

Bureau of Land Management, Idaho State Office
ATTN: Fuels Reduction Draft PEIS
1387 South Vinnell Way
Boise, ID 83709

Comments submitted via email to [BLM PEIS Comments@blm.gov](mailto:BLM_PEIS_Comments@blm.gov)

June 2, 2020

Dear ID Team,

Please and fully consider our comments, appendices, and attachments on the Draft Programmatic Environmental Impact Statement for Fuels Reduction and Rangeland Restoration in the Great Basin (PEIS), referred to on ePlanning as [DOI-BLM-ID-0000-2017-0003-EIS](#). The undersigned have a deep interest in the welfare of the sagebrush biome that constitutes a large fraction of the interior west and is home to hundreds of species including the iconic and majestic sage grouse.

With this PEIS, its companion Programmatic Environmental Impact Statement for Fuel Breaks in the Great Basin ([DOI-BLM-ID-0000-2017-0001-EIS](#)), the Tri-State Fuel Breaks project ([DOI-BLM-ID-B000-2015-0001-EIS](#)), and the proposed Pinyon-Juniper Removal Categorical Exclusion ([DOI-BLM-WO-WO2100-2020-0001-OTHER NEPA](#)), the BLM is committing to drastic sagebrush and pinyon pine and juniper habitat manipulation in the Great Basin (California, Idaho, Nevada, Oregon, Utah, and Washington) and across BLM lands in the West on a grand scale. At the same time, the BLM is making it harder for the public to find out about or engage in BLM projects that flow from these initiatives.

While we appreciate the BLM's interest in restoring the sagebrush biome in the Great Basin, we are profoundly concerned with BLM's approach. Our organizations and members would be adversely affected by this proposal, where the preferred alternative writes BLM a broad authorization to undertake a wide range of actions across millions of acres of public lands without examining in any useful detail where exactly those projects will be implemented, what the projects will be, and how, combined, they will affect the environment. The analysis is not sufficient to determine whether the projects will provide net benefit to the sagebrush sea or result in more disturbance to this embattled biome.

Despite this, the BLM in the PEIS asserts that site level environmental analysis and public engagement will not be necessary and that the BLM will rely on Determinations of NEPA Adequacy (DNA) for implementation. We strongly disagree with this unlawful approach and urge the BLM to commit in the PEIS to NEPA analysis on future implementation projects. Such site-specific analysis is especially necessary because the nature of the proposed projects demands careful examination of site-specific factors including project objectives, site-specific project design, and monitoring to evaluate whether objectives have been achieved.

Developing a large-scale restoration program should include being able to strategically guide project level implementation, effectively monitor treatment effectiveness, apply emerging science, and adapt accordingly. It also presents the opportunity to work closely with the public on all of these activities, especially important for a program like this one that needs to utilize unproven and emerging science. The BLM with this PEIS, unfortunately, does not capitalize on these opportunities, and instead delegates project identification and design to numerous disconnected field offices, making it likely impossible for

the BLM to implement the program in a coordinated, scientifically rigorous, and strategic way. Indeed, instead of using this PEIS to meaningfully include the public in program implementation, the PEIS appears designed to do the opposite, to make it nearly impossible for the public to participate (or even know about) subsequent implementation activities.

We urge the BLM to use this opportunity to reevaluate its programmatic approach and take the following steps to increase transparency, accountability and public engagement in the development and implementation of this PEIS:

- Establish citizen and science oversight for Great Basin Restoration Planning, Research, and Implementation
- Establish a website that provides centralized project tracking and reporting, monitoring data, and rangeland health assessments¹
- Ensure that the public can participate in planning and design of every project and that the BLM commits to NEPA analysis (which can be tiered to the PEIS) for each project.
- Hold annual, public workshops to review the previous year's work, new research, and monitoring, and to design the following year's work incorporating lessons learned and new science
- Identify a program leader and point person with authority and accountability.

Finally, we would be remiss if we did not point out that the sagebrush biome is in a degraded condition as a result of an array of activities – including energy development, roading, grazing, sage brush/tree removal to facilitate grazing – that for the most part will continue after treatment projects are implemented and will continue to degrade the habitat. If the BLM is serious about restoring the sage brush biome and not repeating past mistakes, it must adopt the recommendations above and diminish post-treatment activities that stress the ecosystem. To do otherwise may continue the current trend of degradation, all while effectively wasting taxpayer funds.

While we firmly believe that the BLM should retool its approach to this program as presented in the PEIS, we offer the attached comments on the specifics of the PEIS for your consideration and incorporation. If you have questions or want to discuss any aspect of these comments, please do not hesitate to contact us. We look forward to continuing to engage with you on how to best tackle restoring the sage brush biome.

Sincerely,

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¹ The Environmental Governance and Data Initiative authored a report on the BLM's sage grouse website noting that information over the last few years has been deliberately removed and manipulated to make it harder for the public to understand how BLM sage grouse lands are being managed. See <https://enviroadatagov.org/sage-grouse-informational-resources-on-blm-website-inadequate-for-public-participation-in-management-plan-amendments/>.

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Founded in 1947, **Defenders of Wildlife** (Defenders) is a national conservation organization focused solely on conserving wildlife and safeguarding biodiversity. Based in Washington, DC, the organization also maintains field offices across the country and represents more than 1.8 million members and supporters in the United States and around the world. Defenders is deeply involved in public lands management and wildlife conservation, including conservation and restoration of the sagebrush biome in the American West.

The **Southern Utah Wilderness Alliance** (SUWA) is a non-profit environmental membership organization with members in all fifty states and offices in Washington, D.C. and Utah. It is dedicated to the sensible management of all federal public lands within the State of Utah, the preservation and protection of plant and animal species, the protection of clean air and water found on federal public lands, the preservation and protection of cultural and archaeological resources, and the permanent preservation of Utah's remaining wild lands. SUWA members and staff enjoy a myriad of activities on the public lands managed by BLM, including hiking, biking, nature viewing, photography, and quiet contemplation in the solitude offered by wild places.

The **Center for Biological Diversity** is a national, nonprofit conservation organization with over 1.7 million members and online activists dedicated to the protection of endangered species and wild places. The Center has members and employees living in the Great Basin and Colorado Plateau who have visited the landscapes affected by the PEIS for recreational, scientific, educational, and other pursuits; they will continue to do so in the future. The Center, its members, directors, and staff have worked and advocated to conserve and protect public lands and wildlife across the Great Basin and Colorado Plateau, including greater sage-grouse and numerous species endemic to these areas.

The **Oregon Natural Desert Association** ("ONDA") is an Oregon non-profit, public interest organization of about 10,000 members and supporters. It has offices in Portland, Oregon and Bend, Oregon. ONDA's mission is to protect, defend, and restore forever, the health of Oregon's native deserts. ONDA actively participates in BLM and Department of the Interior proceedings and decisions concerning the management of public lands in eastern Oregon.

Western Watersheds Project is a nonprofit environmental conservation group with nearly 11,000 followers founded in 1993 and has field offices in Idaho, Montana, Wyoming, Arizona, Utah, Nevada and California. WWP works to influence and improve public lands management throughout the West with a primary focus on the negative impacts of livestock grazing on 250 million acres of western public lands, including harm to ecological, biological, cultural, historic, archeological, scenic resources, wilderness values, roadless areas, Wilderness Study Areas and designated Wilderness. Western Watersheds Project staff and members use and enjoy the public lands, including the lands at issue here, and its wildlife, cultural, and natural resources for recreational, scientific, educational, aesthetic, and other purposes.

Grand Canyon Trust is a non-profit, regional conservation organization formed in 1985 and dedicated to making sure the natural wonders, communities, and cultures of the Colorado Plateau thrive. We base our conservation work and advocacy in science, including observations and measurements throughout the sagebrush, pinyon, juniper, ponderosa pine, aspen, alpine, grassland, and riparian habitats of the Plateau. Our staff and members visit, enjoy, and observe BLM lands throughout the West; and participate in collaborations and public engagement regarding decisions that affect the public lands of the Colorado Plateau.

WildLands Defense, Inc. is a 501c3 environmental organization based in Hailey, Idaho. WLD works to protect biodiversity and conserve native ecosystems, and educate the public about wild lands.

The **Sierra Club** is a national nonprofit organization of approximately 784,000 members dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. The Toiyabe Chapter of the Sierra Club has approximately 6,600 members in Nevada and the Eastern Sierra, including many members who live and recreate in the Pinyon Juniper ecosystem.

The **Pennsylvania Society for Ornithology** is a group of birders that promotes the study and appreciation of the wild birds of Pennsylvania and promotes the conservation of birds and their habitats.

The **Maryland Ornithological Society** is a statewide nonprofit, volunteer organization established in 1945 and devoted to the study and conservation of birds. Currently we have 15 chapters and approximately 1,800 members. Some are scientists and naturalists, but our membership includes people of all ages and all walks of life, from physicists to firefighters, legislators to landscapers. MOS has been participating in BLM resource management planning for more than 15 years. We participate because our members visit BLM public lands and appreciate their outstanding values for bird habitat.

The **North Cascades Audubon Society** is dedicated to supporting conservation of birds and wildlife habitat in general. Management practices on BLM lands in eastern Washington particularly directly impact birds that populate our extensive sage and steppe ecosystems, and also affect some that migrate to our diverse western Washington.

The **Los Angeles Audubon Society** has been a voice for birds and conservation in Los Angeles for 113 years. Our mission is to promote the study and protection of birds, other wildlife, and their habitats. We have over 3,500 members and supporters, most of whom live in Los Angeles. Our founding principles

include a commitment to fostering “a proper conservation of our native birds, other animals, wild flowers, trees, shrubs, soil and water.”

The **Salem Audubon Society's** mission is to connect people to nature, through education focused on birds, other wildlife and their habitats, and conservation and restoration of natural ecosystems.

The **Juniata Valley Audubon Society** is dedicated to the conservation and restoration of natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the Earth's biological diversity.

Californians for Western Wilderness (CalUWild) is a citizens organization dedicated to protecting wilderness, wildlife habitat, and other landscapes in the West, by encouraging and facilitating participation in legislative and administrative actions affecting them. CalUWild supports efforts to establish connectivity between areas and is concerned with activities that would fragment existing habitat. Its members use and enjoy the public lands in California and all over the West.

Friends of Nevada Wilderness is dedicated to preserving all qualified Nevada public lands as wilderness, protecting all present and potential wilderness from ongoing threats, educating the public about the values of and need for wilderness, and improving the management and restoration of wild lands.

Comments on the Draft Programmatic Environmental Impact Statement for Fuels Reduction and Rangeland Restoration in the Great Basin

Table of Contents

- I. BLM needs to clarify the purpose and need for this proposal as it has been substantially revised since scoping and omits key baseline considerations
- II. BLM Needs to Take Additional Steps to Ensure Compliance With The Endangered Species Act (ESA)
- III. The BLM must ensure compliance with the National Environmental Policy Act (NEPA) for implementation projects
- IV. The PEIS fails to, but should, provide an effective framework to guide project level implementation and broad-scale monitoring, evaluation and adaptive management
- V. BLM needs to accurately describe the baseline conditions and cumulative impacts
- VI. BLM must provide a broader range of alternatives
- VII. Special Management Areas Included in the PEIS needs to be modified and broadened
- VIII. BLM's prohibition on new road building
- IX. BLM must rigorously examine climate change, both its being impacted by proposed actions and its impact on proposed actions
- X. The BLM must discuss the efficacy of various treatment methods, disclose the rate of success in past and ongoing vegetation treatment projects where similar methods to those proposed in the PEIS were used, and modify final proposal accordingly
- XI. The PEIS needs to more rigorously analyze the impacts of each alternative on specific resources
- XII. Livestock grazing
- XIII. Targeted grazing
- XIV. The PEIS' Appendix F and Appendix H need to incorporate best available science
- XV. The PEIS must assure that post-treatment management will not undo restoration treatments
- XVI. The Project Area improperly includes lands within the Colorado Plateau
- XVII. References
- XVIII. Appendices
 - Appendix A – Historical and Ecological Information Related to Pinyon Pine and Juniper Forest Vegetation Community
 - Appendix B – Mapping Concerns and Uncertainty
 - Appendix C - Sagebrush treatments in Greater Sage Grouse Habitat
 - Appendix D - Letter from scientists to BLM state sage grouse coordinators dated April 6 entitled "Comments on Greater sage-grouse Draft Supplemental Environmental Impact Statements"
 - Appendix E – Recent, current and Reasonably Foreseeable Disturbances to the Sage Brush Biome in the Great Basin

- I. BLM needs to clarify the purpose and need for this proposal as it has been substantially revised since scoping and omits key baseline considerations

BLM is required by CEQ regulations to "briefly specify the underlying purpose and need to which the agency is responding in proposing alternatives including the proposed action." 40 C.F.R. § 1502.13. The range of reasonable of alternatives derives from the EIS's purpose and need section.

Although an agency has "considerable discretion to define the purpose and need of a project," *Friends of Southeast's Future v. Morrison*, 153 F.3d 1059, 1066 (9th Cir. 1998), the purpose and need statement must not be unclear. See, e.g., *Soda Mountain Wilderness Council v. Norton*, 424 F. Supp. 2d 1241, 1264-66 (E.D. Cal. 2006) (finding alternatives analysis inadequate because court could not determine what purposes the BLM sought to accomplish). Nor may it be so narrow that it precludes a range of reasonable alternatives. See, e.g., *Environmental Prot. Info. Ctr. v. United States Forest Serv.*, 234 Fed. Appx. 440, 2007 WL 1417163, at *2, No. 05-17093 (9th Cir. 5-9-07) (holding that the Forest Service improperly defined the goals of a forest-thinning project so narrowly that only its preferred alternative would serve those goals). Cf. *Muckleshoot Indian Tribe v. United States Forest Serv.*, 177 F.3d 800, 812-14 (9th Cir. 1999) (finding EIS's statement of purpose to be reasonable but its discussion of alternatives to be inadequate).

The purpose and need of this project appear to be a moving target. The scoping notice for this PEIS had a clear fire-suppression focus and noted impacts on "rangeland productivity" and "the western lifestyle," while the draft PEIS now states that the project's main purpose is to enhance the resistance and resilience of sagebrush communities. Compare Draft PEIS at 1-3 to BLM, Notice of Intent To Prepare Two Great Basin-Wide Programmatic Environmental Impact Statements to Reduce the Threat of Wildfire and Support Rangeland Productivity, 82 Fed. Reg. 60759, 60760 (December 22, 2017). While similar, these are ultimately different objectives and suggest different metrics for success. Although BLM is permitted to revise the purpose and need statement in response to new information or public input, it must nevertheless sufficiently inform the public about the need for the proposed action and the agency's desired outcomes. Too much change in the purpose and need statement without adequate explanation thwarts public involvement because the public is responding to different drivers at different stages of public input. BLM must clarify its goals and intended outcomes in order to facilitate meaningful opportunities for public participation. If a purpose and need statement is revised, additional, early-stage public comment opportunities should be provided.

- a. BLM should explain how the purpose and need for this project relates to existing strategies, such as the 2015 Integrated Rangeland Fire Management Strategy and the Fire and Invasives Assessment Tool (FIAT)

As noted, BLM's approach to fire management and sage-steppe restoration has been inconsistent, making it difficult for the public to understand BLM's objectives or participate in planning processes. Over the past decade, BLM has released numerous documents outlining a multitude of overlapping strategies and frameworks for addressing the combined threats of fire and invasive species. It is unclear how this PEIS relates to those strategies and frameworks. In many respects, the PEIS appears to disregard and exceed the recommendations contained in documents such as the 2015 Integrated

Rangeland Fire Management Strategy and FIAT reports. BLM needs to clarify how the proposal set forth in this PEIS relates to those strategies and consider that the PEIS ignores some of their key recommendations.

