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Working to protect and restore Western Watersheds

March 5, 2018

Custer Gallatin National Forest
Attn: Forest Plan Revision Team
P.O. Box 130 (10 E Babcock)
Bozeman, MT 59771.

RE: Scoping Comments for Custer Gallatin NF Forest Plan Revision

Dear Forest Plan Revision Team:

Western Watersheds Project (“WWP”) and Prairie Hill Audubon Society (“PHAS”) are pleased to provide comments in response to the Custer Gallatin National Forest’s scoping notice for the Custer Gallatin Forest Plan/EIS (“FP”) revision.

WWP is a nonprofit organization dedicated to protecting and restoring western watersheds and wildlife through education, public policy initiatives, and legal advocacy. With over 5,000 members and supporters throughout the United States, WWP actively works to protect and improve upland and riparian areas, water quality, fisheries, wildlife, and other natural resources and ecological values, including the subject areas within Custer Gallatin National Forest.

PHAS is a South Dakota non-profit corporation, which is a chapter of the National Audubon Society. PHAS is a volunteer grassroots organization. Our mission is to educate about, protect and restore our environment and natural heritage. We work to conserve the rich natural resources and wildlife heritage of the prairies and hills of western South Dakota and the surrounding region. PHAS volunteers and members use the Custer National Forest of SD for recreation and care about its conservation. The Custer National Forest is designated as an Important Bird Area by the National Audubon Society, thus it has special importance to us. Link to IBA listing: <http://www.audubon.org/important-bird-areas/custer-national-forest>

Purpose and Need

Maintaining and improving wildlife habitat and restoring degraded range conditions should be reflected in the purpose and need for the FP in compliance with both the Granger-Thye Act of 1950, the Federal Lands Policy Management Act (FLPMA) of 1976, and other laws that govern livestock management on public lands. Approval of the FP will guide livestock management in the project area for years to come and provides the foundation on which future Allotment Management Plans will be based.

The Federal Land Policy and Management Act (FLPMA) requires the FS to maintain and improve wildlife habitat. It also requires that “Allotment management plans shall be tailored to the specific range condition of the area to be covered by such plan, and shall be reviewed on a periodic basis to determine whether they have been effective in improving the range condition of the lands involved...”¹

The requirement to focus on improvement of range condition is also explicit in the Public Rangeland Improvement Act (PRIA), which provides that the goal of public land range management is to improve range condition (emphasis added).² “Range condition” as defined in PRIA means the “quality of the land” as reflected by the ability of specific areas to support the productivity sought by FS.³

Thus, the reason for addressing livestock grazing in the FP is to improve the range condition of the allotments within the project area and to maintain and improve wildlife habitat. This direction, based on laws and regulations, should be explicitly stated in the “Purpose and Need for the Plan” in the DEIS. Furthermore, the selection of any alternative in the DEIS that does not provide direction for meeting those goals violates the intent of the laws and regulations that govern public land management.

The purpose and need section of the DEIS should include the need to conserve all wildlife habitat and restoration of degraded range conditions as a purpose of the document.

Importantly, 43 CFR Sec. 4100.0-8 states:

“Land use plans shall establish allowable resource uses (either singly or in combination), related levels of production or use to be maintained, areas of use, and resource condition goals and objectives to be obtained. The plans also set forth program constraints and general management practices needed to achieve management objectives. Livestock grazing activities and management actions approved by the authorized officer shall be in conformance with the land use plan as defined at 43 CFR 1601.0-5(b).”

The Preliminary Need for Change fails to identify negative impacts from livestock grazing and the current plans failure or lack of adequate direction to ensure that rangelands and associated wildlife habitat are actually improving and making significant progress toward desired future conditions. Additionally, monitoring of rangeland conditions as related to livestock grazing has been inadequate over the past three decades. The Need for Change should reflect the lack of emphasis on effective monitoring beyond the terse statements for monitoring in the document. There is a plethora of well-established monitoring techniques for livestock grazing impact available to the Forest Service (“FS”). The problem is a lack of will and a lack of enforcement. These issues should be addressed in the Need for Change document. Certain wildlife species such as greater sage-grouse have experienced large declines in population over the past several decades in part due to ineffective and insufficient direction in the existing forest plans. The Need for Change should address the need to incorporate specific measures to ensure sage-grouse recovery.

¹ 43 U.S.C. § 1752(d) (emphasis added)

² 43 U.S.C. §§ 1901(b)(2), 1903(b)

³ See id. § 1902(d)

The Preliminary Need for Change states:

There is a need for plan direction for permitted livestock grazing that allows adaptive management toward ecosystem-based desired conditions, within site capability, and with particular emphasis on management in areas of concentrated use (that is, riparian, wetlands, and green ash draws) and when addressing drought or post-wildfire recovery.

While adaptive management can be an effective strategy for ensuring that livestock grazing does not cause undue degradation to the environment by defining specific triggers and actions that will be taken when those triggers are tripped, we are concerned that what the Forest Service has in mind here by adaptive management is a loosening of definable standards and thresholds that will be replaced by unproven livestock grazing strategies. Along with the unwillingness of the FS to ensure that annual monitoring and compliance checks are done, this is a recipe for ecological disaster that will be difficult to remedy without enforceable standards. Furthermore, site capability must be clearly defined as the capability of the site absent livestock grazing rather than the currently degraded state. As is made clear elsewhere throughout the proposed action (“PA”) and the assessments, the FS seems to be admitting that some sites are so degraded by current management practices (*see* sections on green ash draws) that recovery is impossible without dramatic and costly action. Unfortunately, rather than address these areas by allowing for potential natural recovery, the FS will seek to continue current management with a “what difference does it make” approach.

If adaptive management is to be used for permitted livestock grazing, the FS must clearly define the terms, thresholds, triggers, and specific actions to take when thresholds are surpassed. The FP must clearly define the boundaries and structure of any adaptive management protocol that is adopted during site-specific analysis.

Public Contributions of Best Available Science

As the PA 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 PA says its foundation 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.” and that “Resource specialists considered what is most accurate, reliable, and relevant in their use of the best available scientific information.” We do not agree the Assessment of the Custer Gallatin National Forests (hereinafter “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 contradicts its status quo resource extraction regime. However, it is Forest Service policy for the Forest Supervisor to delay final determination on best available science until the Record of Decision is signed. As parties quite interested in seeing the revision process be genuinely guided by best available science, in these comments and in the months to come we will be providing the Forest Service with scientific information the draft Environmental Impact Statement (EIS) should treat as best available science.

Climate Change

A prime example of the PA's narrow consideration of science is its failure to address climate change. How can our national forest be considered "suitable" for activities that contribute to— rather than reduce—the greatest threat to the Earth's biosphere? The present level of carbon dioxide (CO₂) in Earth's atmosphere is already dangerous and not sustainable under any definition of the word. The PA's direction towards unnecessary activities that would worsen the problem violates the 2012 Planning Rule's mandate to "provide for social, economic, and ecological sustainability." The Committee of Scientists, 1999 recognize the importance of forests for their contribution to global climate regulation. Also, the 2012 Planning Rule recognizes, in its definition of *Ecosystem services*, the "Benefits people obtain from ecosystems, including: (2) *Regulating services*, such as long term storage of carbon; climate regulation..."

Some politicians and status quo profiteers pretend there's nothing to do about climate change because it isn't real. The Forest Service acknowledges it's real, but just like those politicians and profiteers, it prefers to ignore and distract from the climate change causes it enables.

Moomaw and Smith, 2017⁴ 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's natural climate stabilization systems will doom any attempt to meet the Paris (COP21) global temperature stabilization goals.

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

⁴ Moomaw, Bill and Janna Smith, 2017. *The Great American Stand: US Forests and the Climate Emergency*. Why the United States needs an aggressive forest protection agenda focused in its own backyard. March 2017. Dogwood Alliance, PO Box 7645 Asheville, NC 28802. info@dogwoodalliance.org

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 Custer Gallatin National Forest (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 § 1502.16; 16 USC § 1604(g); 36 CFR § 219.12; ESA Section 7; 50 CFR §§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 “irretrievable and irreversible commitments of resources.”

Clearly, the management of the planet’s forests is a nexus for addressing the largest crisis ever facing humanity. Yet the Assessment fails to even provide a minimal quantitative analysis of agency-caused CO₂ emissions or consider the best available science on the topic. This is immensely unethical and immoral. This is far more troubling than the Forest Service’s failures on other topics, because the consequences of unchecked climate change will be disastrous for food production, sea level rise, and water supplies, resulting in complete turmoil for all human societies. This is an issue as serious as nuclear annihilation (although at least with the latter we’re not already pressing the button).

Respected experts say that the atmosphere might be able to safely hold 350 ppm of CO₂.⁵ 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’s the safe level of additional emissions (from logging or any other activity)? It’s negative. There is no safe level of additional emissions that our earth systems can tolerate. In fact, we need to be removing carbon, not adding carbon to the atmosphere.⁶

⁵ <http://www.350.org/about/science>

⁶ “To get back to 350 ppm, we’ll have to run the whole carbon-spewing machine backwards, sucking carbon out of the atmosphere and storing it somewhere safely. ... By growing more forests, growing more trees, and better managing all our forests, ...” <http://blog.cleanenergy.org/2013/11/26/exploringbiocarbon-tools/comment-page-1/#comment-375371>

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., 2008⁷ found that ending commercial logging on U.S. national forests and allowing forests to mature instead would remove an additional amount of carbon from the atmosphere equivalent to 6 percent of the U.S. 2025 climate target of 28 percent emission reductions. Forest recovery following logging and natural disturbances are usually considered a given. But forests have recovered under climatic conditions that no longer exist. Higher global temperatures and increased levels of disturbance are contributing to greater tree mortality in many forest ecosystems, and these same drivers can also limit forest regeneration, leading to vegetation type conversion. (Bart et al. 2016.)⁸

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.)⁹ Such a potentially reduced role of soils doesn't mean that forest soils won't have a role in capture and storage of carbon, rather it puts more of the onus on aboveground sequestration by trees, even if there is a conversion to unfamiliar mixes of trees.

The Idaho Panhandle National Forests plan revision draft EIS defines **carbon sequestration**: "...the process by which atmospheric carbon dioxide is taken up by vegetation through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. The Forest Service ignores the large body of science on forest management's adverse effects on carbon sequestration. The agency has never analyzed and disclosed the cumulative effects of overall agency management contributions to the reduction in stored carbon and thus, to climate change.

The best scientific information clearly indicates that management involving removal of trees and other biomass increases atmospheric CO₂. The FS needs to face up to that simple fact. The Assessment does not analyze or disclose the body of science that implicates logging activities as reducing carbon stocks in forests and increasing greenhouse gas (GHG) emissions. Law and Harmon, 2011¹⁰ conducted a literature review and concluded ...

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

⁷ Depro, B. M., Murray, B. C., Alig, R. J. & Shanks, A.; 2008. Public land, timber harvests, and climate mitigation: Quantifying carbon sequestration potential on U.S. public timberlands. *For. Ecol. Manage.* 255, 1122–1134 (2008).

⁸ Bart RR, Tague CL, Moritz MA (2016). Effect of Tree-to-Shrub Type Conversion in Lower Montane Forests of the Sierra Nevada (USA) on Streamflow. *PLoS ONE* 11(8): e0161805. doi:10.1371/journal.pone.0161805

⁹ He, Yujie, Susan E. Trumbore, Margaret S. Torn, Jennifer W. Harden, Lydia J. S. Vaughn, Steven D. Allison, James T. Randerson 2016. Radiocarbon constraints imply reduced carbon uptake by soils during the 21st century. *Science* 23 Sep 2016: Vol. 353, Issue 6306, pp. 1419- 1424 DOI: 10.1126/science.aad4273

¹⁰ Law, B. & M.E. Harmon 2011. Forest sector carbon management, measurement and verification, and discussion of policy related to mitigation and adaptation of forests to climate change. *Carbon Management* 2011 2(1). <http://terraweb.forestry.oregonstate.edu/pubs/lawharmon2011.pdf>

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 be 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.)

Van der Werf et al., 2009¹¹ discuss the effects of land-management practices and 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.

Keith et al., 2009¹² 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, 2009¹³ reviews how forest ecosystems store carbon, recommends issues to be addressed when assessing any proposed course of action, and identifies some common misconceptions. He also reviews

¹¹ Van der Werf, G. R.; D. C. Morton, R. S. DeFries, J. G. J. Olivier, P. S. Kasibhatla, R. B. Jackson, G. J. Collatz and J. T. Randerson; 2009. CO₂ emissions from forest loss. *Nature Geoscience* vol. 2, November 2009.

