planning Rule required [ldquo]Population trends of the management indicator species will be monitored and relationships to habitat changes determined[rdquo], the DFP Monitoring Program reveals that the Forest Service makes no commitment to monitor population trends of ANY species. Since focal species[rsquo] [ldquo]status permits inference to the integrity of the larger ecological system to which it belongs[rdquo], please disclose precisely how the focal species[rsquo] status will be measured. It seems the Forest Service wants to be completely unaccountable for population trends of any species that other agencies (state fish and game departments for hunted and fished species; U.S. Fish & Wildlife Service for ESA listed species) aren[rsquo]t tracking under their own agency missions.

The DEIS states, [ldquo]Regional Forester sensitive species and management indicator species would no longer be in place under the revised plan alternatives. [hellip] Analysis of sensitive [hellip]species pertain to the current forest plans. Appendix C provides the Regional Forester[rsquo]s sensitive species list.[rdquo] DEIS Appendix C lists the following as current Regional Forester[rsquo]s Sensitive Species [ndash] Wildlife: greater sage grouse, Baird[rsquo]s sparrow, loggerhead shrike, long-billed curlew, bald eagle, black-backed woodpecker, peregrine falcon, blue-gray gnatcatcher, burrowing owl, flammulated owl, trumpeter swan, harlequin duck, gray wolf, bighorn sheep, wolverine, black-tailed prairie dog, white-tailed prairie dog, fringed myotis, long- eared myotis, Long-legged myotis, pallid bat, Townsend[rsquo]s big-eared bat, spotted bat, greater short-horned lizard, milksnake, western hognose snake.

This list omits several terrestrial species on these two forests[rsquo] current list of Sensitive species. There is substantial concern about long-term viability of these species, given their presence on the Sensitive list. The DEIS has no explanation as to why most species listed as Sensitive under

current plan implementation are not on the Regional Forester[rsquo]s CGNF Species of Conservation Concern list under revised forest plan implementation. Therefore the Forest Service must disclose the best scientific information available that unequivocally demonstrates there are no longer viability concerns for Sensitive species proposed for omission from the Species of Conservation Concern list. Please put your Conservation Assessments for all current Sensitive species on the forest plan website.

[ldquo]Terrestrial wildlife species of conservation concern for the Custer Gallatin National Forest are found at the Northern Region land management planning webpage: https://www.fs.usda.gov/detail/r1/landmanagement/planning/?cid=fseprd500402.[rdquo] Whereas a lot of process is described there, no biological rationale can be found.

The DFP lacks fine filter direction for protecting or managing habitat of most specific Species of Conservation Concern.

FW-DC-WL-03: [ldquo]Vegetation conditions are generally within the natural range of variation as described for vegetation, thereby providing wildlife habitat for a variety of life cycle needs[hellip][rdquo] This DC makes little sense in the context of the impending and ongoing highly significant change in climate.

FW-DC-WL-05: [ldquo]Landscape patterns throughout the Custer Gallatin provide habitat connectivity for wildlife, particularly wide-ranging species such as medium to large carnivores and wild ungulates. Resulting habitat connectivity facilitates daily and seasonal movement, as well as long-range dispersal of wildlife to support genetic diversity, allowing animals to adapt to changing conditions over time.[rdquo] Including DCs without any measurement parameters and lacking definition of key terms is little but a feel-good exercise. This comment applies to FW- DC-WL-04 and FW-DC-WL-06 also. Despite Connectivity being identified as a main issue that drove alternatives, the DFP is weak on identification of key linkages, and weak on how connectivity is to be maintained and restored where needed.

[ldquo]There are two primary requirements for habitat connectivity. The first is that suitable habitats are present for species of interest, and the second is that landscapes are permeable to wildlife movement.[rdquo] The DFP provides insufficient direction for maintaining suitable habitats, nor for landscape permeability. There are no mandates to accomplish anything measurable. The DEIS discusses some modeling methodology, but gives you no idea concerning model validity.

Basically, the agency is saying we[rsquo]ll make things more resilient, so there you go.

FW-OBJ-WL-01. Conducting only 1 to 10 wildlife habitat restoration projects per decade reveals a real lack of ambition or sense of purpose for wildlife. And as we state elsewhere, just about any project the Forest Service undertakes these days is dubbed [ldquo]restoration[rdquo] regardless of a lack of scientific basis.

FW-OBJ-WL-02. Same problem as FW-OBJ-WL-01.

FW-GDL-WL-01: [ldquo](M)anagement actions should not create movement barriers to wide-ranging species such as medium to large carnivores and wild ungulates[hellip][rdquo] This could mean something of the agency were to adopt a strong, scientifically supportable definition of [ldquo]movement barrier.[rdquo]

To [ldquo]restore, maintain or enhance habitat connectivity for long distance range shifts of wide ranging wildlife species[rdquo] (FW-GDL-WL-01) there needs to be some solid direction for the [ldquo]medium to large carnivores and wild ungulates[rdquo] based upon each species[rsquo] biological needs. Not found in the DFP, unfortunately.

In his book Wild Trees, Preston (2007) uses the example of the removal of a top predator and resulting ecological collapse. The loss of wolves led to the decline of old growth in Scotland, mainly because of the loss of the predatory function of wolves on the native red deer[mdash]a type of elk. He describes [ldquo]a striking example of a total crash of forest ecosystem evidently brought about by the removal of the top predator. The extinction of the wolf in Scotland would cause not only the loss of the pines but the loss of the lichens, the bonsai rowans, the smaller trees, and the animals and birds that depended upon the trees[mdash]the extinction of the forest itself." (Emphasis added.)

FW-GDL-WL-04: [ldquo](F)ree of sustained substantial disturbance for at least four years out of every 10-year period[hellip][rdquo] What is the scientific basis for four years out of every 10 years, and what in the world does [ldquo]throughout an entire key linkage area[rdquo] mean?

FW-GDL-WL-05: [ldquo]Known[rdquo] raptor nests. There is no mandate to survey or become aware of nests, so this does little for raptors. What is the scientific support for [ldquo]Raptors that establish nests near existing human use areas are assumed to be tolerant of the level of activity present when the nest was established[rdquo]? If the nest results in brood failure, does that still constitute [ldquo]tolerant[rdquo]?

FW-GDL-WL-07: Avoid [ldquo]known[rdquo] reptile and amphibian reproductive areas and hibernacula.[rdquo] Same problem of not knowing as with FW-GDL-WL-05.

FW-GDL-WLBAT-01: [ldquo]Known[rdquo] bat winter hibernacula. Who knows?

FW-GDL-WLBAT-02: [ldquo]Known[rdquo] bat maternal roosts. Who in the Forest Service even wants to know, if

it constrains logging? [ldquo]Roost trees may be removed once adults and young bats have moved on after the pup season, but replacement roost trees should be retained in the general vicinity to provide for maternal roosts in the future.[rdquo] Because people know better than bats what works for bats?

FW-GDL-WLBG-01: [ldquo]retain coniferous forest cover (where it exists) to provide for snow intercept, hiding cover and thermal regulation for big game species.[rdquo] An example of no quantification (e.g., [ldquo]retain[rdquo]) whereas previous forest plan standards and scientific research specify numbers. Weak. And all the loopholes (a [ndash] g) starve this guideline even further.

FW-GDL-WLBG-02: [ldquo]minimize disturbance of wild ungulates on winter ranges during the winter and in known calving, fawning, lambing, or kidding areas during the reproductive

season.[rdquo] Please minimize the use of direction that uses, [ldquo]minimize[rdquo] without proper definition.[rdquo] By [ldquo]minimize[rdquo] we mean[mdash]zero out.

FW-GDL-WLBG-02: [ldquo](C)oncentrate[hellip] in time or space to reduce impacts[hellip][rdquo] Concentrate? Reduce?

FW-GDL-WLBG-03: [ldquo]If [hellip]secure habitat is lacking [hellip](roads) should not result in a reduction of secure habitat during big game hunting seasons (archery and rifle). Please define [ldquo]secure habitat.[rdquo] Yet another example of no quantification (e.g., secure habitat) whereas previous forest plan standards and scientific research specify minimums.

Why no Goal to bring back bighorn sheep to all vacant historic ranges?

The DFP largely punts management direction of the greater sage grouse to broader landscape planning, without making explicit reference or citation. And since the Trump administration is now attempting to sabotage earlier conservation commitments, this forest plan must exemplify best available science for management of greater sage grouse habitat. Please list this best available science.

The DEIS indicates that sage grouse are essentially extirpated from the CGNF, yet it contains no scientifically sound direction to reverse cumulative damage to crucial habitat components or restore the species to its historic range.

FW-STD-WLSG-01: [ldquo]In greater sage-grouse priority and general habitat, vegetation management shall

result in no net loss of habitat or be beneficial to greater sage-grouse.[rdquo] Aside from our concerns as expressed immediately above, please disclose the part of the equation to the left of < current habitat. I.e., [ldquo]no net loss[rdquo] is too vague.

As with other resource issues, the DEIS vacillates between seeing wildland fire as a vital restorative factor for maintaining sage grouse habitat and as a destroyer of sage grouse habitat. His is because natural processes are not very well incorporated into DFP management regimes. (E.g., [ldquo]Sagebrush control activities are permitted to occur outside of designated big game and sage-grouse winter ranges.[rdquo])

The DEIS discloses:

Much of the designated sage-grouse habitat on the Custer Gallatin is located within permitted livestock grazing allotments. Utilization by livestock has the potential for impacts across all seasonal habitats. Grazing can influence sagebrush communities through reduced productivity, changing plant composition, and herbaceous structure. Indirect effects include those associated with grazing infrastructure, including mortalities associated with water troughs and fence strikes (Boyd et al. 2014).

Given that the DFP plan mandates no substantial changes to the livestock grazing regime on the CGNF, we see the prospects of sage grouse recovery to be practically nil under the DFP.

FW-STD-WLSG-05: [ldquo]Invading conifer[rdquo]? How do you determine such a conifer is different from any other conifer tree?

The DFP glossary states: [ldquo]key linkage areas are typically located near the Custer Gallatin National Forest boundary, where wildlife movement is desirable for genetic exchange between blocks of public lands, but may be restricted by permanent development such as highways, railroads, agricultural lands and residential areas.[rdquo] Without specifying or even displaying these key linkage areas on a map, all the DFP direction pertaining to [ldquo]key linkage areas[rdquo] doesn[rsquo]t amount to much.

The DEIS fails to analyze and disclose the quality of habitat in any wildlife corridors, including key linkage areas. Please disclose a list of best available scientific information the CGNF uses for corridor and key linkage evaluation.

The DFP and DEIS infuse negative motives on prairie dogs such as [ldquo]encroachment[rdquo] and [ldquo]spread[rdquo] and [ldquo]pests[rdquo] as if they are an invasive species rather than the persecuted natives they actually are. Further, current forest plans sanction the killing of prairie dogs for [ldquo]a popular sport[rdquo], revealing an unwillingness to confront unethical behavior. The DFP would be no more progressive.

[ldquo]There is no existing plan direction that would prohibit lethal control of white-tailed prairie dogs[hellip][rdquo] (DEIS) nor is there any in the DFP.

Given the extremely limited range of the white-tailed prairie dog on the CGNF (DEIS range map, below) we are not surprised the Forest Service is willing to risk the potential of having constraints from this species as one of its few SCC.

DEIS: [ldquo]Prairie dogs in Montana are managed under a state-wide conservation plan (Montana Prairie Dog Working Group 2002).[rdquo] Does the Forest Service defer to this working group as determining best available science for prairie dogs?

[ldquo]Properly managed livestock grazing can benefit white-tailed prairie dogs by reducing vegetation height to enhance visibility and predator detection by prairie dogs.[rdquo] (DEIS). How did prairie dogs manage to persist before livestock were introduced?

What is the specific policy rationale for the DFP including guidelines for raptors, amphibians, bats, and ungulate species since they are not focal, management indicator, species of conservation concern, threatened, endangered, or proposed?

Where is the wildlife direction to survey for wildlife and fish presence? Is the Forest Service going to merely assume that it or the State of Montana already know the complete distribution of all wildlife and fish species, the locations of all raptor or other bird nests, the locations of all mammal den sites?

For no wildlife or fish species is there an evaluation using data on distribution, population status and abundance, habitat and genetic connectivity, impacts of non-native species, roads, recreation, hunting, fishing, trapping, road kill, etc. The DEIS doesn[rsquo]t say why focal species were not evaluated using such data. Is this because the data is incomplete and/or unavailable, or does the Forest Service consider those factors to be scientifically irrelevant?

For commonly hunted species (ungulates), the DFP guidelines contain no mandatory, nondiscretionary minimums for winter range/conditions, security, cover, road densities, or any meaningful numerical metrics. The Forest Service is entirely depending upon the ability of Montana Fish, Wildlife and Parks to tell it that populations are being killed in too great of numbers in hunting districts. Whatever happened to the Forest Service[rsquo]s habitat management strategy? Which vegetation coarse filter standards and guidelines specifically address elk, for example?

DFP doesn[rsquo]t cite a scientifically based conservation strategy for whitebark pine, a candidate species for listing under the ESA.

The DFP has no Standard or Guideline to protect the amount and distribution of old growth to resemble historic conditions. The DFP contains no requirement to manage for the amount and distribution of old growth that has been determined by scientific research to be necessary in order to sustain old-growth associated wildlife species.

The DEIS violates NEPA because the Forest Service has not insured the reliability of data input to models, and the Forest Service has not validated the models for the way the DEIS utilizes them.

The DFP and DEIS fail to consider the best available science in the design of Plan Components, formulation of alternatives and disclosure of impacts, in violation of NEPA and NFMA.

The DFP[rsquo]s Plan Components provide a few token measures for protecting and restoring wildlife and fish habitat, however they fail to address important biological needs or recognize ecological relationships between key habitat components and the natural processes that create and maintain them.

The Committee of Scientists (1999) states that Focal Species should be identified in the Assessments:

Bioregional assessments should develop an integrated and synthetic analysis of the best scientific and technical information about the historical and current diversity of native plant and animal communities, the productive capacity of ecological systems in the bioregion, the social and economic context, existing institutional arrangements, and current stewardship capacity. To achieve this goal, assessments should at least:

C) Define the focal species for use in the analysis of species diversity in planning and develop procedures for estimating the viability of focal species, threatened and endangered species, and sensitive species. Apply these procedures to estimate the viability of these species under likely management in the region while allowing, to some degree, for uncertainties that may develop (e.g., changing levels of funding, natural disturbances, and competition from exotic species). As a result of this analysis, highlight risks to species viability[hellip]

(Emphasis added.) We find nothing of substance in the DFP or DEIS that responds to the Committee of Scientists commissioned by the Forest Service.

We look to the USDA[rsquo]s responses to comments on the 2012 Planning Rule to provide further explanation of how the revised forest plan will use focal species, because the definition in the rule itself is quite vague. The

USDA says:

Appropriate monitoring of focal species will provide information about the integrity of the ecosystem and the effectiveness of the plan components in maintaining diversity of plant and animal communities in the plan area. In other words, focal species monitoring is used as means of understanding whether a specific ecological condition or set of conditions is present and functioning in the plan area.

[hellip]Focal species [hellip]are species whose presence, numbers, or status are useful indicators that are intended to provide insight into the integrity of the larger ecological system[hellip]

[hellip]Focal species monitoring provides information regarding the effectiveness of the plan in providing the ecological conditions necessary to maintain the diversity of plant and animal communities and the persistence of native species in the plan area.

Monitoring for [hellip]focal species will also provide information about the effectiveness of plan components for at risk species.6

Essentially, this means that focal species are basically to be used as monitoring tools, to check on the effectiveness of forest plan components for maintaining [ldquo]at risk[rdquo] 7 species and the diversity

6 How the revised forest plan will utilize focal species to conserve and recover [ldquo]at risk[rdquo] species is uncertain, because the USDA states that [ldquo]Focal species are not intended to be a proxy for other species[hellip][rdquo] and [ldquo]Focal species are not surrogates for the status of other species.[rdquo]

7 Defined as those listed under the Endangered Species Act (ESA) or those Proposed or Candidate species for listing under the ESA, as well as Species of Conservation Concern.

of plant and animal communities on the Forests, and whose presence, numbers, or status as monitored are intended to provide insight into the Forests[rsquo] ecological integrity.

However, not only are focal species to provide insight into the effectiveness of forest plan elements, the USDA states that they are also to provide insight into the 2012 Planning Ruleitself:

Focal species [hellip]are species whose presence, numbers, or status are useful indicators that are intended to provide insight into [hellip]the effectiveness of the [sect] 219.9 provisions.

The DFP and DEIS fail to justify the vague list of Focal Species as indicators of ecological integrity on the CGNF.

The USDA admits the 2012 Planning Rule is vague on how the status of Focal Species be measured and largely says what is not required:

[hellip]The rule does not specify how to monitor the status of focal species. [hellip]The objective is not to choose the monitoring technique(s) that will provide the most information about the focal species, but to choose a monitoring technique(s) for the focal species that will provide useful information with regard to the purpose for which the species is being monitored.

[hellip]Focal species monitoring is not intended to provide information about the persistence of any individual species. The rule does not require managing habitat conditions for focal species, nor does it confer a separate conservation requirement for these species simply based on them being selected as focal species.

[hellip] (P)opulation trend monitoring is not required by the final rule.

The USDA does suggest how focal species might be monitored: [ldquo]Monitoring methods may include measures of abundance, distribution, reproduction, presence/absence, area occupied, survival rates, or others.[rdquo] However, the DFP doesn[rsquo]t go far enough to a) identify a scientifically justified list for the Forest, and b) ensure monitoring will be useful for determining how forest plan implementation would impact ecological integrity.

The Committee of Scientists (1999) states:

Given the importance of monitoring for ecological sustainability, a critical step will be to broadly define ecological attributes to include any biotic or abiotic features of the environment that can be measured. The convention has been to refer to the measured attributes as [ldquo]indicator variables[rdquo] under the assumption that their values are indicative of the integrity of the larger ecosystem to which they belong. The Committee adopts this definition and extends it to include the concept of focal species. These are species that fulfill the indicator criterion and provide specific insights into the biological diversity of the ecological system at different scales.

The USDA does state that there must be more than mere measurement of vegetative conditions[mdash]that a set of ecological conditions must be monitored:

Respondents felt that monitoring habitat conditions only, specifically related to vegetation composition and structure, will not adequately address the reasons why species may or may

not occupy those habitats; and that there may be other stressors unrelated to habitat that make suitable habitat conditions unsuitable for occupation by a particular species. The final rule requires monitoring the status of select ecological conditions. The concept of ecological conditions as defined in the proposed rule and the final rule includes more than vegetation composition and structure[hellip]

Those ecological conditions [ldquo]encompass (vegetation composition and structure) as others, including stressors that are relevant to species and ecological integrity. Examples of ecological conditions include the abundance and distribution of aquatic and terrestrial habitats, connectivity, roads and other structural developments, human uses, and invasive species.

The USDA also stated:

The concept of focal species is well supported in the scientific literature and community. [hellip] The inclusion of the focal species ([sect] 219.19) in the monitoring section is based on concepts from the March 15, 1999, Committee of Scientists report, which recommended focal species as an approach to monitor and assess species viability.

Here is an example of the 2012 Planning Rule ignoring its own best available science. Whereas [ldquo]population trend monitoring is not required by the final rule[rdquo], the Committee of Scientists (1999) report pans such a position:

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

Yet monitoring ecological conditions for focal species[mdash]habitat[mdash]is precisely what the 2012 Planning Rule says is all that[rsquo]s required. Regarding how to go about choosing focal species, USDA states:

In some circumstances, a threatened, endangered, proposed, or candidate species, or a species of conservation concern may be the most appropriate focal species for assessing the ecological conditions required by [sect] 219.9.

The Committee of Scientists report said focal species may be indicator species, keystone species, ecological engineers, umbrella species, link species, or species of concern. Agency directives will provide guidance for

considering the selection of a focal species from these or other categories. Criteria for selection may include: the number and extent of relevant ecosystems in the plan area; the primary threats or stressors to those ecosystems, especially those related to predominant management activities on the plan area; the sensitivity of the species to changing conditions or their utility in confirming the existence of desired ecological conditions; the broad monitoring questions to be answered; factors that may limit viability of species; and others.

The Committee of Scientists (1999) report suggests a pool of potential focal species:

The key characteristic of a focal species is that its status and time trend provide insights to the integrity of the larger ecological system. The term [ldquo]focal[rdquo] includes several existing categories of species used to assess ecological integrity:

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1. Indicator species: species selected because their status is believed to (1) be indicative of the status of a larger functional group of species, (2) be reflective of the status of a key habitat type; or (3) act as an early warning of an anticipated stressor to ecological integrity. The presence of fish in a river is an indicator of water quality.
2. Keystone species: species whose effects on one or more critical ecological processes or on biological diversity are much greater than would be predicted from their abundance or biomass (e.g., the red-cockaded woodpecker creates cavities in living trees that provide shelter for 23 other species).
3. Ecological engineers: species who, by altering the habitat to their own needs, modify the availability of energy (food, water, or sunlight) and affect the fates and opportunities of other species (e.g., the beaver).
4. Umbrella species: species who, because of their large area requirements or use of multiple habitats encompass the habitat requirements of many other species (e.g., deer).
5. Link species: species that play critical roles in the transfer of matter and energy across trophic levels or provide a critical link for energy transfer in complex food webs. For example, prairie dogs in grassland ecosystems efficiently convert primary plant productivity into animal biomass. Prairie dog biomass, in turn, supports a diverse predator community.
6. Species of concern: species that may not satisfy the requirement of providing information to the larger ecosystem but because of public interest will also be monitored and assessed for viability. Such species include some threatened and endangered species, game species, sensitive species, and those that are vulnerable because they are rare.

To make a genuine attempt at monitoring diversity, the Forest Service must include population monitoring of a robust list of focal species, SCC, and Threatened, Endangered, Sensitive, Proposed, and Candidate species. We also suggest the revised forest plan include others whose habitats are not represented by those. Based on the best available science (Committee of Scientists, 1999), the Monitoring Program must include continuous population trend monitoring for a more scientifically robust list of Focal Species, in order to assure population viability and overall sustainability of the forest plan.