For example, 2015 Integrated Rangeland Fire Management Strategy (Strategy) outlines a “landscape-scale approach to management” that “emphasizes the sustainability of entire ecosystems.” “Inherent in the Strategy is recognition that a strong science foundation is fundamental to successful rangeland fire prevention, suppression, and restoration.” The Strategy also acknowledges the need to address the direct, indirect, and cumulative impacts of anthropogenic stressors, including land uses authorized by BLM. For instance, the Strategy notes that “[a]ddressing improper grazing practices, where they occur, can reduce the likelihood of non-native annual grass invasion.” Finally, the Strategy includes an emphasis on monitoring, data collection, analysis, and adaptation: “Monitoring and evaluation is an essential part of adaptive management and depends upon timely information, analysis, and learning. . . . [W]e cannot be certain that we are achieving desired outcomes without careful monitoring and evaluation of our management efforts.” None of these recommendations are carried through or refined in the PEIS. In fact, the PEIS expressly avoids analysis of existing stressors, such as livestock grazing, and does not include triggers for course correction, or adequate monitoring and evaluation protocols. It also encourages a “one-size-fits-all” approach to treatments across an incredibly vast land area.

The FIAT framework likewise emphasizes the need for site-specific analysis and the variability of native ecosystems. See USDOl BLM, Greater Sage-Grouse Wildfire Invasive Annual Grasses, and Conifer Expansion Assessment for the Western Great Basin/Warm Springs Valley, 5-1, 5-3 (March 2015). In fact, it explicitly calls for “project-specific NEPA.” *Id.* at 5-3. The FIAT directs that “all projects designed to enhance or restore [sage-grouse] habitat . . . will use the approved fine- and site-scale monitoring methods,” and “actions will be assessed as they relate to [sage-grouse] habitat measures of sagebrush availability, human disturbance levels, and sagebrush conditions.” *Id.* at 5-8. Crucially, the FIAT framework “assumes that proper post-disturbance management does not continue to bring a site back to a ruderal successional state.” *Id.* at 5-3. But BLM does not commit to future site-specific analyses in this proposal. BLM should redesign its proposal to provide for detailed site-specific analysis, quantitative treatment-specific desired conditions which would trigger adaptive management if not met, reliable monitoring, and effective post-treatment management. BLM should also consider whether there is any rational basis for its preferred alternative, which expands the proposed treatment area far beyond the FIAT treatment priority recommendations. BLM’s current approach appears to emphasize acres treated rather than long-term ecological outcomes.

- b. The purpose and need statement must acknowledge the role of anthropogenic stressors, including climate change in driving and intensifying changes in fire behavior.

The Draft PEIS’s purpose and need statement explains that there is a need to restore sage-steppe communities and reduce fire risk because intact systems are disappearing due to interactions of wildfire, pinyon-juniper expansion, and invasive annual grasses. But it fails to acknowledge both the role of climate change in driving and intensifying these phenomena, and the role of other stressors, including BLM-authorized land uses that damage sagebrush ecosystem functionality and reduce the geographical extent of sagebrush systems.

Livestock grazing, specifically, is the most widespread use of BLM lands, but the Draft PEIS largely ignores the impacts of authorized grazing, particularly the connection between livestock grazing in arid environments and the spread of invasive annual grasses. The shrub-steppe and desert environments of the interior West evolved without significant grazing pressure because bison and other large herbivores were relatively uncommon west of the Continental Divide before Euro-American settlement (Mack & Thompson 1982, Warren & Eldridge 2001, Knapp 1996). Consequently, the introduction of livestock devastated native bunchgrasses and paved the way for weed invasion. Historical grazing practices established cheatgrass throughout the Intermountain West (Yensen 1981, Knapp 1996, Chambers & Wisdom 2009, Condon & Pyke 2018), and today, grazing continues to drive annual grass invasions across the Great Basin and Colorado Plateau (Williamson et al. 2019).

Grazing spreads invasive annual grasses through three primary mechanisms: by removing native perennial grasses (Reisner et al. 2013, Rosentreter 1994, Chambers et al. 2007, Belsky & Blumenthal 1997, Briske & Richards 1995); by disturbing soils (Olff & Ritchie 1998); and by damaging biological soil crusts (Belnap 2006, Chambers et al. 2014, Reisner et al. 2013, Ponzetti, McCune, & Pyke 2007, Warren & Eldridge 2001, Belnap 1995). As summarized by Chambers et al. (2014):

Inappropriate grazing can decrease the relative abundance of palatable grasses and forbs, disrupt biological soil crusts, and increase soil surface disturbance in communities dominated by herbaceous species and shrubs/trees. These changes can increase available soil water and nitrate in the upper profile of cold desert soils. . . . With increasing levels of grazing intensity, bare soil can increase and cheatgrass can become progressively more abundant in interspaces among residual perennial herbaceous species. These changes can lower resilience to fire due to higher or more contiguous fine fuels that result in greater fire severity and extent and high mortality of fire-intolerant trees and shrubs.

In practical terms this means that pre-fire grazing increases the chances of post-fire cheatgrass invasion (Getz & Baker 2008) and thus intensifies the “cheatgrass-fire” cycle. Reducing or stopping grazing is recommended to reduce disturbance, control invasive species, and reduce wildfire frequency (DiTomaso 2000, Chambers et al 2014, Warren & Eldridge 2001, Bagchi et al. 2013).

Grazing and climate also affect the extent and behavior of pinyon-juniper systems (Jones 2019 and sources cited therein). In many pinyon-juniper woodlands throughout the Great Basin and Colorado Plateau, inappropriate grazing has diminished or altered herbaceous vegetation, leading to widespread degradation of understory conditions (Burkhardt 1996; Lanner 1981; Milchunas 2006; Nevada Division of Water Planning 2000). Some of the researchers who have studied pinyon-juniper woodland expansion into adjacent shrublands have concluded that the expansion of trees into formerly unoccupied sites is in part due to livestock grazing which depletes native herbaceous vegetation and causes subsequent reductions in fire frequency (Burkhardt and Tisdale 1976; Eddleman 1987; Ellison 1960; Evans 1988; Miller and Wigand 1994; Neilson 1986; Young and Evans 1981). And, in areas where herbaceous vegetation is in poor condition—particularly within sagebrush communities invaded or recolonized by pinyon-juniper trees—the signs of ecosystem degradation that are attributed to conifer expansion are often difficult to tease apart from the symptoms caused by livestock grazing. BLM should therefore revise its purpose and need statement to encompass the impacts of livestock grazing, particularly in areas that have undergone treatment and restoration.

Another common anthropogenic stressor in sage-steppe ecosystems is energy development, which reduces habitat functionality for many wildlife species, including sage-grouse and native ungulates. According to BLM's own research, "[t]here is strong evidence . . . to support that that surface-disturbing energy or mineral development within priority sage-grouse habitats is not consistent with a goal to maintain or increase populations or distribution" (NTT 2011). Multiple peer-reviewed studies have found that infrastructure and human activity associated with oil and gas development adversely affect greater sage-grouse and their habitat through direct mortality, habitat loss, displacement and behavioral effects, noise, spread of invasive plants, disease transmission, and other means.

Holloran (2005) for instance, found that sage-grouse avoided habitats within 3.1 miles of active oil and gas drilling operations, and within 2 miles of roads or wellpads during the production phase of oil and gas extraction. Energy development has been shown to specifically impact male sage-grouse lek attendance, lek persistence, recruitment of yearling male and female grouse to leks, nest initiation and site selection, nest survival, chick survival, brood survival, summer survival of adult females, early brood-rearing habitat selection, adult female summer habitat selection, and adult female winter habitat selection. (Gamo and Beck 2017). Another recent study (Green et al. 2017), confirms that sage-grouse lek attendance remains stable only where no oil and gas development is present within 6,400m, a level of protection far greater than that provided by the BLM's 2015 NV/CA Sage-Grouse Plan Amendments.

Noise from oil and gas operations can mask the breeding vocalizations of sage grouse (Blickley and Patricelli 2012), displace grouse from leks (Blickley et al. 2012a), and cause stress to the birds that remain (Blickley et al. 2012b). In addition, it is reasonable to suppose that if noise that mimics oil and gas truck traffic causes elevated levels of stress-related metabolites in grouse on the lek (Blickley et al. 2012b), that this physiological response would be substantially similar during other parts of this bird's life cycle. Indeed, these researchers stated, "Noise at energy development sites is less seasonal and more widespread and may thus affect birds at all life stages, with a potentially greater impact on stress levels."

Energy development has also impacted ungulate populations and habitats across the West. Recent studies have shown a clear link between oil and gas development, displacement from habitat, and decreases in population abundance (Hebblewhite 2011). In one study, mule deer consistently avoided energy infrastructure throughout a 15-year period (Sawyer 2017). The consequences of this avoidance behavior for migration, energy budgets, adult and fawn survival, and population are not yet adequately understood (Hebblewhite 2011; Sawyer et al. 2013; Lendrum et al. 2012).

Some of the best available long-term, controlled studies evaluate mule deer population density before and after oil and gas development in the Sublette mule deer herd. The Sublette mule deer study has compared mule deer density in control and development zones, and found mule deer densities declined 30% in the development area, as opposed to 10% in the control area. Sawyer and Strickland (2009) found that "the observed decline of mule deer in the treatment area was likely due to gas development, rather than drought or other environmental factors that have affected the entire Sublette Herd unit."

The most recent spatial analysis of already-occurring effects on mule deer in western Colorado likewise found that energy development has the second-largest effect on deer recruitment, exceeded only by residential development (Johnson et al. 2016). Additionally, mule deer may suffer higher mortality rates in developed landscapes because of increased vehicle collisions and accidents (i.e., entrapment in fences).

Road and OHV use also diminish habitat functionality for wildlife. For example, roads have multiple impacts on sage grouse, including noise and movement from vehicle traffic, habitat fragmentation, and dust pollution that can depress productivity of sagebrush and other plants important to sage-grouse diets. BLM's own Sage-grouse National Technical Team (NTT) (2011) therefore recommended that at minimum, vehicle traffic in Priority Habitats be limited to designated roads and trails; that existing roads be used exclusively for access; that construction be limited to realignment of existing routes; and that road upgrades that change the road category be prohibited. The NTT (2011) also advised BLM to consider seasonal road closures, and conduct travel planning within 5 years, and reclaim roads and trails not designated for vehicular use.

Road densities are an issue because sage grouse avoid habitats adjacent to roads. Holloran (2005) found that road densities greater than 0.7 linear miles per square mile within two miles of leks resulted in significant negative impacts to sage grouse populations. Limiting road and trail networks and off-road vehicle travel also is critical in limiting the spread of invasive weeds. According to BLM's own NEPA analysis, "[r]oads and trails are one of the main vectors of invasive weed spread, which leads to increase [in fire danger] and ecosystems moving away from natural fire regimes." Nevada – Northeastern California Greater Sage-grouse RMP Amendment DEIS at 701. BLM has also acknowledged that noise from off-road vehicles typically exceeds background noise levels by more than 10 dBA, a level that can have significant negative consequences for sage-grouse. Northwest Colorado Greater Sage-grouse RMP Amendment DEIS at 399.

These findings call for more careful study of the interactions between vegetation treatment techniques and anthropogenic stressors. In order to ensure that restoration efforts are successful, BLM must consider the root causes of habitat degradation. Accordingly, BLM should revise its purpose and need statement to include assessment, evaluation, and post-project control of anthropogenic stressors such as livestock grazing, energy development, and motorized travel.

Recommendations: BLM should clarify the purpose and need for the PEIS, to facilitate more meaningful public participation; BLM's project design should incorporate site-specific analysis, post-treatment thresholds that would trigger adaptive management, monitoring, and data collection protocols that take into account the variability of natural systems across the Great Basin; and finally, BLM's restoration strategy should address and control preexisting anthropogenic stressors such as livestock grazing, energy development, and motorized travel.

II. BLM Must Comply with The Endangered Species Act (ESA)

The Draft PEIS states that a biological assessment is included in Appendix D.2, but upon review it appears to have been omitted. See Draft PEIS at 4-10, 4-59, Appendices. The Draft PEIS elsewhere states that a biological opinion is forthcoming. Draft PEIS at 5-2. Whatever the case, BLM must consult with the U.S. Fish and Wildlife Service in order to ensure compliance with the Endangered Species Act (ESA), section 7. According to the Draft PEIS, there are at least fifteen threatened, endangered candidate or proposed species within the project area, five of which have designated or proposed critical habitat. PEIS at 3-7. This tally, moreover, likely underestimates the impacts to listed species, as it appears to entirely exclude many aquatic and riparian-dependent species. Since any implementation of the proposed action can reasonably be thought to have the potential for causing a take of listed species or

adverse modification of critical habitat, both programmatic and project-specific consultation are necessary to comply with the ESA.

To ensure compliance with these Section 7(a)(2) prohibitions, the “action agency”—in this case BLM—must undergo a consultation process with FWS upon proposing to authorize, fund, or carry out an action that “may affect” a species or its critical habitat. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.02. A “may affect” determination is required when any “possible effect, whether beneficial, benign, adverse, or of an undetermined character” occurs. *Center for Biological Diversity v. BLM*, 698 F.3d 1101 (9th Cir. 2012) (emphasis added). The consultation process ensures a rigorous review of the actions’ impacts on threatened and endangered species and serves as an independent check on the tendency of federal agencies to pursue their other goals and mandates at the expense of imperiled species. “Formal” consultation is required when the agency’s action is likely to “adversely affect” listed species or critical habitat. 50 C.F.R. §§ 402.13, 402.14(a). Formal consultation concludes with an FWS biological opinion. In a biological opinion, FWS determines whether “jeopardy” or “adverse modification” is likely to occur due to the action and, if so, sets forth the reasonable and prudent alternatives that could avoid such ESA violations. 16 U.S.C. § 1536(b)(3)(A).

In considering an agency’s proposed action, FWS must identify the action area, the environmental baseline, and the effects of the action. The action area includes “all areas to be affected directly or indirectly by the Federal action, and not merely the immediate area involved in the action.” 50 C.F.R. § 402.02. The environmental baseline “includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area.” *Id.* The effects of the action include the direct, indirect, and cumulative effects to a species from the proposed agency action, as well as “interrelated and interdependent actions.” *Id.* (defining “effects of action”), § 402.14(c)(4) & (8). Direct impacts are caused by the action and occur at the same time and place. *Id.* § 402.02. Indirect impacts are those that are caused by the proposed action but are later in time and reasonably certain to occur. *Id.* Cumulative effects include “those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.” *Id.* Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. *Id.* Interdependent actions are those that have no independent utility apart from the action under consideration. *Id.* During the ESA consultation process and in developing a biological opinion, both FWS and the action agency must use the best scientific and commercial data available. *Id.* § 1536(a)(2).

Further, it is inappropriate for a programmatic biological opinion or concurrence to completely defer analysis of particular types of impacts to future site-specific consultations. *Natural Resources Defense Council v. Kempthorne*, 69 Env’t. Rep. Cas. (BNA) 1095, 2008 WL 5054115, *33 (E.D. Cal. 2008), superseded in part, 621 F. Supp. 2d 954 (E.D. Cal. 2009), decision clarified, 627 F. Supp. 2d 1212 (E.D. Cal. 2009), on reconsideration, 2009 WL 2424569 (E.D. Cal. 2009), aff’d on other grounds, 686 F.3d 1092 (9th Cir. 2012). Even in the limited circumstances where such “tiering” is appropriate under the ESA, site-specific actions must strictly conform to the programmatic documents to which they are tiered. See, e.g., *Center for Sierra Nevada Conservation v. U.S. Forest Service*, 832 F. Supp. 2d 1138 (E.D. Cal. 2011) (invalidating tiered site-specific consultation because FS did not conduct analysis required by programmatic BiOp).

In addition to the Section 7(a)(2) prohibitions on agency actions, the ESA also prohibits agency actions that “take” threatened and endangered species. 16 U.S.C. § 1538(a)(2); 50 C.F.R. § 17.31(a). “Take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.” 16 U.S.C. § 1532(19). ESA regulations further define “harm” as “significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.” 50 C.F.R. § 17.3.