¹² Keith, Heather; Brendan G. Mackey and David B. Lindenmayer. 2009. Re-evaluation of forest biomass carbon stocks and lessons from the world's most carbon-dense forests *PNAS* July 14, 2009 vol. 106 no. 28 11635-11640

¹³ Harmon, Mark E. 2009. Testimony Before the Subcommittee on National Parks, Forests, and Public Lands of the Committee of Natural Resources for an oversight hearing on "The Role of Federal Lands in Combating Climate Change", March 3, 2009. Mark E. Harmon, PhD, 67 Richardson Endowed Chair and Professor in Forest Science, Department of Forest Ecosystems and Society, Oregon State University.

and assesses some of the more common proposals as well as general scientific concerns about the forest system as a place to store carbon.

Kutsch et al., 2010¹⁴ 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:

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.)

Moomaw and Smith, 2017¹⁵ state:

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

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

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.

Mitchell et al. (2009)¹⁶ refute the notion that fuel-reduction treatments increase forest carbon storage in the western US. Campbell et al., 2011 agree:

¹⁴ Kutsch, Werner L. Michael Bahn and Andreas Heinemeyer, Editors, 2010. *Soil Carbon Dynamics: An Integrated Methodology*. Cambridge University Press 978-0-521-86561-6 -

¹⁶ Mitchell, Stephen R., Mark E. Harmon, and Kari E. B. O'Connell. 2009. Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems. *Ecological Applications* 19:643–655. <http://dx.doi.org/10.1890/08-0501.1>

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.

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

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

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

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

The CGNF's Assessment also ignores CO₂ and other GHG emissions from other common human activities related to forest management and recreational uses. These include emissions associated with machines used for logging and associated activities, vehicle use for administrative actions, recreational motor vehicles, and emissions associated with livestock grazing.

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—another GHG not even mentioned in the Assessment. Methane is a far more potent substance than CO₂ causing climate change.

Beschta et al., 2012¹⁷ review some of the science on livestock exacerbation of climate change:

¹⁷ Beschta, Robert L., Debra L. Donahue, Dominick A. DellaSala, Jonathan J. Rhodes, James R. Karr, Mary H. O'Brien, Thomas L. Fleischner, Cindy Deacon Williams. 2012. Adapting to Climate Change on Western Public Lands: Addressing

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 belowground 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 “if temperatures warm and summer precipitation increases as is anticipated, [soils in grazed areas] may become net sources of CO₂ to the atmosphere” (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.

Gerber, et al., 2013¹⁸ state, “Livestock producers, which include meat and dairy farming, account for about 15 percent of greenhouse gas emissions around the world. That’s more than all the world’s exhaust-belching cars, buses, boats, and trains combined.”

Saunio et al., 2016a¹⁹ note “the recent rapid rise in global methane concentrations is predominantly biogenic—most likely from agriculture—with smaller contributions from fossil fuel use and possibly wetlands. ...Methane mitigation offers rapid climate benefits and economic, health and agricultural co-benefits that are highly complementary to CO₂ mitigation.” (Also see Saunio et al., 2016b; Gerber et al., 2013; and the Grist articles “Why isn’t the U.S. counting meat producers’ climate emissions?” and “Cattle grazing is a climate disaster, and you’re paying for it” and Stanford News article “Methane from food production could be wildcard in combating climate change, Stanford scientist says”.)

Ripple et al. 2014²⁰ 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 35–45% 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

the Ecological Effects of Domestic, Wild, and Feral Ungulates. Environmental Management, DOI 10.1007/s00267-012-9964-9 2012. <http://www.springerlink.com/content/e239161819g01117/fulltext.pdf>

¹⁸ Gerber, P.J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A. & Tempio, G. 2013. Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities. Food and Agriculture Organization of the United Nations (FAO), Rome.

¹⁹ Saunio, et al., 2016b. The global methane budget 2000–2012. *Earth Syst. Sci. Data*, 8, 697–751, 2016

²⁰ Ripple William J., Pete Smith, Helmut Haberl, Stephen A. Montzka, Clive McAlpine and Douglas H. Boucher, 2014. Ruminants, climate change and climate policy. *Nature Climate Change*, Vol. 4, January 2014.

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 CO₂e yr⁻¹). Approximately 44% (3.1 Gt CO₂e yr⁻¹) of the livestock sector'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⁻¹) from land-use change and fossil fuel use, and nitrous oxide (N₂O) (29%, 2 Gt CO₂e yr⁻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, landuse 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'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 — such as soy, pulses, cereals and tubers — is associated with significant human health benefits.
- The greenhouse gas footprint of consuming ruminant meat is, on average, 19–48 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 'farm to fork' 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 30–470% 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'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.

More explanation can be found at:

<https://www.facebook.com/DavidAvocadoWolfe/videos/10153860126441512/>

Estimates of GHG emissions from common recreational activities on national forests have been made. Kassari and Spittler, 2008²¹ provide an analysis of the carbon footprint of off-road vehicles in California. They determined that:

Off-road vehicles in California currently emit more than 230,000 metric tons — or 5000 million pounds — of carbon dioxide into the atmosphere each year. This is equivalent to the emissions created by burning 500,000 barrels of oil. The 26 million gallons of gasoline consumed by off-road vehicles each year in California is equivalent to the amount of gasoline used by 1.5 million car trips from San Francisco to Los Angeles.

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

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

Also, Sylvester, 2014²² 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

²¹ Kassari, Chris and Paul Spittler, 2008. Fuel to Burn: The Climate and Public Health Implications of Off-road Vehicle Pollution in California. A Center for Biological Diversity report, May 2008.

²² Sylvester, James T., 2014. Montana Recreational Off-Highway Vehicles Fuel-Use and Spending Patterns 2013. Prepared for Montana State Parks by Bureau of Business and Economic Research, University of Montana. July 2014.

pounds per gallon) and snowmobiling releases 192 million pounds (96 thousand tons) of climate warming CO₂ per year into the atmosphere.

We cannot afford to have the Forest Service sanction such frivolous, earth-threatening recreational activity.

Moomaw and Smith, 2017 conclude:

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

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

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

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

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

Watersheds and Aquatics

With regard to protecting watersheds and aquatic species, the PA fails to incorporate enforceable standards that will ensure that desired conditions are met or exceeded. Rather, the PA relies on unspecified “best management practices” and vague language instead of specific direction and minimum requirements to meet reference conditions for instream and riparian habitat condition. FW-DC-WTR-11 states:

Instream and riparian habitat conditions for managed watersheds move in concert with or towards those in reference watersheds (such as, large woody debris recruitment, pool frequency and residual depth, width-to-depth ratios, stream shading and temperature, bank stability, etc.).

The FS must define “move in concert with or towards” as a specific percentage of reference conditions. This must include such items as percent stable banks and maximum departures from reference width-to-depth ratios. In relation to livestock grazing, the FP must contain as standards, allowable use limits (AULs) for bank trampling, utilization, and stubble height that are based on the Rosgen stream classification. Bengeyfield and Svoboda provide a good example of how this can be accomplished in a practical manner.²³

The PA includes the guideline FW-GDL-WTR-03: To protect spawning fish, management activities that have the potential to directly deliver sediment to habitat, should be limited to times outside of spawning and incubation seasons.

This guideline should be included as a standard and also specifically relate to livestock grazing. Avoidance periods should be put firmly in place for livestock access to riparian habitat during times of spawning and incubation.

In terms of Riparian Management Zones (RMZs), guideline FW-GDL-RMZ-01 should be changed to include the removal and relocation of existing livestock handling, training/loading facilities. It is not acceptable to accommodate poor past decision making at the expense of riparian habitat and aquatic species.

FW-SUIT-RMZ should also include a prohibition on permitted livestock grazing. Current allotments within RMZs should be a priority for new analysis to determine the impacts from livestock grazing. RMZs should be permanently removed from allotment boundaries.

Non-forested vegetation

The PA utterly fails to address the impacts of livestock grazing on non-forested vegetation. Table 2-12 outlines desired condition for each vegetation type that are nearly impossible to achieve with current levels of permitted livestock grazing in the CGNF. This is particularly evident in the way the PA addresses green ash draws. According to the final assessment for livestock grazing:

On the Sioux District, 137 sites were inventoried of which 21 percent were found to be functioning, 63 percent were “at risk”, and 22 percent were non-functional. On the Ashland District, of the 299 acres inventoried, approximately 16 percent were considered healthy, 59 percent considered at risk, and 25 percent considered not functioning. When averaging these two pine savanna units, 19 percent of inventoried areas are functional, 61 percent are “at risk”, and 20 percent are non-functional.

²³ Bengeyfield, P. and Svoboda D., 1998. Determining Allowable Use Levels for Livestock Movement in Riparian Areas. American Water Resource Assoc., Proceedings: Specialty Conference on Rangeland Management and Water Resources., <http://awra.org/~awra/proceedings/reno98/Bengeyfield/>

Livestock grazing is the predominant use of these areas. Livestock grazing is assuredly responsible for most of the decline in these rare ecosystems. Yet, the only direction in the plans pertaining to livestock grazing for green ash draws is a guideline about the location of new livestock infrastructure. This FP and DEIS must analyze an alternative that eliminates livestock grazing from green ash draws to facilitate recovery at the fastest rate achievable.

Standard FW-STD-GRAZ-01 is simply not enough to achieve desired results for green ash draws or other areas impacted by permitted grazing. The standard fails to require the development of new allotment management plans (AMPs) even when grazing is leading to undue degradation of riparian areas, uplands and associated flora and fauna. Every permitted grazing allotment should undergo a new NEPA analysis every 10 years to examine monitoring data, allow for public input, incorporate new information, and determine if grazing is even suitable for the lands at issue. Priority for completion should be based on the current condition of sensitive habitats such as green ash draws which basically means that the Sioux and Ashland districts have a lot of work to do. Resources should be allocated accordingly.

Invasive Species

Permitted livestock grazing is a quantifiable vector of invasive plant infestations.²⁴ Annual grasses, in particular, *bromus tectorum*, commonly known as cheatgrass, are invading habitats that were previously unsuitable for colonization due to increased temperatures and persistent drought. The PA does not adequately address the role of livestock in the spread of invasive species. The DEIS must fully analyze this issue and the FP must adopt a standard that ensures that livestock to not cause invasive to spread or thrive.

Sensitive Species and Wildlife

Despite their extent, sagebrush-dominated communities are among North America's most critically endangered ecosystems as a consequence of losses to agriculture, conversions to exotic annuals, and/or degradation due to excessive grazing by domestic livestock.²⁵

Big sagebrush (*Artr*) is eaten by domestic sheep and cattle, but has long been considered to be of low palatability to domestic livestock, a competitor with more desirable species, and a physical impediment

²⁴ Reisner, Michael D.; Grace, James B.; Pyke, David A.; Doescher, Paul S. 2013. Conditions favouring *Bromus tectorum* dominance of endangered sagebrush steppe ecosystems. *Journal of Applied Ecology*.

²⁵ Noss, Reed, et.al. 1995. *Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation*. Biological Report 28. National Biological Service, Washington, DC, USA; Christensen, N.L. et. al. 1996. *The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management*. *Ecological Applications* 6:665-691; Knick, S.T. 1999. *Requiem for a Sagebrush Ecosystem?* *Northwest Science* 73:53-57; Anderson, Jay E. and Richard S. Inouye. 2001. *Sagebrush Steppe Vegetation Dynamics*. *Ecological Monographs*. Vol. 71, No.4

to grazing.²⁶ The range management community has been conducting a war against big sagebrush (*Artemisia tridentata*) for over 50 years.²⁷

Literature highlights the importance of sagebrush to a variety of wildlife ranging from sage-grouse to big game.²⁸ Wildlife researchers have argued that the importance of sagebrush as forage, and effects of foraging on sagebrush are not fully appreciated.²⁹ Regarding the sagebrush steppe ecosystem, West³⁰ makes the following remark: "Some of it has been so degraded by excessive livestock grazing and burning that its relationship to its origins is no longer easily recognizable."

Furthermore, the ecology of mountain big sagebrush in the West has been altered not only by a decrease in fire as claimed by the FS, but also by livestock grazing, widespread invasion by exotic annuals, and perhaps climate change.³¹ Historical abundance of big sagebrush has been disputed. There

²⁶ Blaisdell, James P.; Murray, Robert B.; McArthur, E. Durant. 1982. Managing Intermountain rangelands--sagebrush-grass ranges. Gen. Tech. Rep. INT-134. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. Shaw, Nancy L.; Monsen, Stephen B. 1990. Use of sagebrush for improvement of wildlife habitat. In: Fisser, Herbert G., ed. Wyoming shrublands: Aspen, sagebrush and wildlife management: Proceedings, 17th Wyoming shrub ecology workshop; 1988 June 21-22; Jackson, WY. Laramie, WY: Wyoming Shrub Ecology Workshop, University of Wyoming, Department of Range Management.