The DFP also fails to provide direction recognizing the vital role of keystone species to the ecosystems, which

the Committee of Scientists, 1999 defines as:

[hellip]species whose effects on one or more critical ecological processes or on biological diversity are much greater than would be predicted from their abundance or biomass (e.g., the red-cockaded woodpecker creates cavities in living trees that provide shelter for 23 other species).

Several species native to the CGNF play the role of keystone species, such as gray wolf and other predators, bison, Clark[rsquo]s nutcracker, whitebark pine, pollinators, and beaver. Regarding the latter, the DEIS states:

Beaver populations have declined across much of the Custer Gallatin due to trapping and reductions in woody forage species from livestock grazing impacts, road construction, and

access-related activities (Pollock et al. 2015). Fire suppression is also a factor as riparian areas can convert from the cottonwood, aspen, green ash, and willow species preferred by beavers towards coniferous tree species under the prolonged absence of fire. This reduction in beaver populations in ecosystems adapted to their presence results in reduced and less resilient riparian and aquatic habitats (Bouwes et al. 2016).

FW-DC-WTR-09 recognizes that [ldquo]Beavers play an important ecological role8 within suitable habitat by increasing water residence time and spatial extent of water on the landscape, and aquatic and riparian habitat complexity[rdquo] yet there is no direction to restore their populations across their historical range on the Forest, nor to insure population viability. FW-GDL-WTR-03 only vaguely requires that some [ldquo]management actions to reduce beaver threats to infrastructure should use techniques that sustain beavers (such as, using pipes to reduce water levels, notching dams to restore streamflow).[rdquo] How does messing with beaver dams help beavers, and assist with their vital ecosystem function? How does maintaining the livestock grazing status quo, as does the DFP, respond to (DEIS): [ldquo]Beaver populations have declined across much of the Custer Gallatin due to reductions in woody forage species from livestock grazing impacts,..[rdquo]?

What is the data source the Forest Service relies upon to estimate historical, pre-management variability of snag conditions, i.e., the NRV?

What is meant by [ldquo]area[rdquo] in DEIS Table 40 ([ldquo]Percentage of area[hellip][rdquo]) regarding snag amounts?

What is the data source the Forest Service relies upon to estimate historical, pre-management variability of large down wood, i.e., the NRV?

Please list precisely the species the Forest Service considers to be associated with old-growth forest communities on the CGNF.

An open, independent peer review process was described by the Committee of Scientists (1999): 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.

Schultz (2010) recommends peer review of large-scale assessments and project level management guidelines, and more robust, scientifically sound monitoring, and measurable

8 Also, the DEIS states: [ldquo]Beavers were instrumental in the creation and maintenance of willow, alder, birch, and aspen stands. Water table during historical times were much closer to the surface due to the creation of beaver ponds therefore, soil moisture was more available to support extensive stands of riparian vegetation. Wildlife, primarily bird species, which are tied to riparian communities were probably maintained at a higher population level than those currently documented. In some locations, historic floodplains now appear as dry upland benches, which support little if any riparian vegetation.[rdquo]

objectives and thresholds for maintaining viable populations of all native and desirable non- native wildlife species.

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).

CANADA LYNX

The DFP states, [ldquo]The Custer Gallatin plan includes by reference direction for managing Canada lynx habitat from the Northern Rockies Lynx Management Record of Decision (appendix E).

This direction includes plan components for management of a variety of resources, including vegetation management, livestock grazing, recreation, and others.[rdquo] Alliance for the Wild Rockies participated during

the public process as the Northern Rockies Lynx Management Direction (NRLMD) was developed, and continues to believe that the NRLMD does not consider the best available science. A big problem with the NRLMD is that it allows with few limitations the same level of industrial forest management activities that occurred prior to Canada lynx ESA listing.

[ldquo](T)he wording in the Northern Rockies Lynx Management Direction is not always consistent with the definitions for plan components in the 2012 Planning Rule.[rdquo] The Forest Plan must explicitly state the standards, guidelines, objectives, etc. not just criticize the terminology. The Forest Service, in its vagueness, is altering the meaning of the NRLMD, so in the context of forest plan revision the agency is obligated to state in full its proposed management direction, including alternations to the NRLMD.

The current best science indicates that lynx winter foraging habitat is critical to lynx persistence (Squires et al. 2010), and that this habitat should be [ldquo]abundant and well-distributed across lynx habitat.[rdquo] (Squires et al. 2010; Squires 2009.) Existing openings such as clearcuts not yet recovered are likely to be avoided by lynx in the winter. (Squires et al. 2010; Squires et al. 2006.) During project analyses, the Forest Service mostly accepts stand data to be valid for analysis purposes, but not if the NRLMD restricts logging. Many times in the Region since the NRLMD was adopted, the Forest Service stated that upon field review stands initially mapped (using its databases) as lynx multistory habitat were described to be not in a structural condition that provides snowshoe hare foraging habitat (i.e., stem exclusion), and logging[mdash]usually clearcutting[mdash]was proposed in those stands. Since it turns out there[rsquo]s less lynx suitable habitat than the NRLMD previously assumed, the agency needs to step back and consider how overly optimistic its range-wide Canada lynx suitable habitat estimations were to begin with.

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 DFP does not include scientifically-based direction that would protect connectivity between Lynx Analysis Units.

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

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

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

Recent scientific findings undermine DFP/NRLMD direction for management of lynx habitat. This creates a scientific controversy the DEIS fails to resolve.

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

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

First, we demonstrated that lynx clearly use silviculture treatments, but there is a [sim]10 year cost of implementing any treatment (thinning, selection cut, or regeneration cut) in terms of resource use by Canada lynx. This temporal cost is associated with lynx preferring advanced regenerating and mature structural stages (Squires et al., 2010; Holbrook et al., 2017a) and is consistent with previous work demonstrating a negative effect of precommercial thinning on snowshoe hare densities for [sim]10 years (Homyack et al., 2007). Second, if a treatment is implemented, Canada lynx used thinnings at a faster rate post- treatment (e.g.,[sim]20 years posttreatment to reach 50% lynx use) than either selection or regeneration cuts (e.g., [sim]34[ndash]40 years post-treatment to reach 50% lynx use). Lynx appear to use regeneration and selection cuts similarly over time suggesting the difference in vegetation impact between these treatments made little difference concerning the potential impacts to lynx (Fig. 4c). Third, Canada lynx tend to avoid silvicultural treatments when a preferred structural stage (e.g., mature, multi-storied forest or advanced regeneration) is abundant in the surrounding landscape, which highlights the importance of considering landscape-level composition as well as recovery time. For instance, in an area with low

amounts of mature forest in the neighborhood, lynx use of recovering silvicultural treatments would be higher versus treatments surrounded by an abundance of mature forest (e.g., Fig. 3b). This scenario captures the importance of post-treatment recovery for Canada lynx when the landscape context is generally composed of lower quality habitat. Overall, these three items emphasize that both the spatial arrangement and composition as well as recovery time are central to balancing silvicultural actions and Canada lynx conservation.

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

Results of a study by Vanbianchi et al., 2017 also conflict with NRLMD assumptions: [ldquo]Lynx used burned areas as early as 1 year postfire, which is much earlier than the 2[ndash]4 decades postfire previously thought

for this predator.[rdquo] The NRLMD erroneously assumes clearcutting/regeneration logging have basically the same temporal effects as stand-replacing fire as far as lynx re-occupancy.

Kosterman, 2014, Vanbianchi et al., 2017 and Holbrook, et al., 2018 demonstrate NRLMD direction is inadequate for lynx viability and recovery, as the DFP assumes.

The allowance of [ldquo]exemptions[rdquo] from Forest Plan direction is an 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 Forest Service or USFWS influence. As stated in the DEIS, [ldquo]wildland urban interface locations could change over time due to new development near the national forest boundary, new methods of mapping wildland urban interface, the evolving science of predicting fire impacts to community values, and county updates to wildland urban interface maps (counties are responsible for wildland urban interface maps, and update the maps updated every 5 to 10 years).[rdquo] In other words, the area exempt from Forest Plan standards is ever-growing along with human population and development, and is constantly in flux without any forest plan amendment or NEPA analysis.

The DEIS also fails to adequately consider the cumulative impacts on lynx due to trapping or from use of the road and trail networks in the CGNF.

WOLVERINE

The DEIS indicates the importance of areas in or adjacent to the CGNF are extremely important for population persistence in the region and beyond, especially emphasizing important connectivity.

FW-GDL-WLWV-01: (T)here should be no increase in special use authorizations or designation of winter routes in maternal habitat for wolverines during the reproductive denning season.[rdquo] (Emphasis added.) Yet there is nothing in the DFP to reduce recreational or other human activities to protect this species, Proposed for listing under the ESA. The DEIS admits that [ldquo]Winter time human disturbance at or near wolverine reproductive den sites has been documented to result in den abandonment.[rdquo]

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

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

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

Ruggiero et al. (1994b) recognized that [ldquo]Over most of its distribution, the primary mortality factor for the wolverines is trapping.[rdquo] Those authors also state, [ldquo]Transient wolverines likely play a key role in the maintenance of spatial organization and the colonization of vacant habitat.

Factors that affect movements by transients may be important to population and distributional dynamics.[rdquo]

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/mi2 (1.7 km/km2) (Carroll et al. 2001b).

1. 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, [ldquo]Human use, including winter recreation and the presence of roads, reduced habitat value for wolverines in our studies.[rdquo]

Results from Scrafford et al., 2018:

[hellip]show that roads, regardless of traffic volume, reduce the quality of wolverine habitats and that higher-traffic roads might be most deleterious. We suggest that wildlife behavior

near roads should be viewed as a continuum and that accurate modeling of behavior when near roads requires quantification of both movement and habitat selection. Mitigating the effects of roads on wolverines would require clustering roads, road closures, or access management.[rdquo]

Wisdom et al. (2000) state:

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

[hellip]Snow-tracking and radio telemetry in Montana indicated that wolverines avoided recent clearcuts and burns (Hornocker and Hash 1981).

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

Carroll et al. (2001b) state:

The combination of large area requirements and low reproductive rate make the wolverine vulnerable to human-induced mortality and habitat alteration. Populations probably cannot sustain rates of human-induced mortality greater than 7[ndash]8%, lower than that documented in most studies of trapping mortality (Banci 1994, Weaver et al. 1996).

[hellip] (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.

Given the uncertain status of wolverine within the United States and elsewhere, there is growing concern regarding the potential negative effects of winter recreation on wolverine and particularly in areas potentially used by female wolverine for reproductive denning (Carroll et al. 2001, Rowland et al. 2003, May et al. 2006, Copeland et al. 2007, Krebs et al. 2007).

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

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

The DFP includes no such scientifically-based strategies for wolverine protection.

BISON

The best available scientific information supports the Regional Forester listing American bison as a species of conservation concern in Region 1. The Regional Forester must provide a reasoned response to the evidence presented in public comment in support of listing bison as a species of conservation concern.

[ldquo]The framework for management of Yellowstone bison is found in the Interagency Bison Management Plan, including the delineation of management zones where bison presence is tolerated and management is emphasized.[rdquo] The Interagency Bison Management Plan is not based on the best available scientific information.

It is improper for the CGNF to adopt the State of Montana[rsquo]s [ldquo]management[rdquo] and [ldquo]tolerance zones[rdquo] as a policy standard on the National Forest. The State[rsquo]s arbitrarily defined [ldquo]tolerance zones[rdquo] for bison on the CGNF are not based on the best available scientific information.

In spite of significant changes in federal brucellosis rules benefitting cattle ranchers in the States of Montana, Idaho, and Wyoming, managers have failed to account for the changed circumstances favoring natural regulation of bison in the wild.

Studying population viability was identified as a high priority in the Interagency Bison Management Plan in 2000. U.S. Dept. of the Interior & U.S. Dept. of Agriculture 2000 Vol. 1 at 731. Two decades later, this high priority scientific study to ensure the bison population persists in the wild remains unfulfilled.

The Interagency Bison Management Plan is a flawed plan operating on an outdated Environmental Impact

Statement: the 15-year effective life of the plan analysis expired in 2015. That plan analysis could not and did not foresee impacts to the bison population and the ecosystem beyond this timeframe. Indeed, after providing notice of its[rsquo] intent to prepare a new Environmental Impact Statement in 2015, the State of Montana and Yellowstone National Park have failed to produce an updated scientific analysis on the impacts of its[rsquo] actions. National Park Service 80 Fed. Reg. 13603 (Mar. 16, 2015).

In theory, the Interagency Bison Management Plan is an adaptive one based on science. In practice, it is not.

Mont. Code Ann. [sect] 81-2-120 and the governor-approved plan it calls for, is a stressor and risk to bison and their habitat through the life of the next forest plan.

[ldquo]Management actions[rdquo] to restrict or impede natural migrations are in conflict with National Forest planning rule requirements to use the best available scientific information, restore habitat connectivity, and provide for diversity and viable subpopulations of bison on the National Forest.

There is no rational basis for relying upon the State of Montana to initiate[mdash]or even consider over the life of the next forest plan[mdash]an adaptive change that would benefit bison on National Forest habitat. It[rsquo]s just as plausible that with a change in the Governor[rsquo]s office or the Montana

legislature, the State[rsquo]s arbitrarily defined [ldquo]tolerance zones[rdquo] would result in habitat loss for bison on the National Forest.

The CGNF must recognize and rely upon the best available scientific information of genetically distinct subpopulations of bison in the Northern and Central Interior herds.

The Central herd or subpopulation is at risk and being driven down under the stressors of the Interagency Bison Management Plan, the governor-approved plan Mont Code Ann. [sect] 81-2-120 calls for.

According to National Park Service biologists, the number of Central herd buffalo counted declined from 3,531 in 2006 to 847 in 2017.

The unexplained loss of a significant portion of the Central herd buffalo in a period of time when more habitat was available on the National Forest in State [ldquo]tolerance zones[rdquo] is a grave cause of concern.

Through its[rsquo] voluntary participation in the Interagency Bison Management Plan, the Custer Gallatin has adopted arbitrarily defined State [ldquo]tolerance zones[rdquo] that destroy bison naturally migrating into the dead zone (Zone 3) on the National Forest.

How much National Forest habitat are bison excluded from in Zone 3?

What is the environmental impact of Zone 3 on migration corridors and habitat connectivity?

How does the CGNF reconcile adopting Zone 3 as a standard with the National Forest planning rule requirement to maintain or restore connectivity?

The American bison is a land-intensive, nomadic species that once roamed over great distances. Reducing migrants through over-killing or removing range contributes to habitat loss, population declines, shortens the distances migrants can travel, and can destroy mass migration and drive the migratory species to extinction.

Conserving mass migrants means preserving animals[rsquo] freedom of movement in response to the temporal aspects of forage across seasonal extremes. This requires understanding basic parameters of the migration (e.g. location, numbers, routes, distances traveled), ecological drivers, habitat needs and threats. When migrants are excluded from forage and water resources , their numbers plummet and migrations disappear.

Unexplained subpopulation loss, excluding bison from a significant portion of National Forest habitat, disrupting migration in wildlife corridors, and degrading habitat connectivity are factors indicating a substantial concern about the capability of a truly unique population of migratory bison to persist in the wild.

The best available scientific information supports including enforceable standards for bison in the revised forest plan.

Conserving bison viability and diversity should be a forestwide standard.

Freedom for bison to roam National Forest habitat should be a forestwide standard. Restoring habitat connectivity for bison should be a forestwide standard.

To restore connectivity, and conserve the viability and diversity of bison[rsquo]s genetically distinct subpopulations, the CGNF must adopt a standard to close and not permit cattle grazing allotments in bison range.

FW-DC-WLBI-02: [ldquo]Suitable habitat[hellip][rdquo] is what? [ldquo]Adequate connecting corridors[rdquo] are defined as[mdash]what?

FW-DC-WLBI-04: [ldquo]self-sustaining population on the Custer Gallatin National Forest.[rdquo] In other words, the Forest Service will ignore the Interagency Bison Management Plan? Somehow we don[rsquo]t think so.

FW-GDL-WLBI-01: [ldquo][hellip]within management zones [hellip]management actions taken to resolve bison-livestock conflicts should favor bison.[rdquo] The forest plan must explicitly delineate [ldquo]management zones[rdquo] and not leave them to the whims of non-NEPA planning. Also, what does [ldquo]favor[rdquo] mean?

MANAGEMENT INDICATOR SPECIES

The DFP and DEIS do not explain how the viability of northern goshawk and pine marten will be assured on the CGNF. These are Management Indicator Species under one or both current forest plans, and the Assessment and DEIS fail to provide assurance that implementation of those plans has not threatened their forestwide viability. Monitoring of population trends, required by the 1986 forest plans, was not adequate.

NORTHERN GOSHAWK

The DFP and DEIS don[rsquo]t disclose Forest Service[rsquo]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 Forest Service must utilize goshawk survey methodology consistent with the best available science. For example the recent and comprehensive protocol, [ldquo]Northern Goshawk Inventory and Monitoring Technical Guide[rdquo] by Woodbridge and Hargis 2006. Also, USDA Forest Service 2000b state:

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

(Reynolds). (Emphasis added.)

Best available science implicates management 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 conflict with Reynolds et al. (1992) guidelines.

Crocker-Bedford (1990) noted:

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

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

The Forest Service[rsquo]s Samson (2006a) reports says that 110 breeding individuals (i.e. 55 pairs) are necessary for a viable goshawk population in R1. Attachment 2 of our comments on the PA is a map showing the results from the 2005 R1 region-wide goshawk survey using their [ldquo]Woodbridge and Hargis[rdquo] goshawk monitoring protocol, which is published as a USFS technical report. That 2005 detection map says there were 40 detections in 2005 in Region 1. So the results of this survey essentially show that the population in Region 1 is not viable according to the agency[rsquo]s own science (only 40 instead of 55). And some of the detections may have been individuals using the same nest, so the number of nests (and therefore number of breeding pairs) could be even lower than 40.

PINE MARTEN

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

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

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

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

Please also include Bull and Blumton, 1999; Hargis et al., 1999 and Wasserman et al., 2012 as best available science concerning pine marten biology and management impacts.

The DFP and DEIS do not disclose the quantity and quality of habitat that is necessary to sustain the viability of the marten.

BLACK-BACKED WOODPECKER

The viability of the black-backed woodpecker is threatened by fire suppression and other forest policies which specifically attempt to prevent its habitat from developing. [ldquo]Insect infestations and recent wildfire provide key nesting and foraging habitats[rdquo] for the black-backed woodpecker and [ldquo]populations are eruptive in response to these occurrences[rdquo] (Wisdom et al. 2000). A basic purpose of the Forest Service[rsquo]s management strategies, as revealed in DFP management direction including striving for [ldquo]resilience[rdquo] and [ldquo]resistance[rdquo], 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 since habitat suppression is DFP direction.

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

Contrary to what one might expect to find immediately after a major disturbance event, I detected a large number of species in forests that had undergone stand-replacement fires.

Huff et al. (1985) also noted that the density and diversity of bird species in one- to two- year-old burned forests in the Olympic Mountains, Washington, were as great as adjacent old-growth forests[hellip]

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

USDA Forest Service 2011c states:

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

Also the agency[rsquo]s Fire Science Brief, 2009 states, [ldquo]Hutto found that Black-backed Woodpeckers fared best on sites unharvested before fire and poorest in the heavily harvested sites[rdquo], raising a concern about logging for forest restoration that is not addressed in the DEIS or Assessment: The DEIS fails to consider that logging affects the future suitability of forested areas to this post- disturbance specialist.

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

Cherry (1997) states:

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

suppression and insect eradication is likely to cause further decline. (Emphasis added.)

The Forest Service proposes to manage against severely burned forests, according to the DFP.

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

Woodpeckers play critical roles in the forest ecosystem. Woodpeckers are primary cavity nesters that excavate at least one cavity per year, thus making these sites available to secondary cavity nesters (which include many species of both birds and mammals). Black- backed and three-toed woodpeckers can play a large role in potential insect control. The functional roles of these two woodpecker species could easily place them in the [lsquo]keystone[rsquo] species category[mdash]a species on which other species depend for their existence.

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

Cherry (1997) notes that:

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, Forest Service 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.

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

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

trees are found primarily in areas that have undergone natural disturbances, such as wind- throw, and within structurally diverse old-growth forests (Steeger and Dulisse in press, Bull et al. 1986, Goggans et al. 1987, Villard 1994, Hoffman 1997, Weinhagen 1998).

Bond et al., 2012a explain the need for a conservation strategy for the black-backed woodpecker: In California, the Black-backed Woodpecker[rsquo]s strong association with recently burned forest, a habitat that is ephemeral, spatially restricted, and often greatly modified by post- fire logging, as well as the species[rsquo] relative rarity, may make the woodpecker vulnerable to declines in the state. Additionally, Black-backed Woodpeckers in California are affected by the management of unburned forests [ndash] both because pre-fire stand conditions affect the suitability of post-fire habitat for the species, and because a substantial proportion of California[rsquo]s Black-backed Woodpeckers nest and forage at a low population density in unburned forests. Conserving the Black-backed Woodpecker in California likely requires appropriate management and stewardship of the habitat where this species reaches its highest density [ndash] recently burned forest [ndash] as well as appropriate management of [lsquo]green[rsquo] forests that have not burned recently.

The DFP and DEIS do not disclose the quantity and quality of habitat that is necessary to sustain the viability of the black-backed woodpecker.

WESTERN (BOREAL) TOAD

The DEIS states:

Western toads are relatively common in some portions of the Custer Gallatin, particularly Hebgen Lake and north in the Madison mountain range (Maxell 2009) The Crazy Mountains and Beartooth Plateau are areas for which additional data are needed to assess species status; the species is considered vulnerable to population crashes, as has happened in other places within its distribution (Maxell et al. 2009).

Maxell et al., 1998 state:

We believe that the status of the Boreal toad is largely uncertain in all Region 1 Forests.

[hellip]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[rsquo] sensitivity to a variety of anthropogenic impacts.

USDA Forest Service, 2003a states:

Little quantitative data are available regarding the boreal toad[rsquo]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. [hellip](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 [ldquo]TNC Database, 1999[rdquo]) also discuss boreal (Western) 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).

The Forest Service has not described the quantity and quality of habitat necessary to sustain the viability of the western toad, and the DFP has no specific direction or conservation strategy for this species.