Congress created two “incidental take” exceptions to the take prohibition, including “incidental take statements” that are issued to federal agencies. 16 U.S.C. §§ 1536(b)(4)(A), 1536(o)(2). Like biological opinions, FWS issues incidental take statements at the conclusion of the ESA section 7(a)(2) consultation process. *Id.* § 1536(b)(4)(A). FWS must issue incidental take statements if it (1) concludes in a biological opinion that the agency’s action will neither jeopardize the species nor destroy or adversely modify critical habitat, and (2) the agency action “may” take a listed species. 50 C.F.R. §§ 402.14(g)(7); 402.14(i)(1). An incidental take statement must (1) limit and quantify the amount of take, (2) specify the reasonable and prudent measures that FWS considers necessary to minimize such impact, (3) set forth terms and conditions that must be complied with by the federal agency to implement these reasonable and prudent measures, and (4) establish monitoring and reporting requirements. 16 U.S.C. § 1536(b)(4); 50 C.F.R. § 402.14(i). Any taking that exceeds the limits set forth in an incidental take statement triggers the need to immediately reinitiate consultation. See 50 C.F.R. § 402.16.

It is clear that listed species lie within the action area, and that the effects of the proposed action could cause take or adverse modification. Consultation is therefore required. The BLM must conduct the necessary analysis and share any consultation documentation with the public as early as possible, but no later than the release of the FEIS. BLM must also engage in project-specific consultation.

In addition to the substantive and procedural requirements outlined above, BLM has affirmative responsibilities to develop species recovery programs under section 7(a)(1). Specifically, section 7(a)(1) requires all federal agencies, including BLM, to “conserve” listed species. 16 U.S.C.A. § 1536(a)(1). This means taking actions that will tend to increase endangered and threatened species’ populations. 16 U.S.C.A. § 1532(3). Section 7(a)(1) imposes more than just a generalized duty; it requires agencies to consult, develop programs, and “take whatever actions are required to ensure the survival of each [listed] species.” See, e.g., *Sierra Club v. Glickman*, 156 F.3d 606, 616 (5th Cir. 1998). See also *Carson-Truckee Water Conservancy Dist. v. Clark*, 741 F.2d 257 (9th Cir. 1984), cert. denied, 470 U.S. 1083 (1985). BLM should meet these obligations by establishing enforceable, regionally and locally appropriate constraints in the PEIS and prescribing specific actions necessary or important to advancing conservation and recovery.

Recommendations: BLM must conduct section 7(a)(2) consultation with the U.S. Fish and Wildlife Service for each listed species that is or may be present within the project area; such consultation must occur at both the programmatic and project-specific levels; BLM must ensure that any actions taken under this PEIS do not take listed species or adversely modify critical habitat outside of section 7’s narrow exceptions; and BLM should fulfill its affirmative conservation duties under section 7(a)(1) by establishing enforceable, regionally and locally appropriate constraints and prescriptions in the PEIS.

III. The BLM must ensure compliance with the National Environmental Policy Act (NEPA) for implementation projects

In the Draft PEIS, BLM states that it intends to rely on the PEIS for NEPA authorization for future “fuels reduction” projects and will conduct such projects under a “Determination of NEPA Adequacy” (DNA) unless certain resources are present. *e.g.*, PEIS at 1-2. But the PEIS does not provide adequate site-specific detail to inform the public about proposed projects or assess their environmental impacts, and thus the BLM must conduct site-specific analyses to comply with NEPA.

While agencies “may prepare a single NEPA document to support both programmatic and project-specific proposals... Such a programmatic NEPA review should address both the broad impacts of the proposed broad Federal action and provide sufficiently detailed environmental analyses for specific decisions, such as determining the locations and designs of one or more proposals to implement the broad Federal action.” Council on Environmental Quality, Effective Use of Programmatic NEPA Reviews 15 (Dec. 18, 2014). The critical inquiry in considering the adequacy of an EIS prepared for a large scale, multi-step project is not whether the project's site-specific impact should be evaluated in detail, but when such detailed evaluation should occur. *State of Cal. v. Block*, 690 F.2d 753, 761 (9th Cir. 1982). Site-specific design features and impacts “must be evaluated at the point of critical decision when the agency proposes to make an irreversible and irretrievable commitment of the availability of resources.” *N. Alaska Env'tl. Ctr. v. Norton*, 361 F. Supp. 2d 1069, 1079 (D. Alaska 2005) *aff'd sub nom. N. Alaska Env'tl. Ctr. v. Kempthorne*, 457 F.3d 969 (9th Cir. 2006) (Internal citations and quotations omitted). “If the [agency] decided to select a project site consisting of the head ranger's backyard... it must indeed analyze that particular site to determine the effects of the proposed action.” *Native Ecosystems Council v. Tidwell*, 599 F.3d 926, 934 (9th Cir. 2010).

The PEIS does not provide any of the site-specific information required to support further actions. The PEIS does not determine “locations and designs” of specific projects or otherwise discuss the impacts of specific planned projects on the environment. Instead, it purports to analyze the general effects of “fuels reduction” treatments across 223 million acres of public lands in six western states. This broad analysis and general discussion of effects is not sufficient to support implementation-level action; “[g]eneral statements about “possible” effects and “some risk” do not constitute a “hard look” absent a justification regarding why more definitive information could not be provided.” *Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1380 (9th Cir. 1998). And, effects from treatments are not uniform across that entire broad area.

Indeed, the PEIS recognizes that further analysis will be necessary at the site-specific level. For instance, it states that “actual treatment locations would be based on site-specific conditions,” and “[l]and managers would decide, on a site-specific basis, when and where to apply targeted grazing.” DPEIS, 2-2, 2-8. It puts off considering impacts from fuels treatments to sensitive species or other resources, explaining that “[i]f special status plant or animal populations and their habitats occur in a proposed treatment area, a qualified biologist will assess the area for habitat suitability and balance the need for treatment with the habitat needs of special status wildlife and plant species,” PEIS at D-5, and committing to “[c]onsider on a project-by-project basis potential impacts on cultural resources from

targeted grazing, including temporary fences, corrals, and watering sites, per Section 106 of the NHPA and other cultural resource authorities,” PEIS at D-2, to give a couple of examples. Analysis considering and disclosing impacts of applying different management actions in specific locations must be completed through a public NEPA process.

It seems as though this document conflates the ability to “tier” site-specific projects to an analysis of greater scope with the requirement to discuss site-specific environmental effects of proposed actions. But, “[t]hough “tiering” to a previous EIS is sometimes permissible, the previous document must actually discuss the impacts of the Project at issue.” *South Fork Band Council of Western Shoshone of NV. v. United States Dept. of Interior*, 588 F.3d 718, 726 (9th Cir. 2009) (citing *Muckleshoot Indian Tribe v. United States Forest Serv.*, 177 F.3d 800, 810 (9th Cir. 1999) (holding that reliance on the EIS accompanying an earlier planning document was improper because it did not discuss the subsequent specific Project in detail). The PEIS does not discuss specific projects, including where they will occur, which actions they entail, what desired or anticipated outcomes are, which site-specific resources may be affected, or any other required information, and consequently, further NEPA analysis is required before undertaking those projects.

The PEIS discloses that the 223 million acres on which it is intended to authorize fuels treatments include unique and important resources like cultural resources, historic resources, and rare (including federally-listed threatened and endangered) plant and animal species. But it does not discuss how any of the projects authorized would affect any of those resources because it does not describe in detail what any of the projects are. Before projects may be authorized or implemented, BLM must do surveys, mapping, or other analysis to determine whether cultural resources, rare plants and animals, or other sensitive resources are present and disclose the results of those surveys along with alternatives to avoid or reduce impacts to them through a public NEPA analysis. It also must conduct required consultations with the State Historic Preservation Officer or the U.S. Fish and Wildlife Service, as appropriate, and make the public aware of the results of those consultations.

Indeed, in many instances the tools the PEIS uses for effects analysis admit that further site-specific data and analysis is necessary. For instance, the analysis in the PEIS relies on LANDFIRE², but the LANDFIRE website says that its maps are best at a landscape scale: “LANDFIRE products are not intended to replace local-scale data products. Appropriate landscape-scale analysis may include nationwide, regional (single large states, groups of smaller states), or sub-regional (large landscapes) strategic planning.” This statement is itself confusing. It highlights the complexity and uncertainty associated with using this methodology. It was primarily developed based on modeled fire return intervals and fuels characteristics. Applying such methods to disturbance-sensitive arid sagebrush and pinyon-juniper habitats in often already fragmented landscapes without a hard look at the specific local habitat conditions present in relation to wildlife needs may result in significant new habitat degradation or losses to vulnerable species. Thus, BLM cannot rely on LANDFIRE analysis alone and further site-specific analysis is necessary.

² <https://www.fs.usda.gov/ccrc/tools/landfire>

It also bears repeating that without quantified, detailed information, the agency cannot adequately assess cumulative effects. See *Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1380 (9th Cir. 1998). The agency may not simply rely on its staff's opinions about cumulative effects without hard data. *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 996 (9th Cir. 2004). But that is what BLM seeks to do here—it seeks to grant itself broad permission to undertake a wide range of actions across millions of acres of public lands without examining in any useful detail where exactly those projects will be implemented, what the projects will be, and how, combined, they will affect the environment. That is unlawful.

IV. The PEIS fails to, but should, provide an effective framework to guide project level implementation and broad-scale monitoring, evaluation and adaptive management

The PEIS does not present a clear framework for identifying, prioritizing, designing, monitoring, or evaluating implementation projects. In fact, it presents more like a summary of options rather than a prescriptive program making us question why the BLM felt a PEIS was required. For example, instead of laying out clear direction for each of these steps, the PEIS refers to a number of BLM handbooks and documents but does not specify how to apply them. Further it applies no clear timeframe for the program and provides no programmatic mechanism for multi-scale monitoring³ and adaptive management. Finally, the PEIS does not provide for a public stakeholder engagement process for downstream implementation projects counter to restoration best practices (e.g., see Keenlyside et al. 2012; Gann et al. 2019) and, in fact, presumably is attempting to bypass further public engagement as discussed above by using DNAs for specific projects.

- a. The PEIS is overly broad, vague, and noncommittal in the direction it provides for project level implementation and does not provide adequate direction to establish that the treatments it proposes will provide net benefit

The PEIS does not prioritize or commit to a strategy for identifying and implementing projects as suggested in Pyke et al. 2015 (starting on page 11), and instead leaves those decisions to the state, field or district offices. The PEIS invokes the resistance/resilience matrix suggested by Chambers et al. (2014) as a useful decision support tool and refers to the FIAT (2014) reports which aggregately identified 12 million priority acres for treatment but does not commit to adhering to these reports. Neither does the PEIS suggest consistent criteria for identifying project sites (e.g., connectivity habitat, current and future land uses). In fact, the PEIS in several places makes it clear that the BLM can undertake projects anywhere within the project treatment area and is not constrained to the emphasis areas, FIAT treatment areas, or other schemes. E.g., see PEIS at 2-10 and 2-2 (“While projects may occur anywhere within the potential treatment area most projects are expected to occur within the emphasis area” and “The potential treatment and emphasis areas are used for analysis and comparison purposes only; actual treatment locations would be based on site specific conditions.”) This approach to identifying

³ Note that the DEIS at 2-4 states that a sample monitoring plan is provided in Appendix E. We cannot find that plan in Appendix E.

project areas will likely lead to scattershot implementation and squanders an opportunity to be strategic and scientific.⁴ The BLM in the final PEIS should remedy this by establishing project siting criteria.

The PEIS does not offer measurable criteria (and timeframes) by which to measure progress and success. All the PEIS offers in this context is a broadly defined desired condition towards which projects should move vegetation states – namely “a natural mosaic of two native perennial vegetation states: ‘Perennial Grasses, Forbs, and Shrubs’ and ‘Perennial Grasses and Forbs -- but provides no further detail on where or how to do this or what constitutes success. In fact, the PEIS defers the detail to future site-specific project design and analysis. PEIS at 2-4 (“Desired conditions would further be defined at the site level using goal setting and analysis following Pyke et al. (2018) or other relevant sources...”). The BLM in the final PEIS should remedy this by establishing measurable criteria (and timeframes) by which to measure progress and success.

Alternative B, the preferred alternative, is so general that it allows the BLM to undertake vegetation management projects anywhere (except for the excluded lands) within the 38.5 million-acre potential treatment area utilizing the full array of treatment methods described in the PEIS. These methods include mastication, chaining, prescribed fire, jackpot burning, pile burning, plowing, mowing, herbicides, biological controls, and targeted grazing among others. PEIS at 2-6. Alternative B allows the BLM to implement projects in all vegetation states, even those that already meet desired conditions. PEIS at 2-10. (“Treatments to improve degraded conditions would be allowed in all vegetation states, to move toward the desired conditions (Section 2.2.9). Treatments would be allowed in low, moderate, and high resistance and resilience areas.”) Alternatives C and D offer some constraints compared to Alternative B although still suffer to identify priorities, evaluative criteria, or a monitoring, learning, and adaptive management system.

The PEIS does not provide a monitoring framework for projects that could be very helpful if applied consistently. While we understand that BLM has existing monitoring protocols (e.g., AIM to monitor conditions and trends), there is no consistency in how implementation projects will be monitored, evaluated, or reported on. This is especially important for feeding into and informing adaptive management frameworks and facilitating shared learning. Crist et al. (2019) in chapter 2 explain the value in designing specific monitoring protocols for a restoration program and advises designing a deliberate multi-scale monitoring program that stratifies monitoring across resilience and resistance categories in order to capture the range of potential responses to management actions.

Finally, the PEIS does not distinguish in any way projects for fuel reduction and projects for restoration purposes in terms of project siting, desired outcomes, etc. The two are clearly not the same and should not be conflated.

By not offering a clear program of work for projects -- including priority setting, project identification, desired outcomes, monitoring, and criteria for success – and granting itself enormous discretion, the

⁴ See letter from scientists to BLM state sage grouse coordinators dated April 6 entitled “Comments on Greater sage-grouse Draft Supplemental Environmental Impact Statements” in which the scientists point out that a landscape strategy is missing and will leave vulnerable key landscape areas like connectivity zones. Attached as Appendix D to this letter.

BLM has forfeited an opportunity to meaningfully guide sagebrush sea restoration and conservation across the Great Basin in a prescriptive coordinated way. Indeed, with this PEIS, the BLM may be opening the door to increased disturbance and degradation of the sage brush biome.

- b. The PEIS should establish a programmatic framework for multi-scale monitoring, shared learning, planned experimentation, and adaptive management

The final PEIS should establish (and hold the BLM accountable to) multi-scale monitoring, information sharing, and adaptive management. The scientific literature and BLM's management documents readily acknowledge that sagebrush restoration and conservation is an evolving science and that adaptive management (including deliberate experimentation, learning, and feedback loops) are integral to a large-scale restoration program.⁵ Absent these broader elements, it's difficult for the BLM to cumulatively evaluate its impact and iteratively improve its scientific understanding and implementation efficacy. As written, the PEIS provides no assurances that BLM will utilize a scientifically rigorous framework to facilitate learning and incorporate that learning effectively into future projects and decision-making.⁶

While the term "adaptive management" is often called for in land management plans and policies, it rarely is utilized in a deliberate proactive way that bears fruit. Per Stankey et al. (2005), "while adaptive management might be full of promise, generally it has fallen short on delivery." Adaptive management is not a "trial or error" process ((Schultz and Nie 2012; Gann et al. 2019) but rather requires "explicit designs that specify problem-framing and problem-solving processes, documentation and monitoring protocols, roles, relationships, and responsibilities, and assessment and evaluation processes." (Stankey et al. 2005; Keenleyside et al. 2012) It also requires deliberate learning and feedback loops and some level of accountability for assuring that new information is applied to future decision-making. *See, e.g., Western Watersheds Project and Randall Hermann v. United States Forest Service*, CV-05-189-E-BLW, 2007 WL 129038 (D. Idaho 2006) (Simply proposing that BLM will use future "adaptive management" protocols, without defining or discussing the implementation of those protocols, is inadequate.) Hence, the BLM should utilize Crist et al. (2019) and others to design a programmatic multi-scale monitoring and adaptive management framework that will facilitate learning, test hypotheses, and ultimately lead to more effective region-wide management.