²⁷ Welch, Bruce L. and Craig Criddle. 2003. Countering Misinformation Concerning Big Sagebrush. USDA Forest Service Rocky Mountain Research Station RBRS-RP-40.

²⁸ Blaisdell, James P.; Murray, Robert B.; McArthur, E. Durant. 1982. Managing Intermountain rangelands--sagebrush-grass ranges. Gen. Tech. Rep. INT-134. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; Hodgkinson, Harmon S. 1989. Big sagebrush subspecies and management implications. Rangelands. 11(1): 20-22; McGee, John M. 1979. Small mammal population changes following prescribed burning of mountain big sagebrush. In: Johnson, Kendall L., ed. Wyoming shrublands: Proceedings of the 8th Wyoming shrub ecology workshop; 1979 May 30-31; Jackson, WY. Laramie, WY: University of Wyoming, Division of Range Management, Wyoming Shrub Ecology Workshop: 35-46; Nagy, Julius G. 1979. Wildlife nutrition and the sagebrush ecosystem. In: The sagebrush ecosystem: a symposium: Proceedings; 1978 April; Logan, UT. Logan, UT: Utah State University, College of Natural Resources: 164-168; Noste, Nonan V.; Bushey, Charles L. 1987. Fire response of shrubs of dry forest habitat types in Montana and Idaho. Gen. Tech. Rep. INT-239. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 22 p. Peek, James M.; Riggs, Robert A.; Lauer, Jerry L. 1979. Evaluation of fall burning on bighorn sheep winter range. Journal of Range Management. 32(6): 430-432. Shaw, Nancy L.; Monsen, Stephen B. 1990. Use of sagebrush for improvement of wildlife habitat. In: Fisser, Herbert G., ed. Wyoming shrublands: Aspen, sagebrush and wildlife management: Proceedings, 17th Wyoming shrub ecology workshop; 1988 June 21-22; Jackson, WY. Laramie, WY: Wyoming Shrub Ecology Workshop, University of Wyoming, Department of Range Management: 19-35. Wambolt, C. L.; Creamer, W. H.; Rossi, R. J. 1994. Predicting big sagebrush winter forage by subspecies and browse form class. Journal of Range Management. 47(3): 231-234; Welch, Bruce L.; Briggs, Steven F.; Johansen, James H. 1996. Big sagebrush seed storage. Res. Note INT-RN-430. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

²⁹ Wambolt, Carl L. 1995. Elk and mule deer use of sagebrush for winter forage. Montana Ag Research. 12(2): 35-40; Wambolt, Carl L. 1996. Mule deer and elk foraging preference for 4 sagebrush taxa. Journal of Range Management. 49(6): 499-503; Welch, Bruce L.; Wagstaff, Fred J.; Roberson, Jay A. 1991. Preference of wintering sage-grouse for big sagebrush. Journal of Range Management. 44(5): 462-465.

³⁰ West, Neil E. 1988. Intermountain deserts, shrub steppes, and woodlands. In: Barbour, Michael G.; Billings, William Dwight, eds. North American terrestrial vegetation. Cambridge; New York: Cambridge University Press: 209-230.

³¹ Blaisdell, James P.; Murray, Robert B.; McArthur, E. Durant. 1982. Managing Intermountain rangelands--sagebrush-grass ranges. Gen. Tech. Rep. INT-134. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest

are numerous studies that show sagebrush obligates prefer living in big sagebrush canopy cover above the levels currently existing in the planning area.

Rasmussen and Griner³² noted that the highest sage-grouse nesting success in Strawberry Valley of central Utah occurred in mountain big sagebrush stands having 50 percent canopy cover. Ellis et. al.³³ reported male sage-grouse loafing areas with 31 percent canopy cover. Other obligates such as sage thrasher, Brewer's sparrow, and sage sparrow prefer big sagebrush canopy cover of 20 to 36 percent.³⁴

For sagebrush species other than big sagebrush, Walchek³⁵ reported that a population of Brewer's Sparrows were living in an area of silver sagebrush having canopy cover of 53 percent. Petersen and Best³⁶ found sag sparrows nested where big sagebrush cover was 23 percent in the vicinity of nests and 26 percent in the general study area. They further noted that all nests were found in big sagebrush plants and large, living shrubs were strongly preferred.

Since sagebrush communities on private lands have been converted to agricultural or other uses or are not being managed in a manner compatible with sagebrush dependent wildlife, the importance of maintaining the integrity of sagebrush habitats on FS lands within the planning area to provide taller, denser stands for mule deer, pronghorn, and sage-grouse is extremely important.

For example, big sagebrush canopy cover values on undisturbed relicts and kipukas does not support the assertions by the FS that big sagebrush canopy cover increases due to livestock grazing.³⁷ In fact, the just cited researchers found the following:

and Range Experiment Station; Burkhardt, Wayne J.; Tisdale, E. W. 1976. Causes of juniper invasion in southwestern Idaho. *Ecology*. 57: 472-484; Mueggler, W. F. 1985. Vegetation associations. In: DeByle, Norbert V.; Winokur, Robert P., eds. *Aspen: ecology and management in the western United States*. Gen. Tech. Rep. RM-119. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 45-55; West, Neil E. 1988. Intermountain deserts, shrub steppes, and woodlands. In: Barbour, Michael G.; Billings, William Dwight, eds. *North American terrestrial vegetation*. Cambridge; New York: Cambridge University Press: 209-230.

³² Rasmussen, D. I. and Lynn A. Griner. 1938. Life history and management studies of the sage-grouse in Utah, with special reference to nesting and feeding habits. *North America Wildlife Conference*. 3:852-864

³³ Ellis, Kevin L. et.al. 1989. Habitat use by breeding male sage-grouse: A management approach. *Great Basin Naturalist*. 49:404-407

³⁴ Best, Louis B. 1972. First-year effects of sagebrush control on two sparrows. *Journal of Wildlife Management*. 36:534-544; Feist, Francis G. 1968. Breeding-bird populations on sagebrush-grassland habitat in central Montana. *Audubon Field Notes*. 22:691-695; Grinnell, Joseph, et. al. *Vertebrate natural history of a section of California through the Lassen Peak region*. University of California Publications in Zoology. 35:1-594; Knick, Steven T. and John T. Rotenberry. 1995. Landscape characteristics of fragmented shrubsteppe habitats and breeding passerine birds. *Conservation Biology*. 9:1059-1071; Petersen, Kenneth L. and Louis B. Best. 1986. Diets of nesting sage sparrows and Brewer's sparrow in an Idaho sagebrush community. *Journal of Field Ornithology*. 57:283-294. Petersen, Kenneth L. and Louis B. Best. 1991 Nest site selection by sage thrashers in southeastern Idaho. *Great Basin Naturalist*. 51:261-266; Reynolds, Timothy D. and Charles H. Trost. 1980 The response of native vertebrate populations to crested wheatgrass planting and grazing by sheep. *Journal of Range Management*. 33:122-125. Reynolds, Timothy D. and Charles H. Trost. 1981. Grazing, crested wheatgrass, and bird populations in southeastern Idaho. *Northwest Science*. 55:225-234; Winter, B. M. and Louis B. Best. 1985. Effect of prescribed burning on placement of sage sparrow nests. *Condor*. 87:294-295.

³⁵ Walchek, Kenneth C. 1970. Nesting bird ecology of four plant communities in the Missouri River breaks, Montana. *Wilson Bulletin*. 82:370-382.

³⁶ Petersen, Kenneth L. and Louis B. Best. 1985. Nest-site selection by sage sparrows. *Condor*. 57:217-221.

³⁷ Holechek, Jerry L., and Thor Stephenson. 1983. Comparison of big sagebrush vegetation in northcentral New Mexico under moderately grazed and grazing excluded conditions. *Journal of Range Management*. 36:455-456. Eckert, Richard E. Jr., and John S. Spencer. 1986. Vegetation response on allotments grazed under rest-rotation management. *Journal of*

- Big sagebrush canopy cover was higher inside grazing exclosures and was decreased outside exclosures,
- Perennial grasses and sagebrush canopy cover were significantly higher in ungrazed vs. grazed plots,
- After grazing had been removed big sagebrush canopy cover and grass cover increased significantly.

Anderson and Inouye³⁸ found that contemporary state-and-transition models do not fit the sagebrush ecosystem because viable remnant populations of native grasses and forbs are able to take advantage of improved growing conditions when livestock are removed. They found further that despite depauperate and homogenous conditions of permanent plots in 1950, after 45 years vegetation had been anything but static, clearly refuting claims of long-term stability under shrub dominance. Mean richness per plot of ALL growth forms increased steadily in the absence of domestic livestock grazing. Grasses and forbs increased significantly.

Given these findings, perhaps the FS should analyze the impacts of long-term active management and its impacts on sagebrush communities and obligates compared to the impacts of removing livestock and allowing these communities to recover naturally. Additionally, since the continued “management” of sagebrush has led to many of the situations scientists now agree are threatening these ecosystems, the removal of livestock from sagebrush communities in less than satisfactory condition should be a seriously considered alternative in the FP.

Sage-grouse depend almost entirely on sagebrush for food and protection from predators. In the summer, the birds depend on the grasses and plants that grow under the sagebrush to provide nesting material, as well as high protein insects that are critical to the diet of chicks in the first few months of life. In winter, almost 99 percent of their diet is sagebrush leaves and buds. Recent estimates indicate that the sage-grouse populations have declined by approximately 86 percent from historic levels. One of the greatest threats to sage-grouse populations is the destruction and loss of habitat from a variety of management activities including livestock grazing.³⁹

Range Management. 39:166-174; Pearson, L.C. 1965. Primary production in grazed and ungrazed desert communities of eastern Idaho. *Ecology*. 46:278-285; Anderson, Jay E. and Karl E. Holte. 1981. Vegetation Development over 25 years without grazing on sagebrush dominated rangeland in southeastern Idaho. *Journal of Range Management*. 34:25-29; Wambolt, Carl L. and Myles J. Watts. 1996. High stocking rate potential for controlling Wyoming big sagebrush. In: Barrow, Jerry R. et. al. comps. *Proceedings: shrubland ecosystems dynamics in a changing environment*. 1995 May 23-25; Las Cruces, NM. Gen. Tech. Rep. INT-GTR-338. Ogden, UT: USDA Forest Service, Intermountain Research Station; Peterson, Joel G. 1995. Ecological implications of sagebrush manipulation – A literature review. Montana Fish and Wildlife and Parks, Wildlife Management Division, Helena, MT; Wambolt Carl L. and Harrie W. Sherwood. 1999. Sagebrush response to ungulate browsing in Yellowstone. *Journal of Range Management*. 52:363-369.

³⁸ Anderson, Jay E. and Rishard S. Inouye. 2001. Landscape-Scale Changes in Plant Species Abundance and Biodiversity of a Sagebrush Steppe Over 45 Years. *Ecological Monographs*, 71(4), 2001, pp. 531-556.

³⁹ U.S Fish and Wildlife Service April 16, 2004

In presettlement times, the range of the sage-grouse paralleled the range of big sagebrush. Basin big sagebrush provides important cover for sage-grouse.⁴⁰ Populations of sage-grouse have declined primarily because of loss of habitat due to overgrazing, elimination of sagebrush, and land development.⁴¹ Sage-grouse populations began declining from 1900 to 1915, when livestock utilization of sagebrush rangeland was heavy.⁴² In the 50's and 60's, land agencies adopted a policy of aggressive sagebrush control in order to convert sagebrush types to grassland. Chaining, frequent fire, and herbicide treatments reduced sagebrush by several million acres and sage-grouse numbers plummeted drastically.⁴³

Sage-grouse historically occurred throughout the range of big sagebrush (*A. tridentata*), except on the periphery of big sagebrush distribution or in areas where it has been eliminated.⁴⁴ Sage-grouse prefer mountain big sagebrush (*A. t. ssp. vaseyana*) and Wyoming big sagebrush (*A. t. ssp. wyomingensis*) communities to basin big sagebrush (*A. t. ssp. tridentata*) communities. Sage-grouse are totally dependent on sagebrush-dominated habitats.⁴⁵ Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover.⁴⁶

⁴⁰ Benson, Lee A.; Braun, Clait E.; Leininger, Wayne C. 1991. Sage-grouse response to burning in the big sagebrush type. In: Comer, Robert D.; Davis, Peter R.; Foster, Susan Q.; [and others], eds. Issues and technology in the management of impacted wildlife: Proceedings of a national symposium; 1991 April 8-4. Snowmass Resort, CO. Boulder, CO: Thorne Ecological Institute: 97-104.

⁴¹ Hamerstrom, Frederick; Hamerstrom, Frances. 1961. Status and problems of North American grouse. *Wilson Bulletin*. 73(3): 284-294.