GRIZZLY BEAR

The DFP includes [ldquo]plan components[rdquo] which [ldquo]formally adopt habitat standards from the Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem into the Custer Gallatin Forest Plan.[rdquo] AWR objects to a stated purpose of this Conservation Strategy, that being to accomplish removal of the grizzly bear in the GYE from the ESA. The grizzly bear population in the GYE suffering increasing mortalities over the past several years.

This figure by David Mattson from IGBST data on grizzly deaths 2013 to present, shows the cumulative death toll for grizzly bears each year 2013-2018 with the passage of time from when they emerge from their dens in the Spring to when they hibernate during the Fall. Death tolls during 2015-2017 shattered all previous records, but these records were in turn shattered during 2018 when 71 grizzlies were recorded as being killed in the GYE.

The Forest Service and U.S. Fish and Wildlife Service err by considering the grizzly bear in the GYE as a separate population in disregard of the status of the bear in the Northern Continental Divide Ecosystem and beyond. A major problem with this approach is that grizzly bears attempting to exist outside of artificial agency bounds are provided less protection, are harassed and harmed with greater frequency, and experience lesser regulator protections than bears within the formal recovery zone. This also ignores the fact that the policies are restricting grizzly bears from historic range including suitable habitat likely needed for the bears to adapt to climate change.

Again, incorporating other direction such as the Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem into the forest plan[mdash]without stating the direction (essentially, without the FS owning the direction)[mdash]the Forest Service is signaling its intention to adopt direction that is fluid and likely to change under political influence without proper NEPA and NFMA planning processes.

Also, the Conservation Strategy is itself in flux: [ldquo](T)he conservation strategy proposed a review of the developed site standards relative to the baseline. Results of this review were not available at the time this analysis was written. However, if this review results in timely recommendations for changes to the developed site standards or baseline, the effects of such changes may be disclosed in the final environmental impacts statement for forest plan revision.[rdquo] Thus, the public is not adequately informed as the NEPA process concludes.

FW-STD-WLGB-01: [ldquo][hellip].management actions shall not reduce the percent of secure habitat in each bear management subunit below 1998 baseline levels.[rdquo] The Forest Service is perpetuating habitat standards that result in unacceptable take.

FW-STD-WLGB-02: This sanctions the policy of moving around habitat core every 10 years, which has long term adverse consequences for grizzly bear persistence. What is the best available scientific information that justifies the extent of security changes outlined in a [ndash] d? Also, [ldquo]Habitat quality must be assessed based on the best collective scientific understanding of grizzly bear habitat ecology and the rationale for all mitigation measures must be fully documented.[rdquo] Please identify your current list of [ldquo]best collective scientific understanding of grizzly bear habitat ecology.[rdquo]

FW-STD-WLGB-03 and FW-GDL-WLGB-01: Likewise, the policy of allowing [ldquo]Temporary Changes in Secure Habitat[rdquo] is a recipe for disaster. What is the best available scientific information that justifies the extent of further security reductions outlined in FW-STD-WLGB- 03 a [ndash] c? And FW-GDL-WLGB-01 [ldquo]activities should be concentrated in space and time to minimize disturbance[rdquo] is too vague.

FW-SUIT-WLGB-01: This sanctions suitability of [ldquo]non-wheeled, over-the-snow use (such as, snowmobile)[rdquo] as if denning periods are cut-and-dried, not subject to annual variation from weather and snow conditions, and individual bears[rsquo] needs which vary from year to year. It also punts dealing with take due to [ldquo]conflicts [hellip]that develop[rdquo] to vague [ldquo]local area restrictions[rdquo]. The Forest Service has a history of being slow to react to new and evolving technologies.

Schwartz et al. (2010) noted that management for grizzly bears requires not only the provision of security area, but control of open road densities between security areas. Otherwise, grizzly bear mortality risks will be high as bears attempt to move across highly roaded landscapes to another security area. There must be direction in the forest plan regarding existing road densities located outside of and between security areas.

Much is said these days about human recreational impacts on grizzly bears, and here is some scientific opinion specific to the CGNF DFP:

https://mountainjournal.org/scientists-say-mountain-biking-negatively-impacts-bears

NATIVE FISH, AQUATIC AND RIPARIAN HABITATS

In many ways, the DFP Plan directives for fish and riparian zones exemplify the Forest Service[rsquo]s aversion to adopting strong management to actually protect and restore aquatic habitat conditions on the CGNF.

The DFP breaks the riparian management zone into two areas called the inner and outer zones. Some activities

are prohibited or restricted in the inner zone, whereas more active management is allowed in the outer zone. [ldquo](R)iparian management zones are not intended to be [lsquo]no touch zones,[rsquo] but rather [lsquo]carefully managed zones[rsquo] with an increase in protections in close proximity to water resources.[rdquo] The Forest Service fails to provide scientific support for these premises that claim vague [ldquo]careful management[rdquo] isn[rsquo]t highly risky. The Forest Service should be prioritizing rehabilitating existing sediment sources in damaged riparian zones, not risking them with more industrial activities.

A large body of scientific research shows that logging near streams can have long-term and devastating consequences for stream ecological integrity and water quality. Logging in RMZs can cause degradation of water quality such as stream temperature increases, changes to stream temperature patterns, increased fine sediment inputs, stream bank instability, and other problems. The DFP and DEIS ignore and downplay the well-documented negative effects and ecological risks associated with logging within streamside corridors. Even non-commercial thinning in RMZs is, at best, a large scale and ecologically risky experiment in which little is known about the outcome. Risks are considerable, and the outcome can have unintended negative consequences. Rieman et al. (2001) noted: [ldquo][hellip]vulnerable aquatic species could be impacted in the short term in ways from which they could not easily recover, even if long-term benefits eventually became evident in later years.[rdquo]

We suggest adopting INFISH-like protections into the Forest Plan, stronger than the permissive DFP direction which embraces logging within RMZs. The DEIS and Assessment fail to identify the best available science that supports this inner and outer riparian management zones scheme. What is it about the science supporting the establishment of INFISH buffers that the FS is now disagreeing with? We incorporate the Forest Service[rsquo]s [ldquo]Where Did The 300 Feed Come From???[rdquo] which answers the question and is written under the assumption that RMZs are fully protected buffers. (Attachment 8.)

DEIS: [ldquo]Recent research has documented that in some cases active riparian zone management can advance riparian condition while preserving the functional attributes for riparian, aquatic, and water resources.[rdquo] Which best available science, listed in the references section, are you referring to here?

FW-WTR-STD-01: [ldquo]Vegetation management, using mechanical treatments, shall only occur in the inner riparian management zone if the purpose is to restore or enhance aquatic and riparian- associated resources.[rdquo] The FS[rsquo] definition of [ldquo]restore[rdquo] is so permissive, that clearcutting is not prohibited with this standard.

FW-WTR-DC-03: [ldquo]Habitat and ecological conditions support self-sustaining populations of native aquatic and riparian associated plant and animal species.[rdquo] The DFP has no definition of [ldquo]self-sustaining population[rdquo][mdash]why not use [ldquo]viable population[rdquo] since that is defined?

FW-WTR-DC-05: [ldquo]The sediment regime within water bodies is within the within the range of conditions of

the reference watersheds, as defined by agency monitoring.[rdquo] This implies the range of reference conditions for water bodies are known or have been measured; there is no indication this is the case. Also, FW-WTR-DC-06 refers to [ldquo]reference dimensions (such as, bankfull width, depth, entrenchment ratio, slope, and sinuosity)[rdquo] and other parameters to be maintained but since the Forest Service has no reference measures of such things[mdash]how can these DCs have any meaning?

FW-WTR-STD-03 is worded so weakly that nothing is actually constrained: [ldquo]Portable pump set- ups shall include containment provisions for fuel spills and fuel containers shall have appropriate containment provisions. Vehicles shall be parked in locations that avoid entry of spilled fuel into streams.[rdquo] How can a set-up include a provision? How can a container have a provision? The DFP language bleeds insincerity. For standards to be meaningful they must specifically limit or direct. E.g. [ldquo]Permits and NEPA decisions for portable pumps shall include specific writtenprovisions for containment of fuel spills[rdquo] and [ldquo]Vehicles shall only be parked in locations specifically approved in permits so spilled fuel cannot enter water bodies[rdquo] etc.

FW-WTR-GDL-04 says road construction [ldquo]should[rdquo] be avoided in RMZs, unless the Forest Service wants to build a road across the stream. Consistent with this Guideline, theoretically a new road running hundreds of feet near a stream inside an RMZ is discouraged[mdash]unless even more damage would occur if this new road also crosses the stream. And then it could run a few hundred more feet inside the RMZ on the other side. This guideline hardly protects waters from new road impacts.

FW-WTR-GDL-05 is an example of a guideline that seems to prohibit something ([ldquo]new landings, skid trails, staging or decking should be located outside riparian management zones [rdquo]) but then provides an all-encompassing loophole ([ldquo]If these activities are needed inside of riparian management zones, minimize the disturbance area footprint[rdquo]). [ldquo]Needed[rdquo] indeed. [ldquo]Minimize[rdquo][mdash] whatever that means.

FW-WTR-GDL-06: [ldquo]retain enough wood onsite to meet riparian ecosystem demands[rdquo][hellip] How much does a riparian zone ever [ldquo]demand[rdquo]? If the forest plan were to use real numbers, specialists could be empowered to protect the resources in which they specialize, preventing line officer overruling/meddling.

FW-WTR-GDL-08: No clearcutting in RMZs, unless it [ldquo]restores[rdquo] something. Right.

FW-WTR-GDL-09: [ldquo][hellip]salvage harvest should not occur in inner riparian management zones.[rdquo] Look at the definition of [ldquo]salvage harvest.[rdquo] Want to salvage anyway? Just call it [ldquo]restoration.[rdquo]

Suitability-01: [ldquo]Riparian management zones are not suitable for timber production, but timber harvest, including by commercial means, may be allowed for purposes such as public safety, fuels reduction, riparian and riparian ecotone habitat restoration, and wildlife habitat enhancement.[rdquo] (Emphases added.) In other words, timber production WILL occur within RMZs regardless of [ldquo]suitability[rdquo].

Suitability-02: [ldquo]Firewood gathering is not suitable within the inner riparian management zone.[rdquo] How does the Forest Service propose to prevent this from happening[mdash]can the forest plan state that, please?

FW-OBJ-CWN-01: [ldquo]Reduce sediment production on five to eight miles per year of National Forest System roads within the critical watershed network by enhancing the roadway drainage erosion control mechanisms.[rdquo] Aside from being hardly ambitious, what if the Indicator and Measure in the DFP Monitoring Plan (p. 194) for this Objective isn[rsquo]t carried out? Or if it is performed once every two years as stated (which doesn[rsquo]t get to the [ldquo]per year[rdquo] part of the Objective by the way), what if the objective isn[rsquo]t met? Please explain how line officer accountability is invoked here? This is, unfortunately, exemplary of most of the DFP[rsquo]s direction

+ monitoring scheme.

FW-GDL-CWN-01: [ldquo][hellip]net increases (measured from beginning to end of each project) in number of stream crossings and road lengths should be avoided in riparian management zones, unless the net increase would improve ecological function in aquatic ecosystems.[rdquo] Loophole nullifies purpose. Real protection would prohibit increases. Real Objectives would set meaningful riparian road mileage reductions per year, along with accountability.

Does the Forest Service maintain a publicly accessible database documenting the results of [ldquo]PIBO monitoring[rdquo] data collected on the CGNF?

The DFP would adopt entities like the Conservation Watershed Network, Priority Watersheds, and Watershed Condition Framework. Trouble is, despite the nice rhetoric none of them actually compel actions that would restore damaged watersheds. They are mostly schemes that identify problem streams and loosely prioritize vague restoration actions for them. Based upon recent history, timber sales would be the primary funding mechanisms relied upon for restorative action. Timber sales are actions certifiably proven to damage[mdash]not restore[mdash]watersheds.

The Watershed Condition Framework (WCF) lays out a six-step process whereby all sixth-field watersheds will be classified according to their condition and prioritized for restoration according to watershed action plans. Implementation will be tracked and monitored. Condition class is determined according to a standardized process that employs 12 metrics. These crude metrics are aggregated to generate a single index of watershed condition that places every watershed in one of only three categories: functioning, functioning at risk or impaired. The goal

of the WCF is to move watersheds to an improved condition class through restoration actions. As the guidance notes, the current WCF framework emphasizes improvement and therefore lacks a performance accountability mechanisms for protection and maintenance of current watershed condition, which is often a priority management goal [USDA FS, 2010, p. 12) ([ldquo]Implementing the National Best Management Practices Implementation and Effectiveness Monitoring Program is expected to provide the Forest Service with a partial mechanism for capturing the costs and benefits of actions taken to maintain watershed condition[rdquo]). In general, the individual metrics are more informative about restoration needs than the index itself, and additional watershed-specific information is needed to craft management actions that effectively address aquatic restoration priorities.

The DEIS states, [ldquo]All occupied and expected to be occupied cutthroat streams and streams with perennial water and native fish presence in the pine savanna stream were designated conservation watersheds networks.[rdquo] Yet the DFP lacks strong management mandates to restores westslope cutthroat trout to the 41% of its historic range where it[rsquo]s missing (DEIS Table 18) and the Yellowstone cutthroat trout to the 57% of its historic range where it[rsquo]s missing (id.)?

DEIS: [ldquo]Stephens et al. 2016, [hellip]found it difficult to find any reference streams and recommended building enclosures, for years or even decades, would be important to accurately assess impacts to prairie stream fishes. This would facilitate understanding potential impacts from permitted livestock grazing in the Custer Gallatin National Forest pine savanna streams, as most streams and waterbodies in these units are open to grazing with 86 percent of all lands covered by primary rangelands within grazing allotments as compared to 6 percent in montane units.[rdquo] (Emphases added). Yet all these rangelands are de facto [ldquo]suitable[rdquo] for grazing under the DFP, and there[rsquo]s no need for action alternatives to lower AUMs or allotment acres, or to keep livestock out of riparian areas! Apparently, [ldquo]sustainability[rdquo] under the 2012 Planning Rule means to the CGNF sustain current levels of livestock use[mdash]not native biodiversity.

If the arctic grayling is native to streams and rivers of the CGNF, it must be adopted as a Species of Conservation Concern (SCC). Likewise, if Iowa darter, Lake chub, sauger, plains spadefoot, and northern leopard frog and other species are Species of Greatest Conservation Need in a State, what is the Regional Forester[rsquo]s rationale for not including them as SCC?

The DFP makes no expressed commitment to reducing sediment in waters already impaired by management-induced sediment increases, to more natural and ecologically sustainable levels by including measurable, quantifiable sediment standards or guidelines. Similarly, there are no standards or guidelines that place a quantifiable, measurable limit on project-induced sediment increases during project activities. This runs counter to best available science and common sense.

Studies have found even selective logging may be associated with increases of instream fine sediments (Kreutzweiser et al. 2005, Miserendino and Masi 2010), changes in macroinvertebrate community structure or metrics (Flaspohler et al. 2002, Kreutzweiser et al. 2005), alterations in nutrient cycling and leaf litter decomposition rates (Lecerf and Richardson 2010), and increases in stream temperatures (Guenther et al.

2012). Flaspohler et al. (2002) noted that changes to biota associated with selective logging were found decades after logging. These studies strongly suggest that alterations caused by logging within RMZs may result in significant changes in water quality parameters and stream biota in many areas; these results are likely tied to dynamics that may be common to many forested streams to varying degrees.

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

In the draft Forest Plan Revision for the Blue Mountains, the Forest Service discloses: [ldquo]Research has shown that effective vegetated filter strips need to be at least 200 to 300 feet wide to

effectively capture sediment mobilizing by overland flow from outside the riparian management area.[rdquo] It is logical that logging or thinning within 50 to 100 feet from streams (or closer!), as the Forest Service is proposing with this DFP, would cause fine sediment production and allow for sediment delivery into streams, and potentially contribute to stream temperature increases, increased variability in waters quality and aquatic habitat parameters, alterations to stream hydrology, and other negative impacts.

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

For adequate protection of core and nodal bull trout habitats, the Montana Bull Trout Scientific Group (1998 at page 58) recommended protection of [ldquo]the 100 year floodplain as described by FEMAT (1993) plus a zone at least 150 feet from either side of the outer edge of the floodplain.[rdquo] They concluded that the additional 150 feet on either side of the 100 year floodplain is required for the following reasons:

(C) it encompasses one site-potential tree height at most locations; (2) it provides sufficient width to filter most sediment from non-channeled surface runoff from most slope classes; (3) it provides some microclimate and shallow groundwater thermal buffering to protect aquatic habitats inside the channel and channel migration zone; and (4) it provides an appropriate margin error for unanticipated channel movement, hillslope, and soil stability, blowdown, wildfire, operator error, tree disease, and certain other events that may be difficult or impossible to foresee on a site-specific basis.

See: https://bluemountainsbiodiversityproject.org/panel-on-logging-in-streamside-corridors-john-day-oregon-2017/ which is a video of Dr. Chris Frissell and Dr. Chad Hanson presentations during a panel discussion on the ecological risks of logging in RMZs.

The revised forest plan should include a standard that a comprehensive inventory of erosion and sediment sources be conducted for watersheds potentially affected by site-specific projects. E.g., see the Boise National Forest[rsquo]s Fly et al., 2011.

The Forest Service appears to be unwilling to make any firm commitment to improve riparian conditions and fish habitat via its forest plan.

FOREST PLAN DIRECTION REGARDING LIVESTOCK GRAZING AND SUITABILITY DETERMINATION

Apparently the Forest Service has already determined vast acreages of the CGNF are capable or suitable for livestock grazing without utilizing a legitimate process for making such a determinations. The DEIS doesn[rsquo]t disclose the nature of the yardsticks the Forest Service relied upon for determining suitability and capability. There[rsquo]s no data cited. There is no DFP direction

for undertaking scientifically based suitability determinations for livestock grazing on the CGNF. The agency has determined suitability without knowing the results of forest plan monitoring.

How can a human activity that causes so much greenhouse gas emission automatically be considered [ldquo]suitable[rdquo] for the CGNF?

The DEIS states, [ldquo]The existing forest plans are supported by a grazing suitability analysis that was done in the mid-1980s. [hellip] Allotment specific capability and suitability analyses have been conducted on allotments with changed conditions resulting in decisions that have refined capability and suitability aspects relative to livestock use. Current allotments are deemed suitable for permitted grazing and suitability is verified during allotment level National Environmental Policy Act analyses.[rdquo] Apparently, precisely HOW specific national forest lands have been determined to be [ldquo]suitable[rdquo] for livestock grazing will remain a mystery.

If it requires the investment in 1,850 water developments to keep the cows watered in CGNF allotments, plus 2,800 miles of fence[mdash]shouldn[rsquo]t that be a red flag indicating things aren[rsquo]t so [ldquo]suitable[rdquo] for livestock after all?

DEIS: [ldquo]Noxious weeds, bare ground and species composition were attributes tested in a Forest Service Intermountain Region Study (O'Brien et al. 2003) and proved to be viable indicators of rangeland health and functionality[hellip][rdquo] Either these problems are the fault of the Forest Service for enabling such damage (in which case livestock grazing should cease due to agency incompetence), or the lands exhibiting these issues are not suitable (in which case livestock grazing should end in those locations).

With all the damage that livestock grazing causes, firm direction for closing allotments should be a feature of all alternatives.

O[rsquo]Brien et al. 2003 (cited in the DEIS) found that four indicators were useful for describing the range condition and functionality of rangelands at many scales. The indicators include presence or absence of noxious weeds, percent ground cover, plant species composition, and percent shrub cover. A consistent analysis across the CGNF for these rangeland health indicators is not available. This is further evidence the Forest Service has not conducted a thorough and scientifically based suitability determination. Furthermore, there are no standards in the DFP that direct such a determination be undertaken at the allotment-specific level.

The DEIS doesn[rsquo]t analyze or disclose noxious weed spread due to livestock grazing. It doesn[rsquo]t quantitatively estimate soil damage due to livestock grazing. The DEIS doesn[rsquo]t quantitatively estimate riparian habitat damage due to livestock grazing. It doesn[rsquo]t analyze or disclose the interaction between upland vegetation changes due to livestock grazing, fire behavior, and forest composition. The DEIS doesn[rsquo]t analyze or disclose the expected annual infrastructure maintenance and installation costs paid for by taxpayers for the benefit of livestock grazing. It does not analyze or disclose the costs and impacts of Wildlife Services destruction of wildlife species at the behest of grazing interests.

[ldquo]Lesica and Cooper (1997) found no evidence that livestock grazing had any greater impacts on the upland vegetation than grazing by bison and that there may be more grass now than before settlement or the end of open range.[rdquo] Twenty-one years ago, how many acres of cheatgrass occurred on the CGNF, and how many acres now?

DEIS: [ldquo]High historic levels of grazing use across the Custer Gallatin National Forest a century ago were responsible for maintaining large acreages in early to mid-seral condition and for over- utilization in many areas. Reducing grazing use over the last several decades has contributed to improving primary rangelands and plant structure needs of other animals such as for nesting birds, invertebrates, fawn cover, etc.[rdquo] How many acres have thus been [ldquo]improved[rdquo] and please cite the documentation to support your statement(s).

The livestock grazing issue is good for illustrating how monitoring of forest plan implementation under the original forest plans has failed to inform the Assessment and thus this revision process.

The DEIS states: [ldquo]Livestock that use rangelands can remove plant material, trample soils, and alter water flow patterns. However, with proper management these impacts are not substantial when compared with the natural resilience of ecosystems (Holling, 1973).[rdquo] It[rsquo]s funny the DEIS cites a 45-year old source to support this assumption, ignoring disclosures sprinkled throughout the DEIS indicating the very real and significant damage livestock grazing has wreaked upon the CGNF.

The National Forest Management Act requires periodic revision of forest plans in order to facilitate adaptive management with public involvement. While the planning rule has been changed, there is still the need to provide continuity between plans to the extent that adaptive management requires. NFMA is very clear that forest plans are to be revised periodically based upon lessons learned from continuous monitoring and evaluation in the field of the environmental impacts from forest plan implementation. Whatever was learned from nearly three decades of monitoring the implementation of livestock grazing under the original forest plans is not disclosed in the Assessment.