- c. The PEIS should establish a transparent and centralized mechanism for tracking, notifying the public about, and reporting on projects

⁵ E.g., Department of Interior, 2015. [*The Final Report: An Integrated Rangeland Fire Management Strategy*](#). ("Inherent in the Strategy is recognition that a strong science foundation is fundamental to successful rangeland fire prevention, suppression, and restoration. As demonstrated by the development and application of the FIAT to guide future sagebrush-steppe and greater sage-grouse conservation efforts, improved coordination of science and research and field experimentation, testing and application of the products of this work is essential." *Also see* Crist et al. 2019, chapter 2.

⁶ The PEIS refers to adaptive management but only in the context of monitoring a specific project and not in the programmatic context of modifying approaches across field offices, states, and the larger Great Basin region. PEIS at 2-4 ("Monitoring would be used to gauge the effectiveness of the treatments and to identify where maintenance would be needed. When treatments are not meeting objectives, modifications should be considered through adaptive management.")

The PEIS format presents an opportunity for the BLM to commit to heightened transparency and information sharing. The PEIS should provide a transparent and centralized mechanism for tracking, notifying the public about, and reporting on projects. Without this information, neither BLM nor the public will be able to understand where projects have been conducted, how they may be affecting sensitive resources, whether monitoring has been conducted, or whether projects have met objectives. This transparency and context will also enable the public to engage more meaningfully in site-level project identification and design, environmental analysis, and project review. It will also facilitate scientific evaluation and learning including by the BLM, US Geological Survey scientists, and other researchers.

Complementing the larger picture suggestions for enhanced transparency and inclusivity offered in the introduction of this letter, the BLM can take simple tangible steps to assure the public can understand implementation schedules and participate in project design and decision-making. For instance, the BLM before the field season begins should post online a preliminary list of projects and basic information such as objectives, timeframe, methods, and location and provide an opportunity for the public to provide input. In addition, the BLM should commit to an annual round-up of projects, monitoring results, trends, lessons learned, etc. ideally in an interactive forum where researchers and interested publics could attend and participate.

Further, if and when the BLM elects to proceed through categorical exclusions (CX) or DNAs, the CXs and DNAs should be posted, and interested publics notified, at least 30 days before project implementation and include specific information about project location, methods, monitoring, special status species, and site-specific effects. The random way in which BLM has approached similar projects in the past risks causing real ecological damage, especially when the projects proceed with little or no public input or environmental analysis. Transparency and accurate tracking of projects and project effects is a minimum first step for BLM to understand the individual and aggregate effect of its treatment projects.

Recommendations: Supplement the DEIS with an alternative that establishes programmatic elements that will facilitate restoration and conservation of the sagebrush biome. This includes establishing a clear framework for identifying, prioritizing, designing, tracking, evaluating, and reporting on projects and establishing multi-scale monitoring that will feed into a rigorous learning and adaptive management framework. Establish a clear timeframe for the PEIS. Commit in the PEIS to heightened transparency and information sharing including a robust website on the Great Basin restoration and fuels reduction initiative, posting a list of projects and related information such as objectives, timeframe, methods, and location and provide for provide input, and commit to an annual gathering on PEIS implementation, monitoring, lessons learned, and course correction. Post implementation projects on the Great Basin website as well as ePlanning at least 30 days before decisions documents are signed but ideally at the beginning of the field season.

V. BLM needs to accurately describe the baseline conditions and cumulative impacts

The Draft PEIS does not accurately or adequately describe the environmental baseline within the project area; nor does it adequately consider cumulative impacts. In particular, the Draft PEIS does not contain

any detailed information on the extent of land use and anthropogenic disturbance in areas that could be impacted by fuels reduction treatments. Without such critical information, BLM cannot fulfill its mandate under NEPA to fully disclose the likely direct, indirect, and cumulative environmental impacts from the proposed action. Put simply, BLM has not taken the “hard look” that NEPA requires. BLM should remedy this deficiency by including in the final PEIS a complete discussion of the environmental baseline, as well as “quantified or detailed” information on cumulative impacts throughout the project area. See *Klamath-Siskiyou Wildlands Ctr. v. BLM*, 387 F.3d 989, 993 (9th Cir. 2004).

BLM must establish and discuss the environmental baseline in all NEPA documents. “The establishment of a ‘baseline’ is not an independent legal requirement, but rather, a practical requirement in environmental analysis often employed to identify the environmental consequences of a proposed agency action.” *Oregon Natural Desert Ass’n v. Jewell*, 840 F.3d 562, 568 (9th Cir. 2016) (holding that the BLM violated NEPA by failing to establish baseline presence or absence of sage grouse in area affected by proposed wind energy development). “It is against baseline information that environmental impacts are measured and evaluated; therefore it is critical that the baseline be accurate and complete.” *Landwatch v. Connaughton*, 905 F. Supp. 2d 1192, 1197 (D. Or. 2012). See also *Northern Plains Resource Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1083–85 (9th Cir. 2011) (finding that agency violated NEPA requirement that it “provide the data on which it bases its environmental analysis,” and that it failed to gather sufficient baseline data to allow it to take a hard look at environmental impact of proposed railroad construction); *Conservation Northwest v. Rey*, 2009 WL 4897727, at *9 & n.12 (W.D. Wash. 2009) (noting that “[a]llowing an agency to ignore a change by deciding that it is of little consequence is a slippery slope to eroding the meaningfulness of a baseline”).

BLM cannot use mitigation measures, such as the design features listed in Appendix D, as a proxy for baseline data. As courts have explained, this approach precludes careful consideration of a proposal’s impacts before an agency commits to it. In addition, it deprives the public of the opportunity to play a role in the decision-making process because the data collected after project approval are not available for public comment. *Northern Plains Resource Council*, 668 F.3d at 1085. See also *Gifford Pinchot Task Force v. Perez*, 2014 WL 3019165, *33, 38–39 (D. Or. 2014); *Idaho Conservation League v. U.S. Forest Serv.*, 2016 WL 3814021, *10-12 (D. Idaho 2016).

BLM must also include a robust discussion of cumulative impacts. The CEQ regulations define “cumulative impacts” as those which, “when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same [EIS].” 40 C.F.R. § 1508.25(a)(2). The regulations add that a cumulative impact:

is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. § 1508.7. As noted, an adequate cumulative effects analysis requires some “quantified or detailed” information. *Klamath-Siskiyou Wildlands Ctr.*, 387 F.3d at 993. Cf. *Sierra Club v. Bosworth*, 510 F.3d 1016, 1028-30 (9th Cir. 2007) (requiring consideration of cumulative impacts for activities covered by categorical exclusion for fuel reduction activities); *Soda Mountain Wilderness Council v. Norton*, 424 F. Supp. 2d 1241, 1266-67 (E.D. Cal. 2006) (finding one-page cumulative impact analysis inadequate).

Generalized, conclusory statements about the insignificance of cumulative effects or how they will be effectively mitigated will not suffice. *Te-Moak Tribe of Western Shoshone of Nevada v. U.S. Dept. of Interior*, 608 F.3d 592, 606 (9th Cir. 2010) (failure to include quantified or detailed information on cumulative effects of past, present, and reasonably foreseeable mining activities). *See also Great Basin Mine Watch v. Hankins*, 456 F.3d 955, 971-74 (9th Cir. 2006) (holding cumulative impact analysis for gold mining operations inadequate because it consisted of "vague and conclusory statements, without any supporting data" and lacked any explanation for why other mining projects were not explicitly discussed).

Agencies not only have an obligation to discuss the cumulative impacts of related projects; they also have an "affirmative duty to locate, describe, and consider other projects that could have cumulative impacts when combined with the project under consideration." *Edwardsen v. United States Dep't of the Interior*, 268 F.3d 781, 786 (9th Cir. 2001), citing 40 C.F.R. § 1508.25(c)(3); *Kettle Range Conservation Group v. United States Forest Serv.*, 148 F. Supp. 2d 1107, 1129 (E.D. Wash. 2001). In assessing cumulative impacts, "the [EIS] must give a sufficiently detailed catalogue of past, present, and future projects, and provide adequate analysis about how these projects, and differences between the projects, are thought to have impacted the environment." *Lands Council v. Powell*, 395 F.3d 1019, 1028 (9th Cir. 2005). *See also Western Watersheds Project v. Kraayenbrink*, 620 F.3d 1187, 1207 (9th Cir. 2010) (failure to address combined effects of various reductions in opportunities for public participation in process of issuing grazing allotments); *League of Wilderness Defenders-Blue Mountains Biodiversity Project v. United States Forest Serv.*, 549 F.3d 1211, 1218–19 (9th Cir. 2008) (identification of one past timber sale and general statement that other timber sale had occurred insufficient); *Oregon Natural Res. Council Fund v. Goodman*, 505 F.3d 884, 892-93 (9th Cir. 2007); *Oregon Natural Res. Council Fund v. Brong*, 492 F.3d 1120, 1133 (9th Cir. 2007).

BLM's Integrated Rangeland Fire Management Strategy (BLM 2015) also calls for a detailed examination of cumulative impacts. The Strategy focuses explicitly on an "integrated, landscape-scale approach." Accordingly, the Strategy directs BLM to "think[] and plan[] holistically, . . . applying actions that take into consideration the needs of an entire ecosystem" in a way that "will result in a healthy sagebrush-steppe landscape." Such a "landscape-scale approach" necessarily requires a thorough examination of any past, present, or reasonably foreseeable actions and impacts that could affect the sagebrush steppe landscapes.

The Draft PEIS does not adequately analyze the environmental baseline or cumulative effects because it lacks detailed information about past, present, and ongoing impacts within the project area. These include grazing permits and leases, results of land health assessments, oil and gas activities and lands under lease for oil and gas, existing road networks and lands open to cross-country motorized travel, utility rights-of-way, wind and solar development, wildfire, and emergency stabilization and rehabilitation (ESR) treatments.

As the maps at Appendix E show, all of these are present throughout the project area, and all can have significant cumulative environmental impacts. Ungulate grazing, for instance, can promote conversion of native shrub-steppe habitats to invasive annual grasslands (for instance, see Sections I and XIII in this letter). Grazing can also affect the extent and behavior of pinyon and juniper communities (e.g., see Section I of this letter). Energy development diminishes habitat functionality for multiple species, including sage-grouse and native ungulates (e.g., see Section I of this letter). Roads and motorized travel

have multiple impacts on wildlife, including noise and movement from vehicle traffic causing disturbance, habitat fragmentation, weed invasion, and dust pollution that can depress productivity of sagebrush communities (e.g., see Section I of this letter). Because the cumulative impacts of these activities can substantially affect the resistance and resilience of sagebrush communities—and thus the outcome of treatment and restoration efforts—the final PEIS should include detailed discussion of each source of cumulative impacts, supported by reliable, quantified data. Only after this information is disclosed can the public fully understand the likely impact of BLM’s proposal.

The final EIS should also acknowledge the extent of Emergency Stabilization and Rehabilitation (ESR) treatments across the project area and consider the degree to which such treatments have been successful. ESR treatments use many of the same methods—and have many of the same objectives—as the treatments that would be authorized under BLM’s action alternatives (Arkle et al. 2014). As such, a thorough analysis of ESR treatments throughout the project area is a critical step in understanding the likely impacts of BLM’s current proposal. As Arkle et al. (2014) explain, successful restoration requires “understanding the characteristics of high-quality habitat and knowing whether we are capable of restoring those characteristics within degraded areas” (*Id.*)

Research indicates that ESR treatments are currently widespread, but rarely (if ever) produce quality habitat, even over long periods of time (Arkle et al. 2014). In 2014, USGS researchers published the results of a two-decade study with the goal of “quantify[ing] the effects of post-fire restoration treatments on habitat quality throughout the Great Basin” (*Id.*). They reported several findings that bear directly on the likely efficacy, and environmental impact, of widespread fuels reduction and restoration treatments. For example, Arkle et al. (2014) report that degradation and loss of sagebrush habitat is the result of a variety of factors, including “decades of sagebrush removal efforts, invasion of non-native plants, expansion of woodlands, altered fire regimes, and persistent human influences such as roads, agricultural development, improper grazing practices, oil and gas extraction, and expansion of urban areas.” They also found a “strong negative association between sage-grouse occupancy and cheatgrass, even at relatively low cover values.” These results suggest both that: (1) anthropogenic stressors must be addressed if restoration is to be successful, and (2) unsuccessful restoration efforts could increase sage-grouse habitat losses through the proliferation of non-native invasive grasses.

According to Arkle et al. (2014) at least 1,600 ESR treatments, covering 2.2 million hectares, have been completed since 1990. These treatments, however, have not proven effective in restoring key habitat values. Arkle et al. (2014) found that “[r]estoration actions did not increase the probability of burned areas meeting most [sage-grouse habitat] guideline criteria.” Within 20 years of treatment, moreover, “none of the treated plots met breeding season overstory (sagebrush) guidelines, few (2 of 313) met brood-rearing overstory guidelines, and only 2% potentially met winter overstory guidelines.” According to the authors, these results suggest that “sage-grouse are relatively unlikely to use many burned areas of the Great Basin for at least 20 years, regardless of whether post-fire seeding treatments were implemented.” Because many of the treatment methods described in the Draft PEIS closely resemble ESR techniques, BLM should carefully consider these results, as they indicate that the proposed action alternatives will not achieve BLM’s stated purpose of restoring sage-steppe habitats.

Arkle et al. (2014) also note the influence of land use and environmental factors on treatment success. “Restoration sites with quality habitat tended to occur at higher elevation locations with low annual temperatures, high spring precipitation, and high plant diversity.” Warmer, drier sites had lower

treatment success. In addition, ESR sites with higher plant diversity and lower cattle grazing pressure “were more likely to provide quality sage-grouse habitat than were species-poor, heavily grazed restoration areas.” These findings underscore the importance of a robust cumulative impacts analysis, and counsel for a more cautious, geographically focused, and data-driven approach to sage-steppe restoration (as suggested in section IV above).

In addition, the Draft PEIS does not consider potentially significant cumulative impacts from ongoing land-use planning processes. BLM is currently revising resource management plans (RMPs) throughout the Great Basin, with many of the revisions eliminating protected areas and increasing the amount of allowable surface disturbance from grazing, OHVs, energy development, mining, and logging. *See, e.g.,* Four Rivers Field Office Final Revised RMP (2019). These land use plans will guide “[a]ll future resource management authorizations and actions” for the foreseeable future, 43 U.S.C. § 1732(a), and could thus have a significant impact on the likely success or failure of BLM’s restoration efforts.

Resources and activities that could be affected by the cumulative impacts of RMP revisions and fuels reduction treatments include tribal and cultural resources, vegetation, fish and wildlife, rare plants; water quantity and quality, livestock grazing, recreation, travel and transportation, mining, special designations (such as areas of critical environmental concern (ACECs) and wilderness study areas (WSAs), visual resources, and energy development. For example, BLM’s recently-completed revision of the Four Rivers RMP in southwestern Idaho increased livestock grazing by an additional 9,635 animal-unit-months (AUMs), opened more than 95% of the Field Office to OHV travel, opened over 600,000 acres to oil and gas exploration and development, eliminated seven of 10 existing ACECs, authorized over 132,000 acres of surface-disturbing fuels reduction treatments (including fuel breaks), and called for an annual timber harvest of 1.5 MMBF from 430 acres.

These management changes will likely increase existing stressors on sage-steppe habitats and risk expanding the rate of sagebrush habitat degradation. Other ongoing or recently completed RMP amendments or revisions within the project area include the Southeastern Oregon RMP (Draft RMP and EIS released in May 2019), the Basin and Range National Monument RMP (draft EIS forthcoming), the Carson City RMP (final RMP and Record of Decision forthcoming), and the Cedar City RMP (notice of intent issued September 10, 2010 (75 Fed. Reg. 55344)). BLM needs to take a “hard look” at the cumulative impacts of the significant land management changes that could be accomplished through these and other RMP revisions.