⁴² Patterson, Robert L. 1952. The sage-grouse in Wyoming. Federal Aid to Wildlife Restoration Project 28-R. Denver, CO: Sage Books, Inc. 341 p.

⁴³ Call, Mayo W. 1979. Habitat requirements and management recommendations for sage-grouse. Denver, CO: U.S. Department of the Interior, Bureau of Land Management, Denver Service Center. 37 p. Mattise, Samuel N. 1995. Sage-grouse in Idaho: Forum 94'. Technical Bulletin No. 95-15. Boise, ID: U.S. Department of the Interior, Bureau of Land Management, Idaho State Office. 10 p.

⁴⁴ Call, Mayo W.; Maser, Chris. 1985. Wildlife habitats in managed rangelands--the Great Basin of southeastern Oregon: sage-grouse. Gen. Tech. Rep. PNW-187. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 30 p.

⁴⁵ Benson, Lee A.; Braun, Clait E.; Leininger, Wayne C. 1991. Sage-grouse response to burning in the big sagebrush type. In: Comer, Robert D.; Davis, Peter R.; Foster, Susan Q.; [and others], eds. Issues and technology in the management of impacted wildlife: Proceedings of a national symposium; 1991 April 8-4. Snowmass Resort, CO. Boulder, CO: Thorne Ecological Institute: 97-104.

⁴⁶ Patterson, Robert L. 1952. The sage-grouse in Wyoming. Federal Aid to Wildlife Restoration Project 28-R. Denver, CO: Sage Books, Inc. 341 p.

When not on the lek, sage-grouse disperse to the surrounding areas.⁴⁷ Some females probably travel between leks. Patterson⁴⁸ reported that in Wyoming, 92 percent of sage-grouse nests in Wyoming big sagebrush were in areas where vegetation was 10 to 20 inches (25-51 cm) tall and cover did not exceed 50 percent.

The importance of sagebrush in the diet of adult sage-grouse is impossible to overestimate. Numerous studies have documented its year-round use by sage-grouse.⁴⁹ A Montana study, based on 299 crop samples, showed that 62 percent of total food volume of the year was sagebrush. Between December and February it was the only food item found in all crops. Only between June and September did sagebrush constitute less than 60 percent of the sage-grouse diet.⁵⁰

In places, the number of young sage-grouse simply is not enough to sustain a stable population. Sage-grouse have one of the lowest recruitment rates of any upland game bird in North America. Loss of habitat, predation, drought, and poor weather conditions during hatching and brooding periods have been cited as factors leading to poor recruitment.⁵¹ Lack of adequate nesting and brooding cover may account for high juvenile losses in many regions.⁵² A decline in preferred prey may also result in increased predation on sage-grouse. Nest losses to predators vary throughout the range of sage-grouse, but predators are more successful in areas of poor-quality nesting habitat.

⁴⁷ Wallestad, Richard; Pyrah, Duane. 1974. Movement and nesting of sage-grouse hens in central Montana. *Journal of Wildlife Management*. 38(4): 630-633.

⁴⁸ Patterson, Robert L. 1952. *The sage-grouse in Wyoming*. Federal Aid to Wildlife Restoration Project 28-R. Denver, CO: Sage Books, Inc. 341 p.

⁴⁹ Beck, D. I. 1975. *Attributes of a wintering population of sage-grouse, North Park, Colorado*. Fort Collins, CO: Colorado State University. 49 p. Thesis. Call, Mayo W. 1979. *Habitat requirements and management recommendations for sage-grouse*. Denver, CO: U.S. Department of the Interior, Bureau of Land Management, Denver Service Center. 37 p. Call, Mayo W.; Maser, Chris. 1985. *Wildlife habitats in managed rangelands--the Great Basin of southeastern Oregon: sage-grouse*. Gen. Tech. Rep. PNW-187. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 30 p. Klebenow, Donald A. 1973. *The habitat requirements of sage-grouse and the role of fire in management*. In: *Proceedings, annual Tall Timbers fire ecology conference; 1972 June 8-9; Lubbock, TX*. No. 12. Tallahassee, FL: Tall Timbers Research Station: 305-315. Patterson, Robert L. 1952. *The sage-grouse in Wyoming*. Federal Aid to Wildlife Restoration Project 28-R. Denver, CO: Sage Books, Inc. 341 p. Schneegas, Edward R. 1967. *Sage-grouse and sagebrush control*. *Transactions, North American Wildlife Conference*. 32: 270-274. Sime, Carolyn Anne. 1991. *Sage-grouse use of burned, non-burned, and seeded vegetation communities on the Idaho National Engineering Laboratory, Idaho*. Bozeman, MT: Montana State University. 72 p. Thesis. Wallestad, Richard. 1975. *Life history and habitat requirements of sage-grouse in central Montana*. Helena, MT: Montana Department of Fish and Game. 65 p. In cooperation with: U.S. Department of the Interior, Bureau of Land Management. Wallestad, Richard; Peterson, Joel G.; Eng, Robert L. 1975. *Foods of adult sage-grouse in central Montana*. *Journal of Wildlife Management*. 39(3): 628-630.

⁴⁹ Wallestad, Richard. 1975. *Life history and habitat requirements of sage-grouse in central Montana*. Helena, MT: Montana Department of Fish and Game. 65 p. In cooperation with: U.S. Department of the Interior, Bureau of Land Management.

⁵¹ Mattise, Samuel N. 1995. *Sage-grouse in Idaho: Forum 94'*. Technical Bulletin No. 95-15. Boise, ID: U.S. Department of the Interior, Bureau of Land Management, Idaho State Office. 10 p.

⁵² Kindschy, Robert R. 1986. *Rangeland vegetative succession—implications to wildlife*. *Rangelands*. 8(4): 157-159.

Due to their reliance on sagebrush, sage-grouse are great indicators of the health of the sagebrush steppe ecosystem on which they depend. Literature previously cited indicates that sage-grouse need higher levels of sagebrush canopy cover than exist within the planning area and livestock reduce that cover.

The 2012 Montana Fish, Wildlife, and Parks (“MTFWP”) counts for the eastern Montana Sage-grouse Management Zone are only 64.9% of the long term average.⁵³ Across Montana, sage-grouse numbers have declined by more than half since 1980.⁵⁴ Furthermore, hunter harvest estimates have declined even further, dropping from 40,000 birds in 1984 to less than 5,000 in 2011.⁵⁵ This represents an 87.5% decline in hunter harvest across the State. Please review and share this important sage-grouse data in the final EIS. If you have more site specific information relevant to sage-grouse trends and habitat conditions within the planning area, please reveal it in the DEIS as well.

Livestock grazing is considered the single most important influence on sagebrush habitats and fire regimes throughout the Intermountain West in the past 140 years.⁵⁶ Grazing is the most widespread use of sagebrush steppe and almost all sagebrush habitat is managed for grazing.⁵⁷ Livestock grazing disturbs the soil, removes native vegetation, and spreads invasive species in sagebrush steppe.⁵⁸ Cattle or sheep grazing in sage-grouse nesting and brood-rearing habitat can negatively affect habitat quality; nutrition for gravid hens; clutch size; nesting success; and/or chick survival.⁵⁹ Livestock may directly

⁵³ Montana Fish, Wildlife & Parks. June 20, 2012. Interoffice Memorandum From: Rick Northrup To: George Pauley. Re: Sage-Grouse AHM lek results from spring 2012.

⁵⁴ Id.

⁵⁵ Id.

⁵⁶ Knick, S. T., A. L. Holmes, R. F. Miller. 2005. The role of fire in structuring sagebrush habitats and bird communities. FIRE AND AVIAN ECOLOGY IN NORTH AMERICA. Studies in Avian Biology, no. 30. Page 68. Cooper Ornithological Society. Boise, ID.

⁵⁷ Connelly, J. W., S. T. Knick, M. A. Schroeder, S. J. Stiver. 2004. Conservation assessment of Greater Sage-grouse and sagebrush habitats. Western Association of Fish and Wildlife Agencies. Cheyenne, WY. (July 22, 2004).; Knick, S. T., D. S. Dobkin, J. T. Rotenberry, M. A. Schroeder, W. M. Vander Haegen, C. van Riper. 2003. Teetering on the edge or too late? Conservation and research issues for avifauna of sagebrush habitats. Condor 105(4): 611-634.; Knick, S. T., S. E. Hanser, R. F. Miller, D. A. Pyke, M. J. Wisdom, S. P. Finn, E. T. Rinkes, C. J. Henny. 2011. Ecological influence and pathways of land use in sagebrush. Pages 203-251 in S. T. Knick and J. W. Connelly (eds). GREATER SAGE-GROUSE: ECOLOGY AND CONSERVATION OF A LANDSCAPE SPECIES AND ITS HABITATS. Studies in Avian Biol. Series, vol. 38. Cooper Ornithological Society. Univ. Calif. Press. Berkeley, CA.

⁵⁸ Knick et al. 2005.

⁵⁹ Connelly, J. W. and C. E. Braun. 1997. Long-term changes in sage-grouse *Centrocercus urophasianus* populations in western North America. Wildl. Biol. 3: 229-234.; Beck, J. L. and D. L. Mitchell. 2000. Influences of livestock grazing on sage grouse habitat. Wildl. Soc. Bull. 28(4): 993-1002. Barnett, J. F. and J. A. Crawford. 1994. Pre-laying nutrition of sage-grouse hens in Oregon. J. Range Manage. 47: 114-118. Coggins, K. A. 1998. Relationship between habitat changes and productivity of sage grouse at Hart Mountain National Antelope Refuge, Oregon. M.S. thesis. Oregon State University. Corvallis, OR. Aldridge, C. L. and R. M. Brigham. 2003. Distribution, status and abundance of Greater Sagegrouse, *Centrocercus urophasianus*, in Canada. Canadian Field-Natur. 117: 25-34.

compete with sage-grouse for grasses, forbs and shrub species; trample vegetation and sage-grouse nests; disturb individual birds and cause nest abandonment.⁶⁰

The potential conflict between livestock grazing and sage-grouse intensifies near water sources due to the importance of these areas to sage-grouse, particularly during early brood rearing. Heavy cattle grazing near springs, seeps, and riparian areas can remove grasses used for cover by grouse.⁶¹ “[R]apid removal of forbs by livestock on spring or summer ranges may have a substantial adverse impact on young grouse, especially where forbs are already scarce.”⁶²

Grazing across many of the western states has led to the invasion of cheatgrass, a highly flammable noxious weed that accelerates the fire cycle to less than five years destroying the sagebrush upon which sage-grouse rely for food and cover. Approximately 36 percent of the Greater Sage-Grouse range is invaded by cheatgrass.⁶³ Because sagebrush requires at least 15 years (and up to 50) to reoccupy burned sites, restoring invaded areas is a difficult and slow process. Preventing further spread into intact sagebrush should be prioritized.

Biological invasions, especially invasion by exotic annual grasses such as cheatgrass, are consistently cited as among the most important challenges to maintenance of healthy sagebrush communities.⁶⁴ Estimates of the rapid spread of weeds in the West include 2,300 acres per day on FS lands and 4,600 acres per day on all western public lands.⁶⁵

A recent study published in the *Journal of Applied Ecology* concludes that livestock grazing contributes to the domination of some western landscapes by cheatgrass, an invasive grass that both destroys sage-

⁶⁰ Vallentine, J. F. 1990. *GRAZING MANAGEMENT*. Academic Press. San Diego, CA. Pederson, E. K., J. W. Connelly, J. R. Hendrickson, W. E. Grant. 2003. Effect of sheep grazing and fire on sage grouse populations in southeastern Idaho. *Ecol. Model.* 165(1): 23-47.; Call, M. W. and C. Maser. 1985. Wildlife habitats in managed rangelands – the Great Basin of southeastern Oregon: sage grouse. Gen. Tech. Rep. PNW-187. U.S. Forest Service, Pacific Northwest Forest and Range Exp. Stn. Portland, OR. Holloran, M. J. and S. H. Anderson. 2005. Spatial distribution of Greater Sage-grouse nests in relatively contiguous sagebrush habitats. *Condor* 107(4): 742-752. Coates, P. S. 2007. Greater Sage-grouse (*Centrocercus urophasianus*) nest predation and incubation behavior. Ph.D. Diss. Idaho State Univ. Pocatello, ID.

⁶¹ Klebenow, D. A. 1982. Livestock grazing interactions with sage grouse. *Proc. Wildlife-Livestock Relations Symp.* 10: 113-123.

⁶² Call, M. W. and C. Maser. 1985. Wildlife habitats in managed rangelands – the Great Basin of southeastern Oregon: sage grouse. Gen. Tech. Rep. PNW-187. U.S. Forest Service, Pacific Northwest Forest and Range Exp. Stn. Portland, OR.