How livestock grazing alone might have affected plant communities, soil biota, and thus other indicators of natural diversity is apparently not known by the agency who has administered livestock grazing on these two national forests for several decades.

Please include a section in the final Assessment on the results of monitoring and evaluation of forest plan implementation performed in accordance with NFMA[rsquo]s direction over the last three decades in the Gallatin and Custer NFs. Also, please include a section that reviews the Forest Service[rsquo]s compliance and non-compliance, successes and failures with monitoring and evaluation commitments made in the original Gallatin and Custer National Forest Plans, and disclose in the Final EIS any and all adverse environmental impacts from the noncompliance.

Please utilize the science concerning noxious weed spread from livestock grazing. The DEIS highly downplays the clear implication in scientific literature that livestock are a major vector for noxious weed spread.

There[rsquo]s hardly any science and no forest plan monitoring results disclosing the changes to riparian habitats due to livestock grazing on these two Forests.

The Forest Service has also failed to explain why the degraded conditions discussed in the Assessment and DEIS apparently did not have any effect on its determinations of grazed area [ldquo]suitability[rdquo] for livestock grazing.

The DEIS for the Helena-Lewis and Clark forest plan revision states, [ldquo]The severity of the effects of livestock grazing on aquatic wildlife populations can be expected to increase under warmer climatic conditions with lower summer flows.[rdquo] It also states, [ldquo]Livestock grazing can greatly impact riparian habitats and at-risk plant habitat.[rdquo] Please cite the quantitative data sources regarding livestock impacts upon which the CGNF DEIS[rsquo]s analyses on riparian habitat and at- risk plant species are based.

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

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

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

*
* If livestock use on public lands continues at current levels, its interaction with anticipated changes in climate will likely worsen soil erosion, dust generation, and stream pollution. Soils whose moisture retention capacity has been reduced will undergo further drying by warming temperatures and/or drought and become even more susceptible to wind erosion (Sankey and others 2009).
* (I)n 1994 the BLM and FS reported that western riparian areas were in their worst condition in history, and livestock use[mdash]typically concentrated in these areas[mdash]was the chief cause (BLM and FS 1994).
* Ohmart and Anderson (1986) suggested that livestock grazing may be the major factor negatively affecting wildlife in eleven western states. Such effects will compound the problems of adaptation of these ecosystems to the dynamics of climate change (Joyce and others 2008, 2009). Currently, the widespread and ongoing declines of many North American bird populations that use grassland and grass[ndash]shrub habitats affected by

grazing are [lsquo][lsquo]on track to become a prominent wildlife conservation crisis of the 21st century[rsquo][rsquo] (Brennan and Kuvlesky 2005, p. 1)

*
* Climate change and ungulates, singly and in concert, influence ecosystems at the most fundamental levels by affecting soils and hydrologic processes. These effects, in turn, influence many other ecosystem components and processes[mdash]nutrient and energy cycles; reproduction, survival, and abundance of terrestrial and aquatic species; and community structure and composition. Moreover, by altering so many factors crucial to ecosystem functioning, the combined effects of a changing climate and ungulate use can affect biodiversity at scales ranging from species to ecosystems (FS 2007) and limit the capability of large areas to supply ecosystem services (Christensen and others 1996; MEA 2005b).
* The site-specific impacts of livestock use vary as a function of many factors (e.g., livestock species and density, periods of rest or non-use, local plant communities, soil conditions). Nevertheless, extensive reviews of published research generally indicate that livestock have had numerous and widespread negative effects to western ecosystems (Love 1959; Blackburn 1984; Fleischner 1994; Belsky and others 1999; Kauffman and Pyke 2001; Asner and others 2004; Steinfeld and others 2006; Thornton and Herrero 2010). Moreover, public-land range conditions have generally worsened in recent decades (CWWR 1996, Donahue 2007), perhaps due to the reduced productivity of these lands caused by past grazing in conjunction with a changing climate (FWS 2010, p. 13,941, citing Knick and Hanser 2011).
* Livestock use effects, exacerbated by climate change, often have severe impacts on upland plant communities.

For example, [hellip] areas severely affected include the northern Great Basin and interior Columbia River Basin (Middleton and Thomas 1997).

* Livestock grazing has numerous consequences for hydrologic processes and water resources. Livestock can have profound effects on soils, including their productivity, infiltration, and water storage, and these properties drive many other ecosystem changes. Soil compaction from livestock has been identified as an extensive problem on public lands (CWWR 1996; FS and BLM 1997). Such compaction is inevitable because the hoof of a 450-kg cow exerts more than five times the pressure of heavy earthmoving machinery (Cowley 2002). Soil compaction significantly reduces infiltration rates and the ability of soils to store water, both of which affect runoff processes (Branson and others 1981; Blackburn 1984). Compaction of wet meadow soils by livestock can significantly decrease soil water storage (Kauffman and others 2004), thus contributing to reduced summer base flows. Concomitantly, decreases in infiltration and soil water storage of compacted soils during periods of high-intensity rainfall contribute to increased surface runoff and soil erosion (Branson and others 1981). These fundamental alterations in hydrologic processes from livestock use are likely to be exacerbated by climate change.
* The combined effects of elevated soil loss and compaction caused by grazing reduce soil productivity, further compromising the capability of grazed areas to support native plant communities (CWWR 1996; FS and BLM 1997). Erosion triggered by livestock use continues to represent a major source of sediment, nutrients, and pathogens in western streams (WSWC 1989; EPA 2009).
* Historical and contemporary effects of livestock grazing and trampling along stream channels can destabilize streambanks, thus contributing to widened and/or incised channels (NRC 2002). Accelerated streambank erosion and channel incision are

pervasive on western public lands used by livestock (Fig. 4). Stream incision contributes to desiccation of floodplains and wet meadows, loss of floodwater detention storage, and reductions in baseflow (Ponce and Lindquist 1990; Trimble and Mendel 1995). Grazing and trampling of riparian plant communities also contribute to elevated water temperatures[mdash]directly, by reducing stream shading and, indirectly, by damaging streambanks and increasing channel widths (NRC 2002). Livestock use of riparian plant communities can also decrease the availability of food and construction materials for keystone species such as beaver (Castor canadensis).

*
* Livestock production impacts energy and carbon cycles and globally contributes an estimated 18% to the total anthropogenic greenhouse gas (GHG) emissions (Steinfeld and others 2006). How public-land livestock contribute to these effects has received little study. Nevertheless, livestock grazing and trampling can reduce the capacity of rangeland vegetation and soils to sequester carbon and contribute to the loss of above- and below-ground carbon pools (e.g., Lal 2001b; Bowker and others 2012). Lal (2001a) indicated that heavy grazing over the long-term may have adverse impacts on soil organic carbon content, especially for soils of low inherent fertility. Although Gill (2007) found that grazing over 100 years or longer in subalpine areas on the Wasatch Plateau in central Utah had no significant impacts on total soil carbon, results of the study suggest that [lsquo][lsquo]if temperatures warm and summer precipitation increases as is anticipated, [soils in grazed areas] may become net sources of CO2 to the atmosphere[rsquo][rsquo] (Gill 2007, p. 88). Furthermore, limited soil aeration in soils compacted by livestock can stimulate production of methane, and emissions of nitrous oxide under shrub canopies may be twice the levels in nearby grasslands (Asner and others 2004). Both of these are potent GHGs.
* Managing livestock on public lands also involves extensive fence systems. Between 1962 and 1997, over 51,000 km of fence were constructed on BLM lands with resident sage- grouse populations (FWS 2010). Such fences can significantly impact this wildlife species. For example, 146 sage-grouse died in less than three years from collisions with fences along a 7.6-km BLM range fence in Wyoming (FWS 2010). Fences can also restrict the movements of wild ungulates and increase the risk of injury and death by entanglement or impalement (Harrington and Conover 2006; FWS 2010). Fences and roads for livestock access can fragment and isolate

segments of natural ecological mosaics thus influencing the capability of wildlife to adapt to a changing climate.
* (L)ivestock use (particularly cattle) on these lands exert disturbances without evolutionary parallel (Milchunas and Lauenroth 1993; MEA 2005a). [hellip]The combined effects of ungulates (domestic, wild, and feral) and a changing climate present a pervasive set of stressors on public lands, which are significantly different from those encountered during the evolutionary history of the region[rsquo]s native species. The intersection of these stressors is setting the stage for fundamental and unprecedented changes to forest, arid, and semi-arid landscapes in the western US (Table 1) and increasing the likelihood of alternative states. Thus, public-land management needs to focus on restoring and maintaining structure, function, and integrity of ecosystems to improve their resilience to climate change (Rieman and Isaak 2010).
* Natural floods provide another illustration of how ungulates can alter the ecological role of disturbances. High flows are normally important for maintaining riparian plant communities through the deposition of nutrients, organic matter, and sediment on

streambanks and floodplains, and for enhancing habitat diversity of aquatic and riparian ecosystems (CWWR 1996). Ungulate effects on the structure and composition of riparian plant communities (e.g., Platts 1991; Chadde and Kay 1996), however, can drastically alter the outcome of these hydrologic disturbances by diminishing streambank stability and severing linkages between high flows and the maintenance of streamside plant communities. As a result, accelerated erosion of streambanks and floodplains, channel incision, and the occurrence of high instream sediment loads may become increasingly common during periods of high flows (Trimble and Mendel 1995). Similar effects have been found in systems where large predators have been displaced or extirpated (Beschta and Ripple 2012). In general, high levels of ungulate use can essentially uncouple typical ecosystem responses to chronic or acute disturbances, thus greatly limiting the capacity of these systems to provide a full array of ecosystem services during a changing climate.

*
* (F)ederal grazing fees on BLM and FS lands cover only about one-sixth of the agencies[rsquo] administration costs (Vincent 2012).

Belsky and Gelbard, 2000 is a literature review of livestock as contributing to noxious weed spread. Belsky et al., 1999 is a literature review of peer-reviewed studies concerning effects of livestock grazing on water resources. Please consider this as best available science.

Belsky and Blumenthal, 1997 investigate impacts livestock grazing causes to stand dynamics and soils of upland forests of the Interior West. The Forest Service refuses to consider this scientific information because it incriminates the manipulate-and-control management paradigm.

FW-DC-GRAZ-02: [ldquo]Forage reserve allotments (also known as grassbanks) are available across the Custer Gallatin to provide short term permitted livestock grazing opportunities when conditions on active allotments are limited by factors such as fire, drought, etc.[rdquo] This is a recipe ripe for abuse. When the conditions on active allotments are said to call for utilization of these [ldquo]grassbanks[rdquo] there will no assessment of current conditions to determine if livestock grazing is proper under even the Forest Service[rsquo]s lax criteria. This is a gross violation of NEPA.

FW-STD-GRAZ-01. All this basically says is, whenever the agency gets around to updating the grossly out of date allotment management plans, logical resource issues should be considered. Since the DFP has absolutely no mandate to update any AMPs anyway during the life of the revised forest plan, this standard is meaningless.

FW-GDL-GRAZ-01: [ldquo]New or revised allotment management plans should be designed to maintain stream habitat and water quality[rdquo] whenever the Forest Service gets around to it, which may be never. Same problem with FW-GDL-GRAZ-03

FW-GDL-GRAZ-02, FW-GDL-GRAZ-04, FW-GDL-GRAZ-06, FW-GDL-GRAZ-07, FW-

GDL-GRAZ-08: How and when will the Forest Service implement such measures, which might conflict with current AUMs/stocking levels and permits?

The wildland fire issue is one of the most daunting and perplexing ones facing management of the CGNF. On one hand, the DFP and DEIS implicate fire as a looming [ldquo]catastrophe[rdquo], a threat to life and property, a natural force to be controlled at all costs[mdash]even if those costs bust the agency budgets. On the other hand, it is recognized as a vital creative force that sustains practically all components of the forest ecosystems[mdash]wildlife, fish, soil productivity, species composition, landscape pattern and structure. In addressing the issue of wildland fire, the revision of the forest plan is at the crossroads where overall management of the CGNF can boldly shift towards sustainability. Unfortunately, progressive evolution on fire management is apparently a topic too hot for the agency to handle.

The pressing unmet need for public education on this issue, coupled with the vested economic interests in carrying on fire suppression (limited only by equipment and firefighter availability), other political forces that prioritize timber over ecology, and the culture of the agency itself (favoring manipulation and control rather than embracing natural processes)[mdash]all stand as significant barriers to accomplishing the necessary change in fire policy.

The DEIS touts the benefits of most action alternatives because the revised forest plan would direct that wildland fire be less suppressed and more accepted. However, the DFP does not provide solid Plan Components that would effectively reduce the incentives of managers to order as much fire suppression as available resources would allow. So the DEIS fails to provide an analysis what really would happen[mdash]perpetual [ldquo]fuel treatment[rdquo] via industrial logging to mitigate perpetual fire suppression. Odion and DellaSala, 2011 agree: [ldquo][hellip]fire suppression continues unabated, creating a self-reinforcing relationship with fuel treatments which are done in the name of fire suppression. Self-reinforcing relationships create runaway processes and federal funding to stop wildfires now amounts to billions of tax dollars each year.[rdquo]

[ldquo]Values at risk[rdquo] from fire include: [ldquo]Ecological, social, and economic assets and resources that could be impacted by fire or fire management actions. Examples include life, property, structures, natural and cultural resources, community infrastructure, public support, economic opportunities such as tourism, and air quality.[rdquo] Most of these are associated with humans themselves risking these things by locating them in places incompatible with native fire regimes. And it takes money to maintain these [ldquo]values[rdquo][mdash]from federal taxpayers who aren[rsquo]t really being consulted on the issue.

Additionally, who really believes fire incident [ldquo]commanders[rdquo] will disappoint the vast vested interests that revolve around firefighting[mdash]essentially the [ldquo]fire-industrial complex[rdquo] [mdash]and decide to allow fire to play out its natural role in the CGNF? There is no real incentive built into the DFP.

The DEIS states, [ldquo]The need for vegetation treatments being implemented within wildland urban interface (wildland urban interface) areas will increase.[rdquo] The implications of this drive for more vegetation management is uncertain because, as the DEIS also states, [ldquo]wildland urban interface

9 Whereas the DEIS seems to make a distinction between wildfire and wildland fire, our comments do not.

locations could change over time due to new development near the national forest boundary, new methods of mapping wildland urban interface, the evolving science of predicting fire impacts to community values, and county updates to wildland urban interface maps (counties are responsible for wildland urban interface maps, and update the maps updated every 5 to 10 years).[rdquo] (Emphasis added.)

We incorporate [ldquo]A New Direction for California Wildfire Policy[mdash] Working from the Home Outward[rdquo] dated February 11, 2019 from the Leonard DiCaprio Foundation as comments on the DFP. It criticizes policies from the state of California, which are far too in common with Forest Service fire policies on display in the DFP. From the Executive Summary: [ldquo]These policies try to alter vast areas of forest in problematic ways through logging, when instead they should be focusing on helping communities safely co-exist with California[rsquo]s naturally fire-dependent ecosystems by prioritizing effective fire-safety actions for homes and the zone right around them. This new direction[mdash]working from the home outward[mdash]can save lives and homes, save money, and produce jobs in a strategy that is better for natural ecosystems and the climate.[rdquo] It also presents an eye-opening analysis of the Camp Fire, which destroyed the town of Paradise.

We also incorporate the John Muir Project document [ldquo]Forest Thinning to Prevent Wildland Fire

[hellip]vigorously contradicted by current Science[rdquo] (Attachment 4).

We likewise incorporate [ldquo]Open Letter to Decision Makers Concerning Wildfires in the West[rdquo] signed by over 200 scientists (Attachment 5).

And also see [ldquo]Land Use Planning More Effective Than Logging to Reduce Wildfire Risk[rdquo] (Attachment 7).

The DEIS is rife with contradictions about fire, as it is with other topics. (E.g., [ldquo]there is an emerging scientific consensus that the total number of acres burned by wildfire will increase in coming decades[rdquo] vs. [ldquo]Fire exclusion will likely continue to alter successional processes[hellip][rdquo])

DEIS [ldquo]For much of the last century, wildfire burned less area than it should have relative to the historic condition.[rdquo] How many acres less?

FW-GO-FIRE-01: [ldquo]The Custer Gallatin National Forest works with community leaders, service providers, business owners, homeowners and permittees who are invested in or adjacent to the Custer Gallatin to provide education about wildfire risk and that wildland fire is an essential ecological process.[rdquo] The goal is merely to vaguely [ldquo]provide education[rdquo] but where[rsquo]s the emphasis on defensible space, and the recognition that the responsibility lies chiefly with the owners of these [ldquo]values[rdquo][mdash]not the federal taxpayer?

FW-STD-FIRE-01: [ldquo]All wildfires shall have a management response that considers risk to life and safety, taking into account the costs and effects to resources and values at risk.[rdquo] Given that this is the only fire Standard, it appears that management accountability is to be based mostly around suppression at all cost.

FW-GDL-FIRE-01: [ldquo]To meet multiple resource desired conditions, the Custer Gallatin should use wildland fires forestwide where and when conditions permit.[rdquo] There is no guidance on [ldquo]where and when conditions permit[rdquo] except for FW-STD-FIRE-01 which basically says[mdash]almost never.

FW-GDL-FIRE-02: This one is chock full of the assumption that the Forest Service can control vegetation conditions all across the CGNF [ldquo]to reduce fire intensity.[rdquo] This also completely contradicts FW-GDL-FIRE-01.

The DEIS makes claims to the effect that fire suppression has led to fuels accumulation in some fire types, resulting in wildfires that are uncharacteristic in both fire effects and scale. It makes similar statements about

insect outbreaks ([ldquo]pests[rdquo]) in the Forest. The DEIS includes no scientific basis for any such claims. No examples of [ldquo]uncharacteristic[rdquo] disturbances are mentioned, probably because with such specifics, any claim of their being [ldquo]uncharacteristic[rdquo] could easily be refuted. The Forest Service uses fire scare as propaganda to mask its real agenda, perpetual [ldquo]fuel treatment[rdquo] fueling agency budgets to mitigate perpetual fire suppression.

Of the eight distinct Fire Severity Classifications displayed in Table 10, only one is outside the Desired Range. This is not reconciled with the dozens of statements made in the DFP and DEIS that claim the Forest is suffering from fire suppression (e.g., [ldquo]The absence of fire in many areas of the Custer Gallatin over the last century, mainly due to fire suppression, has led to a fire deficit[rdquo]).

What are the annual amounts of funding necessary to [ldquo]fix[rdquo] the problems the DEIS alleges are caused by fire suppression? How does that compare to recent budget appropriations?

In discussing what are claimed to be landscape departures, the DEIS does not provide a spatial analysis, either for the true reference conditions or of current project area conditions for [ldquo]fuel conditions.[rdquo] The DEIS has no scientifically defensible analysis of the project area landscapepattern departure from NRV.

The DEIS assumes that natural fire regimes would maintain much of the CGNF in open conditions with widely spaced mature and old trees including ponderosa pine and juniper. The DEIS fails to acknowledge that mixed-severity and even low-severity fire regimes result in much more variable stand conditions across the landscape through time. Assumptions that drier forests did not experience stand-replacing fires, that fire regimes were frequent and nonlethal, that these stands were open and dominated by large well-spaced trees, and that fuel amounts determine fire severity (the false thinning hypothesis that fails to recognize climate as the overwhelming main driver of fire intensity) are not supported by science (see for example Baker and Williams 2015, Williams and Baker 2014, Baker et al. 2006, Pierce et al. 2004, Baker and Ehle 2001, Sherriff et al. 2014). Even research that has uncritically accepted the questionable ponderosa pine model that may only apply to the Mogollon Rim of Arizona and New Mexico (and perhaps in similar dry-forest types in California), notes the inappropriateness of applying that model to elsewhere (see Schoennagel et al. 2004). The DEIS[rsquo]s assertion that fuel treatments under the DFP will result in likely or predictable later wildland fire effects is of considerable scientific doubt (Rhodes and Baker, 2008).

Cohen, 1999 reviewed current scientific evidence and policy directives on the issue of fire in the wildland/urban interface and recommend the focus be on structure ignitability in the Home Ignition Zone rather than extensive wildland fuel management. Cohen, 1999 also recognizes [ldquo]the imperative to separate the problem of the wildland fire threat to homes from the problem of ecosystem sustainability due to changes in wildland fuels[rdquo] (Id.). In regards to the latter[mdash] ecosystem sustainability[mdash]Cohen and Butler (2005) state:

Realizing that wildland fires are inevitable should urge us to recognize that excluding wildfire does not eliminate fire, it unintentionally selects for only those occurrences that defy our suppression capability[mdash]the extreme wildfires that are continuous over extensive areas. If we wish to avoid these extensive wildfires and restore fire to

a more normal ecological condition, our only choice is to allow fire occurrence under conditions other than extremes. Our choices become ones of compatibility with the inevitable fire occurrences rather than ones of attempted exclusion. (Emphasis added.)

Large fires are weather-driven events, not fuels-driven. When the conditions exist for a major fire[mdash]which includes drought, high temperatures, low humidity and high winds[mdash]nothing, including past logging, halts blazes. Such fires typically self-extinguish or are stopped only when less favorable conditions occur for fire spread. As noted in Graham, 2003:

The prescriptions and techniques appropriate for accomplishing a treatment require understanding the fuel changes that result from different techniques and the fire behavior responses to fuel structure. Fuel treatments, like all vegetation changes, have temporary effects and require repeated measures, such as prescribed burning, to maintain desired fuel structure.

Fire Regimes are often used by the Forest Service to support the position that there are significant departures of the forest from historic fire processes and vegetation conditions. The DEIS does not disclose the limitations of this methodology. This method likely has very limited accuracy and tends to overestimate the risk of higher-severity fire posed by fuel loads, as documented by studies of recent fires (Odion and Hanson, 2006).