Finally, we noted that the PEIS does not consider the influence of climate change on fire frequency and intensity; nor does it consider the likelihood of severe drought within the project area. Abnormally intense wind-driven fires are becoming more common in the West due to climate change. Because of the substantial influence of climatic factors on fire frequency and intensity, biomass reductions alone are unlikely to accomplish BLM’s stated purpose and need.

Several studies have found that climatological factors are more correlated with wildfire than biomass, especially in forests and pinyon-juniper woodlands (Dennison et al. 2014, Holden et al. 2007, Westerling et al. 2016, Westerling et al. 2006). Climate modeling can thus be a valuable tool for restoration planning. Models predict an increase in wildfire in the Great Basin as climate change accelerates (Abatzoglou & Kolden 2011). Keyser and Westerling (2017) used climate data to develop fire severity models and predict where high severity fires are likely to occur. BLM should incorporate this climate

modeling data into all action alternatives and consider the cumulative impacts of climate change alongside biomass reduction, invasive species, and land use.

In particular, BLM should carefully consider recent findings suggesting that climate change is poised to cause a “megadrought” in the southwestern U.S. Williams et al. (2020) used a combination of hydrological modeling and tree-ring reconstructions of summer soil moisture to show that the period from 2000 to 2018 was the driest 19-year span since the late 1500s and the second driest since 800 CE. This appears to be just the beginning of a more extreme trend toward megadrought as global warming continues. The hotter, drier conditions of the past two decades thus offer a preview of how climate change will continue to complicate efforts to manage wildfire in the arid West.

Recommendations: BLM should conduct a detailed analysis of the environmental baseline that takes into account current levels of habitat disturbance from livestock grazing, energy development, mining, motorized travel, and other sources; BLM should include in the final PEIS “quantified or detailed” information on the cumulative impacts of past, present, and reasonably foreseeable BLM-authorized projects throughout the planning area; BLM’s discussion of cumulative impacts should consider the findings of Arkle et al. (2014) regarding the efficacy of ESR restoration techniques; BLM should consider the cumulative impacts of land use plan revisions throughout the project area; BLM should consider the impacts of climate change on wildfire behavior, aridity, and treatment outcomes; and BLM should emphasize site-specific planning, data collection, and experimentation, rather than “one-size-fits all” treatments.

VI. The BLM must provide a broader range of alternatives

After developing a sufficient purpose and need for the proposed action, NEPA requires BLM to consider a range of reasonable alternatives. The range of alternatives is “the heart of the environmental impact statement.” 40 C.F.R. § 1502.14. NEPA requires BLM to “rigorously explore and objectively evaluate” a range of alternatives to proposed federal actions. See 40 C.F.R. §§ 1502.14(a), 1508.25(c). “An agency must look at every reasonable alternative, with the range dictated by the nature and scope of the proposed action.” *Nw. Env’tl. Defense Center v. Bonneville Power Admin.*, 117 F.3d 1520, 1538 (9th Cir. 1997). An agency violates NEPA by failing to “rigorously explore and objectively evaluate all reasonable alternatives” to the proposed action. *City of Tenakee Springs v. Clough*, 915 F.2d 1308, 1310 (9th Cir. 1990) (quoting 40 C.F.R. § 1502.14). Reasonable alternatives include those that are more environmentally protective as well. Regarding the proposed PEIS, the consideration of more environmentally protective alternatives is also consistent with FLPMA’s requirement that BLM “minimize adverse impacts on the natural, environmental, scientific, cultural, and other resources and values (including fish and wildlife habitat) of the public lands involved.” 43 U.S.C. §1732(d)(2)(a).

NEPA requires that an actual “range” of alternatives be considered, so as to “preclude agencies from defining the objectives of their actions in terms so unreasonably narrow that they can be accomplished by only one alternative (i.e. the applicant’s proposed project).” *Col. Env’tl. Coal. v. Dombeck*, 185 F.3d 1162, 1174 (10th Cir. 1999) (citing *Simmons v. U.S. Corps of Eng’rs*, 120 F.3d 664, 669 (7th Cir. 1997)). This requirement prevents the outcomes of the agency’s planning from becoming “a foreordained formality.” *City of New York v. Dep’t of Transp.*, 715 F.2d 732, 743 (2d Cir. 1983). See also *Davis v. Mineta*, 302 F.3d 1104 (10th Cir. 2002). In addition, the “evaluation of alternatives mandated by [NEPA]

is to be an evaluation of alternative means to accomplish the general goals of an action; it is not an evaluation of the alternative means by which a particular applicant can reach his goals.” *Colo. Envtl. Coal. v. Dombeck*, 185 F.3d 1162, 1174 (10th Cir. 1999) (citations omitted).

Although this PEIS offers a unique opportunity for BLM to consider a suite of alternatives that would achieve the purpose and need with the least environmental harm and provide the greatest benefits across a large landscape, the Draft PEIS fails to do this. Instead, not only does it not analyze a true “no action” alternative, but also does not analyze an alternative or elements of an alternative suggested by the public during scoping that would increase protection of important habitat areas from anthropogenic impacts like motorized recreation, energy development, and livestock grazing. See WWP et. al Scoping Letter at 4. An alternative that would address these activities and their harmful impacts on the very habitat which BLM seeks to restore through preparation of this PEIS is critical if BLM is to truly look to the causes and solutions of the underlying resource degradation that the PEIS seeks to address.

To remedy these significant oversights and comply with NEPA, BLM must include an alternative in the PEIS that combines elements from the alternatives suggested during the combined scoping period for this PEIS and for BLM’s related Fuel Breaks PEIS. Currently, there is no “restoration alternative” that would minimize heavy-handed, large-scale treatments and surface disturbance in favor of passive restoration and protecting important habitat and historic disturbance areas from further impacts like motorized recreation, livestock grazing, and development. For example, reasonable alternative components suggested by the public during the scoping period that were not discussed, addressed by BLM, or otherwise incorporated into existing alternatives in the Draft PEIS include:

- Employ an ecological science advisory team for guidance.
- Rely less on surface disturbing restoration or vegetation removal methods like mechanical treatments, drill seeding, and other tilling-based processes.
- Avoid using both non-native and rhizome-forming grasses in seed mixes.
- Refrain from surface disturbance in areas with functioning, native plant communities.
- Refrain from treatments in sagebrush habitats occupied by sage-grouse or other sensitive species.
- Within crested wheatgrass seedings or other depauperate areas with minimal sagebrush cover, focus on native shrub establishment through techniques such as interplanting sagebrush, aerial seeding of sagebrush seed, crested wheatgrass seeding removal and replacement with native shrubs and understory plants.
- Do not plant crested wheatgrass, forage kochia, or other species known for forming monocultures and excluding native plants.
- Refrain from treatments in areas grazed by domestic livestock to avoid the spread of invasive weeds.
- Employ passive restoration methods over large areas in existing sagebrush and pinyon-juniper communities to enhance native understory plants and biological soil crusts, increase biodiversity and promote resilience and resistance.

These elements of possible alternatives are scientifically and ecologically-defensible, and can easily be applied in restoring extremely denuded locations where intervention is most likely to make a positive difference for ecosystem health, wildlife habitat, and fire resiliency without making things worse.

Along with elements from scoping that were not considered by BLM in any proposed alternatives, as discussed above, the BLM should consider an alternative that clearly includes the following elements:

- Build into the alternative the transparency, accountability, public feedback, and scientific/stakeholder collaborative mechanisms discussed in the introduction and section IV of these comments.
- Use a rigorous adaptive management framework and experimental approach (e.g., that uses exclosures, matched treatment areas).⁷
- Establish priorities for treatment based on BLM sagebrush strategy documents and relevant scientific studies that evaluate the efficacy of previous treatments and methods.⁸
- Protect the most intact ecosystems from surface disturbing activities. Restrict treatments to areas within the analysis area that 1) are degraded (i.e., where the dominant plant community does not match the historic or expected plant community for the area based on scientific data; **and** 2) where scientific studies show that treatments are likely to be successful, even in expected drought or harsh environmental conditions.
- Restrict the treatment area to FIAT-identified areas.
- Based on the best available science and review of existing scientific literature on the efficacy of treatments establish specific constraints that:

1) Prohibit the use of heavy, surface-disturbing machinery in intact and largely intact ecosystems to prevent soil disturbance, which is likely to only further exacerbate habitat loss, dust production, desertification, and the spread of invasive species leading to increased wildfire.⁹ Heavy machinery should only be used in largely degraded and disturbed areas, i.e. the locations of past treatments that have failed.

2) Limit treatments in high resistance and resilience areas to non-large-scale-mechanical means (i.e., hand tools, chainsaws, no ground-disturbing machinery), and only where a demonstrated need for action beyond passive restoration exists.¹⁰

⁷ Restoration and vegetation management is an evolving science and adaptive management (including deliberate experimentation, learning, and feedback loops) are integral to a large-scale restoration program. *See, e.g.* Department of Interior, 2015. [*The Final Report: An Integrated Rangeland Fire Management Strategy*](#); Crist et al. 2019, chapter 2 (explaining the need for a deliberate multi-scale monitoring program and adaptive management framework that bases future action on whether past actions have improved ecological function). *See also* our discussion in Section IV of these comments.

⁸ *See* Section IV.

⁹ Duniway et al. 2019 (explaining that restoration techniques including seeding with soil surface disturbance imparts inherent dust-production risk in more arid regions...leaving large areas of exposed, disturbed soils); Jones et al. 2019 (discussing throughout that surface disturbance associated with mechanical treatments facilitates cheatgrass expansion and has been shown to increase the incidence of fire)..

¹⁰ *See* Jones et al. 2019; Section X of these comments.

3) Use only native plants and seeds, conditioning treatments on the availability of appropriate seed and native cultivars.¹¹

4) Prohibit targeted grazing,¹² prescribed fire, and removal of sagebrush in Sage-Grouse GHMA, IHMA, and PHMA.¹³

6) Expand areas excluded from analysis for potential treatment. We appreciate that BLM has excluded sensitive ecological, cultural, and other areas described at 2-1 in the Draft PEIS, however, these exclusion areas should be expanded to include Tribal Cultural Areas, critical habitat for listed species, *all* pinyon-pine and juniper Phase III communities, and also in all Phase II communities in areas identified as persistent pinyon-juniper forested vegetation, and all BLM-identified lands with wilderness characteristics.¹⁴

Each of these specific alternative parameters would help accomplish BLM's stated purpose and need for the PEIS (restoring ecosystem and habitat health, as well as preventing harmful wildfire), while minimizing the risks associated with large-scale habitat manipulation that is not supported by the best available science. These specific alternative elements are reasonable and should be considered by BLM as part of its robust NEPA process in preparing this PEIS.

Additionally, a reasonable range of alternatives in the PEIS must include an alternative that better responds to the *causes* of the current ecological situation, including livestock grazing, fire suppression, and climate change. The stated purpose of the proposed PEIS is to enhance the long-term function, viability, resistance, and resilience of sagebrush communities. The PEIS must analyze an alternative that considers long-term reduction in livestock grazing (*e.g.*, a reduction in livestock numbers, utilization, grazing acreages, and/or seasons of use, especially following *any* form of treatment) in order to assure all allotments meet public land health standards and anticipate more extreme weather conditions and drought. Reduction in or elimination of domestic livestock grazing could result in significant enhancement of grouse habitat, better forage conditions, more cover, less erosion, and more effective fuel breaks with few, if any, negative impacts to natural conditions in the area. Intact and functioning ecosystems should not be deforested and mechanically modified when other reasonable alternatives exist, such as reducing or eliminating livestock grazing which could achieve similar goals with less intrusion and surface disturbance.

See, for instance, recent research by Zheng et al. (2020) in exclosures in inner Mongolia that had been converted from grasslands to shrublands due to livestock grazing. After livestock were absent, the areas reverted to grasslands beginning in the 8th year and continuing through the 19-year study. The study adds support showing that grasslands can recover if grazing is completely eliminated for a long period of

¹¹ Tallamy 2007 (discussing the importance of using native species and cultivars for both ecosystem health, soils, and fire resilience).

¹² See section XIII, discussing both the ineffectiveness and the degradation-exacerbating effects of targeted grazing, including trampling biological soil crust, increasing the spread of invasive species, and widening gaps between perennial plants.

¹³ Connelly et al. 2019, articulating the scientifically inappropriate focus on prescribed fire and sagebrush removal treatments by land managers in response to sage-grouse population declines.

¹⁴ See section VII.

time. The PEIS expresses concern about (a) conversion of sagebrush communities to pinyon and juniper (though much of that may be range shift under climate change); and (b) dominance of cheatgrass in sagebrush rather than concern about conversion of grasslands to shrublands. However, the direct relevance of the Zheng, et al. research to considerations of alternatives in this PEIS is that the BLM cannot simply dismiss out of hand alternatives that would call for elimination of grazing in at least some areas or for some periods of time, or that would rely on a 30% utilization limit to reduce pressure on native grasses and forbs throughout the entire project area.

At minimum, BLM should assess an alternative that prescribes 30% utilization for livestock grazing, after a rest interval following treatments. A number of organizations on these comments have proposed 30% utilization as part of our comprehensive alternative submitted on March 6, 2020 during scoping comments for the revision of the BLM grazing regulations (O'Brien et al 2020a and 2020b). The Draft PEIS repeatedly plans for the establishment of native perennial grasses and forbs after treatments, but nowhere discusses grazing as a threat to native, palatable seedings. Although it is clear that excessive livestock utilization would prevent establishment and/or maintenance of native perennial grasses and forbs, the Draft PEIS does not commit to rest treated areas for two years or more following treatments. Nor does the Draft PEIS describe what level of grazing utilization has allowed for the establishment and maintenance of native perennial grasses and forbs in areas that were formerly dominated by cheatgrass and were treated for improved native grass and forb conditions, following rest. The Draft PEIS does not acknowledge what level of livestock utilization would preclude the establishment or maintenance of native grasses and forbs and prevent selection for cheatgrass in these areas. There are no design criteria for post-treatment grazing in Appendix D.

Research indicates that allocation of 25% of forage to livestock, after resting treated areas from grazing, will allow for “range betterment and minimization of risk: Rangeland researchers have recommended that a 25 percent harvest coefficient be used when forage is allocated to livestock in stocking-rate decisions. It allows both forage species and livestock to maximize their productivity, allows for error in forage production estimates, greatly reduces problems from buying and selling livestock, reduces the risk of financial ruin during drought years, and promotes multiple-use values. (Lacey et al., 1994; Johnston et al, 2016; White and McGinty 1997; Galt et al., 2000) and USDA-Natural Resources Conservation Service 1997). Holechek et al. (1999) (examined 25 studies on effects of grazing intensity on native vegetation and livestock production in North America, concluding that light grazing (approximately 30%) allowed for the most consistent increase in both range economic benefits and ecological restoration.

By contrast, the Draft PEIS merely indicates that current grazing is a cumulative impact on 99 percent of the project area and never defines the intensity of grazing that would allow restoration of “healthy conditions” post treatment:

Excessive historic grazing pressure has modified sagebrush communities over many areas in the western US. Domestic livestock modified much of the native grass in the Great Basin by the early twentieth century, and more recently, less than 1 percent of the sagebrush communities in the region remains untouched by livestock (Paige and Ritter 1999). To ensure that BLM administration of grazing helps preserve currently healthy conditions and restores healthy

conditions of rangelands, the BLM has approved Grazing Management (43 CFR 4120) and Authorized Grazing Use (43 CFR 4130) to guide grazing management.