⁶³ Lebbin, Daniel J.; Parr, Michael J.; and Fenwick, George H., *The American Bird Conservancy Guide to Bird Conservation*. The University of Chicago Press, 2010.

⁶⁴ Miller, R. F., S. T. Knick, D. A. Pyke, C. W. Meinke, S. E. Hanser, M. J. Wisdom, A. L. Hild. 2011. Characteristics of sagebrush habitats and limitations to long-term conservation. Pages 145-184 in S. T. Knick and J. W. Connelly (eds). *Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and its Habitants*. Studies in Avian Biol. Series, vol. 38. Cooper Ornithological Society. Univ. Calif. Press. Berkeley, CA.; Wisdom, M. J., M. M. Rowland, R. J. Tausch. 2005c. Effective management strategies for sagegrouse and sagebrush: a question of triage? *Trans. N. Wildl. Nat. Res. Conf.* 70: 206-227.

⁶⁵ See 65 Fed. Reg. 54544.

grouse habitat and increases the frequency of wildfire.⁶⁶ To mitigate the spread of cheatgrass, the study suggests maintaining and restoring bunchgrasses and soil crusts, two ecological features quickly degraded under the hooves of livestock. Such mitigation would require the decrease or elimination of livestock grazing in the affected areas.

Sage-grouse do not use cheatgrass. Invasive species was identified as a threat to sage-grouse by three expert panels and in recent reviews (Connelly et al. 2011, Table 1). One panel listed cheatgrass as the most important threat to sage-grouse in the western portion of its range (70 Fed. Reg. 2267), where it has invaded much of the lower elevation, xeric sagebrush habitat (Miller et al. 2011). Land uses such as livestock grazing (Reisner 2010), off-road vehicle use, and coalbed methane development.

Do you have any programs that promote cooperation and habitat protection for sage-grouse on FS lands and/or with neighboring private and/or public landowners/managers? How will FS, as a major habitat owner help reverse these negative trends for sage-grouse? We understand that mixed/fragmented land ownership prevents significant challenges for managing both sage-grouse habitat as well as viable sage-grouse population levels. Given this fragmented habitat do you believe the “Great Bird” (sage-grouse) should be listed under the Endangered Species Act to ensure its habitat is protected across the landscape upon which it depends?

Big game species such as elk and mule deer are negatively impacted by livestock. According to a study conducted in southwestern Montana by Gniadek⁶⁷:

When in the same pasture, elk appeared to tolerate cattle only in low densities. Elk generally avoided pastures being grazed, making relatively greater use of rested pastures and of grazed pastures before and after grazing. Elk made greater use of forest cover than cattle. However, this difference appeared to be unrelated to cattle presence, with elk using more forest cover in both grazed and ungrazed pastures. Elk also used steeper slopes than cattle, apparently as a response to the presence of cattle.

Meadow sites heavily used by cattle during the previous year were avoided by elk during the early summer. Elk were rarely observed in close proximity to cattle and probably made greater use of grazed pastures during nocturnal hours when most cattle were bedded in compact groups.

Kie, et. al.⁶⁸ found that:

Companion studies indicated that with cattle grazing, deer home-range sizes were larger (Loft 1988), and hiding cover for fawns was reduced (Loft et al. 1987). The results are consistent with the hypothesis that cattle competed with deer, particularly at high stocking rates and during

⁶⁶ Reisner, Michael D.; Grace, James B.; Pyke, David A.; Doescher, Paul S. 2013. Conditions favouring *Bromus tectorum* dominance of endangered sagebrush steppe ecosystems. *Journal of Applied Ecology*.

⁶⁷ Gniadek, Steve, "Elk and cattle relationships on summer range in southwestern Montana" (1987). *Theses, Dissertations, Professional Papers*. Paper 2210.

⁶⁸ Kie, John G., Evans, Charles J., Loft, Eric R., Menke, John W. 1991. "Foraging Behavior by Mule Deer: The Influence of Cattle Grazing." *The Journal of Wildlife Management*, Vol. 55, No. 4 (Oct., 1991), pp. 665-674

a year of below-average precipitation. We suggest that female mule deer were acting as time-minimizers to meet the high energetic demands of lactation while minimizing their exposure to predators. Management options to reduce adverse effects include reducing or eliminating cattle grazing during early summer on all or part of the grazing allotment.

Antelope are also negatively impacted by livestock and livestock-related fencing. Fences or fragment antelope habitat. Fences pose a serious challenge and create a number of problems for antelope.⁶⁹ Fences can disrupt antelope escape strategies by confusing them, forcing them to slow down, change routes and congregate, in particular in fence corners. FS must consider the removal of fences on pronghorn habitat within the planning area. Livestock use and presence can also significantly impact pronghorn habitat and behavior.⁷⁰

The DEIS should discuss in detail the vast array of livestock diseases that can significantly harm if not kill native wildlife. Bighorn sheep in particular are extremely susceptible to livestock diseases carried by domestic sheep and goats, which are often asymptomatic to these same diseases.⁷¹ *Pasteurella pneumonia* and lung worm in particular are spread by domestic sheep.

There are 5 important bird areas listed by the National Audubon Society in the Custer National Forest⁷². The section on Conservation Issues identifies the following threats:

Fire is the most serious threat – because of the steep and inaccessible terrain, a single fire could destroy most of the forest and grassland habitat. The Keystone pipeline and a related pumping station are planned to be built extremely close to the Slim Buttes; if allowed, there would be considerable noise pollution. High radiation levels near old uranium mines in the south Cave Hills continue to threaten breeding birds, especially a large Prairie Falcon population. Cattle grazing negatively impacts understory growth and riparian areas.

In Montana, the Hebgen Lake District is also listed as an important bird area⁷³. Activities related to the hazing of bison to protect permitted livestock grazing on several grazing allotments in the Hebgen Lake Ranger District cause significant stress to trumpeter swans.

Bison migrate from Yellowstone National Park in winter to Horse Butte peninsula in the center of the proposed IBA. Owing to a controversy over the spread of brucellosis from bison to livestock, in winter the Montana Department of Livestock hazes bison from the area using

⁶⁹ Pyrah, D.B. 1987. American pronghorn antelope in the yellow water triangle, Montana: a study of social distribution, population dynamics, and habitat use. Montana Dept. Fish, Wildl. and Parks in cooperation with USDI, FS. P. 121; Trubak, G., A. Carey and S. Carey. 1995. Pronghorn: portrait of the American Antelope. Northland Publishing, Flagstaff Arizona. P. 138.

⁷⁰ Pyrah, D.B. 1987. American pronghorn antelope in the yellow water triangle, Montana: a study of social distribution, population dynamics, and habitat use. Montana Dept. Fish, Wildl. and Parks in cooperation with USDI, FS. P. 121.

⁷¹ Schommer, T and M. Woolever. 2008. A review of diseases related conflicts between domestic sheep and goats and bighorn sheep. USDA Forest Service, Rocky Mountain Research Station, General Technical Report RMRS-GTR-209. 16pp

⁷² <http://www.audubon.org/important-bird-areas/custer-national-forest> last accessed March 5, 2018

⁷³ <http://www.audubon.org/important-bird-areas/hebgen-lake> last accessed March 5, 2018

helicopters, ATVs, and snowmobiles. Buffalo Field Campaign observers have witnessed (and videotaped) more than 300 Trumpeter Swans being driven to flight during helicopter hazing of bison. Continued flushing of wintering swans potentially causes serious energetic stress. Swans also are potentially threatened by recreational disturbance in winter, this threat being smaller than hazing.

Grizzly bears are negatively impacted by the presence of domestic livestock on public lands. Livestock grazing should be considered unsuitable inside primary conservation area (PCA). Grazing permits that expire, are revoked, or are waived should be permanently closed. The DEIS must analyze an alternative to this effect. No new permitted livestock grazing should be permitted in areas that are considered migratory corridors for grizzly bears. Any permits that expire, are revoked or waived should be permanently closed. All vacant grazing allotments both within and outside of the PCA should be permanently closed in the FP. If conflicts arise between domestic livestock and grizzly bears, livestock should be immediately removed for the associated allotments.

Bison are negatively impacted by the presence of domestic livestock on public lands. Bison are further impacted by the outdated Interagency Bison Management Plan and the decision of the CGNF to adhere to the politically drawn “tolerance zones” for bison. Bison habitat and movements should be managed by the biological needs of the species. For a full discussion of issues related to bison, *see*: <http://buffalofieldcampaign.org/images/get-involved/action-opportunities/act-now/American-Bison-A-Species-of-Conservation-Concern-Report/Report-American-Bison-A-Species-of-Conservation-Concern-02-04-2018.pdf>

Additionally, any analysis of grazing is incomplete without a discussion of the effect the practice has had on predators. The most vehement opposition to wolves, bears, and other predators comes from the livestock industry, and is one of the main reasons some of the species are now listed. Predators perform important top-down ecological functions, yet they are consistently eradicated and heavily managed in order to protect livestock on public land, costing taxpayers millions of dollars. The DEIS must include an analysis of the impacts from livestock grazing on predators in the planning area.

Livestock Grazing

The section on livestock grazing in the PA is severely lacking. While the livestock grazing final assessment has some valuable information and is decent starting point, it paints an inaccurate picture of the actual condition of grazed lands in the CGNF. What is clearly evident from both documents is that the FS has very little actual data to base policy decision on and is largely unaware of the trends or baseline conditions for most of the grazing allotments in the forests. One visit to an allotment in over 30 years is inexcusable yet for nearly every stream in the forest, there is only one survey to base future decisions on. It is clear that little to no data exists for soils in regard to grazing or on a site-specific basis for upland vegetation. There is no information presented about permittee compliance with terms and conditions of grazing permits. This is likely because with so little monitoring and compliance checks, the FS does not actually know if permittees are in compliance.

The problem is clearly identified early on in the PA. FW-DC-GRAZ states, “(s)ustainable grazing opportunities are available for livestock on suitable lands.” Inexplicably, this is the only desired condition for livestock grazing. What about a desired condition to have healthy and productive forested and grassland ecosystems that support of full complement of plant and animal species. How

about a desired condition that livestock grazing does not negatively impact or lead to diminished opportunities for other users of public lands, i.e. campers, hunters, recreationist, fishers, etc.

Livestock grazing standards, the only enforceable mechanism in the FP are also lacking. While standard FW-STD-GRAZ-01 sounds good, the truth is that is impotent. There is no actual requirement to create new or revised AMPs, only that if they are revised, grazing practices might be changed. However, even here, actions are totally discretionary as there is not even a direction to avoid first, minimize second, and only if absolutely necessary, mitigate for impacts. Given this direction, a captured agency such as the FS is sure to always propose mitigation through increased range infrastructure at taxpayer expense.

In regards to livestock grazing generally, Western Watersheds Project urges the FS to incorporate the following in the FP as interim AULs:

Specific measurable terms and conditions for livestock grazing in riparian areas, uplands, and wildlife and fisheries habitat, including:

- (i) a minimum of 7" stubble height remaining on hydric soils riparian greenlines after livestock grazing
- (ii) a 10% maximum annual bank or wetland alteration from all sources for streams and wetland hydric and mesic soil areas of upland seeps, springs, wet meadows, green ash draws, and aspen clones
- (iii) a maximum annual woody browse utilization by all browsing ungulates of 15% on cottonwood, aspen, woody shrub, and willows
- (iv) a maximum annual grazing utilization of perennial grass species on upland landscapes by all grazer of 35%
- (v) a minimum 9" residual perennial native grass cover for ground-nesting birds like sage-grouse and sharp-tailed grouse.

Then when new AMPs are developed through a public NEPA process, AULs should be determined by specific site characteristics based on the best available science. These AULs must include bank trampling standards that are based on stream channel type and upland utilization standards that are based on the habitat needs of both native plants and wildlife.

Appendix A provides some additional insight into livestock grazing management however, this sections still needs significant improvement, clarification and direction. In the section titled Allotment Planning and Management, bullet point two relating to AMPs does not specify that AMP revision will be undertaken using a public NEPA process. Further, there is no information or direction about how priority will be assigned to AMP revisions. These issues must be spelled out for land managers in order to ensure compliance.

While we appreciate the direction that limits the use of end of season stubble height, it is also imperative to include more direction about bank trampling or streambank disturbance. Specifically, all C and E channel streams must also utilize streambank disturbance in addition to riparian stubble height as this will almost always be the first AUL exceeded. The Northern Region streambank alteration protocol is referenced as the recommended protocol. Please provide this protocol for review in the DEIS for review.