Rhodes, 2007 states: [ldquo]The transient effects of treatments on forest, coupled with the relatively low probability of higher-severity fire, makes it unlikely that fire will affect treated areas while fuel levels are reduced.[rdquo] (Internal citations omitted.) See also Rhodes and Baker (2008). And Rhodes, 2007 also points out that management with mechanical fuel treatments (MFT) to restore natural fire regimes must take into consideration the root causes of the alleged problem:

In order to be ultimately effective at helping to restore natural fire regimes, fuel treatments must be part of wider efforts to address the root causes of the alteration in fire behavior. At best, MFT can only address symptoms of fire regime alteration. Evidence indicates that primary causes of altered fire regimes in some forests include changes in fuel character caused by the ongoing effects and legacy of land management activities. These activities include logging, post-disturbance tree planting, livestock grazing, and fire suppression.

Many of these activities remain in operation over large areas. Therefore, unless treatments are accompanied by the elimination of or sharp reduction in these activities and their impacts in forests where the fire regime has been altered, MFT alone will not restore fire regimes. (Internal citations omitted.)

If the predictions of uncharacteristically severe fire attributed to past suppression were accurate, one might think that the results of scientific validation of such assumptions would have been cited in the DEIS. We find no data or scientific analysis of such fire effects validating DEIS assumptions of uncharacteristically severe fire effects.

DellaSala, et al. (1995) state:

Scientific evidence does not support the hypothesis that intensive salvage, thinning, and other logging activities reduce the risk of catastrophic fires if applied at landscape scales [hellip] At very local scales, the removal of fuels through salvage and thinning may hinder some fires.

However, applying such measures at landscape scales removes natural fire breaks such as moist pockets of late-seral and riparian forests that dampen the spread and intensity of fire and has little effect on controlling fire spread, particularly during regional droughts. [hellip] Bessie and Johnson (1995) found that surface fire intensity and crown fire initiation were strongly related to weather conditions and only weakly related to fuel loads in subalpine forest in the southern Canadian Rockies..... Observations of large forest fires during

regional droughts such as the Yellowstone fires in 1988 (Turner, et al. 1994) and the inland northwest fires of 1994..... raise serious doubts about the effectiveness of intensive fuel

reductions as [ldquo]fire-proofing[rdquo] measures.

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

Noss et al. (2006) state:

Forest landscapes that have been affected by a major natural disturbance, such as a severe wildfire or wind storm, are commonly viewed as devastated. Such perspectives are usually far from ecological reality. Overall species diversity, measured as number of species[ndash]at least of higher plants and vertebrates [ndash] is often highest following a natural stand replacement disturbance and before redevelopment of closed-canopy forest (Lindenmayer and Franklin 2002). Important reasons for this include an abundance of biological legacies, such as living organisms and dead tree structures, the migration and establishment of additional organisms adapted to the disturbed, early-successional

environment, availability of nutrients, and temporary release of other plants from dominance by trees. Currently, early-successional forests (naturally disturbed areas with a full array of legacies, i.e. not subject to post-fire logging) and forests experiencing natural regeneration (i.e. not seeded or planted), are among the most scarce

habitat conditions in many regions.

Baker et al., 2006 state:

Because multiple explanations exist for the presence and abundance of young, shade- tolerant trees, these trees need to be dated and linked definitively to a particular land use (e.g. livestock grazing, logging, fire exclusion) before their removal is ecologically appropriate in restoration, and so that the correct land use, as discussed later, can be modified.

[hellip]Identification of which land uses affected a stand proposed for restoration is essential. Fire exclusion, logging and livestock grazing do not have the same effects on these forests, their effects vary with environment, and they require different restoration actions. Before restoration begins, it makes sense to modify or minimize the particular land uses that led to the need for restoration, to avoid repeating degradation and ongoing, periodic subsidies that merely maintain land uses at non-sustainable levels (Hobbs & Norton, 1996). For example, thinning an overgrazed forest, without restoring native bunchgrasses lost to grazing, may simply lead to a new pulse of tree regeneration that will have to be thinned again.

The DEIS and DFP are not clear as to how the fluid WUI boundary and the Community Wildfire Protection Plans comprise policy and direction the Forest Service must comply with. Our understanding is that the WUI has been defined, and can be re-defined, without any NEPA process. Given the uncertain location of the WUI, the DEIS cannot possibly analyze the implication of plan implementation of WUI management.

Experience shows the countless dangers faced by firefighters, to the degree that public safety ought to be genuinely at risk before decisions are made to risk firefighter safety. And though we disagree about the extent of the WUI, we welcome a dialogue that would result in agreement where firefighting will be understood as likely (a more reasonably defined WUI) vs. where potential losses to lives would be nonexistent if a fire is allowed to burn and where private property risks are minimal. Because of the importance of dealing with this issue, such [ldquo]management area[rdquo] classifications are highly important. As stated above, however, they must be established in the context of NEPA rather than by county governments, and therefore be subject to the test of good science and full and fair analysis, unlike present WUI delineations.

The DEIS fails to adequately analyze and disclose the forestwide impacts of the proposed fire suppression policy. There is little indication the management of wildland fire in the CGNF will have evolved under the revised forest plan.

The scale of ecological damage claimed to have occurred due to the wide-scale fire suppression program that began almost 100 years ago isn[rsquo]t properly analyzed or disclosed in the DEIS. The

DEIS includes nothing like a best available science discussion weighing the ecological and financial costs and

benefits of wildland fire.

The DEIS does not disclose how the vegetation patterns that result from past logging, other management actions, and revised plan implementation 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[rsquo]t recognize the temporal gradients in vegetative recovery following [ldquo]fuel treatments.[rdquo]

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 Forest Service 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 [ldquo]catastrophes[rdquo] that must be prevented through aggressive increases in forest thinning. Yet the real catastrophes are not the fires themselves but those land uses, in concert with fire suppression policies that have resulted in dramatic alterations to ecosystem structure and composition. The first step in the restoration of biological diversity (forest health) of western landscapes must be to implement changes in those factors that have resulted in the current state of wildland ecosystems. Restoration entails much more than simple structural modifications achieved through mechanical means. Restoration should be undertaken at landscape scales and must allow for the occurrence of dominant ecosystem processes, such as the natural fire regimes achieved through natural and/or prescribed fires at appropriate temporal and spatial scales. (Emphases added.)

The DEIS indicates fire suppression will continue under any alternative, meaning that further timber management and fuels treatments would occur perpetually in intervals. The Forest Service contends a high density of roads also facilitates fire suppression. These are cumulative effects issues, all across the managed portion of the CGNF. Project-level NEPA documents then implement 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 [ldquo]restoration.[rdquo] 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[rsquo]s Phoenix which synthesizes published, peer-reviewed science investigating the value of mixed- and high-severity fires for biodiversity (DellaSala and Hanson, 2015). The book includes research documenting the benefits of high-intensity wildfire patches for wildlife species, as well as a discussion of mechanical [ldquo]thinning[rdquo] and its inability to reduce the chances of a fire burning in a given area, or alter the intensity of a fire, should one begin under high fire weather conditions, because overwhelmingly weather, not vegetation, drives fire behavior (DellaSala and Hanson, 2015, Ch. 13, pp. 382-384).

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

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

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

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

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

Ultimately the DFP and DEIS reflect an overriding bias favoring vegetation manipulation and resource extraction via [ldquo]management[rdquo] needed to [ldquo]move toward[rdquo] some selected desired conditions, along the way neglecting the ecological processes driving these ecosystems.

Essentially the Forest Service rigs the game, as the [ldquo]desired conditions[rdquo] would only be achievable by resource extractive activities. But since desired conditions must be maintained through repeated management/manipulation the management paradigm conflicts with naturalprocesses[mdash]the real drivers of the ecosystem.

Also, many direct and indirect effects of fire suppression are also ignored. 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.

[hellip]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.

[hellip]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.

[hellip]One of the many paradoxes of fire suppression is that it involves a considerable amount of human-caused fire reintroduction under the philosophy of [ldquo]fighting fire with fire.[rdquo] The most routine form of suppression firing, [ldquo]burnout,[rdquo] occurs along nearly every linear foot of perimeter fireline. Another form of suppression firing, [ldquo]backfiring,[rdquo] occurs when firefighters ignite a high-intensity fire near a wildfire[rsquo]s flaming edge, with or without a secured containment line. In the [ldquo]kill zone[rdquo] 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.

[hellip]Firelines, especially dozerlines, can become new [ldquo]ghost[rdquo] 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.

[hellip]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.

[hellip]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.

[hellip]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[mdash]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 DFP and DEIS is the assumption that fire risk can be mitigated to a significant degree by reacting in opposition to natural processes[mdash]namely the growth of various species of native vegetation propagandized as [ldquo]fuels.[rdquo] We believe the Forest Service oversells the ability of land managers to make conditions safe for landowners and firefighters. This could lead to landowner complacency[mdash]thereby increasing rather that decreasing risk. Many likely fire scenarios involve weather conditions when firefighters can[rsquo]t react quickly enough, or when it[rsquo]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 Landscaping10 as recommended by Utah State University, and the Firewise USA website by the National Fire Protection Association11 for examples of educational materials.

The Forest Service has no detailed long-term program for maintaining the allegedly safer [ldquo]fuel[rdquo] conditions, including how often 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 needs to 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.

10 https://extension.usu.edu/ueden/ou-files/Firewise-Landscaping-for-Utah.pdf

11 http://www.nfpa.org/Public-Education/By-topic/Wildfire/Firewise-USA/The-ember-threat-and-the-home-ignition-zone

Regardless of DEIS claims of unnatural conditions due to fire suppression, it doesn[rsquo]t provide scientific support for its claims that disturbance regimes have somehow been altered to the degree that the DFP proposed actions are justified.

WEEDS

The DEIS identifies a huge problem:

Establishment and spread by aggressive non-native invasive plants is one of the greatest threats to the ecosystems in Custer Gallatin National Forest. Aggressive non-native invasive plants have the potential to alter ecosystems by outcompeting and displacing native plants. Invasive plants have been found to impact wildlife habitat by decreasing the amount of forage, change fire frequency by forming dense stands of flashy fuels, and change soil characteristics by altering soil nutrients.

[hellip]Invasive plant species can displace at-risk and other native species through competitive displacement. Competition from invasive non-native species and noxious weeds can result in the loss of habitat, loss of native pollinators, and decreased at-risk plant species persistence. Subsequent impacts from management actions include herbicide spraying and mechanical ground disturbance to control noxious weeds once they gain a foothold.

The DEIS explains why the Forest Service[rsquo]s management has been such a huge cause of the problem:

(I)ncreased ground disturbance corresponds with increased risk of weed spread. Roads, trails, livestock, and canopy reduction and/or ground disturbance from fire and vegetation management can provide ideal pathways for the introduction of invasive species.

The DFP states, [ldquo]Decisions outlining required protection and prevention measures are addressed in applicable weed management environmental analysis decisions (Custer National Forest Noxious Weed Management Environmental Impact Statement and Record of Decision [2006] and the Gallatin National Forest Noxious and Invasive Weed Treatment Project Environmental Impact Statement and Record of Decision (2005))[hellip][rdquo] (Hereinafter, [ldquo]Weed Management plans[rdquo]). Those Weed Management plan Decisions are apparently being carried forth into the revised forest plan, so please disclose a list of the best available science the Forest Service used in preparation of those weed management environmental analysis decisions.

Despite the urgency of the weed problem and the existence of Weed Management plans, [ldquo]There is now a footprint of about 58,000 acres of weeds and weed seed banks on the Custer Gallatin. Available resources have only allowed weed treatment annually on about 4,000 to 5,000 acres.[rdquo] (DEIS) There is no direction in the DFP, however, which mandates more weed treatment.

Neither the Assessment nor DEIS contain any monitoring data forthcoming from the implementation of the Weed Management plans. That[rsquo]s how genuine adaptive management works. How can the Forest Service ever verify it is managing consistent with Objective FW- OBJ-INV-01: [ldquo]new infestations are prevented; densities of existing infestation are reduced; total acres or areas infested are reduced; infested acres or areas are restored and rehabilitated; existing infestations are contained, controlled, suppressed, or eradicated depending on infestation

characteristics, management opportunities, and resource values at risk; and uninfested areas are maintained and protected[rdquo] if it cannot monitor the outcomes?

Likewise, we can never know the meaning of [ldquo]minimize[rdquo] in FW-STD-INV-01 ([ldquo]Activities shall be designed to minimize the risk of spreading the infestation[rdquo]).

The degree of inconsistency and outright contradictory information in the DEIS concerning noxious weeds is perhaps indicative of how powerless the Forest Service is to do anything about existing and spreading weeds, and how resistant the agency is to changing its management to address the problem. We present some of these statements[mdash]some of which cannot be true:

*

* [ldquo]assumptions used in the analysis that are common to all alternatives include: [hellip]weeds and weed

seeds would continue to be deposited and spread onto and within the Custer Gallatin[hellip][rdquo]
* [ldquo]Warmer temperatures will likely result in increased fire frequency and intensity, creating more favorable conditions for invasive species[hellip][rdquo]
* [ldquo]Infestation levels of invasive plants would likely remain steady to slightly increasing over time.[rdquo]
* [ldquo]As a result of these plan components, all ecosystems are expected to benefit from the reduction of invasive plant species,[hellip][rdquo]
* [ldquo]The purpose of (DFC direction) is to ensure that all Forest Service management activities are designed to minimize or prevent establishment or spread of invasive species on national forest lands, or to adjacent areas[hellip][rdquo]

FW-STD-INV-04: [ldquo](U)se required best management practices and other agency requirements to minimize noxious weed establishment and spread.[rdquo] [ldquo]Required[rdquo] by what? The Forest Plan is the document to make explicit mandates, especially if this is a Standard.

The DFP states, [ldquo]The purpose of the invasive species plan components are to ensure that all Forest Service management activities are designed to minimize or prevent establishment or spread of invasive species on national forest lands, or to adjacent areas, and to provide for healthy resilient and resistant ecosystems.[rdquo] Yet nothing in the DEIS or Assessment even suggests that weeds are being reduced or adequately controlled on the CGNF, even though the Forest Service has been relying upon weed treatment programs that are more detailed than DFP direction, for many years.

Every project, all authorized activities would violate FW-DC-INV-01, a Desired Condition that is mostly wishful thinking.

FW- STD-INV-01: [ldquo]For all new projects or activities, the risk of noxious weed introduction or spread shall be determined and appropriate mitigation measures shall be implemented. Activities shall be designed to minimize the risk of spreading the infestation. [rdquo] How is this [ldquo]standard[rdquo] a

[ldquo]constraint[rdquo] on management? This is simply project design criteria. Furthermore, there is no metric for [ldquo]determining[rdquo] any [ldquo]risk of noxious weed introduction or spread[rdquo] so the NEPA document can say anything about risk. We already know that every soil and land disturbing actions will increase the risk of noxious weed spread, so what[rsquo]s the point?

The section on invasive weeds is exemplary for its use of the undefined and therefore meaningless word, [ldquo]minimize.[rdquo] The agency promotes the fiction that it can increase disturbance of land and soils, and facilitate more weed spread with a myriad of human activities and somehow keep weed spread to a minimum.

ECONOMICS

The economics analysis (General Contributions to Society and Economic Sustainability) is all about justifying management by expounding upon the benefits to the local economy. On the other hand the costs to U.S. taxpayers for all these local focus benefits are not analyzed or disclosed. The externalized costs of the existing and subsequent environmental damage due to management actions and other human activities are also not considered.

From the DEIS, there is no way to assess the efficiency of alternatives towards the assumed benefits. The costs of units of management activity were not analyzed. One might wonder what the expected costs might be of noxious weed treatments over the life of the revised forest plan, as they vary per alternative. Forget that. What about the taxpayer investment per board feet produced? Nada. What dollar amount per grazed Animal Unit Month or accumulated pound of beef does the taxpayer spend with its subsidies to the ranchers? It isn[rsquo]t in there.

What would it cost to achieve Desired Conditions for the road system for each alternative under the revised forest plan, for the 15 years of expected implementation? Nothing there.

It would be consistent with the agency[rsquo]s outlook if the DEIS expressed the benefits of creating more jobs for the local economy by increasing the need for[mdash]and therefore amount of[mdash]noxious weed treatments.

Ecosystem services were not analyzed. Check the 2012 Planning Rule for why this is important.

SOIL[mdash]THE MOST FUNDAMENTAL FOREST RESOURCE

The DEIS recognizes the importance of soil:

In natural systems, soil resources along with local climate and topography are primary determinants of the land[rsquo]s inherent ability to grow specific types and amounts of native vegetation. As a result, nearly all goods and services provided to the public on National Forest lands are in one way or another dependent on soil productivity. Maintaining that productivity is essential to preserving the Custer Gallatin[rsquo]s ability to provide resource benefits to the public. These benefits include, but are not limited to, clean water, wildlife habitat, fisheries, timber and grazing resources, recreation opportunities, and pristine landscapes.

The DEIS also recognizes this NFMA mandate: [ldquo]All national forests are required by the National Forest Management Act to avoid substantial and permanent impairment of the soil.[rdquo] For the issue of protecting soil productivity, the DFP is an example of the watering down of a strong statutory requirement into weak forest plan direction that doesn[rsquo]t meet the legal mandate. How, for instance, can the Plan conform to the Regulations[rsquo] requirement to [ldquo]Conserve soil [hellip] resources and not allow significant or permanent impairment of the productivity of the land[rdquo] if the Forest Plan allows extensive, almost permanent soil property degradation on a significant portion of the productive timber base of the Forest? And there is absolutely

no limit to the amount of soil loss or damage that is allowed in livestock grazing allotments or pastures, logging or burning units, temporary roads or landings, etc.

The DEIS states, [ldquo]Forest Service Manual, Chapter 2550 [hellip]directs the Washington Office Director of Watershed, Fish, Wildlife, Air, and Rare plants to [lsquo]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[rsquo].[rdquo] Please cite these validation studies, if the agency believes they are best available science for forest management and planning purposes.

The DFP summarizes NFMA requirements for soil thus: [ldquo]Soil and land productivity must not be reduced as a result of management actions. Soil productivity is considered to be maintained when the soil[rsquo]s capacity to support desired types and amounts of native vegetation remains unchanged from pre-disturbance levels.[rdquo] Yet the Assessment Final Soil Report admits the Forest Service has failed to a notable degree: [ldquo]There are certain types of detrimental soil disturbance, mainly severe soil displacement and accelerated soil erosion that will not disappear over the course of decades, even lifetimes, especially on soil-landscapes that are highly sensitive to those specific types of disturbance. These areas, although limited in overall extent on the Custer Gallatin, will require more active land restoration measures if they are to recover.[rdquo] (Emphasis added.) And, [ldquo]Legacy soil disturbance from past timber harvesting activities that occurred prior to 1990 persist in many past harvest areas on the Custer Gallatin National Forest. In most of the past harvest areas, legacy detrimental soil disturbance is associated with old landing areas and temporary or jammer roads.[rdquo]

The DEIS indicates that part of the problem is that current forestwide and regional direction is not taken seriously: [ldquo]Most of the direction at the national forest level would remain in place under the current plans, but only as technical guides outside of forest plan direction. There will remain a critical lack of forest plan direction needed to ensure that appropriate soil management, mitigation, and restoration procedures are followed. This casts doubt about the effectiveness of mitigation actions that would be taken in the future to protect soil and land productivity under the current plans and increases the likelihood that the 15 percent maximum detrimental soil disturbance standard would be exceeded in activity areas as a result of management activities.[rdquo]

The most complex web of biodiversity is found on the forest floor, in the organic layers of soil. Harvey et al., 1994, scratch the surface of this this ecological complexity:

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.)

Fungi are not animals, they[rsquo]re not plants. Yet they perform keystone functions in the ecology of the forest. Without fungi, little of the diversity in the forest would be possible.

Simard et al., 2015 have conducted research on relationships between some fungi and plants, how nutrient transfers are facilitated by fungal networks. The authors state, [ldquo]resource fluxes though ectomycorrhizal (EM) networks are sufficiently large in some cases to facilitate plant establishment and growth. Resource fluxes through EM networks may thus serve as a method for interactions and cross-scale feedbacks for development of communities, consistent with complex adaptive system theory.[rdquo] The FEIS fails to examine such important ecological functions, and the Forest Plan provides no assurance these functions will be maintained as the FS carries on with its narrowly informed industrial forest management regime.

[ldquo]The big trees were subsidizing the young ones through the fungal networks. Without this helping hand, most of the seedlings wouldn[rsquo]t make it.[rdquo] (Suzanne Simard: http://www.ecology.com/2012/10/08/trees-communicate/.) Simard et al., 2013 state, [ldquo]Disrupting network links by reducing diversity of mycorrhizal fungi[hellip] can reduce tree seedling survivorship or growth (Simard et al, 1997a; Teste et al., 2009), ultimately affecting recruitment of old-growth trees that provide habitat for cavity nesting birds and mammals and thus dispersed seed for future generations of trees.[rdquo] (Also see the YouTube video [ldquo]Mother Tree[rdquo] embedded within the Suzanne Simard [ldquo]Trees Communicate[rdquo] webpage at: https://www.youtube.com/watch?v=-8SORM4dYG8&feature=youtu.be).

Also, Gorzelak et al., 2015:

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

Complex Adaptive Systems

Underground [lsquo]tree talk[rsquo] is a foundational process in the complex adaptive nature of forest ecosystems. Since plants form the basis of terrestrial ecosystems, their behavioural interactions, feedbacks and influences are important in generating the emergent properties of ecosystems (Levin 2005). Given the connectivity inherent in the formation of MNs12 and

12 MN = mycorrhizal network

the impressive array of plant behavioural interactions that can be mediated through them, plant behaviour and MNs are intricately linked. In the interior Douglas-fir forests of British Columbia, seedlings regenerate within the MN of old conspecific trees. The architecture of the MN is scale-free, where hub trees are highly connected relative to other trees in the forest (Beiler et al. 2010), and this is characteristic of a complex adaptive system (Simard et al. 2013; Beiler et al. 2015). The scale of the MN is at least on the order of tens of metres (Beiler et al. 2010) and potentially much larger, with a single fungus sometimes spanning hundreds of hectares of forest (Ferguson et al. 2003). Recent work on the diversity of plant[ndash]fungal connections in forests revealed multiple levels of nestedness in the associations between host plants and fungal symbionts (Toju et al. 2014; Beiler et al. 2015). Each individual component (plant or fungus) of the ecosystem-wide network will, therefore, have a different potential to influence the behaviour of every other individual based on the extent, diversity and hierarchical level of its connections. As discussed above, the connections created by mycorrhizal fungi are agents for both positive (Song et al. 2010) and negative (Achatz et al. 2014) feedbacks to complex adaptive plant behaviour, which lead to self-organization of ecosystems (Simard et al. 2013; Beiler et al. 2015). Resilience is an emergent property of the interactions and feedbacks in scale-free networks (Levin 2005). Targeted loss of hub trees, however, can cross thresholds that destabilize ecosystems. Through the study of MNs, we are beginning to characterize the connections that are important to behaviour of system agents and thus ecosystem stability.