Draft PEIS at 4-2. BLM must include an alternative that actually prescribes what level of the “cumulative effect” of grazing will allow for the establishment and maintenance of native perennial grasses and forbs in lands that have been grazed and in which native perennial grasses and forbs have been depleted or are absent, or have been seeded

Recommendations: NEPA dictates that BLM must provide a broader range of alternatives to address its stated purpose and need. The PEIS must analyze an alternative that would minimize or exclude large, surface-disturbing treatments in favor of passive restoration in largely intact ecosystems, focusing any mechanically intense restoration methods only on severely degraded areas. BLM’s PEIS must include an alternative that addresses significant causes of degraded habitat and enhanced fire potential, and includes prescriptions that protect habitat and treatment areas from impacts resulting from activities such as motorized recreation, development, and livestock grazing, and attempts to anticipate, address and mitigate climate stressors that are likely to frustrate restoration efforts. The PEIS must include an alternative that would rest treated areas from grazing for at least two years following treatments and then limit livestock utilization to 25% or less.

VII. Special Management Areas Included in the PEIS needs to be modified and broadened

Although we appreciate that BLM has made clear in Section 2.1 that the PEIS would exclude an important array of lands within the analysis area, such as Wilderness, Wilderness Study Areas, VRM Class I areas, National Conservation Areas and National Monuments, and other sensitive or special management areas, the GIS data and mapping provided in the draft PEIS do not support these assurances. For example, the “Analysis Area” for the preferred alternative includes:

- 95,110 acres of designated wilderness
- 84,174 acres of BLM-managed Natural Areas
- 44,724 acres within the newly-established San Rafael Swell Recreation Area, as designated through the John D. Dingell Jr. Conservation, Management, and Recreation Act (2019)
- 256, 947 acres within the boundaries of Grand Staircase-Escalante National Monument as established in Presidential Proclamation 6920.¹⁵

Likewise, even the smaller “Emphasis Area,” where BLM has said treatments are *most likely to occur* still includes:

- 237 acres of designated wilderness
- 70,528 acres of BLM-managed Natural Areas

¹⁵ On September 18, 1996, President William J. Clinton issued Proclamation 6920, establishing the 1.88-million-acre Grand Staircase-Escalante National Monument (GSENM) pursuant to his authority under the Antiquities Act of 1906. On December 4, 2017, President Trump issued Proclamation 9682, which reduced the size of GSENM by nearly half—to approximately 1 million acres. The legality of President Trump’s rescission of GSENM is the subject of pending federal litigation, and we maintain that Proclamation 9682 is illegal. Due to the uncertainty surrounding the legal status of GSENM, we request that all potential treatment analysis and emphasis areas within the original GSENM boundaries be removed from the PEIS.

- 98,893 acres within the boundaries of Grand Staircase-Escalante National Monument as established in Presidential Proclamation 6920.

BLM must amend its mapping and GIS to accurately and definitively reflect its statements that the areas listed above and *all* other special management areas are excluded from the PEIS, affirmatively removing any ambiguity that may result from individual BLM field offices looking only at GIS data or mapping to make management decisions under the PEIS.

BLM should also expand these exclusion areas to include several other types of areas that require site-specific NEPA analysis in the form of, at minimum, an Environmental Assessment, before any fuels, restoration, or removal treatments are conducted. These other areas that are inappropriate to include in the high-level PEIS proposed include Tribal Cultural Areas, areas of designated critical habitat for any ESA-listed threatened or endangered species,¹⁶ old-growth or Phase III pinyon pine and juniper forests,¹⁷ and all BLM-identified lands with wilderness characteristics (LWC).

The preferred alternative analyzes treatments on 812,580 acres of BLM-managed LWC. Contrary to BLM's assertions in the draft PEIS, this includes areas that BLM has proactively chosen to manage to maintain and enhance those wilderness characteristics. It also includes all remaining LWC, which, in many field offices, are simply *new* inventories that have postdated the revision of the underlying resource management plan (RMP). BLM itself has determined that these areas possess wilderness characteristics but has not yet made the affirmative decision in their applicable RMP to manage for protection of these wilderness values over other multiple uses. This means that, by allowing surface-disturbing and naturalness-impacting activities like mechanical vegetation removal in these areas, the PEIS possibly is precluding future or forthcoming decisions to manage these LWC-identified areas to maintain their natural character. For these reasons, the PEIS should exclude *all* BLM-identified LWC.

Furthermore, NEPA requires that BLM fully analyze potential impacts to LWC—regardless if those LWC units are managed for protection of wilderness values—including disclosing both the acres of LWC that may be impacted by proposed treatments under the PEIS and how many acres of LWC will be permanently lost as a result of the activities the PEIS authorizes. This includes, in Utah, analyzing and disclosing the potential impacts of treatments on lands subject to proposed federal wilderness legislation. A review of GIS data indicates that 1,327,000 acres of the treatment analysis area are located within lands proposed for wilderness designation in America's Red Rock Wilderness Act. H.R. 2044, S. 948 (115th Congress).

The planning area and wilderness-quality lands within it contain some of the least developed, most remote, wild, and rugged landscapes remaining in the United States. Not managing these areas for their wilderness character threatens their exceptional wilderness values. Despite this, and BLM's responsibility to articulate "a rational connection between the facts found and the choice made," BLM has not explained its rationale in the PEIS for determining that no identified wilderness-quality lands

¹⁶ See Section II regarding Endangered Species Act compliance.

¹⁷ See Appendix A.

other than those currently, affirmatively, managed for protection of LWC should be excluded from treatments that could impair their wilderness values.

Recommendations: BLM must remove all sensitive and special management areas from consideration for treatments under the PEIS, including all acres of those already listed in Section 2.1 of the draft PEIS and expanded to also include all BLM-identified LWC, Tribal Cultural Areas, areas of designated critical habitat for ESA-listed threatened or endangered species, and old-growth and Phase III pinyon pine and juniper forests.

VIII. BLM's prohibition on new road building

We agree with and commend the draft PEIS' prohibition on new road building, as found on page 3-1 of the PEIS:

2.2.5. Road Creation and Maintenance No new roads would be created. Existing roads may be maintained within their current maintenance level but improving roads beyond the designation or maintenance level would require additional site-specific analysis.

The scientific literature is clear that roads can cause an array of ecological harms (Gucinski et al. 2000; Trombulak and Frissell 2000; Coffin 2007; Robinson et al. 2010; Fahrig and Rytwinski 2009; Benítez-López et al. 2010). However, BLM must make absolutely clear in the final PEIS that "existing" roads are, in fact, only *designated* roads as established by an underlying RMP and its corresponding Travel Management Plan, as required by FLPMA. These BLM-designated routes do not include the millions of miles of illegal, user-created routes that snake across BLM-managed public lands in the west.

Recommendations: The PEIS may not authorize or contemplate treatment activities under the PEIS that require the use or maintenance of undesignated motorized routes. This would be unlawful under FLPMA. BLM must clarify in the final document that the only roads used for any and all fuels, restoration, or habitat management activities under the PEIS will be those whose impacts have been considered, analyzed, and officially designated as "open" or for "administrative use" in the relevant RMP and corresponding Travel Management Plan.

IX. The BLM must rigorously examine climate change, both its being impacted by proposed actions and its impact on proposed actions

Climate change (specifically global warming) represents an environmental problem of "worldwide and long-range character" that NEPA (Sec. 102 (F)) was enacted to address. The PEIS fails to address how that problem threatens the predicted success of the proposed treatments and how the proposed treatments amplify climate change impacts on the region.

a. Inadequate treatment of climate impact — it is "significant"

The PEIS has 18 search hits on the word "climate"; only three short paragraphs (Sec. 3.4 and 4.5) are devoted to it. Sec. 3.4 (Affected Environment: Climate) in a scant 10 lines attempts to describe some of the effects of climate change on the project area but does not touch on how the proposed treatments

may affect climate. Sec. 4.5 (Environmental Impacts: Climate) has only 20 lines and is headed with this assumption:

“Nothing proposed in the action alternatives would measurably affect climate change; as such, a detailed analysis of each alternative has not been conducted.”

Overall it is obvious that climate is not considered a significant issue in this DPEIS. We strongly disagree and note that the DPEIS provides no rationale for virtually ignoring climate impacts. This is a fundamental failure to follow the intent of NEPA, Section 101 (b).

b. Effects of global climate trajectory on proposed treatments

With the trajectory alarmingly upward for global warming by all scientific evidence (IPCC, 2019, p. 57) and its underlying cause being agreed upon by well-established scientific organizations (AGU, 2020; AMS, 2019), it is incumbent on the BLM to address in detail the likely effects on climate of the proposed actions in all the PEIS alternatives, and, inversely, the likely effects of climate on the proposed actions. While the projects may have comparatively little cumulative effect on climate, the inverse is potentially large and may prevent the success of any treatment projects. The recent paper of Palmquist et al. (2017) highlights this with:

“Ecohydrological responses to climate change will exhibit spatial variability and understanding the spatial pattern of ecological impacts is critical from a land management perspective. To quantify climate change impacts on spatial patterns of ecohydrology across shrub steppe ecosystems in North America, we asked the following question: How will climate change impacts on ecohydrology differ in magnitude and variability across climatic gradients, among three big sagebrush ecosystems (SB-Shrubland, SB-Steppe, SB-Montane), and among Sage-grouse Management Zones? We explored these potential changes for mid-century...”

The Fourth National Climate Assessment (NCA4, 2017) is a better reference for climate changes in the US than IPCC (2014) because it is specific to the US and is more recent. Table 6.4, p. 197, of the NCA4 report predicts roughly 4°-5°F rise in temperature across the western states by 2050, depending on which assumptions are made in the climate model, compared to the “near-present averages (1976-2005). Precipitation changes are much less certain, and a zero to small increase (NCA4, 2017, p. 217) is the likely outcome for the 21st century compared to the 1976-2005 average. However, any increase in precipitation is likely negated by the predicted increases in temperature (Palmquist et al. 2016).

On pp. 3-4, the PEIS addresses the reasons that pinyon-juniper is expanding into sagebrush areas. On that page Rowland et al. (2008) is cited, but that paper is hardly a good source of evidence on this issue. Rowland et al. refer to Miller and Wigand (1994) in their discussion, but even Miller and Wigand are non-committal in their excellent examination of possible factors while they do point to some evidence that increased CO₂ levels will favor pinyon-juniper. Thus, the DEIS is far from instructive on the issue of pinyon-juniper encroachment related to increased CO₂ levels. Recently, Archer et al. (2017) make the connection solidly between CO₂ levels and the expansion of trees into grasslands and shrublands, and

this reference should be used in the DEIS. The implication is that, given current, and even higher, CO₂ levels in the atmosphere, pinyon-juniper removal will be a failing method to attain the goals of this PEIS. This must be recognized in the PEIS and incorporated into the analysis.

In general, it has been shown that Earth's current atmosphere, which contains amplified CO₂ levels, is conducive to woody plant encroachment (Pugh et al., 2019; Fernandez et al., 2013; Pan et al., 2011). Atmospheric modeling points to CO₂ increasing in the atmosphere until at least mid-century even under a concerted worldwide effort to control CO₂ emissions (NCA4, Figure 4.1). This does not bode well for pinyon-juniper encroachment on sagebrush habitats. Indeed, under Section 4.5.2, the DPEIS says: "Each degree Celsius of warming is predicted to result in the loss of 12% of sagebrush..." Although there are other factors to consider in pinyon-juniper encroachment, if CO₂ and its consequential global warming is a driver, then it is inevitable that such encroachment will continue, possibly negating the desired outcomes of proposed treatments. The DPEIS fails to consider this, contributing to a scientifically unwarranted prediction of long-term, post-treatment restoration success.

c. Effects of proposed treatments on the global climate trajectory.

On p. 4-49, the first bullet under 4.5.1 says: "Nothing proposed in the action alternatives would measurably affect climate change; as such, a detailed analysis of each alternative has not been conducted." We disagree strongly with this bald bold assertion. The PEIS proposes to remove large quantities of Phase I, II, or III pinyon-juniper stands within the project area. Table 4-3 of the PEIS shows that the preferred Alt. B would remove pinyon-juniper on 3.1M acres. Even Alt. D, the smaller-scale treatment, targets 0.6M acres. pinyon-juniper trees are a major carbon sink, therefore a positive factor in depressing global warming (e. g., Fernandez et al., 2013; Throop and Lajtha, 2018).

The effect of pinyon-juniper removal cannot be fully understood or evaluated because the PEIS has not described the balance of carbon sequestration and emission in these respects:

1. relative carbon sequestration of pinyon-juniper versus sagebrush based on the current annual carbon sequestration of pinyon, juniper, and sagebrush;
2. the potential emissions of proposed removal of pinyon-juniper;
3. the effective biomass of pinyon-juniper aboveground, underground, and in detritus at the surface;
4. balances between actual pinyon-juniper wildfire carbon emissions and pinyon-juniper natural carbon sequestration.

d. Role of woodlands in triggering precipitation, in water retention, and in locally depressing temperature.

Physical ecosystem services supplied by tree cover are crucial for the Great Basin and other hot, dry areas of the West. From a basic perspective, we can't afford to remove trees in a warming climate trajectory, just as cities cannot logically remove trees which depress urban temperatures. The PEIS must address physical climatological benefits of pinyon-juniper forests because these effects are as important

as their carbon sequestration role (see the review paper by Ellison et al., 2017). We list verbatim from the abstract of Ellison et al. these seven benefits:

- Precipitation is recycled by forests and other forms of vegetation and transported across terrestrial surfaces to the other end of continents.
- Upward fluxes of moisture, volatile organic compounds and microbes from plant surfaces create precipitation triggers.
- Forest-driven air pressure patterns may transport atmospheric moisture toward continental interiors.
- Water fluxes cool temperatures and produce clouds that deflect additional radiation from terrestrial surfaces.
- Fog and cloud interception by trees draws additional moisture out of the atmosphere.
- Infiltration and groundwater recharge can be facilitated by trees.
- All of the above processes naturally disperse water, thereby moderating floods.

To this list, we add an 8th one: dust suppression (Hahnenberg and Nicoll 2014). In contrast, the effects of massive deforestation (as opposed to manual thinning, reduced livestock consumption of understory vegetation, and seeding of native vegetation followed by multi-year rest) are mostly non-ecological and are closely tied to assumed economic advantages for small segments of the public. The PEIS makes no attempt to weigh the economic effects of deforestation (pinyon-juniper removal) against the ecological benefits listed above.

- X. The BLM must discuss the efficacy of various treatment methods, disclose the rate of success in past and ongoing vegetation treatment projects where similar methods to those proposed in the PEIS were used, and modify final proposal accordingly

- a. Review of efficacy of treatment methods

The BLM reserves for itself the ability to continuously treat and retreat sites indefinitely, which may lead to increased soil compaction, erosion, exotics, and other unfavorable results. Throughout the document the PEIS asserts that treatments will increase perennial grasses and forbs and decrease exotics. However, it hedges its bets by saying that treatments may not be immediately effective and successive retreatments may be necessary until such time as objectives are met. PEIS at 4-1,36,37. At what point do poor treatment results transition from “not immediately effective” to “failed”? It is not reasonable for the BLM to allow itself an indefinite period in which to declare success. There should be defined limits on how often the same site can be retreated over and over again before improvements are seen. This allows the agency to sidestep addressing activities that may be contributing to the failure to achieve objectives. For example, if livestock grazing is allowed back on a treatment but utilization is too high, the agency can say the poor resource conditions are simply because the site is in an intermediate state of recovery and there is no need to change management. The site just needs to be retreated. There should be defined limits on how often the same site can be retreated over and over again before improvements are seen. This also would incentivize the agency to more carefully plan and manage treatments.