In the section for Allotment Inspections, there is only direction to inspect selected allotments annually. This is absolutely not acceptable. Every allotment must be inspected annually to determine compliance with terms and conditions. Without annual inspections, a permittee might exceed AULs and be out of compliance with and AMP for several years in a row without detection. This will lead to degraded resources and habitat, undue an previous progress toward desired conditions, and make it exceedingly difficult to impose required penalties for failure to comply. If the FS does not have the resources to do annual inspections of each allotment, then it is clear that the grazing program has exceeded its capacity and must be reduced. In areas where the FS does not have the resources or personnel for annual inspections, those lands should be designated as unsuitable for livestock grazing.

Furthermore, in addition to permittees participating in inspections, direction should be included that requires permittees to learn how to identify thresholds for AULs. Permittees should also be required to herd or have riders herding livestock on each allotment to ensure that AULs are not exceeded. It may only take one day of overuse to do significant damage to sensitive riparian areas or aquatic resources.

Allotment Infrastructure – direction should be included to ensure that all new allotment infrastructure projects are subject to a public NEPA analysis with notice and comment. Further, allotment infrastructure should analysis should be included in the AMP revision and permit renewal NEPA so that its need can be placed in the context of the overall grazing situation. In general, the first preferred action before the addition of infrastructure should be changes in timing, duration, and intensity of grazing. Again, riders and/or herders can be employed to effectively protect riparian resources without the need for taxpayer supported infrastructure.

All allotment infrastructure should be annually inspected by FS personnel. If infrastructure in a non-functional state, the grazing season should be delayed until it is fixed or removed if determined to be unnecessary.

On further question to address relates to livestock grazing on unreclaimed uranium mine habitat. Does the FS have any documentation or can the FS provide information about the safety to humans who consume these animals?

“Rest”oration, Grazing Systems, and Utilization

As the FS must certainly acknowledge, the quality of the land in the project area is severely diminished. Thus, when the FP seeks to improve range condition, as it must, what this really means is that the FP must provide for improved riparian, upland, and wildlife habitat conditions and include goals, terms and conditions, and standards to achieve those goals.

The correction of resource degradation caused by domestic livestock and the prevention of future degradation should be driving forces behind the FP and should be reflected throughout the NEPA document and in any future agency decisions regarding domestic livestock grazing in the project area. The Alternatives in the DEIS must set specific livestock grazing levels that will be used to meet standards.

Simply stating that specific standards will be developed at the site specific level violates law and allows the FS to continue the degradation caused by domestic livestock. The FS must establish allowable use

levels as required by both 43 CFR Sec 4100.0-8 and 43 CFR 1601.0-5(b) by including maximum livestock utilization standards in the FP.

The FS must define what constitutes a sustainable level of livestock grazing. “Sustainability” is defined in the glossary as “(t)he capability to meet the needs of the present generation without compromising the ability of future generations to meet their needs. For purposes of this part, “ecological sustainability” refers to the capability of ecosystems to maintain ecological integrity; “economic sustainability” refers to the capability of society to produce and consume or otherwise benefit from goods and services including contributions to jobs and market and nonmarket benefits; and “social sustainability” refers to the capability of society to support the network of relationships, traditions, culture, and activities that connect people to the land and to one another, and support vibrant communities”⁷⁴ The DEIS must explain how it meets this definition of sustainability.

The FP should provide for long-term rest to facilitate recovery. Any discussion of impacts should address the use of peer-reviewed range science principles for management and rely on high standards of performance. The reliance on unfounded solutions such as time-controlled grazing are not adequate for recovery.

For example, the effects of different livestock grazing intensities on forage plant production were studied in a ponderosa pine type in Colorado as early as the 1940’s.⁷⁵ This study showed that forage consumption at a rate of 57% produced an average of twice as much forage as a rate of 71%. An area left ungrazed by livestock for 7 years produced three times as much forage as the 71% use area. The authors concluded that, as grazing use increased, forage production decreased.

During that same period, Dyksterhuis,⁷⁶ in a classic paper on the use of quantitative ecology in range management, presented examples of how stocking rates must be adjusted based on precipitation and range condition, which included a rating based on departure from the potential plant community. NRCS⁷⁷ considers proper grazing management as that management that sustains the potential plant community.

Hutchings and Stewart,⁷⁸ suggested that 25 – 30 % use of all forage species by livestock was proper. They recommended this level because routinely stocking at capacity will result in overgrazing in half the years and necessitate heavy use of supplemental feed. Even with this system, they recognized that

⁷⁴ PA at 185.

⁷⁵ Schwan, H.E., Donald J. Hodges and Clayton N. Weaver. 1949. Influence of grazing and mulch on forage growth. *Journal of Range Management* 2(3):142-148.

⁷⁶ Dyksterhuis, E. J. 1949. Condition and management of range land based on quantitative ecology. *Journal of Range Management* 2:104-115.

⁷⁷ USDA. 1982. Soil Survey of Rich County Utah. USDA Soil Conservation Service, Forest Service and Bureau of Land Management.

⁷⁸ Hutchings, S.S. and G. Stewart. 1953. Increasing forage yields and sheep production on Intermountain winter ranges. U.S. Department of Agriculture Circular 925. 63p.

complete destocking would be needed in 2 or 3 out of ten years. Holechek et al⁷⁹ concluded that the research is remarkably consistent in showing that conservative grazing at 30 – 35% use of forage will give higher livestock productivity and financial returns than stocking at grazing capacity. They also recognized that consumption by rodents and other wildlife must be taken into account as part of this utilization, otherwise, rangeland productivity would suffer even at these levels of use. Galt et al⁸⁰ recommended levels of 25% utilization for livestock and 25% for wildlife with 50% remaining for watershed protection. In none of these cases have the scientists recommended 50% utilization by livestock, as the FS continually authorizes (i.e. take half, leave half) and they are clear that even at the lower use levels recommended, allowance for wildlife use must be included in overall use.

Clearly, the long-term range studies cited here show that under actual field conditions, light grazing (25% or less by livestock) or no grazing is most appropriate to meet FS's mandate for sustainable use. These utilization rates are the minimum needed to ensure proper functioning condition, which is the minimum acceptable condition. The FS must require at least minimum compliance with these standards in the FP until these standards can be evaluated at the site-specific level.

The most effective way to protect and restore lands in the planning area would be the elimination of cattle from the landscape, and allow limited the amount of browsing in the area to that by wildlife. Stating that stricter standards will improve range in declining condition is not only a failure to disclose impacts, but it ignores the real problem. In numerous studies of riparian grazing impacts, investigators concluded that total removal of livestock was necessary to restore ecosystem health.

For example, along Mahogany Creek, Nevada, reduction in grazing had little benefit; only a complete removal brought about habitat improvement.⁸¹ Ames⁸² found that "even short-term or seasonal use is too much," and compared mere reductions in livestock numbers to letting "the milk cow get in the garden for one night." In a recent comparison of eleven grazing systems, total exclusion of livestock

⁷⁹ Holechek, Jerry L., Hilton Gomez, Francisco Molinar and Dee Galt. 1999a. Grazing studies: what we've learned. *Rangelands* 21(2):12-16

⁸⁰ Galt, Dee, Francisco Molinar, Joe Navarro, Jamus Joseph and Jerry Holechek. 2000. Grazing capacity and stocking rate. *Rangelands* 22(6):7-11.

⁸¹ Chaney, E., W. Elmore, and W.S. Platts. 1990. Livestock grazing on western riparian areas. U.S. Environmental Protection Agency, Region 8. Denver, Colorado. Dahlem, E.A. 1979. The Mahogany Creek watershed--with and without grazing. Pages 31-34 in O.B. Cope, editor. *Proceedings of the Forum--grazing and riparian/stream ecosystems*. Trout Unlimited, Denver, Colorado.

⁸² Ames, C.R. 1977. Wildlife conflicts in riparian management: grazing. Pages 49-51 in R.R. Johnson and D.A. Jones, technical coordinators. *Importance, preservation, and management of riparian habitat: a symposium*. General Technical Report RM-43. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

offered the strongest ecosystem protection.⁸³ As Davis⁸⁴ put it: "If the overgrazing by livestock is one of the main factors contributing to the destruction of the habitat, then the solution would be to ... remove the cause of the problem." The GAO study cited above also showed that restoring riparian areas was best accomplished by removal of livestock.

Weighing the impacts of resource management practices is consistent with the FS's mission of providing lands for multiple uses as recognized in the Multiple Use Sustained Yield Act. The "multiple use" concept as defined in law and regulations requires "a reasoned and informed decision that the benefits of grazing ... outweigh the costs" and a weighing of "the relative values of the resources."⁸⁵ Therefore, the FS must show that the benefits of domestic livestock grazing outweigh the costs.

Impacts of Livestock Grazing

In spite of the evidence of widespread loss of plant productivity and ground cover, accelerated erosion and FS's own documentation of rapid declines in species such as sage-grouse, FS routinely chooses not to address livestock impacts in any scientific or sustainable fashion. **The FP must acknowledge the negative impacts of livestock grazing and propose significant grazing reductions to address these impacts.**

Belsky, et al.⁸⁶ found that livestock grazing negatively effects water quality and seasonal quantity, stream channel morphology hydrology, riparian zone soils, instream and streambank vegetation, and aquatic and riparian wildlife. Livestock were also found to cause negative impacts at the landscape and regional scale.⁸⁷ While evidence is abundant describing the negative impacts of grazing before the Taylor Grazing Act in 1934, recent studies document that livestock grazing remains a key factor in the continued degradation of riparian habitats.⁸⁸

⁸³ Kovalchik, B.L., and W. Elmore. 1992. Effects of cattle grazing systems on willow-dominated plant associations in central Oregon. Pages 111-119 in W.P Clary, E.D. McArthur, D. Bedunah, and C.L. Wambolt, compilers. Proceedings--Symposium on ecology and management of riparian shrub communities. General Technical Report INT-289. Forest Service, Intermountain Research Station, Ogden, Utah.

⁸⁴ Davis, J.W. 1982. Livestock vs. riparian habitat management--there are solutions. Pages 175-184 in L. Nelson, J.M. Peek, and P.D. Dalke, editors. Proceedings of the wildlife-livestock relationships symposium. Forest, Wildlife, and Range Experiment Station, University of Idaho, Moscow, Idaho.

⁸⁵ National Wildlife Federation v. FS, No. UT-06-91-01 US Dep't of Interior, Office of Hearings & Appeals, Hearings Div. (Rampton, J. 1993), p. 23, the "Comb Wash Allotment" decision.

⁸⁶ Belsky, A.J. et.al. 1999 Survey of livestock influence on stream and riparian ecosystems in the western United States. Journal of Soil and Water Conservation. Vol 54 Issue 1, p. 419.

⁸⁷ Ibid

⁸⁸ U.S. General Accounting Office. 1988. Public Rangelands: some riparian areas restored, but widespread improvement will be slow, p. 85. Szaro, R.C. 1989. Riparian forest and scrubland community types of Arizona and New Mexico. Desert Plants 9 (3-4) Platts, William S. 1981. Influence of Forest and Rangeland Management on Anadromous Fish Habitat in Western North America – Effects of Livestock Grazing. General Technical Report PNW 124, USDA Pacific Northwest Forest and Range Experiment Station, Boise, ID; Elmore, W., and B. Kauffman. 1994. A Riparian and Watershed Systems: Degradation and Restoration In M. Vavra, W.A. Laycock, and R.D. Pieper (eds), *Ecological Implications of Livestock Herbivory* 1994 West. Soc. Range Management: Denver, CO.

In addition, Platts⁸⁹ concluded that livestock grazing was the major cause of degraded stream and riparian environments and reduced fish populations in the arid west. A recent report by the USDA Forest Service found grazing to be the fourth major cause of animal species endangerment in the United States and the second major cause of endangerment of plant species.⁹⁰ Moreover, livestock grazing is still considered to be the most pervasive source of upland and riparian habitat degradation in the arid West.⁹¹

Blackburn⁹² and Trimble and Mendel⁹³ summarized the negative impacts of grazing on watersheds. They listed the erosive force of raindrops on denuded surfaces, the shearing force of hooves on slopes, decreased soil organic matter, and increased soil compaction as primary impacts. Together, these impacts result in reduced infiltration rates and increased runoff, soil bulk density, erosion, and sediment delivery to streams. Indirectly, this affects everything from plants to fish and the impacts occur across entire landscapes. The Natural Resource Defense Council found that overgrazing is the number one threat to Western trout streams.

Based on 43 CFR 4180, appropriate actions to address the negative impacts of domestic livestock are to be implemented that will result in significant progress toward attainment of the standards no later than the start of the next grazing season. Clearly this has not been accomplished. Given the fact that the number of cows that could be grazed on FS land in the planning area represents a slight and declining economic influence, this degradation is unacceptable.