Also see Song et al., 2015; Beiler et al., 2009; and [ldquo]Dying Trees Can Send Food to Neighbors of Different Species via Wood-Wide Web[rdquo].

The scientists involved in research on ectomycorrhizal networks have discovered connectedness, communication, and cooperation between separate organisms. Such phenomena are usually studied within single organisms, e.g. the interconnections in humans (between neurons, sense organs, glands, muscles, and other organs) necessary for individual survival. The DEIS fails to consider the ecosystem impacts from industrial management activities on this mycorrhizal network, and the DFP is written in virtual ignorance of these ecological relationships in the soil. The industrial forestry management paradigm would inevitably destroy what it fails to recognize.

The DEIS does not provide quantitative estimates of reductions of soil productivity due to noxious weeds. The Soil Report admits:

Another source of soil disturbance prevalent on certain areas of the Custer Gallatin is infestation of lands by noxious weed species. Weed seed when it becomes prevalent in surface soil horizons becomes a biological factor of the soil that has the potential to reduce land productivity and restrict management options. Strong correlations have been found on the Custer Gallatin, especially on certain soil-landscape types, between past soil disturbance and the occurrence of noxious weeds. These infection sites then become source areas for the spread of noxious weeds into adjacent, non-disturbed areas. Noxious weed spread can follow disturbance since

weeds have opportunistic traits and can exploit disturbed soil conditions (Williamson and Harrisburg 2002; Norton et al. 2007; James et al. 2010) typical of many pioneer species. The expansion of weed infestations into new areas can alter nutrient regimes and organic carbon levels in the soil which shifts the

competitive balance on a site away from desired native species (Wolf and Klironomos 2005; Steinlein 2013). Management options and growth potential are both reduced when weed infestations exceed thresholds where restoration becomes difficult, creating new novel plant assemblages (Seastedt et al. 2008). Once a noxious weed becomes a co- dominant species on a site, whether in a grassland area or as a forest understory plant, changes to the soil and reduced site potential are consistent with the concept of [ldquo]permanently degraded[rdquo] as used in the National Environmental Policy Act (1970) and the National Forest management Act (1976). (Emphases added.)

The DEIS explains the relationship between noxious weed infestation and losses of soil productivity[mdash]they correlate very highly:

The relationship between noxious weeds and soils is tightly intertwined. Certain types of soil disturbance (especially disturbance that exposes low quality subsoil or substrate materials or otherwise creates unsuitable surface soil conditions for establishment of native, perennial plants) will almost invariably result in localized noxious weed infestations. These become the infestation sites from which the subsequent spread of noxious weeds to surrounding areas originate in a classic source-sink fashion. In return, the presence of dense noxious weeds populations such as spotted knapweed, Dalmatian toadflax, or Canada thistle at landings, along temporary roads, or on hillsides are often accompanied by evidence of accelerated erosion due to poor ground cover in these areas. The presence of noxious weed seed in the soil, especially at high concentrations, becomes a biological property of the soil. Although this alone would not be considered detrimental soil disturbance in accordance with the 1999 Northern Region supplement, it does reduce soil productivity and at high levels, limits land management options.

Despite the admission that noxious weed infestation is a significant degradation of soil productivity, the DFP proposes nothing but increased weed infestation and therefore lower soil productivity.

The DEIS and Assessment fail to actually quantify this loss of soil productivity attributable to noxious weeds[mdash]both current levels and under proposed Alternatives. Cumulative effects are not disclosed.

This situation indicates the overall inadequacy of existing regulatory mechanisms for protecting soil productivity on national forests as discussed by Lacy, 2001. And we discuss below the inadequate direction of DFP Standards and guidelines provide no substantial improvement over the 1980s forest plans and Regional standards.

The decrease in future timber yield or livestock forage due to cumulative soil damage forestwide is not quantified in the DEIS. Even if timber and livestock forage were the only accepted uses of the CGNF, it would make no sense for the Forest Service to never factor in management-induced decreases in productivity, leading to

unanticipated significant reductions over time in timber yields. USDA Forest Service, 2007 stated:

Sustained yield was defined[hellip] as [ldquo]the achievement and maintenance in perpetuity of a high- level annual or regular periodic output of the various renewable resources of the National

Forest System without permanent impairment of the productivity of the land.[rdquo] Sustained yield is based on the lands[rsquo] ability to produce.

The forestwide extent of soils with permanently impairment or experiencing long-term detrimental impacts must be quantified to address the [ldquo]sustained yield.[rdquo] The DEIS fails to analyze or disclose these cumulative impacts.

Booth, 1991 explains the relationship between soil quality conditions and hydrology:

Drainage systems consist of all of the elements of the landscape through which or over which water travels. These elements include the soil and the vegetation that grows on it, the geologic materials underlying that soil, the stream channels that carry water on the surface, and the zones where water is held in the soil and moves beneath the surface. Also included are any constructed elements including pipes and culverts, cleared and compacted land surfaces, and pavement and other impervious surfaces that are not able to absorb water at all.

[hellip]The collection, movement, and storage of water through drainage basins characterize the hydrology of a region. Related systems, particularly the ever-changing shape of stream channels and the viability of plants and animals that live in those channels, can be very sensitive to the hydrologic processes occurring over these basins. Typically, these systems have evolved over hundreds of thousands of years under the prevailing hydrologic conditions; in turn, their stability often depends on the continued stability of those hydrologic conditions.

Alteration of a natural drainage basin, either by the impact of forestry, agriculture, or urbanization, can impose dramatic changes in the movement and storage of water.

[hellip]Flooding, channel erosion, landsliding, and destruction of aquatic habitat are some of the unanticipated changes that [hellip]result from these alterations.

[hellip]Human activities accompanying development can have irreversible effects on drainage- basin hydrology, particularly where subsurface flow once predominated. Vegetation is cleared and the soil is stripped and compacted. Roads are installed, collecting surface and shallow subsurface water in continuous channels. [hellip]These changes produce measurable effects in the hydrologic response of a drainage basin.

The DFP proposes FW-STD-SOIL-01 as its primary soil standard, which is a small portion of the current Region

1 Soil Quality Standards (R1-SQS). FW-STD-SOIL-01 is worded:

Vegetation management activities shall not exceed 15 percent detrimental soil disturbance (detrimental soil disturbance) for pre-existing plus new management-caused soil detrimental soil disturbance in activity areas. If pre-existing activity-caused detrimental soil disturbance levels already exceed 15 percent prior to a management action, then the total of prior plus new activity-caused detrimental soil disturbance must not exceed the pre-existing detrimental soil disturbance level and should move toward improvement.

FW-STD-SOIL-02 is essentially the same as FW-STD-SOIL-01, but applies a 12% figure to riparian management zones. What is the scientific basis for the 12% limitation?

Nowhere does the DFP propose to incorporate the full R1-SQS. The latter is mentioned in the DEIS: [ldquo]Forest Service Northern Region Supplement 2550-99-1: directs land managers to [lsquo]design new activities that do not create detrimental soil conditions on more than 15 percent of an activity area[rsquo] and that 'research guidelines such as those contained in Graham et.al. 1994[rsquo] for coarse woody debris [lsquo]should be used if more specific local guidelines are not available.[rsquo][rdquo] Why does the DFP not simply, clearly, and unequivocally incorporate or re-state the full R1-SQS? As it stands, the Regional Forester may arbitrarily re-write the R1-SQS, without a NEPA process.

FW-STD-SOIL-01 is weaker that the R1-SQS in multiple ways. For one, the DFP would set these limits on soil damaging activities only for [ldquo]Vegetation management activities[rdquo] whereas the R1-SQS included [ldquo]new activities[rdquo] generally. FW-STD-SOIL-01 and FW-STD-SOIL-02 DFP omit some of soil damage the R1-SQS recognizes as [ldquo]detrimental soil conditions[rdquo] for example, burned soil conditions. The DFP also fails to explain what is meant by, [ldquo]move toward improvement[rdquo] or [ldquo]long-term trend towards continued improvement[rdquo] in these contexts.

Also, the Forest Service fails to clearly state how detrimental soil conditions can actually be measured, based upon the weak definition of detrimental soil conditions in the DFP Glossary. If the Forest Plan is to be adopting formal assessment methodology, it must explicitly state so.

FW-GDL-SOIL-05 states, [ldquo]The use of ground-based equipment for timber harvesting or temporary road construction should be avoided in areas of high landslide potential to maintain land stability and improve operator safety.[rdquo] How [ldquo]high landslide potential[rdquo] is to be assessed is only explained in terms of past landslide events[mdash]not simply the existing risky geology.

The purpose of FW-GDL-SOIL-07 is [ldquo]To maintain the productivity of conifer stands[hellip][rdquo] Also, [ldquo]Table 1 identifies minimum levels of coarse woody debris to be retained after timber harvesting in vegetation management units[hellip][rdquo] However, the only requirement for size of CWD is [ldquo]mainly

[hellip]the largest[rdquo] which is too vague to monitor or enforce. Also, distribution is to be[mdash]similarly vaguely[mdash][ldquo]60% or more of each treatment unit at or above CWD minimum.[rdquo] Although this suggests percentages, it doesn[rsquo]t state what is to be measured so as to be put in a formula for calculation of the percentages.

The DFP and Assessment also fail to disclose the scientific controversy surrounding proper design of soil standards. The Custer and Gallatin NFs adopted the current Region 1 Soil Quality Standards in 1999. USDA Forest Service, 2016a states that the R1-SQS [ldquo]created the concept of [lsquo]Detrimental Soil Disturbance[rsquo] (DSD) for National Forests in Region One as a measure to be used in assessing potential loss of soil productivity resulting from management activities.[rdquo] USDA Forest Service, 2016a explains:

Without maintaining land productivity, neither multiple use nor sustained (yield) can be supported by our National Forests. Direct references to maintaining productivity are made in the Sustained Yield Act [ldquo][hellip]coordinated management of resources without impairment of the productivity of the land[rdquo] and in the Forest and Rangeland Renewable Resources Act [ldquo][hellip]substantial and permanent impairment of productivity must be avoided[rdquo].

Soil quality is a more recent addition to Forest Service Standards. The Forest and Rangeland Renewable Resources Act (1974) appears to be the first legal reference made to protecting the [ldquo]quality of the soil[rdquo] in Forest Service directives. Although the fundamental laws that directly govern policies of the U.S. Forest Service clearly indicate that land productivity must be preserved, increasingly references to land or soil productivity in Forest Service directives were being replaced by references to soil quality as though soil quality was a surrogate for maintaining land productivity. This was unfortunate, since although the two concepts are certainly related, they are not synonymous.

Our understanding of the relationship between soil productivity and soil quality has continued to evolve since 1974. Amendments to the Forest Service Manual, Chapter 2550 [ndash] Soil Management in 2009 and again to 2010 have helped provide some degree of clarity on this issue and acknowledged that the relationship is not as simple as originally thought. The 2009 (2500-2009-1) amendment to Chapter 2550 of the Forest Service Manual states in section 2550.43-5, directs the Washington Office Director of Watershed, Fish, Wildlife, Air and Rare plants to [ldquo]Coordinate validation studies of soil quality criteria and indicators with Forest Service Research and Development staff to ensure soil quality measurements are appropriate to protect soil productivity[rdquo] (USFS-FSM 2009). Inadvertently this directive concedes that the relationship between soil productivity and soil quality is not completely understood. In the end, the primary objective provided by National Laws and Directives relative to the management of Forest Service Lands continues to be to maintain and where possible potentially improve soil productivity.

(Emphases added.) On this same theme, neither the DFP nor Assessment disclose that the 15% DSD areal extent limit is based on feasibility of timber sale implementation rather than concerns over soil productivity. Discussing the R1-SQS, USDA Forest Service, 2008a explains:

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.)

However, Powers refers to separate and distinct thresholds when he discusses 15% increases in bulk density, which is a threshold of when soil compaction is considered to be detectable, and 15% areal limit for detrimental disturbance, which is the soil quality standard limit for DSD (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 had to say in relation to the soil quality standard is quite revealing (as pointed out by 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[hellip] (A)pplying the 15% areal limit for detrimental damage is not correct... that was never the intent of the 15% limit[hellip] and NFMA does not say that we can create up to 15% detrimental conditions, it says basically that we cannot create significant or permanent impairment, period (Emphases added.)

USDA Forest Service 2008b states, [ldquo]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.[rdquo] (Emphasis added.) So the R1-SQS limits are based on feasibility of ground-based logging methodology implementation rather than concerns over soil productivity; and additionally we have the bulk density increase limit is based upon the limitations of detection by Forest Service measuring methods[mdash]again, not concerns over soil productivity.

So the soil quality standards allow 15% of an activity area to be DSD over the long term. The Forest Service claims this is consistent with NMFA and regulations. This is arbitrary, and not supported by any science measuring or estimating the losses in soil, site or land productivity expected under this management regime. 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. [hellip]Application of selected USDA Forest Service standards indicate that blanket threshold variables applied over disparate soils do not adequately account for nutrient distribution within the profile or forest floor depth. These types of guidelines should be continually refined to reflect pre- disturbance conditions and site-specific information. (Emphases added.)

Nineteen years later, the Forest Service can cite no science supporting their application of blanket threshold variables applied over disparate soils.

Soil productivity can only be protected if it turns out that the soil standards work. To determine if they work, the Forest Service would have to undertake objective, scientifically sound measurements of what the soil produces (grows) following management activities. But the Assessment and DEIS don[rsquo]t cite such science.

FW-STD-SOIL-01would allow up to 15% soil impairment in the managed, otherwise productive portion of the forest[mdash]and this doesn[rsquo]t even include permanent features where soil productivity has been completely obliterated to serve uses, such as system roads and permanent log landings. To date, the Forest Service has failed to address these implications in terms of consistency with sustained yield mandates.

Whereas Desired Conditions include [ldquo]soil crusts are found on almost all soil types[rdquo] in grasslands and shrublands, nothing in the direction for soils actually protects these critical biological crusts.

What does it mean to decommission skid trails, landings, and burn pile scars? What treatment methods have been demonstrated to improve soil productivity and quality on each of the categories of disturbed sites?

We return now to proper implementation of the soil standards. Neither the Assessment nor the DEIS cite the results of forest plan implementation monitoring to verify a central DFP assumption[mdash]that the soil quality standards would adequately limit soil damage. Reeves et al.,

2011 found highly variable results, including around 30% DSD from summer or fall ground- based harvesting (a violation of the R1-SQS) on the Lewis and Clark NF. On the Helena NF, [ldquo]Areal extent of DSD from ground-based logging was 9.4%, and from skyline logging it was 2.0%.[rdquo] These are based upon small sample sizes for those two National Forests, but the aggregate results show highly irregular compliance across Region 1 NFs.

SCIENTIFIC INTEGRITY

The DFP indicates the body of science the Forest Service used to date, to comply with 2012 Planning Rule requirements, are publications lists in the Assessment and DEIS. Under [ldquo]Best Available Science[rdquo] it states:

The 2012 Planning Rule requires the responsible official to use the best available scientific information to inform the development of the proposed plan, including plan components, the monitoring program, and plan decisions. The foundation from which the plan components were developed for the proposed action was provided by the Assessment Report of Ecological, Social, and Economic Conditions on the Custer Gallatin National Forest (February 2017) and associated resource reports, and the best available scientific information and analyses therein. From this foundation, resource specialists used a number of resources that included peer-reviewed and technical literature, databases and data management systems, and modeling tools and approaches. Geographic information system data and product precision may vary, but provide a sufficient depiction for purposes of the proposed action. Resource specialists considered what is most accurate, reliable, and relevant in their use of the best available scientific information.

What the Forest Service believes is best available scientific information (BASI) will change, evolve, and be

supplemented up until the forest plan revision Record of Decision is signed, and that the BASI will then be found in the Planning Record. Since forest plans under the [ldquo]adaptive management[rdquo] regime of the 2012 Planning Rule may potentially be amended or revised in response to new situations, monitoring results, or newly developed scientific information, atwhat point will the Forest Service add to existing BASI and how will the public be notified?

And since project-level analyses will likely result in still more scientific information being considered, will literature cited in project-level NEPA documents also become a part of thePlanning Record BASI?

Unlike the Assessment documents, the Draft Forest Plan and its Appendices, and the Draft EIS and its Appendices, the scientific literature thus far identified as [ldquo]Best Available Scientific Information (BASI)[rdquo] is not available on the CGNF Forest Plan Revision website. Reviewers and members of the public are therefore limited in their ability to judge how well the Forest Service has interpreted the scientific literature it has cited.

Also, some of what the DFP states in the above quoted paragraph is unclear. Are any of the [ldquo]databases and data management systems, and modeling tools and approaches[rdquo] referred to in the above DFP paragraph also included as BASI?

We ask that all BASI the Forest Service relies upon be placed on the Revision website as soon as possible, and maintained there as a matter of public record and access as long as the revised forest plan is being designed and implemented. We also request that all scientific references and other documents submitted as part of comments during this and previous CGNF revision comment periods be placed on the website.

These are important question because science is an ever-evolving process, and fully informed decisions and sound management are only possible when managers and agency specialists are kept up to date.

[ldquo](O)ne study (Wilson and Seney 1994) found that horseback and hikers made more sediment available than either motorcycles or off-road bicycles. This study lacked the rigor and statistical significance to prove these findings[hellip][rdquo] Why does the DEIS cite a study the FS believes is misleading? More importantly, has the CGNF evaluated ALL of the scientific studies cited in Revision documents in the same manner as it did with Wilson and Seney 1994?

We request that the references cited in these comments be included as BASI for this revision process. If the Forest Service does not agree with any of these references being BASI, we ask that you provide an explanation, as the 2012 Planning Rule requires at 36 CFR [sect] 219.3.

We request that the Forest Service conduct a Science Consistency Review for this Forest Plan revision process, including the Assessment and DEIS analyses. The process of [ldquo]Science Consistency Review[rdquo] was designed by Forest Service scientists (Guldin et al. 2003, and Guldin et al. 2003b.) Guldin et al. 2003:

...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. (Emphasis added.)

In other words, the Forest Service can cite all the [ldquo]best available science[rdquo] it wants in preparing a forest plan or amendment, but it[rsquo]s another matter entirely whether or not such proposals are consistent with the cited science. Guldin et al., 2003 suggest the review ask and answer the following four questions:

1. Has applicable and available scientific information been considered?
2. Is the scientific information interpreted reasonably and accurately?
3. Are the uncertainties associated with the scientific information acknowledged and documented?
4. Have the relevant management consequences, including risks and uncertainties, been identified and documented?

Similarly, independent scientific review team Hayes, et al., 2011 conducted a [ldquo]Science Review of the United States Forest Service Draft Environmental Impact Statement for National Forest System Land Management.[rdquo] The reviewers considered the following three questions:

1. Does the information accurately reflect the current peer-reviewed scientific literature and understanding? If not, what is missing or incorrectly presented?
2. Based on the current peer-reviewed scientific literature and understanding: does the documentation on environmental effects adequately respond to levels of uncertainty and limitations? If not, please describe what is missing or incorrect, and how the documentation can be improved.
3. What, if any, differing viewpoints should be included that are not mentioned in the DEIS regarding the effects of alternatives on climate change, restoration and resilience, watershed and water protection, diversity of plants and animal communities, sustainable use of public lands to support vibrant communities, forest threats, and monitoring.

Nie and Schembra, 2014 recommend that the agency solicit independent feedback on it use of science:

The 1997 (Tongass National Forest) Plan was written using an innovative process whereby scientists within the Pacific Northwest Research Station (an independent research arm of the USFS) were assembled into risk assessment panels [ldquo]to assist decisionmakers in interpreting and understanding the available technical information and to predict levels of risk for wildlife and fish, old growth ecosystems, and local socioeconomic conditions resulting from different management approaches.[rdquo]172 In this case, [ldquo]science consistency checks[rdquo] were used as a type of audit to ensure that the policy and management branch writing the Tongass Plan could not misrepresent or selectively use information in ways not supported by the best available science. The process, at the very least, facilitated the consideration of best available science when writing the Tongass Plan, even if parts of the Tongass Plan were based on factors going beyond science.

Also, in response to an appeal of its 1997 forest plan revision, the Black Hills National Forest was directed by the Forest Service Washington Office to re-evaluate their Revised Forest Plan for its ability to meet diversity and viability requirements set in existing laws, and correct any deficiencies. Forest Service biologists [ldquo]interviewed accredited scientific experts to obtain information on Region 2 sensitive species for use during the Phase I Amendment[rdquo] in order to remedy deficiencies in their revised forest plan. (USDA Forest Service 2000b.) Similarly, the Boise National Forest consulted with an independent scientist to review portions of their [ldquo]Wildlife Conservation Strategy[rdquo] proposed to amend their revised forest plan. And a Science Consistency Review was undertaken by the Forest Service in the process of designing the Sierra Nevada Forest Plan Amendments.

The DFP indicates the analyses discussed in the terrestrial vegetation section rely on the analytical model, SIMPPLLE. The Forest Service must conduct a peer review process to validate (or reject) the use of that and all other models it utilizes.

Given the importance and potentially controversial nature of the Revised Forest Plan, it is incumbent upon the Forest Service to undertake a Science Consistency Review process.

A scientist from the Forest Service[rsquo]s Rocky Mountain Research station, Ruggiero, 2007 stated, [ldquo]Independence and objectivity are key ingredients of scientific credibility, especially in research organizations that are part of a natural resource management agency like the Forest Service.

Credibility, in turn, is essential to the utility of scientific information in socio-political processes.[rdquo] So Forest Service itself recognizes there is a fundamental need to demonstrate the proper use of scientific information, in order to overcome issues of decisionmaking integrity that arise from bureaucratic rigidity and political pressure.