There is little evidence that treatments like the ones proposed in the PEIS are effective. Although millions of acres of public land have been treated over the decades, few studies have synthesized the effects of these projects to determine their rate of success. Miller et al. 2019 and Jones 2019 are two studies that aggregated hundreds of vegetation treatment articles in an attempt to find overall patterns. Both of these syntheses have concluded that treatments vary widely in the degree to which they achieved their goals. Success depends on a complex interaction of multiple variables, and the outcome of treatments is very difficult to predict. Jones 2019 reports that:

“As McIver et al. (2014) concluded, “[S]ubstantial among-site variation in key ecological attributes will likely always cloud our ability to predict specific outcomes for many sites. Interannual variation, especially in the availability of water in spring, blurs predictive ability further.” Archer and Predick (2014) agree, stating that “our ability to predict ecosystem responses to treatments is limited for many attributes, (e.g., primary production, land surface-atmosphere interactions, biodiversity conservation) and inconsistent for others (e.g., forage production, herbaceous diversity, water quality/quantity, soil erosion, and carbon sequestration).” The ecological legacies of past and current management make prediction of outcomes even more difficult (Monaco et al. 2018; Morris et al. 2011; Morris and Rowe 2014; Morris et al. 2014).”

Jones 2019 analyzed data from mechanical treatments as a group to determine efficacy of this method on multiple land management objectives such as increases in understory grasses and forbs, decreased fuels, improved wildlife habitat, increased water availability, soil stability, and carbon sequestration. Over half of the treatments in pinyon-juniper communities showed no significant effect on perennial grasses and forbs. The other treatments did show marked increase in cover in grasses and modest increases in forbs. However, non-native annuals also showed troubling increases.

Of particular concern is the effect of treatments on sagebrush communities, which are critical for Greater sage-grouse and other wildlife species. Research into the results of sagebrush treatments indicates that they are not as effective as the BLM portrays throughout the PEIS. Treatments in fact show mixed results in achieving objectives. When they do increase forbs and grasses, those same conditions also increase exotics. Further, the increases in the desirable species are often short term (Svejcar et al. 2017; Wilder et al. 2018) or short-lived (Knutson et al. 2014; Pyke et al. 2013; Pyke et al. 2014). Degraded sites in warm, dry areas with low resistance to exotics are particularly vulnerable (Chambers et al. 2014; Chambers et al. 2017), as are those where management perpetuates poor conditions (Bestelmeyer et al. 2015; Morris and Rowe 2014). Thus, without careful project design, including monitoring and reporting outcomes, implementing treatments like these risks destroying or degrading sagebrush habitats.

Miller et al. 2019 conducted a synthesis of varying treatment types and their history of meeting objectives, summarized below.

Chaining: Like all treatment methods, the success rates of chaining vary. Some studies report increases in soil water, length of growing season, and understory cover “When applied properly” (Miller et al. 2019, citing Bates et al. 2000; 2017; Miller et al. 2014b; Roundy et al. 2014a; Young et al. 2013). Other projects showed poor performance of understory species and expansion of invasive annuals. The risk of

invasives correlates with temperature, soil moisture, and presence or absence of pre-treatment native perennials that can provide a seed source and help outcompete and limit invasive expansion (Bybee et al. 2016). Post-treatment seeding greatly increases the probability of success in some cases but it is not a panacea. In Utah, for example, chaining and seeding on pinyon-juniper sites with severely depauperate understories resulted in the dominance of the introduced perennial grasses and a conifer overstory. Native perennial species were excluded, and shrubs did not re-establish for 50-60 years (Davies et al. 2013; Knutson et al. 2014; Lesica and Deluca 1996).

Mastication: Mastication has increased perennial grasses and forbs in early pinyon juniper phases (I and II). However, in later Phase III sites with little understory cover, mastication can cause an increase in invasives. Recent treatments in southwest Utah in these kinds of Phase III woodlands are showing much increased cover of cheatgrass despite being seeded after treatment (Laura Welp, personal observation May 2020).

Mastication produces mulch, which increases nitrogen and facilitates increases in native and non-native grasses (Aanderud et al. 2017). Over time, cheatgrass may decline. Mulch also significantly increases surface fuel loads, especially on sites with high tree cover such as that found in Phase III pinyon-juniper communities. Mulch can decrease bare ground and soil and wind erosion relative to chaining and prescribed burns, although mulch depths over 5 cm can inhibit perennial grass establishment. This method also has less impact on shrubs than other methods.

Manual removal: Removing trees by hand is highly selective, so it is the best method for retaining or increasing desirable vegetation like perennial shrubs, grasses, and forbs. PEIS at 4-10,11. Soil disturbance and bare ground is also minimized and shrubs and biological soil crust is retained to a greater degree than other methods. Soil nutrient release is more gradual than that following fire. Like other methods, however, invasive annuals increased moderately after disturbance, especially on Phase III sites where perennial understory vegetation was less abundant. It is unknown if this unintended result is a long-term impact (Miller et al. 2019)

Prescribed fire: Miller et al. 2019 warn that “the increasingly overwhelming problem of invasive annual plants across the Intermountain Region requires cautious consideration when deciding to use prescribed burning treatments”. Factors influencing success are complicated and the risk of negative consequences is high. If site characteristics are wrong, prescribed burns can significantly increase invasive annuals. “It is important to have adequate native perennials on site before treatment and ecological site characteristics including soil texture, depth, and moisture and temperature regimes” (Miller et al. 2013; Allen et al. 2008b; Everett and Sharrow 1985a; Pekas 2010.) Success depends on complicated factors such as type and amount of pre-treatment vegetation, which are often lacking in late Phase II and Phase III woodlands. Prescribed burns require caution and specific weather conditions to do safely and effectively. Low to mid intensity fires produce better results than high intensity fires. The response of forbs is highly variable and difficult to predict.

Managers often choose fire because it is less expensive than other methods and controls small trees more effectively. However, disadvantages are the removal of important native

nonsprouting shrub species (sagebrush, bitterbrush) and the greatest threat of invasive species of any treatment method, especially on warm, dry locations (Roundy et al. 2014).

Herbicides: Results from broad-scale application of herbicides is also variable. Used alone, herbicide effectiveness is mixed (Miller et al. 2019). They are best when used in conjunction with another method of pinyon and juniper removal, such as individually treating small trees. Some herbicides such as Imazapic (Plateau) are also used to spot treat invasive annuals after treatment on sites with low resistance (although the advisability of doing any kind of surface disturbance in these sites is questionable).

In the words of Miller et al. (2019), “Long-term effectiveness of vegetation management on ecosystem function depends on a complex set of interacting factors that drive plant succession across spatially and temporarily dynamic Great Basin and Colorado Plateau ecosystems. The benefits and drawbacks of vegetation management on ecosystem function are closely linked to the type and severity of treatment as well as ecological site characteristics, pretreatment vegetation composition, and post-treatment management. Vegetation management to limit conifer expansion into shrub-steppe and shrubland communities must be developed with clearly defined objectives and all of the above factors in mind.”

Beck et al 2012 and Bombaci and Pejchar 2016 point out that most vegetation treatment studies have been on specific, fine-scale management actions that only address short-term effects immediately post-treatment. They recommend that experiments be conducted over longer term temporal and spatial scales. Havrilla et al. 2017 found that “studies with management actions had consistently short timescales for evaluating post-treatment effects and were not representative of the possible spatial or temporal extent of responses to management actions.” The BLM has treated millions of acres but data collection has lagged behind. This makes determining whether treatments achieve BLM objectives on public land more difficult. To date, the public have not been presented with adequate assurances that benefits outweigh the detriments.

b. The PEIS does not analyze or disclose the effects of treatment methods sufficiently

The BLM has not accurately analyzed the effects of sagebrush treatments on wildlife, exotic species, and herbaceous understories. The BLM assumes an unrealistically high rate of treatment success and downplays the risks. The BLM should analyze an accurate, thorough analysis of sagebrush and pinyon-juniper woodland treatment responses over time and disclose to the public an accurate rate of positive to negative effects. The public requires this information to clearly understand the risks vs benefits of the proposed alternatives.

c. Based on reviews of treatment effectiveness, the PEIS should not allow treatment of large intact sagebrush communities

The PEIS indicates that its preferred alternative will allow the treatment of perennial sagebrush communities, even those that are healthy and functioning, with most treatment methods (PEIS Table 2-1). Given the risk of poor treatment responses in sagebrush communities, any treatment in even partly

functioning sites should be proscribed (Woodward 2006). The BLM should not treat large swaths of sagebrush communities according to this wholesale, generalized application of methods.

- d. The PEIS should not allow prescribed fire in degraded sagebrush (Shrubs with Depleted Understories, PEIS Table 2-1)

The PEIS rightly eschews prescribed burning as a management tool in most sagebrush communities but allows it in degraded sites with a cheatgrass understory. This is contrary to the recommendations of Riginos et al. (2019), who caution against using this method in sagebrush communities in poor condition with less than 10% sagebrush cover. Prescribed burns in these areas have resulted in loss of sagebrush and cheatgrass expansion.

In sum, it is important for managers to remember that manipulation of complex ecosystem components is not as simple as we might like. Yet the PEIS operates with this flaw at its heart. Its analysis of impacts in Chapter 4 is oversimplified and fails to disclose that the many unpredictable and interacting variables lead to high risk that treatments will fail, especially as temperatures increase and precipitation drops in vulnerable desert areas. The PEIS assumes a broad, one-size-fits-all applicability of methods over vast landscapes, which is how treatments are currently being conducted. This PEIS would enshrine those methods. In addition, it would allow the BLM to conduct treatments without site-specific NEPA and no opportunity for the public, including researchers, to weigh in despite the fact that they may have useful site-specific interests or information.

Recommendations: The BLM in the PEIS must take a hard look at the effectiveness of prior treatment efforts at multiple temporal and spatial scales. The BLM must be more prescriptive in the PEIS about which methods are allowed when using the findings and recommendations of Jones 2019, Miller et al. 2019, Bombaci and Pejchar 2016, Beck et al. 2012, and others. The BLM must also analyze and disclose its capacity to implement, monitor, fix, and maintain treatments and potential consequences for treatment success of inadequate capacity. The BLM should not allow treatments in largely intact sagebrush communities.

- XI. The PEIS needs to more rigorously analyze the impacts of each alternative on specific resources

- a. Biological soil crusts

There are four major problems with the Draft PEIS treatment of biological soil crusts. The PEIS (1) admits the BLM does not know where biological soil crusts are within the project area and makes no attempt to find out; (2) provides no design features for avoiding destruction of biological soil crusts; (3) falsely indicates treatment damage to biological soil crusts will be “short-term”; and (4) notes that targeted grazing will damage biological soil crusts but never acknowledges the cumulative impacts of ongoing, permitted livestock grazing in (a) promoting invasive species for which treatments are proposed and (b) preventing or eliminating predicted post-treatment native grass and forb establishment.

- i. i. The BLM doesn't know where biological soil crusts (or what stage of crusts) are found within the EIS area.

At Vol. 1, p. 48:

Biological soil crusts are commonly found on open spaces in semiarid and arid environments in the project area; however, data on the number of acres of biological soil crusts present in the project area are not available.

The fact that the BLM gives lip service to the important roles of biological soil crusts but claims to not know where they would (a) be expected; (b) are present (they are often under pinyon and juniper that have not been grazed recently); and (c) would be expected but are absent means that the BLM has no real intention to protect or recover biological soil crusts.

It's not clear how the BLM knows that biological soil crusts (BSC) are "commonly found" in the project area, when the agency has no data on the acres. The PEIS makes no distinction between light cyanobacteria, which are much more widely spread than later seral crusts, but which only very weakly bind soil particles within the soil; and dark cyanobacteria, which are later seral, photosynthesize, and, depending on their degree of development, make the soil progressively more resistant to wind erosion. However, dark cyanobacteria are much more vulnerable to trampling by livestock, compression by mechanical equipment tires, and soil disturbance through disking, plowing, and planting seeds.

- i. ii. The PEIS provides no design directions for avoiding destruction of biological soil crusts (Vol. III, Appendix D).

While there is a design feature for avoiding bunchgrass cover (i.e., "Targeted grazing will not be implemented in treatment areas that have 20% or greater cover of perennial bunchgrass" at D-2), there is no similar direction for avoiding targeted grazing or any other treatment on biological soil crust. The PEIS notes that targeted grazing (e.g., page 111), accessing manual treatments cross-country (p. 110); mechanical treatments (p. 110); and prescribed fire (111) all can damage biological soil crusts, but places no limits on any of these activities in relation to biological soil crusts.

- ii. iii. The PEIS falsely claims damage to biological soil crusts would be "short-term"

The PEIS admits that where biological soil crusts are disturbed, impacts can take "up to 250 years to recover depending on the species composition" [p. 110; the citation for this has no reference in Appendix D]. The PDEIS immediately gives confusing examples of the timelines for recovery of different biological soil crust species, saying that lichens "may take several decades to recover," but that mosses "can recover within the first few decades" (p. 110). Huh?

The discussions of impacts to biological soil crusts by different treatment methods are similarly confusing:

Mechanical treatments. The PEIS refers to "**short-term impacts** on biological soil crusts" from mechanical treatments (p. 110), but that "over the long term", mechanical treatments "would benefit soils and biological soil crusts" (p. 110) – even though livestock grazing with associated crust-trampling

would likely be resuming on these treated sites. Later, the PDEIS notes that use of heavy machinery for seeding “would reduce the amount of biological soil crusts” which would “result in a decrease to soil stability and nutrient cycling in the **first few years** after treatments” (p. 115)) [Bold emphases added.]

Targeted grazing. The PEIS claims that the BLM “would use the appropriate livestock type(s)” to “reduce or avoid grazing pressure on native species” (p. 113) It’s not clear how using a particular livestock type avoids grazing pressure on native species and the PEIS offers no data in support of this claim.. The PDEIS also cites a 19-year old study on wet soils in New Zealand that “cattle would affect . . . biological soil crusts, by breaking the crust and forming indentations that increase surface roughness” (p. 111). The point supposedly being made with this factoid from wet New Zealand in the arid Great Basin is not clear.

Prescribed fire. The PEIS then refers again to “**short-term impacts** and damage to soil biological crust” from prescribed fire treatments (p. 111). [Bold emphasis added.]

Chemical treatments. The impacts to biological soil crusts from chemical treatments are vague (“can alter crust species composition”) but the PDEIS says the chemical elimination of invasive annual grasses “would result in more favorable conditions for biological soil crust establishment in the decades following treatment” (p. 112), with the BLM failing to provide any evidence its treatments have resulted in biological soil crust establishment and again ignoring that the treated area would be grazed and thus trampled by livestock in the same decades.

- iii. iv. The PEIS wholly ignores damage to biological soil crusts of ubiquitous, annual livestock (mostly cattle) grazing.

While the PEIS notes that “biological soil crusts are less likely to occur in sites that have incurred multiple disturbances, such as repeated fires,” (4.6.1 Assumptions), and that “less than 1 percent of the sagebrush communities in the region remains untouched by livestock” (Vol. I, p. 63) the long-term impact of this grazing on predicted establishment of native perennials and forbs due to treatments is never examined. The PEIS repeatedly notes that targeted grazing would damage biological soil crusts (e.g., pp. 75, 111, 113) but in only one sentence, in Soil Resources cumulative impacts (4.6.7 on p. 116) does the PEIS mention livestock grazing, and does so in the guise of “projects” [it’s not clear what a livestock grazing “project” is]:

Past, present, and reasonably foreseeable livestock grazing projects and such developments as mineral leasing and land use projects (Table 4-1) have increased and would continue to increase surface disturbance.