Furthermore, grazing affects species composition of plant communities in essentially two ways: 1) active selection by herbivores for or against a specific plant taxon, and 2) differential vulnerability of plant taxa to grazing.⁹⁴ Decreases in density of native plant species and diversity of native plant communities as a result of livestock grazing activity have been observed in a wide variety of western

⁸⁹ Platts, William S. 1981. Influence of Forest and Rangeland Management on Anadromous Fish Habitat in Western North America – Effects of Livestock Grazing. General Technical Report PNW 124, USDA Pacific Northwest Forest and Range Experiment Station, Boise, ID.

⁹⁰ Flather, C.H., et.al. 1994 Species endangerment patterns in the United States. USDA Forest Serv. Gen. Tech. Rep. RM-241.

⁹¹ U.S. General Accounting Office. 1988. Public Rangelands: some riparian areas restored, but widespread improvement will be slow, p. 85. Belsky, A.J. et.al. 1999 Survey of livestock influence on stream and riparian ecosystems in the western United States. *Journal of Soil and Water Conservation*. Vol 54 Issue 1, p. 419; Elmore, W., and B. Kauffman. 1994. A Riparian and Watershed Systems: Degradation and Restoration In M. Vavra, W.A. Laycock, and R.D. Pieper (eds), *Ecological Implications of Livestock Herbivory* 1994 West. Soc. Range Management: Denver, CO.

⁹² Blackburn, W.H. 1984. Impact of grazing intensity and specialized grazing systems on watershed characteristics and responses. In: *Developing strategies for range management*. Westview press: Boulder, CO.

⁹³ Trimble, S.W., and A.C. Mendel. 1995. The Cow as a Geomorphic Agent, A Critical Review. *Geomorphology* 13: 1995.

⁹⁴ Szaro, R.C. 1989. Riparian forest and scrubland community types of Arizona and New Mexico. *Desert Plants* 9 (3-4): 69-138.

ecosystems. Grazing also can exert great impact on animal populations, usually due to indirect effects on habitat structure and prey availability.⁹⁵ Deleterious effects of grazing have been observed in all vertebrate classes. Response of native wildlife to grazing varies by habitat.

Furthermore, Bock et al.⁹⁶ reviewed the effect of grazing on Neotropical migratory landbirds in three ecosystem types, and found an increasingly negative effect on abundances of bird species in grassland, riparian woodland, and Intermountain shrubsteppe (almost equal numbers of species with positive and negative responses to grazing in grassland; six times as many with negative as positive responses in shrubsteppe), but impacts to these species are lacking in the DEIS.

Holechek et al.⁹⁷ have shown that areas up to a mile from water developments can have severe impacts from trampling, compaction and removal of vegetation with impacts occurring for several miles. Using the area within one mile of a water development results in an area of approximately 2,000 acres potentially suffering severe impacts. Placing these developments in areas with steep hillsides or narrow canyons, which is often done to entice cattle to use areas that receive little or no use, can result in severe erosion due to cattle being forced to graze on these steep slopes.

To highlight how grazing can impact arid rangelands, multi-scale analyses of natural vegetation patterns and processes in the northern Chihuahuan Desert show that natural vegetation is capable of recovering from short-term, high intensity disturbances such as an atomic bomb blast. In contrast, mesquite dunelands persist on other sites grazed before the blast, showing the arid land is less resilient to long-term low intensity disturbances.⁹⁸

Beschta et al., 2012⁹⁹ provide a scientific basis for expecting significant environmental damage

⁹⁵ Jones, K.B. 1981. Effects of grazing on lizard abundance and diversity in western Arizona. *Southwestern Naturalist* 26: 107-115. Mosconi, S.L., and R.L. Hutto. 1982. The effect of grazing on the land birds of a western Montana riparian habitat. In L. Nelson, J.M. Peek, and P.D. Dalke, editors. *Proceedings of the wildlife-livestock relationships symposium*. Forest, Wildlife, and Range Experiment Station, University of Idaho, Moscow, Idaho. Quinn, M.A., and D.D. Walgenbach. 1990. Influence of grazing history on the community structure of grasshoppers of a mixed-grass prairie. *Environmental Entomology* 19: 1756-1766. Szaro, R.C., S.C. Belfit, J.K. Aitkin, and J.N. Rinne. 1985. Impact of grazing on a riparian garter snake. Pages 359-363 in R.R. Johnson, C.D. Ziebell, D.R. Patton, P.F. Ffolliott, and F.H. Hamre, technical coordinators. *Riparian ecosystems and their management: reconciling conflicting uses*. General Technical Report RM-120. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. Wagner, F.H. 1978. Livestock grazing and the livestock industry. Pages 121-145 in H.P. Brokaw, editor *Wildlife and America*. Council on Environmental Quality, Washington, D.C.

⁹⁶ Bock, C.E., V.A. Saab, T.D. Rich, and D.S. Dobkin. 1993b. Effects of livestock grazing on Neotropical migratory land birds in western North America. Pages 296-309 in D.M. Finch, and P.W. Stangel, editors. *Status and management of Neotropical migratory birds*. General Technical Report RM-229. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

²⁷ Holechek, Jerry L., Rex D. Piper and Carlton H. Herbel. 1998. *Range Management Principles and Practices*. P. 542. Prentice-Hall, New Jersey.

⁹⁸ Yool, Steven R. 1999. Multi-scale analysis of disturbance regimes in the northern Chihuahuan Desert. *Journal-of-Arid-Environments*. Dec., 1999; 40 (4) 467-483.

⁹⁹ Beschta, Robert L., Debra L. Donahue, Dominick A. DellaSala, Jonathan J. Rhodes, James R. Karr, Mary H. O'Brien, Thomas L. Fleischner, Cindy Deacon Williams. 2012. *Adapting to Climate Change on Western Public Lands: Addressing*

from livestock grazing:

- 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—typically concentrated in these areas—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–shrub habitats affected by grazing are “on track to become a prominent wildlife conservation crisis of the 21st century” (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—nutrient and energy cycles;

the Ecological Effects of Domestic, Wild, and Feral Ungulates. Environmental Management, DOI 10.1007/s00267-012-9964-9 2012. <http://www.springerlink.com/content/e239161819g01117/fulltext.pdf>

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, ... 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—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 belowground 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 “if temperatures warm and summer precipitation increases as is anticipated, [soils in grazed areas] may become net sources of CO₂ to the atmosphere” (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 sagegrouse 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). ...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’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' administration costs (Vincent 2012).

Economics

The FP must meet the requirements of the Federal Land Policy Management Act (“FLPMA”). FLPMA requires the FS “take action necessary to prevent unnecessary or undue degradation of the lands[.]” 43 U.S.C. § 1732 (b). FLPMA also requires that the FS manage lands for multiple use “without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.” 43 U.S.C. § 1702(c).

While the FS’s need not choose the alternative with the greatest economic return, the FS also fails to calculate the economic value of grazing. The economic and social value of public lands livestock grazing receives disproportionate weight in FS planning documents. The importance of public lands grazing to the economy of the region is grossly overestimated. The calculation of the social and economic values of the draft plan should demonstrate a clear understanding and consideration of the conflicts between continued grazing and other uses of the public lands. The FS must provide a more thorough analysis of the social and economic values of different livestock grazing levels. This analysis must consider the administrative costs of a grazing policy, economic benefits from recreation where grazing is reduced or eliminated, and the cost of negative environmental consequences of livestock grazing in the area.

The administrative costs of public lands grazing are often underestimated in FS planning documents. Considering only direct costs, FS range management costs in 2011 totaled \$77.3 million, while income from grazing fees was only \$4.5 million, leaving a net deficit to the U.S. Treasury was \$72.8 million.¹⁰⁰ This loss on federal grazing programs fails to consider indirect costs, such as administration of the range program. Estimates of those indirect costs rise well over \$100 million.¹⁰¹ The economic

¹⁰⁰ Karyn Moskowitz and Chuck Romaniello, *Assessing the Full Cost of the Federal Grazing Program*, October 2002, 14.

¹⁰¹ *Id.* at 17.

calculations in the DEIS should not ignore potential administrative cost savings from reduced grazing. Decreased grazing would save the FS costs associated with environmental analysis, litigation, grazing permit administration, predator control, weed spraying, and costly efforts to preserve species harmed by grazing.

Agricultural statistics often overestimate the value of public lands ranching to local economies. The number of permittees and full-time ranchers is often extremely inflated. In fact, “the elimination of all public lands livestock grazing would result in a loss of 18,300 jobs in agriculture and related industries across the entire West, or approximately 0.1 percent of the West's total employment.”¹⁰² For further information on the significance of federal public lands grazing to employment and economies in the West generally, see Thomas Power’s article, *Taking Stock of Public Lands Grazing: An Economic Analysis*.¹⁰³

Often, public lands recreation provides far more economic benefit to local communities than livestock grazing. Improved environmental conditions that would result from decreased grazing would likely create more jobs and economic development related to outdoor recreation such as hiking, camping, fishing, hunting, and the associated benefits to restaurants, hotels, convenience stores, and other in the area. A 2011 Department of Interior study stated that “[r]ecreation visits to Interior-managed lands in the contiguous United States, Hawaii, and Alaska in 2011 supported over 403,000 jobs and about \$48.7 billion in economic contributions to the communities and regions surrounding Interior-managed land.”¹⁰⁴ The DEIS ignores the economic significance of recreation, an economic benefit that would increase with improved land conditions from decreased grazing.

The FP must address the costs of environmental degradation. The value lost from negative environmental impacts to water quality and quantity, aquatic species habitat, riparian and upland wildlife habitat quality and quantity, and native vegetation should be calculated. The DEIS must also address the potential for further exotic species and weed expansions, the costs associated with weeds and flammable invasive species, and the resulting potential for species loss. The viability of wildlife and rare plant populations and the cost to protect and preserve them in the face of chronic grazing degradation demands FS’s attention. If the FS is to rise to its calling as land administrator for the public, the beauty and intrinsic value of the land, as described by Aldo Leopold, must also be addressed.¹⁰⁵

In accordance with its multiple use mission, the FS must consider land uses other than grazing in its calculation of the economic and social values of each alternative, including administrative costs and

¹⁰² George Wuerthner & Mollie Matteson, *Welfare Ranching: The Subsidized Destruction of the American West*, 13 (2002), available at http://www.publiclandsranching.org/htmlres/wr_myth_economics.htm.

¹⁰³ Thomas Power, *Taking Stock of Public Lands Grazing: An Economic Analysis*, available at http://www.publiclandsranching.org/htmlres/wr_taking_stock.htm.

¹⁰⁴ The Department of the Interior’s *Economic Contributions: Fiscal Year 2011*, July 9, 2012, 152, available at <http://www.doi.gov/americasgreatoutdoors/loader.cfm?csModule=security/getfile&pageid=308931>.

¹⁰⁵ See Aldo Leopold, *A Sand County Almanac*, Part III: The Upshot: The Land Ethic (1949).

environmental impacts to water, wildlife, plants, recreation, potential species loss, intrinsic land value, and beauty. Under the Taylor Grazing Act, the FS must prevent injury to public lands.¹⁰⁶ The current grazing utilization levels are unsustainable and the proposed plan must not continue grazing at unsustainable levels. Restoration of the land will require costly action by the FS. Taking into account the overestimated costs and underestimated benefits of reducing grazing in the planning area, the FS must provide a thorough and balanced analysis that considers the factors addressed in this comment.

Voluntary Retirement

Because of economic pressures and uncertainty, many ranchers in the West would like to voluntarily retire their grazing permits, and the FP and Final EIS should grant ranchers the freedom to retire their permits if voluntarily waived to the FS. Voluntary grazing permit retirement would offer permittees a new economic opportunity while providing protection and restoration for the land managed by the CGNF. All alternatives analyzed in the DEIS and the chosen alternative for the FP need to include specific direction and language authorizing the permanent retirement of voluntarily waived FS grazing permits. Suggested language for authorizations is as follows:

Grazing privileges that are lost, relinquished, canceled, or have base property sold without transfer would have attached AUMs held for watershed protection and wildlife habitat. (Adapted from the Challis Resource Area Proposed FP and Final EIS, October 1998, p. 87).

Wildlands and Wilderness

The Custer Gallatin National Forest contains some of the most unprotected significant public wildlands left in the lower 48 states. As the northern hub of the Greater Yellowstone Ecosystem (GYE), these lands are critical to the overall integrity of the GYE which is the most intact temperate wildlands left in the world.

The Custer Gallatin National Forest (CGNF) is the epicenter to the most spectacular wildlands in the Nation. These wildlands are home to some of the best wildlife habitat in the country, and is habitat to grizzly bear, lynx, wolf, elk, bison, moose, mountain goat, and bighorn sheep, as well as the source of waters that support genetically pure Yellowstone and West Slope cutthroat trout.