Sullivan et al., 2006 also discuss the dangers of the [ldquo]Politicization of Science[rdquo]:

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.

Ruggiero, 2007 points out that the Forest Service[rsquo]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[rsquo]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, [ldquo]Everyone has a hired gun[hellip]they are not credible[hellip]and we need you guys [Forest Service Research] to be credible.[rdquo]

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

R&D function as a separate entity [hellip] with clear accountability through a system that maintains scientific freedom[hellip][rdquo] (Emphasis added).

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 [ldquo]independent[rdquo] 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).

Darimont, et al., 2018 advocate for more transparency in the context of government conclusions about wildlife populations, stating:

Increased scrutiny could pressure governments to present wildlife data and policies crafted by incorporating key components of science: transparent methods, reliable estimates (and their associated uncertainties), and intelligible decisions emerging from both of them.

Minimally, if it is accepted that governments may always draw on politics, new oversight by scientists would allow clearer demarcation between where the population data begin and end in policy formation (Creel et al. 2016b;

Mitchell et al. 2016).

Undeniably, social dimensions of management (i.e., impacts on livelihoods and human[ndash] wildlife conflict) will remain important. (Emphasis added.)

In a news release accompanying the release of that paper, the lead author states:

In a post-truth world, qualified scientists are arm[rsquo]s length now have the opportunity and responsibility to scrutinize government wildlife policies and the data underlying them. Such scrutiny could support transparent, adaptive, and ultimately trustworthy policy that could be generated and defended by governments. (Emphasis added.)

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

Peer review.[mdash]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 which:

...does not typically receive an independent peer review but which may be reviewed in- house, that is, within the author[rsquo]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.

Agency expert opinion and gray literature the Forest Service relied upon thus far is not necessarily the same as [ldquo]the best scientific information[rdquo] 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 [ldquo]science under siege[rdquo] (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:

*
* A clear statement of objectives;
* A conceptual model, which is a framework for characterizing systems, stating assumptions, making predictions, and testing hypotheses;
* A good experimental design and a standardized method for collecting data;
* Statistical rigor and sound logic for analysis and interpretation;
* Clear documentation of methods, results, and conclusions; and
* Peer review.

The Forest Service has not disclosed the reliability of all the data used as input for the models used in planning process, or for design of Desired Conditions and other Forest Plan Elements. Since [ldquo]an instrument[rsquo]s data must be reliable if they are valid[rdquo] (Huck, 2000) this means the data

must accurately measure that aspect of the world it is claimed to measure, or else the data are unreliable. Huck, 2000 states:

The basic idea of reliability is summed up by the word consistency. Researchers can and do evaluate the reliability of their instruments from different perspectives, but the basic question that cuts across these various perspectives (and techniques) is always the same: [ldquo]To what extent can we say the data are

consistent?[rdquo] [hellip](T)he notion of consistency is at the heart of the matter in each case.

[hellip](R)eliability is conceptually and computationally connected to the data produced by the use of a measuring instrument, not to the measuring instrument as it sits on the shelf.

Beck and Suring, 2011 [ldquo]remind practitioners that if available data are poor quality or fail to adequately describe variables critical to the habitat requirements of a species, then only poor quality outputs will result. Thus, obtaining quality input data is paramount in modeling activities.[rdquo]

The DEIS indicates there are only 517 FIA plot locations on the entire CGNF, which is a very limited sample size statistically speaking. Please identify the specific conclusions the DEIS arrives at using FIA data that the Forest Service considers to be valid, in recognition of the limited amount of data.

The document, [ldquo]USDA-Objectivity of Statistical and Financial Information[rdquo] is instructional on the topic of data reliability.

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 Forest Service criticized a report provided by the plaintiffs, stating [ldquo](Its) purported [lsquo]statistical analysis[rsquo] reports no confidence intervals, standard deviations or standard errors in association with its conclusions.[rdquo]

As Huck (2000) states, the issue of [ldquo]standard deviations or standard errors[rdquo] that the Forest Service 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 [ldquo]standard deviations or standard errors[rdquo] and thus high reliability coefficients, which in turn provide the public and decisionmakers with an idea of how confident they can be in the conclusions drawn from the data.

The next level of scientific integrity is the notion of [ldquo]validity.[rdquo] As Huck, (2000) explains, the degree of [ldquo]content validity,[rdquo] or accuracy of the model or methodology is established by utilizing other experts.

This, in turn, demonstrates the necessity for utilizing the peer review process as we discuss above.

The validity of the various models utilized in the DEIS[rsquo]s analyses have, by and large, not been established for how the Forest Service utilizes them. No studies are cited which establishes their content validity, and no independent expert peer review process of the models has occurred.

Even if Forest Service data input to a model is reliable, that still leaves open the question of the validity of analysis methodologies, including models. In other words, are they scientifically appropriate for the uses for which the Forest Service is utilizing them? The Nez Perce- Clearwater NF[rsquo]s 2015 Clear Creek FEIS defines [ldquo]Model[rdquo] as [ldquo]A theoretical projection in detail of a possible system of natural resource relationships. A simulation based on an empirical calculation to set potential or outputs of a proposed action or actions.[rdquo] (G-14.)

From www.thefreedictionary.com :

Empirical [ndash] 1. a. Relying on or derived from observation or experiment: empirical results that supported the hypothesis. b. Verifiable or provable by means of observation or experiment: empirical laws. 2. Guided by practical experience and not theory, especially in medicine.

(Emphasis added.) So the Forest Service acknowledges that the models are [ldquo]theoretical[rdquo] in nature and by calling the models [ldquo]empirical[rdquo] implies that they are somehow based in observation or experiment that support the hypotheses of the models. That would be required, because as Verbyla and Litaitis (1989) assert, [ldquo]Any approach to ecological modelling has little merit if the predictions cannot be, or are not, assessed for their accuracy using independent data.[rdquo] This corresponds directly to the concept of [ldquo]validity[rdquo] as discussed by Huck, 2000: [ldquo](A) measuring instrument is valid to the extent that it measures what it purports to measure.[rdquo]

However, there is no evidence that the Forest Service has performed validation of the models for the way they were used to support the DEIS[rsquo]s analyses. There is no documentation of someone using observation or experiment to support the models[rsquo] inherent hypotheses. Ziemer and Lisle, 1993 state: [ldquo]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.[rdquo]

The DEIS states, regarding vegetation modeling used in revision analyses: [ldquo]Though best available information and knowledge is used to build these models, there is nevertheless a high degree of variability and uncertainty associated with the model results because of the ecological complexity and imperfect knowledge of system dynamics.[rdquo] Then the DEIS proceeds to justify irrationally (see emphasis in the following) use of the models, increasing not understanding but confusion: [ldquo]while model results provide a good indication of how

vegetation may change over time, they are most useful for assessing broad ranges of ecosystem characteristics under historic disturbance regimes (for example, estimating the natural range of variability) and for comparing relative effects among alternatives.[rdquo]

The DEIS does a fairly good job of acknowledging and disclosing the limitations and risky assumptions of the various models it uses for analyses. However, it fails to provide a good scientific justification for using the models anyway, such as providing the odds, perhaps in a Las Vegas sense, of the modeling results being accurate enough for the purposes for which they[rsquo]re being utilized.

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

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

A 2000 Northern Region forest plan monitoring and evaluation report (USDA Forest Service, 2000c) provides an example of the Forest Service itself acknowledging the problems of data that is old and incomplete, leading to the limitation of models the Forest Service typically uses for wildlife analyses. In that case, the Forest Service expert believed the data were unreliable and thus they properly questioned the validity of model use:

Habitat modeling based on the timber stand database has its limitations: the data are, on average, 15 years old; canopy closure estimates are inaccurate; and data do not exist for the abundance or distribution of snags or down woody material[hellip] .

A Kootenai NF project EIS (USDA Forest Service, 2007a) notes the limitations of modeling methodology the Forest Service has relied upon for wildlife analyses:

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 developed several criteria for rating modeling frameworks[mdash]that is, evaluating their validity. Three of their criteria are especially relevant to this discussion:

NEPA states that [ldquo]Accurate scientific analysis... (is) essential to implementing NEPA.[rdquo] And the NEPA regulations at 40 CFR [sect] 1502.24 ([ldquo]Methodology and scientific accuracy[rdquo]) 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 fails to comply with NEPA in terms of methodology, scientific accuracy, and scientific integrity.

WILDERNESS, RECOMMENDED WILDERNESS, WILDERNESS STUDY AREAS, AND ROADLESS AREAS

[ldquo]In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.[rdquo]

[mdash]The Wilderness Act of 1964

The DFP lacks solid direction to protect the Wilderness character of the Absaroka-Beartooth and Lee Metcalf Wildernesses. Currently groups of up to 25 head of stock (horses and mules) and 15 people are allowed in most areas, which degrades the wilderness character.

The revised forest plan must also prohibit fish stocking in naturally fishless wilderness lakes, which significantly alters the lake (and surrounding) natural conditions.

The revised forest plan must address the issue of human and pack animal fecal contamination of lakes and streams on the Beartooth Plateau in the Absaroka-Beartooth Wilderness. Eliminating fish stocking would likely go a long way toward solving this problem, but additional measures must be included if needed.

Vacant grazing allotments in the Wildernesses must be closed immediately, and other existing Wilderness allotments must be phased out, so these areas can return to a wild condition. The same should occur for Recommended Wilderness and all roadless areas.

The revised forest plan must not allow trail construction or reconstruction in areas of the Absaroka Beartooth and Lee Metcalf Wildernesses which currently lack trails. This provides remote areas for wildlife as well as premier areas for solitude.

AWR supports the wilderness recommendations in Alternative D; however, they must be improved by adding the entire 230,000 wild, roadless acres of the Gallatin Range as Recommend Wilderness in the final forest plan. AWR supports enacting the Northern Rockies Ecosystem Protection Act (NREPA), a bill that has been introduced into Congress numerous times. (https://allianceforthewildrockies.org/nrepa/) NREPA is the only comprehensive solution for protecting our national heritage which lies in the mountains, meadows, and rivers of the Northern Rocky Mountains.

NREPA will protect the invaluable ecosystems of the northern Rocky Mountains bio-region by creating biological corridors that connect existing wilderness and roadless areas.

NREPA-protected lands will stretch across almost 20 million acres of public domain in Idaho, Montana, Washington, Oregon, and Wyoming.

NREPA protects 1,810 miles of river headwaters, which feed three different oceans. Wild, Scenic and Recreational River designations will protect these rivers and safeguard ancient migration routes for numerous species of salmon, steelhead, and native trout. World-class rafting and boating opportunities will also be preserved while assuring steady flows of high quality water for downstream users.

The plan should prohibit all motorized and mechanized uses, and any other activities not consistent with Wilderness protection, in Recommended Wilderness and roadless areas so as to preserve their wilderness qualities until Congress acts on the wilderness recommendations.

The process the Forest Service used to evaluate roadless lands for potential wilderness recommendation is of concern. The criteria were not used properly. The Forest Service fails to consider and implement best available science. The Draft EIS for the Helena-Lewis and Clark National Forest plan revision states:

The best remaining trout habitat conditions are found in wilderness and unroaded landscapes (Hitt & Frissell, 2000; Kershner, Bischoff, & Horan, 1997; Rhodes, McCullough, & Espinosa, 1994; USDA, 1995b). Across the west, roadless areas tend to contain many of the healthiest of the few remaining populations of native trout, which are

crucial to protect (Kessler, Bradley, Rhodes, & Wood, 2001). Most of the recommended wilderness would be located in areas already designated inventoried roadless areas. These areas are a source of high quality water essential to the protection and restoration of native trout. The high quality habitats in roadless areas help native trout compete with non-native trout, because degraded habitats can provide non-natives with a competitive advantage (Behnke, 1992). Roadless areas tend to have the lowest degree of invasion of non-native salmonids (Huntington, Nehlsen, & Bowers, 1996). Areas of low road density also act as the foundation for the needed restoration of larger watersheds.

The DEIS fails to disclose all the benefits to wildlife, water, fish, soil, recreation, climate stability, and local communities attributable to an alternative with maximum acreage of land recommended for Wilderness protection.

Undeveloped natural lands provide numerous ecological benefits. They safeguard biodiversity, enhance ecosystem representation, facilitate connectivity (Loucks et al., 2003; The Wilderness Society, 2004; Strittholt and DellaSala, 2001; DeVelice and Martin, 2001), and provide high quality or undisturbed water, soil, and air resources (Anderson et al. 2012; DellaSala et al., 2011). They also serve as ecological baselines to facilitate better understanding of our impacts to other landscapes (Arcese and Sinclair, 1997).

Numerous articles in the scientific literature similarly recognize the contribution of roadless and undeveloped lands to biodiversity, connectivity, and conservation reserve networks. For example, Loucks et al. 2003 examined the potential contributions of roadless areas to the conservation of biodiversity, and found that more than 25% of Inventoried Roadless Areas (IRAs) are located in globally or regionally outstanding ecoregions and that 77% of IRAs have the potential to conserve threatened, endangered, or imperiled species. Arcese and Sinclair (1997) highlight the contribution that IRAs could make toward building a representative network of conservation reserves in the United States, finding that protecting those areas would expand eco-regional representation, increase the area of reserves at lower elevation, and increase the number of large, relatively undisturbed refugia for species. Crist et al., 2005 looked at the ecological value of roadless lands in the Northern Rockies and found that protection of national forest roadless areas, when added to existing federal conservation lands in their study area, would: 1) increase the representation of virtually all land cover types on conservation lands at both the regional and ecosystem scales, some by more than 1000%; 2) help protect rare, species- rich, and often-declining vegetation communities; and 3) connect conservation units to create bigger and more cohesive habitat patches. Roadless lands also provide high quality water and watersheds. Anderson et al., 2012 assessed the relationship of watershed condition and land management status, and found a strong spatial association between watershed health and protective designations. DellaSala et al., 2011 found that undeveloped and roadless watersheds are important for supplying downstream users with high-quality drinking water, and that developing those watersheds comes at significant costs associated with declining water quality and availability.

Scientific research articulates a multitude of reasons why remaining roadless areas should be protected. Roadless areas can be used as benchmarks for assessing the ecological integrity (e.g. genes, species, and assemblages) and processes (e.g., pollination, demography, biotic

interactions, nutrient and energy dynamics, and metapopulation processes) expected in natural habitats (see Karr and Chu, 1995, Pimentel 2000). The species-rich native communities found in roadless areas are more

likely to withstand invasions (Gelbard and Harrison, 2005). Planning is predicated on conserving a sufficient number of ecosystem replicates within protected areas in order to meet representation targets fundamental to conservation of species and ecological sustainability (Noss and Cooperrider, 1994). The Forest Service would advance ecosystem representation targets by solidifying protection for roadless areas (Strittholt and DellaSala 2001), a goal issued at the international level by both the Millennium Ecosystem Assessment, 2005 and the Convention on Biological Diversity (United Nations Environmental Programme, 2002).

Roadless areas contribute disproportionately to landscape and regional connectivity (Strittholt and DellaSala, 2001), a critical component of adaptation strategies for climate change, and should be protected as climate refugia.

Scientific research notes that unroaded areas provide important undisturbed habitat for numerous forest-dependent species of concern. The importance of such areas is not appreciably diminished by the vanishing evidence of limited levels of prior management. In such areas natural disturbance processes are the dominant factors influencing forest succession and habitat dynamics, and therefore exhibit a high capacity for self-recovery.

Virtually without exception, comparative scientific studies find that ecological integrity remains highest in areas that remain unroaded and unmanaged and is lowest in areas that have been roaded and managed. As the density of roads increases, aquatic integrity and wildlife security decreases, while the risk of catastrophic wildfire and the occurrence of exotic weeds increases. The simplest and most cost-effective thing the Forest Service can do to maintain and restore aquatic and ecosystem integrity is to stop building roads and to obliterate in an environmentally sound manner as many roads as possible. This conclusion is supported by the following:

Much of this [overly dense forest] condition occurs in areas of high road density where the large, shade-intolerant, insect-, disease- and fire-resistant species have been harvested over the past 20 to 30 years Fires in unroaded areas are not as severe as in the roaded areas

because of less surface fuel, and after fires at least some of the large trees survive to produce seed that regenerates the area. Many of the fires in the unroaded areas produce a forest structure that is consistent with the fire regime, while the fires in the roaded areas commonly produce a forest structure that is not in sync with the fire regime..... In general,

the effects of wildfires in these areas are much lower and do not result in the chronic sediment delivery hazards exhibited in areas that have been roaded. (USFS 1997a, pages 281-282).

The U.S. Fish and Wildlife Service... found that bull trout are exceptionally sensitive to the

direct, indirect, and cumulative effects of roads. Dunham and Rieman... demonstrated that

disturbance from roads was associated with reduced bull trout occurrence. They concluded that conservation of bull trout should involve protection of larger, less fragmented, and less disturbed (lower road density) habitats to maintain important strongholds and sources for naturally recolonizing areas where populations have been lost. (USFS, 2000.)

Hitt and Frissell.... showed that over 65% of waters that were rated as having high aquatic

biological integrity were found within wilderness-containing subwatersheds.... Trombulak

and Frissell concluded that ...the presence of roads in an area is associated with negative effects for both terrestrial and aquatic ecosystems including changes in species composition and population size. (USFS, 2000 pp 3-80, 81).

High integrity [forests] contain the greatest proportion of high forest, aquatic, and hydrologic integrity of all ... are dominated by wilderness and roadless areas [and] are the least altered by management..... Low integrity [forests have] likely been altered by past

management... are extensively roaded and have little wilderness. (USFS, 1996a, pp. 108,

115 and 116).

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. (USFS, 1996b page 105). This study suggests the general trend for the entire Columbia River basin is toward a loss in pool habitat on managed lands and stable or improving conditions on unmanaged lands. (McIntosh et al., 1994).

The data suggest that unmanaged systems may be more structurally intact (i.e., coarse woody debris, habitat diversity, riparian vegetation), allowing a positive interaction with the stream processes (i.e., peak flows, sediment routing) that shape and maintain high- quality fish habitat over time. (Id).

(A)llocate all unroaded areas greater than 1,000 acres as Strongholds for the production of clean water, aquatic and riparian-dependent species. Many unroaded areas are isolated, relatively small, and most are not protected from road construction and subsequent timber harvest, even in steep areas. Thus, immediate protection through allocation of the unroaded areas to the production of clean water, aquatic and riparian-dependent resources is necessary to prevent degradation of this high quality habitat and should not be postponed. (USFWS et al., 1995).

High road densities and their locations within watersheds are typically correlated with areas of higher watershed sensitivity to erosion and sediment transport to streams. Road density also is correlated with the distribution and spread of exotic annual grasses, noxious weeds, and other exotic plants. Furthermore, high road densities are correlated with areas that have few large snags and few large trees that are resistant to both fire and infestation of insects and disease. Lastly, high road densities are correlated with areas that have relatively high risk of fire occurrence (from human caused fires), high hazard ground fuels, and high tree mortality. (USFS, 1996b page

85). These findings indicate that roadless areas in general will take adequate care of themselves if left alone and unmanaged, and that concerted reductions in road densities in already roaded areas are absolutely necessary.

Indeed, other studies conducted by the Forest Service indicate that efforts to [ldquo]manage[rdquo] our way out of the problem are likely to make things worse. By [ldquo]expanding our efforts in timber harvests to minimize the risks of large fire, we risk expanding what are well established negative effects on streams and native salmonids..... The perpetuation or expansion of existing road networks and

other activities might well erode the ability of [fish] populations to respond to the effects of large scale storms and other disturbances that we clearly cannot change.[rdquo] (Reiman et al., 1997).

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

A growing number of scientific studies indicate the significant value of roadless areas between 1,000 acres and 5,000 acres. (Strittholt and DellaSala, 2001; DeVelice and Martin 2001; Loucks et al. 2003; Crist et al. 2005; Nott et al. 2005). And in a letter to the President urging the protection of roadless areas, 136 scientists noted:

There is a growing consensus among academic and agency scientists that existing roadless areas[ndash]irrespective of size[ndash]contribute substantially to maintaining biodiversity and ecological integrity on the national forests. The Eastside Forests Scientific Societies Panel, including representatives from the American Fisheries Society, American Ornithologists[rsquo] Union, Ecological Society of America, Society for Conservation Biology, and The Wildlife Society, recommended a prohibition on the construction of new roads and logging within existing (1) roadless regions larger than 1,000 acres, and (2) roadless regions smaller than 1,000 acres that are biologically significant[hellip]. Other scientists have also recommended protection of all roadless areas greater than 1,000 acres, at least until landscapes degraded by past management have recovered[hellip]. As you have acknowledged, a national policy prohibiting road building and other forms of development in roadless areas represents a major step towards balancing sustainable forest management with conserving environmental values on federal lands. In our view, a scientifically based policy for roadless areas on public lands should, at a minimum, protect from development all roadless areas larger than 1,000 acres and those smaller areas that have special ecological significance because of their contributions to regional landscapes. (Scientists Roadless letter, 1997; emphases added.)

There is strong consensus among land managers, and within the independent scientific community, that these

small roadless areas serve as refugia for many species of wildlife, and wild fishes. Furthermore, they can act as biological corridors between larger pieces of undisturbed habitat islands.

Roadless areas as small as 1000 acres in size are extremely important to fisheries:

These [unroaded] areas [over 1000 acres] may be extremely important to Bulltrout and other Inland Fishes..... Failure to protect these areas until we have [some insight into what

the effects of entry might be] will hasten the listing of inland fishes. (U. S. Fish and Wildlife Service, 1996.) Recent scientific literature emphasizes the importance of unroaded areas greater than 1,000 acres as strongholds for the production of fish and other aquatic and terrestrial species, as well as sources of high quality water. (Henjum et al. 1994; Rhodes et al. 1994.)

For successful Section 7 ESA consultation, the ICBEMP [Interior Columbia Basin Ecosystem Management Project] should allocate all unroaded areas greater than 1,000 acres as Strongholds for the production of clean water, aquatic and riparian-dependent species. Many unroaded areas are isolated, relatively small, and most are not protected from road construction and subsequent timber harvest, even in steep areas. Thus, immediate protection through allocation of the unroaded areas to the production of clean water, aquatic and riparian-dependent resources is necessary to prevent degradation of this high quality habitat and should not be postponed [until after further analysis]. (USFWS, NMFS and EPA, Advance Draft Aquatic Conservation Strategy, submitted to the ICBEMP November 8, 1995, page 5)

(S)mall fragments of roadless areas in the watershed serve as the anchor points for restoring riparian vegetation, water quality, and fish habitat. (Anderson et al. 1993.)