Roadless areas like the Gallatin Range, Crazy Mountains, Bridger Mountains, Pryor Mountains to name a few CGNF areas should be managed and protected as designated wilderness, the highest protection our legal system provides.

Wilderness protects the habitat of sensitive and in some cases threatened or endangered species like wolverine, grizzly bear, Westslope cutthroat and Yellowstone cutthroat trout. Wilderness is a place where natural ecological processes like wildfire, beetle outbreaks, floods, and drought can “work” their magic without interruption from human management. Wilderness also protects the water quality of major rivers of the state like the Gallatin, Yellowstone, Boulder, Stillwater, and Clarks Fork of the Yellowstone.

¹⁰⁶ 43 U.S.C. §315(a).

Conservation biology principles suggest that it's critical to have large protected areas or "islands of habitat" that are close to other protected "islands" and connected by corridors. The recommendations below would help the CGNF achieve this kind of protection by addition of roadless lands to existing wilderness such as Line Creek Plateau, Deer Creeks, and Dome Mountain areas as additions to the Absaroka Beartooth Wilderness or by designating new "islands" of wilderness such as our proposals for the Pryor Mountains, Crazy Mountains and Bridger Range.

We wish to reiterate that the CGNF national and perhaps international significance is not timber production, livestock production or even oil/gas or mineral production, all of which can be produced at lower cost and with higher quality in other areas. Rather the one thing that the CGNF excels at is wildlands. As a result, it behooves the CGNF to protect what the CGNF does best and give it the recognition these wildlands deserve.

Furthermore, it is well established that protecting public lands from resource extraction is a key driver of the Southcentral Montana economy.

With that in mind, the CGNF proposed wilderness recommendations in its draft Forest Plan are inadequate. Below are suggested comments that will improve the CGNF wilderness recommendations.

Here's what the CGNF recommended for wilderness. Not a single acre in the Crazy Mountains or Bridger Range and paltry wilderness recommendations for the Gallatin Range and Pryor Mountains.

Lost Water Canyon, Pryor Mountains 6,804 acres
Line Creek Plateau, Absaroka Beartooth Mountains, 801
Red Lodge Creek-Hell Roaring, Absaroka Beartooth Mountains 802
Mystic Lake, Absaroka Beartooth Mountains 247
Republic Mountain, Absaroka Beartooth Mountains 388
Gallatin Crest, Gallatin Mountains 70,614
Sawtooth, Gallatin Mountains 14,827
Taylor Hilgard, Madison Mountains 4,466
Lionhead, Henrys Lake Mountains 17,983

Total Acres of Recommended Wilderness Areas by the CGNF is 116,392.

GALLATIN RANGE

The Gallatin Range is the largest unprotected roadless area in Montana and a key part of the Greater Yellowstone Ecosystem. The Gallatin Range portion of the CGNF stretches 50 miles from Yellowstone Park north to Bozeman including the popular Hyalite Canyon area.

The FS identified some 251,700 acres in its Wilderness Inventory Polygon 28 which includes the Hyalite--Porupine-Buffalo Horn WSA, but it is not all inventoried roadless a portion of the full Gallatin Range Roadless area which extends south into Yellowstone NP and takes in over 546,000 acres.

The CGNF appears to use the “purity” argument to disqualify many areas from its recommendations saying there is noise from highway traffic, a municipal watershed, or a few cabins or other structures that do not conform to the Wilderness Act. This argument is used to exclude tens of thousands of acres from its recommendations.

The Gallatin Range higher elevations feature glacially carved cirques, and grassy ridges. There are a lot of open grassy valleys and slopes which are exceptional wildlife habitat, particularly the Porcupine-Buffalo Horn Drainage where thousands of elk winter. Three drainages—Mol Heron, Tom Miner, and Rock Creek-- that flow from the Gallatin Range are considered essential Yellowstone Cutthroat trout habitat by Montana Fish Wildlife and Parks. The Gallatin Range also supports grizzly bear, wolf, mountain goat, wolverine, bighorn sheep, moose, mule deer, and potentially wild bison.

The largest petrified forest in the world is found at the headwaters of Porcupine, Rock, Tom Miner, and Buffalo Horn drainages. Commercial and amateur collectors have ravaged this world-class complex. Wilderness designation would help to halt this tragic damage.

Since 1977 approximately 155,000 acres have been protected as the Hyalite, Porcupine and Buffalo Horn Wilderness Study Area. In total there are about 230,000 acres of potential wilderness, but the CGNF has only recommended about 85,000 in two units and proposes that the Buffalo Horn drainage be designated a backcountry area. The Buffalo Horn drainage is the most important wildlife habitat in the entire Gallatin Range—if any area should be wilderness it is this drainage. Also many roadless drainages in the Gallatin Range were left out of wilderness recommendations including the upper portions of Cottonwood, Sourdough, Trail Creek and others.

For more on the Gallatin Range see the Montanans for Gallatin Wilderness web site located at this link <http://www.gallatinwilderness.org/>

MADISON RANGE

A significant portion of the Madison Range is protected within the Lee Metcalf Wilderness. However, 111,000 acres in the Cabin Creek Recreation and Wildlife Management Area lies between the Taylor Fork and Hebgen Lake and is sandwiched between the Monument Peak area and the main crest of the Madison Range. This exceptional wildlands is without wilderness protection. It is critical grizzly bear habitat, and also could support wild bison herds. Nearly 50 miles of stream support West Slope Cutthroat trout.

The FS does not recommend wilderness here because of on-going biking and ORV/snowmobile use, but that is no excuse. The area easily qualifies for wilderness based on its essential character and should be added on to the Lee Metcalf Wilderness.

Another significant 43,000 acre roadless area lies between Big Sky and the Taylor Fork. This area of rolling hills, open meadows, and scenic view is also critical wildlife habitat. It includes Buck Ridge. The area should be added to the Lee Metcalf Wilderness. Grizzly bear are utilizing this area.

A third 17,000 acre roadless portion of the Madison Range north of the Spanish Peaks that includes the upper Cherry Creek and Spanish Creek drainages would connect the Madison Canyon and Spanish Peaks as a continuous unit. Known as Cowboy's Heaven, it is part of a 26,000 acre roadless area that is split between the CGNF and BDNF;. It should be added to the existing Spanish Peak unit of the Lee Metcalf Wilderness. It contains some of the best lower elevation big game habitat, and is used by several thousand elk.

PRYOR MOUNTAINS:

The Pryor Mountains lie south of Billings and are primarily limestone. There are deep canyons and grassy ridgelines. The area is part of a larger roadless area that could contain lands managed by the BLM and NPS. The FS recommends a paltry 6804 acres in Lost Water Canyon for wilderness. Wilderness in the Pryors could be expanded with the closure of a few tracks and dirt roads.

Support 13,000 acres in the Lost Water Crooked Creek area - not just the 10,421 CGNF Inventoried Roadless. ALL of this area passed the U.S. house in Pat Williams' Wilderness bill in 1994. (In 2015 BLM added 11,00 acres of Lands with Wilderness Character to their 22,000 acres of WSAs from the 1980s.)

In addition, there are three more roadless areas that should be protected as wilderness.

Punch Bowl / Dryhead Creek Canyons RWA (~8,500 acres) of an incredible wild country. This will require converting at least a couple miles of unfortunate 4WD road to motor-free along the ridge between the two canyons.

Big Pryor RWA (12,000 acres) (A couple miles of little used "motorized trail" ought to be converted to motor-free to improve the integrity of the area.)

Bear Canyon RWA (10,000 acres) This one should be a total "no-brainer as there are no roads here.

CRAZY MOUNTAINS

Rising 7,000 feet above the plains (as much as the Tetons rise above Jackson Hole), the Crazy Mountains have numerous peaks over 10,000 feet, including 11,201 foot Crazy Peak. The range also harbors 30 alpine lakes and even a few small glaciers. The range is well known for its geological radiating volcanic dike system and heavily glaciated peaks and valleys. The range is considered sacred to the Crow Tribe. The Crazy Mountains have been included in previous wilderness bills.

The CGNF recommended no wilderness in the Crazy Mountains. Part of their rationale is that there are checkerboard inholdings in the range. However, the CGNF identified 90,690 acres as roadless, but split this into two units for no apparent reason. This is considerably less than the 135,500 acres the FS identified as roadless in the 1980s. Conservationists should insist that at least 90,690 acres be recommended for wilderness with the caveat that private inholdings should be aggressively removed through land trades or purchase.

ABSAROKA BEARTOOTH WILDERNESS ADDITIONS

There are many potential additions to the AB Wilderness. Starting in the East, there is the Line Creek Plateau near Red Lodge. Steep timbered canyons flank this high alpine grassland which supports 20 rare or uncommon plants. The plateau is over 10,000 feet in elevation. The CGNF has recommended only 801 acres out of 32,983 roadless acres with some on the Shoshone NF. The plateau is so special that the FS has designated 16,127 acres as the Line Creek Research Natural Area. At least 30,000 acres should be recommended for wilderness.

The West Fork and Lake Fork of Rock Creek by Red Lodge and the Beartooth Front from Red Lodge to East Rosebud drainage comprise 34,640 acres of roadless lands adjacent to the existing AB Wilderness that includes 27 miles of trail. The West Fork of Rock Creek is the municipal watershed for Red Lodge. In particular, all the roadless lands in both the glaciated valleys of the West and Lake Forks of Rock Creek should be recommended as wilderness.

The 25,000 acre East Rosebud to Stillwater Roadless area along the Beartooth Front provides for the access to East and West Rosebud, as well as Stillwater trailheads. All should be protected as wilderness.

Along the north face of the AB Wilderness are any number of roadless lands that should be added to the list of recommended wildernesses, including the 129,000 Deer Creek drainage lying between the Boulder River and Stillwater River, and includes lands surrounding the East Boulder, Lower Deer Creek, Upper Deer Creek and Bridger Creek. This area, which is mostly foothill terrain, is largely missing from the AB Wilderness. It is important elk and deer habitat, not to mention genetically pure Yellowstone cutthroat trout in the upper Deer Creek drainages. At least half of this area could be managed reasonably well as wilderness.

The 5,000 acre Mount Rae between the Boulder and West Boulder Rivers is another area with aspen and meadows and good wildlife habitat.

The 8,000 Tie Creek/Mission Creek/Livingston Peak including the north face of Shell Mountain with trailhead access near the 63 Ranch east of Livingston Peak provides the scenic backdrop to Livingston. Little Mission and Mission Creek both harbor genetically pure cutthroat trout. All of this area should be protected.

In Paradise Valley, much of the lower foothills of the Absaroka Mountains are not within the wilderness, the entire roadless terrain of 13,000 acres from Deep Creek to Strawberry Creek along the Absaroka Front should be added to the AB Wilderness.

Also, Chico Peak, Emigrant Peak and Dome Mountain 56,000 acre roadless reaches from Cedar Creek by Gardiner north to Passage Creek in the Mill Creek drainage. Except for existing mineral claims, the entire area should also be added to the AB Wilderness. These lands are critical migration corridors and winter range for elk and bison moving north from Yellowstone as well as important grizzly bear habitat. Six Mile Creek has pure Yellowstone Cutthroat trout populations. One way to make a mine in Emigrant Gulch more difficult is if all these lands were designated wilderness.

BRIDGER RANGE

The dramatic face of the Bridger Range walls in the eastern side of the Gallatin Valley. The Bridger Bowl Ski area is located on its eastern flank. The Bridger Range is an important corridor between the Greater Yellowstone Ecosystem and Central Montana. The range supports important winter deer habitat at lower elevations and its streams hold genetically pure West Slope Cutthroat trout and Yellowstone Cutthroat trout. Approximately 45,000 acres of the Bridger Range is roadless and surprisingly the FS did not recommend a single acre for wilderness. The area around Blacktail Peak in the northern Bridger Range has about a third of this roadless component and should be recommended for wilderness.

LIONHEAD (SOUTHERN MADISON RANGE)

The 32,000 acre Lionhead Roadless area includes 18 miles of the Continental Divide Trail and lies to the west of Hebgen Lake. There are a number of alpine lakes, dramatic cirques, and many open meadow areas. The area is a critical corridor that links the Yellowstone Park area to the Lee Metcalf Wilderness and ranges to the West like the Centennials and Gravelly Range. The CGNF has recommended nearly 18,000 acres as wilderness, though their 1986 Forest Plan had recommended 22,000 acres for wilderness. They should be commended for including the Lionhead, but the recommended wilderness should be enlarged to include most of the 32,000-acre roadless area.

Western Watersheds Project thanks you for the opportunity to comments on the CGNF FP Revision. Please keep Western Watersheds Project on the list of interested public for this project. Please feel free to contact me by telephone at (406) 830-3099 or by e-mail at josh@westernwatersheds.org.

Sincerely,



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