The Regional Directors of the Environmental Protection Agency, the National Marine Fisheries Service and the Fish and Wildlife Services also stated in a letter to the Executive Steering Committee of ICBEMP, October 26, 1995:

A review of the designated land-use allocation at the Columbia Basin level is essential to focus management on aquatic and riparian-dependent species conservation to meet the legal obligations under the Clean Water Act (CWA), Endangered Species Act (ESA), National Forest Management Act, and Federal Land Policy and Management Act (FLPMA) We strongly support preservation of existing roadless areas greater than

1000 acres within FS/BLM lands..... for aquatic resource conservation.

Obviously, there is overwhelming scientific support for the protection of smaller roadless areas due to the biological uniqueness of these areas and because of the extensive ecological damage caused by roads and road building.

The overwhelming public sentiment expressed in public comments on the National Roadless Rule was to maintain the wild character of these areas. There is no rational reason to manage any of the Roadless Areas in any manner that would reduce their Wilderness character and therefore diminish the chances that Congress would designate them under the Wilderness Act.

A major flaw in the roadless inventory process, which carried over into the Roadless Rule EIS process, is that the agency refused to look much beyond the stale, out-of-date roadless inventories in the 1986 Forest Plans.

The revised Forest Plan must include a Standard requiring roadless area boundaries be re- evaluated and updated during site-specific project NEPA analyses, utilizing standard procedures, in order to evaluate unroaded areas contiguous with Inventoried Roadless Areas, Wilderness Study Areas, or designated Wilderness for their Wilderness character and eligibility for Wilderness designation. This would be consistent with Region One policy concerning the [ldquo]Roadless Expanse[rdquo] in Region 1 document [ldquo]Our Approach to Roadless Area Analysis of Unroaded Lands Contiguous to Roadless Areas[rdquo] (12/2/10). That document is based on judicial history regarding the Roadless Area Conservation Rule. It states that [ldquo]projects on lands contiguous to roadless areas must analyze the environmental consequences, including irreversible and irretrievable commitment of resources on roadless area attributes, and the effects for potential designation as wilderness under the Wilderness Act of 1964. This analysis must consider the effects to the entire roadless expanse; that is both the roadless area and the unroaded lands contiguous to the roadless area.[rdquo] (Emphasis added.)

The DEIS conflicts with the 2015 Chapter 70 directive which clearly recognizes criteria (at 71.1) for including areas in the revision roadless inventory which may not necessarily be within past or current roadless inventories, for possibly being recommended for wilderness at the conclusion of the forest plan revision process. As the directive states at section 71, [ldquo]The inventory is intended to be reasonably broad and inclusive, based on the inventory criteria set out in this section and additional information provided to the Responsible Official through the required opportunities for public and government participation (sec. 70.61 of this Handbook).[rdquo]

Longstanding case law from the Ninth Circuit Court of Appeals also directs the Forest Service to analyze the wilderness characteristics of uninventoried roadless lands.

The DEIS fails to consider the wide body of research revealing that counties adjacent to Wilderness areas and National Parks show better economic sustainability than counties heavily reliant upon resource extraction. This skewed use of science violates NEPA.

Multiple lawsuits over proliferation of machines in Wilderness Study Areas reveal the Forest Service has failed to anticipate and respond correctly to the technological evolution of ATVs, snowmobiles, and other over-snow machines. [ldquo]Valid existing uses[rdquo] in Recommended Wilderness that are nonconforming under the Wilderness Act must be subject to a forest plan Standard that prohibits them, or removes them where they exist.

WILD AND SCENIC RIVERS

In enacting the Wild and Scenic Rivers Act (Act), Congress envisioned a robust network of protected river corridors in adopting the following national policy:

(C)ertain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in

their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

So the CGNF revision process should err on the side of protecting these environments for current and future generations, in as natural a condition as possible.

The Act recognizes that some streams or rivers now showing signs of development may still be eligible: [ldquo]The existence [hellip]of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion in the national wild and scenic rivers system shall not automatically bar its consideration for such inclusion.[rdquo] Although the term [ldquo]minor[rdquo] is subjective, we believe the policy as stated in the Act requires erring on the side of caution[mdash]not simply eliminating streams currently exhibiting impacts.

Existing uses in Wild and Scenic Rivers, potential Wild and Scenic Rivers, and their river corridors that are/would be nonconforming under the Wild and Scenic Rivers Act must be subject to a forest plan Standard that prohibits them, or removes them where they exist.

Also, the Forest Service must anticipate and respond correctly to technological advances with watercraft, which potentially affect the wild character of designated and potential Wild and Scenic Rivers.

AN ECOLOGICAL/BIOCENTRIC FOREST PLAN

The revision process is not consistent with NEPA[rsquo]s mandate to fully consider a wide range of management alternatives. The limited range of alternatives considered is clearly illustrated in the DFP admission, [ldquo]The majority of plan components do not differ by alternative.[rdquo]

The differences between the DEIS revision alternatives are merely superficial, which is a violation of NEPA.

Management actions would for all intents and purposes be directed by the political whims reflected in Congressional budget allocations, by local politicians, and by other entities with vested financial interests. Citizens whose legitimate public interests contrast with those of the political and financially vested would have little recourse, except in rare cases where it can be easily shown that other environmental laws are being violated. Land managers and members of project interdisciplinary teams, who would by far hold the most sway against political and financial interests during Forest Plan design and implementation have, unfortunately, little career incentive to intervene on behalf of other values, and much incentive to go along with unsustainable resource extraction. And as discussed below, the DEIS reflects this [ldquo]go along[rdquo] attitude, as seen with how science is applied selectively and in a very biased manner, and how logic and reason are often left on the wayside in the analyses for the various resources.

We propose, for full analysis in a Supplemental Draft EIS, an Ecological/Biocentric Forest Plan informed by sound scientific principles and sets a positive future for the CGNF, one which emphasize the outstanding wild, natural and appropriate recreational values for this remarkable place. It would also take advantage of the opportunity to create economic benefits through citizen appreciation of nature while providing genuine restoration work such as road decommissioning.

Each of the alternatives currently featured in the DEIS can be conceptualized as being from the Industrial/Anthropocentric paradigm, as described by Wuerthner, 2006a:

*
* Views fire as a threat
* Thinks in terms of utility (use and exchange value)
* Takes a narrow/specialist view
* Considers the short term
* Promotes the welfare of individuals
* Has a simplistic understanding of how natural systems function
* Sees natural processes as mechanical and able to be controlled
* Ignores extinction
* Advocates biologically unsustainable solutions
* Holds human cleverness to be the measure of the appropriateness of any action

In contrast, the philosophy and worldview defining our proposed alternative is [ldquo]Ecological/Biocentric[rdquo] (Id):

*
* Sees fire as an integral part of the ecosystem
* Thinks in terms of intrinsic worth (existence is valued for its own sake)
* Takes a wide/holistic view
* Considers the long term
* Promotes the public welfare
* Has a nuanced understanding of the complexity of natural systems
* Recognizes that nature operates beyond human control
* Considers species extinction to be a critical issue.

* Advocates biologically sustainable solutions
* Holds nature[rsquo]s wisdom to be the measure of the appropriateness of any action

An Ecological/Biocentric Forest Plan does not mean no management, nor would it institute a total [ldquo]hands off[rdquo] approach to management, or end all commercial uses entirely. Instead, it would reduce such uses to levels that are truly sustainable, based upon independently peer-reviewed scientific analyses.

An Ecological/Biocentric Forest Plan would replace the DFP[rsquo]s Desired Conditions by focusing on natural processes as the creators of Desired Conditions rather than their being instituted artificially. What the Forest Service has promoted with its DFP is the human control of the forest ecosystem through mechanical means in order to maintain unnatural stasis by eliminating, suppressing or altering natural disturbances such as wildfire, to facilitate the extraction of commercial resources for human use.

Ecological resilience, which the DEIS implies the agency is instituting, is not the absence of natural disturbances like wildfire or beetle kill, rather it is the opposite (DellaSala and Hanson, 2015, Chapter 1, pp. 12-13).

Ultimately the DEIS and DFP reflect an overriding bias favoring resource extraction via [ldquo]management[rdquo] needed to [ldquo]make progress toward[rdquo] selected Desired Conditions, such as a certain

numbers, species, and sizes/ages of trees and snags, along the way neglecting many other structures and compositional features, and especially the ecological processes ([ldquo]function[rdquo]) driving these ecosystems. Essentially the Forest Service rigs the game, as many Desired Conditions would only be achievable by resource extractive activities. But since Desired Conditions must be maintained through repeated management/manipulation the management paradigm would be at odds with natural processes[mdash]the real drivers of the ecosystem.

McClelland (undated) criticizes the aim to achieve desired conditions by the use of mitigation measures calling for retention of specific numbers of certain habitat structures:

The snags per acre approach is not a long-term answer because it concentrates on the products of ecosystem processes rather than the processes themselves. It does not address the most critical issue[mdash]long-term perpetuation of diverse forest habitats, a mosaic pattern which includes stands of old-growth larch. The processes that produce suitable habitat must be retained or reinstated by managers. Snags are the result of these processes (fire, insects, disease, flooding, lightning, etc.).

(Emphases added.) Wales, et al. 2007 modeled various potential outcomes of fire and fuel management scenarios on the structure of forested habitats in northeast Oregon. They projected that the natural disturbance scenario resulted in the highest amounts of all types of medium and large tree forests combined and best emulated the Natural Range of Variability for medium and large tree forests by potential vegetation type after

several decades. Restoring the natural disturbances regimes and processes is the key to restoring forest structure and functionality similar to historical conditions.

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

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

In other words, the Desired Conditions the DFP relies upon must be evaluated in the context of how realistic[mdash]or even [ldquo]desirable[rdquo][mdash]achieving them really is in the context of rapidly changing climate.

Hayward, 1994 states:

Despite increased interest in historical ecology, scientific understanding of the historic abundance and distribution of montane conifer forests in the western United States is not sufficient to indicate how current patterns compare to the past. In particular, knowledge of patterns in distribution and abundance of older age classes of these forests in not available.

[hellip]Current efforts to put management impacts into a historic context seem to focus almost exclusively on what amounts to a snapshot of vegetation history[mdash]a documentation of forest conditions near the time when European settlers first began to impact forest structure. [hellip]The value of the historic information lies in the perspective it can provide on the potential variation[hellip] I do not believe that historical ecology, emphasizing static conditions in recent times, say 100 years ago, will provide the complete picture needed to place present conditions in a proper historic context. Conditions immediately prior to industrial development may have been extraordinary compared to the past 1,000 years or

more. Using forest conditions in the 1800s as a baseline, then, could provide a false impression if the baseline is considered a goal to strove toward.

The Forest Service[rsquo]s strategy of [ldquo]making progress toward[rdquo] Desired Conditions (e.g., resilience) basically focuses upon static conditions, instead of the natural dynamics of the ecosystem. An abundance of scientific evidence suggests that Desired Conditions conceptually be replaced with desired future dynamics, to align with best available science. Kauffman, 2004 states:

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.

Desired Conditions must be instead written as desired future dynamics in order to be consistent with the best available science. Hessburg and Agee (2003) for example, state:

Patterns of structure and composition within existing late-successional and old forest reserve networks will change as a result of wildfires, insect outbreaks, and other processes. What may be needed is an approach that marries a short-term system of reserves with a long-term strategy to convert to a continuous network of landscapes with dynamic properties. In such a system, late-successional and old forest elements would be continuously recruited, but would shift semi-predictably in landscape position across space and time. Such an approach would represent a planning paradigm shift from NEPA-like desired future conditions13, to planning for landscape-scale desired future dynamics.

(Emphasis added.) Likewise, Sallabanks et al., 2001 state:

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

(Emphasis added.) There is plenty of support in the scientific literature for such an approach. Noss 2001, for example, believes [ldquo]If the thoughtfully identified critical components and processes of an ecosystem are sustained, there is a high probability that the ecosystem as a whole is sustained.[rdquo] (Emphasis added.) Noss, 2001 describes basic ecosystem components:

Ecosystems have three basic components: composition, structure, and function. Together, they define biodiversity and ecological integrity and provide the foundation on which standards for a sustainable human relationship with the earth might be crafted.

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

Composition includes the kinds of species present in an ecosystem and their relative abundances, as well as the composition of plant associations, floras and faunas, and habitats at broader scales. We might describe the composition of a forest, from individual stands to watersheds and regions.

13 NEPA does not require specific analysis of [ldquo]desired future conditions.[rdquo] Thus it the authors are taken as referring to commonly included discussions of desired future conditions during the NEPA process.

Structure is the architecture of the forest, which includes the vertical layering and shape of vegetation and its horizontal patchiness at several scales, from within stands (e.g., treefall gaps) to landscape patterns at coarser scales. Structure also includes the presence and abundance of such distinct structural elements as snags (standing dead trees) and downed logs in various size and decay classes.

Function refers to the ecological processes that characterize the ecosystem. These processes are both biotic and abiotic, and include decomposition, nutrient cycling, disturbance, succession, seed dispersal, herbivory, predation, parasitism, pollination, and many others. Evolutionary processes, including mutation, gene flow, and natural selection, are also in the functional category.

(Emphasis added.) Hutto, 1995 also addresses natural processes, referring specifically to fire: Fire is such an important creator of the ecological variety in Rocky Mountain landscapes that the conservation of biological diversity [required by NFMA] is likely to be accomplished only through the conservation of fire as a process[hellip]Efforts to meet legal mandates to maintain biodiversity should, therefore, be directed toward maintaining processes like fire, which create the variety of vegetative cover types upon which the great variety of wildlife species depend.

(Emphasis added.) Noss and Cooperrider (1994) state:

Considering process is fundamental to biodiversity conservation because process determines pattern. Six interrelated categories of ecological processes that biologists and managers must understand in order to effectively conserve biodiversity are (1) energy flows, (2) nutrient cycles, (3) hydrologic cycles, (4) disturbance regimes, (5) equilibrium processes, and (6) feedback effects.

(Emphasis added.) The Environmental Protection Agency (1999) recognizes the primacy of natural processes: (E)cological processes such as natural disturbance, hydrology, nutrient cycling, biotic interactions, population dynamics, and evolution determine the species composition, habitat structure, and ecological health of every site and landscape. Only through the conservation of ecological processes will it be possible to (1) represent all native ecosystems within the landscape and (2) maintain complete, unfragmented environmental gradients among ecosystems.

(Emphasis added.) Forest Service researcher Everett (1994) states:

To prevent loss of future options we need to simultaneously reestablish ecosystem processes and disturbance effects that create and maintain desired sustainable ecosystems, while conserving genetic, species, community, and landscape diversity and long-term site productivity.

[hellip]We must address restoration of ecosystem processes and disturbance effects that create sustainable forests before we can speak to the restoration of stressed sites; otherwise, we will forever treat the symptom and not the problem. [hellip] One of the most significant management impacts on the sustainability of forest ecosystems has been the disruption of ecosystem processes through actions such as fire suppression (Mutch and

others 1993), dewatering of streams for irrigation (Wissmar and others 1993), truncation of stand succession by timber harvest (Walstad 1988), and maintaining numbers of desired wildlife species such as elk in excess of historical levels (Irwin and others 1993). Several ecosystem processes are in an altered state because we have interrupted the cycling of biomass through fire suppression or have created different cycling processes through resource extraction (timber harvest, grazing, fish harvest).

(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[ndash]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.) Further, Collins and Stephens (2007) suggest direction to implement restoring the process of fire by educating the public:

(W)hat may be more important than restoring structure is restoring the process of fire (Stephenson 1999). By allowing fire to resume its natural role in limiting density and reducing surface fuels, competition for growing space would be reduced, along with potential severity in subsequent fires (Fule and Laughlin 2007). As a result, we contend that the forests in Illilouette and Sugarloaf are becoming more resistant to ecosystem perturbations (e.g. insects, disease, drought). This resistance could be important in allowing these forests to cope with projected changes in climate. [hellip] Although it is not ubiquitously applicable, (wildland fire use) could potentially be a cost-effective and ecologically sound tool for [ldquo]treating[rdquo] large areas of forested land. Decisions to continue fire suppression are politically safe in the short term, but ecologically detrimental over the long term. Each time the decision to suppress is made, the risk of a fire escaping and causing damage (social and economic) is essentially deferred to the future. Allowing more natural fires to burn under certain conditions will probably mitigate these risks. If the public is encouraged to recognize this and to become more tolerant of the direct, near-term consequences (i.e. smoke production, limited access) managers will be able to more effectively use fire as a tool for restoring forests over the long term.

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

[ldquo](E)cological integrity[rdquo]: Angermeier and Karr (1994), and Karr (1991) define this as:

The capacity to support and maintain a balanced, integrated, and adaptive biological system having the full range

of elements and processes expected in a region[rsquo]s natural habitat. [ldquo][hellip]the ability to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region.[rdquo] That is, an ecosystem is said to have high integrity if its full complement of native species is present in normal distributions and abundances, and if normal dynamic functions are in place and working properly.

Hessburg and Agee, 2003 state [ldquo]Desired future conditions will only be realized by planning for and creating the desired ecosystem dynamics represented by ranges of conditions, set initially in strategic locations with minimal risks to species and processes.[rdquo]

Karr (1991) cites a definition of ecological integrity as [ldquo]the ability to support and maintain "a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region.[rdquo] Karr (1991) also cites a definition of ecological health: [ldquo]a biological system ... can be considered healthy when its inherent potential is realized, its condition is stable, its capacity for self-repair when perturbed is preserved, and minimal external support for management is needed.[rdquo] (Emphasis added.) The DEIS misses that last aspect of ecological health[mdash]specifically that it doesn[rsquo]t need management meddling.

Likewise Angermeier and Karr (1994) describe biological integrity as referring to [ldquo]conditions under little or no influence from human actions; a biota with high integrity reflects natural evolutionary and biogeographic processes.[rdquo]

An Ecological/Biocentric Forest Plan would reduce carbon emissions and promote climate stability by emphasizing carbon-storage in trees, down wood, and soils in the forest. An Ecological/Biocentric Forest Plan would reduce the use of motorized vehicles and fossil fuels.

An Ecological/Biocentric Forest Plan would protect all roadless areas so they maintain the characteristics necessary to be designated by Congress as Wilderness in the future. Motorized and mechanical transport would be prohibited.

An Ecological/Biocentric Forest Plan would protect all Recommended Wilderness, Wilderness, and Wilderness Study areas fully consistent with the Wilderness Act. All rivers designated or eligible for protection as Wild, Scenic, or Recreational would be protected fully consistent with the Wild and Scenic Rivers Act.

An Ecological/Biocentric Forest Plan would include a Standard requiring that, during site- specific project NEPA analyses, roadless area boundaries must be re-evaluated and updated, utilizing standard procedures, in order to evaluate unroaded areas contiguous with Inventoried Roadless Areas or Wilderness for their Wilderness character and eligibility for Wilderness designation.

An Ecological/Biocentric Forest Plan would maintain and/or restore the elements which characterize good native fish habitat and high water quality by including enforceable standards that protect clean and cold water and complex, connected and comprehensive habitats.

An Ecological/Biocentric Forest Plan would protect and restore soils, the building blocks for healthy tree and vegetation growth so vital for wildlife food and shelter by including meaningful and enforceable standards to protect soils as required by law.

An Ecological/Biocentric Forest Plan would curtail domestic livestock grazing so it does not negatively affect watersheds and fish habitat.

An Ecological/Biocentric Forest Plan would allow fire to perform its necessary ecosystem rejuvenating function over much of the forest, saving fire suppression costs markedly.

An Ecological/Biocentric Forest Plan would allow insects and disease to play their ecological functions.

An Ecological/Biocentric Forest Plan would allow natural recovery and restoration in areas damaged by past development practices.

An Ecological/Biocentric Forest Plan would protect all old-growth forest habitat and allow mature forests to develop old-growth characteristics such as large snags, down woody material and other habitat components so vital for dozens of native wildlife and bird species.

An Ecological/Biocentric Forest Plan would curtail clearcutting and other silvicultural prescriptions that leave large openings, which cause edge effects and fragment habitats across the landscape.

An Ecological/Biocentric Forest Plan would adopt enforceable standards informed by monitoring. Management activities which risk water and soil resources, wildlife habit or other ecological components would only be allowed if monitoring determines that current conditions are meeting standards and the activity won[rsquo]t degrade natural resources.

An Ecological/Biocentric Forest Plan would provide wildlife linkage corridors so that animals can move unimpeded across the landscape, facilitating migration and genetic interchange, and emphasize connecting old-growth forest habitats.

An Ecological/Biocentric Forest Plan would reduce the road network to improve wildlife security and watershed integrity, while also providing good paying restoration jobs. An Ecological/Biocentric Forest Plan would use a scientific approach to set the minimum road system necessary to manage the forest within expected budgets. An Ecological/Biocentric Forest Plan would reduce road maintenance costs to an affordable level by calibrating the road system to these anticipated future budgets. An Ecological/Biocentric Forest Plan would set maximum road density standards to minimize the backlog in road maintenance and meet the biological needs of terrestrial and aquatic species.

An Ecological/Biocentric Forest Plan would provide a diversity of recreational and access opportunities while emphasizing non-motorized and non-mechanized access.

An Ecological/Biocentric Forest Plan would include Plan Components reflecting the agency[rsquo]s duty to designate motorized trails and areas to minimize impacts to forest resources and other users as required by Executive Order 11989 and 36 CFR 212.55 and recently affirmed in a federal court decision (see Idaho Conservation League v. Guzman, 2011 WL 447456 (D. Idaho Feb. 4, 2011)).

CONCLUSION

We appreciate the opportunity to comment on the Draft Revised Forest Plan and accompanying Draft Environmental Impact Statement for the Custer-Gallatin National Forest. Please keep us on the list to receive all future notifications regarding this revision process. We will soon be supplying full cites of all of the literature cited. It is our intention that you consider the literature cited, as best available science.