This is a wholly inadequate analysis of “cumulative impacts” on biological soil crusts due to ubiquitous past livestock grazing followed by surface-disturbing treatments followed by post-treatment resumption of ubiquitous livestock grazing with its inevitable trampling of biological soil crusts.

b. Soil Stability

The PEIS does not adequately address impacts to soils from vegetation treatments.

i. i. Compaction

Compaction from mechanical equipment is an impact that is not addressed accurately in the PEIS. It characterizes soil compaction as a short-term impact (PIES at 4-50), but these effects can take decades to reverse (Keller et al. 2017). Compaction reduces pore size and alters soil structure, neither of which are easily reversed. Post-treatment management almost always includes cattle grazing, which further compacts soils and prevents recovery. The BLM has design features and best management practices obligating them to reduce compaction by avoiding treating saturated soils. PEIS at D-5. In practice, however, following this prescription is often not practical. Field offices are subject to time constraints, budget limitations that do not allow the flexibility to adopt some mitigating recommendations. This is a persistent, long-term impact that has not been included in the cumulative impact analysis for soils.

ii. ii. Targeted Grazing Impacts

Intensive livestock concentrations have heavy impacts on soils (see Section XIII on Targeted Grazing), but no design features are included which could mitigate or minimize impacts. The PEIS discusses the damage to soils associated with targeted grazing, including compaction, loss of biological soil crust, decreased water filtration rates, and increased erosion. PEIS at 4-51. The BLM dismisses these negative effects by relying on future treatment success. However, the assertion that targeted grazing will improve vegetation and consequently soil stability, organism diversity, and nutrient cycling is an undocumented over-generalization that avoids any discussion of soil recovery. The PEIS cites no evidence for its assertion. Recovery rates from the soil compaction and removal of biological soil crust are very slow, if recovery occurs at all (Keller et al. 2017), especially since livestock will resume grazing the treated area, exacerbating the soil damage. The PEIS must analyze the cumulative effects of long-term soil degradation from targeted livestock grazing followed by conventional grazing.

iii. iii. Design Features

The design features intended to mitigate soil damage from treatments enumerated in Appendix D (at D-5) should be more explicitly defined. For example, the prescription to “minimize ground disturbance” when heavy machinery is compressing soils, ripping up vegetation, and removing biological soil crust over large areas seems unlikely. This vague and generalized prescription is not adequate to assure the public that it is even possible to protect soil resources from damage due to the proposed treatments.

Recommendations:

1. *Identify and avoid areas of developed biological soil crust cover. Removal of biological soil crust can increase wind and water soil loss and facilitate invasive species expansion (Havrilla and Barger 2017.) If the crust cover on a site is intact and well-developed with dark cyanobacteria, mosses, and/or lichens, treatment should be avoided. Damaging the biological soil crust in these places with surface-disturbing treatments could hinder rather than help resource conditions.*
2. *Salvage biological soil crust prior to treatment. Areas to be treated often have fragmented patches of biological soil crust (BSC). Preliminary research suggests that BSC may be returned to the site after*

treatment and perhaps provide a source for re-establishment of crust organisms (Bowker et al. 2008). Rather than crush them, patches of BSC should be harvested and used to re-inoculated site soils after the surface-disturbing activities have ceased. Establishing pre- and post-treatment exclosures would provide invaluable data on this type of restoration effort. Facilitating BSC re-establishment has the potential to more quickly return some sites to a higher state of ecological function, and this technique should be evaluated for incorporation into more restoration projects in arid and semi-arid areas.

3. *Chaining and prescribed burning treatments are the most disruptive to soils and BSC, followed by mastication. Chemical treatments disrupt soils less, but they can kill BSC. Manual removal of trees is the least impactful way to restore vegetation while protecting other resources, particularly if access is by established routes. Manual removal should be the method of choice in sites with erosive soils and intact biological soil crust throughout the project area.*
4. *Analyze how resuming livestock grazing in areas opened via pinyon-juniper removal may reverse efforts to retain biological soil crust.*

c. Dust

The PEIS discussion of dust is deficient in three fundamental ways. The PEIS (1) arbitrarily fails to note the significant generation of dust by livestock grazing, which is ubiquitous in the region and is even proposed at a higher intensity through “targeted grazing”; (2) falsely claims that dust generated by its mechanical treatments would not travel long distances; and (3) fails to predict increased dust generation (as well as treatment failure) via the increasing drought and heat that are occurring and are predicted to increase with climate change, including amplification of climate change impacts through ground-disturbing treatments. The Final EIS must correct these three deficiencies regarding dust, because dust generation can have significant impacts, e.g., increasing the rate of snowpack melting, compromising seeding success (e.g., Milford Flat), and smothering biological soil crust. If the BLM claims that generation of dust by average fire rate equates with dust generated by livestock plus mechanical treatments plus drought, the BLM needs to quantify this with credible scientific evidence.

- i. i. The PEIS fails to acknowledge the significant dust generation by livestock

The PEIS never mentions the contribution of livestock grazing to the generation of dust. Livestock grazing generates dust through reduction of perennial grasses and palatable shrubs (selective grazing) and associated soil trampling (Miller, et al. 2011). Livestock grazing can crush biological soil crusts, which otherwise anchor the soil against wind erosion (Belnap et al. 2001). In fact, livestock grazing has been found to account for 12 times as much dust regionally as unpaved roads due to its areal extent (Nauman et al 2018). Duniway et al (2019) cite livestock grazing as one of the notable sources of dust production in the region:

Soil surface-disturbing activities such as livestock grazing, off-highway vehicle use, wildland fire, and energy exploration and development increase wind erosion and dust production [*citing six research studies; underlining added*].

Similarly, Belnap et al. (2014), in a review of the scientific literature on dust generation naturally includes livestock grazing:

Much of the world's airborne sediment originates from dryland regions. Soil surface disturbances in these regions are ever-increasing due to human activities such as energy and mineral exploration and development, recreation, suburbanization, livestock grazing and cropping [*underline added.*]

The PEIS mentions the generation of dust by wildfire (Vol.1 p. 46, 107), in “disturbed areas . . . such as pinyon-juniper stands” (Vol. 1, p. 48), by agriculture (Vol. 1, pp. 64, 14); during mechanical treatments (Vol. 1, p. 71); by travel on unpaved roadways (Vol. 1, pp. 104, 107); and from “transportation sources” (Vol. 1, p. 107), power generation facilities (Vol. 1, p. 107), and woodburning (Vol. 1, p. 107). But the PEIS arbitrarily never mentions generation of dust by livestock grazing – despite this being one of the most significant sources of dust. The PEIS in fact proposes to increase the intensity of grazing via targeted grazing (DPEIS Section 2.3.4)

- ii. ii. The PEIS fails to acknowledge that dust generated by proposed mechanical treatments would travel long distance

The PEIS never mentions the generation of long-distance transport of dust due to the mechanical treatments it proposes. The PEIS does mention “soil disturbance during mechanical treatments” (Vol. 1, p. 71), but claims without citing data that this dust would settle on “nearby vegetation.” The DPEIS continues:

This effect would be most intense on vegetation in close proximity to soil disturbance during treatments when dust would be generated; the magnitude of intensity would decrease with increasing distance from the soil disturbance, and would cease over time as wind and rain blow or wash dust off vegetation.

Again, on p. 104, the DPEIS notes that “some types of mechanical treatments may be sources of fugitive dust from ground disturbance during treatments” PEIS, but again claims the dust wouldn't really go anywhere:

Emissions would be localized to the area surrounding any given ground-disturbing activity and would cease when that activity ends and the entrained dust settles.

This is contrary to science, and so it is not surprising that the BLM offers no citation for this claim of dust settling in a localized area. Duniway, et al (2019) note the transport of dust “hundreds of meters to thousands of kilometers”:

Wind erosion and consequent dust emissions carry considerable risk for ecosystems and people at multiple scales (Fig. 2). Worldwide, billions of tons of desert dust are transported annually over distances ranging from hundreds of meters to thousands of kilometers (Ginoux et al. 2012, Pointing and Belnap 2014, UNEP, WMO, and UNCCD 2016). Given the wide range of scales over which dust movements and eolian processes operate, it is critical that dust-mitigation efforts also work at multiple scales and across

land management units. As was learned in the Dust Bowl, cooperation and collaboration are needed to prevent wind erosion and promote restoration; dust emissions resulting from one land owner or permittee's failure will not be contained by administrative or ownership boundaries. Larger-scale planning efforts that span jurisdictions may therefore help avoid deleterious wind erosion impacts in the future (USDI BLM 2007).

Similarly Hahnenberg and Nicoll (2014) discuss dust sources in the eastern Great Basin leading to dust events in Salt Lake City:

This study identifies anthropogenically disturbed areas and barren playa surfaces as the two primary dust source types that repeatedly contribute to dust storm events in the eastern Great Basin of western Utah, U.S.A. This semi-arid desert region is an important contributor to dust production in North America, with this study being the first to specifically identify and characterize regional dust sources. From 2004 to 2010, a total of 51 dust event days (DEDs) affected the air quality in Salt Lake City, UT. MODIS satellite imagery during 16 of these DEDs was analyzed to identify dust plumes, and assess the characteristics of dust source areas. A total of 168 plumes were identified, and showed mobilization of dust from Quaternary deposits located within the Bonneville Basin. *(Underlining added.)*

Miller, et al. (2011) similarly reference research on the long-distance transport of dust and note the environmental significance of dust generation:

Dust emissions from unstable drylands can have downwind consequences through effects on ecosystem biogeochemistry (Neff et al. 2008), mountain snowpack and downstream water delivery (Painter et al. 2010), air quality and human health, and atmospheric dust concentrations that can affect the global energy balance (Field et al. 2010)

After the largest fire in Utah history, the Milford Flat Fire in 2007, massive dust plumes were generated 2008-2010. Notably for this PEIS, the areas that were mechanically seeded after the fire generated dust at up to 80 times the rate of dust generation in those post-burn plots that were not treated. By 2010 dust generation had been reduced by 75% when exotic annuals (rather than the perennials that had been seeded) finally established on the post-burn area (Miller, et al 2012). Ironically, the BLM in 2009 had given a "Partners in Conservation Award" to the private landowners, counties, and state and federal agencies for the post-fire treatment, including spending \$17 million on the seeding that failed (*Deseret News* 2010).

- iii. iii. The DPEIS fails to acknowledge that climate change will increase dust generation and that dust generation by soil-disturbing treatments will amplify climate change impacts

Dust is generated in the eastern Great Basin primarily during spring and fall, and when the Palmer Drought Severity Index is -2 or less (Hahnenberg and Nicoll 2014). Notably, portions of the Great Basin

are experiencing conditions of -2 or less as these comments are being written at the end of May 2020 (U.S. Drought Monitor West, May 26, 2020, <https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?West>)

The transport of dust onto snowpacks in the spring hastens their melting, thereby amplifying the earlier snowmelt that is occurring with rising temperatures. This exposes vegetation and soil earlier in the season increasing evapotranspiration and drying. Wind-blown soil from desert sources has been traced to snowpacks in Colorado mountains (Pointing and Belnap 2014). The increasing frequency of drought and higher temperatures, combined with ground disturbance will lead to increased generation of dust due to decreases in perennial grass cover, increased bare soil, destruction of biological soil crust, and decreased threshold friction velocities (Hahnenberg and Nicoll 2014).

Nauman, et al (2018), who demonstrated the major contribution of livestock grazing vis-à-vis unpaved roads to dust generation, notes the threat posed by climate change to increase that dust generation:

Our findings indicate that predicted future mega-droughts will increase q [a measurement of horizontal dust transport] disproportionately in disturbed rangelands, and potentially further compromise air quality, hydrologic cycles, and other ecosystem services.

Duniway, et al., (2019) in their scientific literature overview of wind erosion and dust from US drylands, conclude that climate change is working against the very soil-disturbing restoration and reclamation approaches that the PEIS proposes:

Predicted future increases in aridity and extreme weather events, including drought, will likely increase wind erosion and consequent dust generation. Under a drier and more variable future climate, new and existent soil-and vegetation-disturbing practices may interact in synergistic ways, with dire consequences for environment and society that are unforeseen to many but fairly predictable given current scientific understanding. Conventional restoration and reclamation approaches, which often entail surface disturbance and rely on adequate moisture to prevent erosion, also carry considerable erosion risk especially under drought conditions.

c. Air quality

BLM's analysis of the impacts of its extensive fuel reduction proposals on air quality is not adequate to meet its NEPA obligations. Despite repeatedly pointing out ways in which its alternative proposals would result in significant emissions of windblown dust over the short and long-term, BLM fails to adequately examine the public health and environmental impacts of enormous fuels reduction proposals.

Initially, BLM admits that its expansive fuels reduction proposals will generate huge amounts of fugitive dust over the short and long-term. BLM begins by admitting that "[e]rodible soils are particularly prevalent in the semiarid rangelands found in the project area" and confirms that existing areas of disturbed ground are sources of and prone to wind erosion. *Id.*; Draft PEIS at 4-44 ("Temporary disturbance areas would be susceptible to windblown soil erosion until soils are stabilized through

vegetation cover.”). BLM continues by describing the many ways in which its huge fuels reduction proposals that will result in vast areas of bare ground for extended periods of time will be sources of fugitive dust and will add to existing sources of dust in the project area. *E.g. id.* at 4-45 (noting “[b]urned areas would be susceptible to windblown soil erosion until they are revegetated and the exposed soils are stabilized.”); *id.* at 4-47 (“Roads, ROWs, and energy and mineral developments on public lands would continue to be a source of fugitive dust emissions, primarily from travel on unpaved surfaces for recreation, access and maintenance of ROWs, and access to energy and mineral developments.”); *id.* at 4-48 (noting that “particulate matter from travel on unpaved roadways and treatment-related ground disturbance” would adversely impact air quality); *id.* at 4-51 (“Domestic animals and associated infrastructure could damage biological soil crusts at treatment sites through physical disruption, including shearing and compacting soil. This would decrease water infiltration rates and increase soil erosion[.]”); *id.* (“Depending on the severity of soil disturbance, vegetation may reestablish in the first few years following prescribed fire treatments; if soils are sterilized, several years of soil deposition may be needed before soils would support vegetation again, thus affecting the growing conditions for future vegetation communities[.]”); *id.* at 4-53 (“Domestic animals used for targeted grazing treatments in would break the soil surface, including any biological soil crusts, with their hooves and expose the soil surface to wind and water erosion.”); *id.* at 4-44 (“Travel on unpaved roadways to access treatment areas would be direct sources of particulate matter in the form of fugitive dust.”); *id.* (“Some types of mechanical treatments may be sources of fugitive dust from ground disturbance during treatment.”); *id.* at 4-11 (“Soil disturbance during mechanical treatments would generate airborne dust.”).

Thus, as BLM admits, its fuels reduction projects will denude immense areas of the project area and open them to wild erosion. The agency further concedes that until these areas are covered with vegetation or otherwise stabilized – a timeframe BLM neglects to quantify – these areas will be producing significant amounts of dust. However, despite these admissions, BLM does not adequately address the impact that all this dust will have on public health and the environment.

First, there are regularly employed ways to estimate the fugitive dust emissions from ground disturbing activities. For example, in the 2006 Western Regional Air Partner’s Fugitive Dust Handbook, created under the auspices of the Western Governors Association, “addresse[s] the estimation of uncontrolled fugitive dust emissions and emission reductions achieved by demonstrated control techniques for eight major fugitive dust source categories,” including open area wind erosion and unpaved roads.¹⁸ Plainly, a hard look at the air quality impacts of the huge fuel reductions project requires such analysis.

Second, BLM’s “Map 12” is inaccurate. For example, it does not properly depict Salt Lake, Utah, Davis, Weber and parts of Tooele and Box Elder counties as being nonattainment areas for the 24-hour 2006 PM_{2.5} National Ambient Air Quality Standard (NAAQS).¹⁹ Both the Salt Lake City and Provo Nonattainment Areas are designated as “serious.”²⁰ There may be additional errors on the map.

Third, BLM’s statement that “[t]he larger particles in PM₁₀ are of less concern to human health, but they can be a localized source of reduced visibility in the form of windblown dust,” Draft PEIS at 3-12, is misleading and inaccurate. In reality, PM₁₀ poses a significant threat to public health and the environment, as reflected in the 24-hour primary and secondary NAAQS for this criteria pollutant. For example, EPA decided to retain the PM₁₀ NAAQS in 2006 precisely because of the adverse health

¹⁸ See https://www.wrapair.org/forums/deif/fdh/content/FDHandbook_Rev_06.pdf

¹⁹ See <https://www3.epa.gov/airquality/greenbook/rncty.html>

²⁰ See <https://www3.epa.gov/airquality/greenbook/rnc.html>

impacts stemming from exposure to the coarser particles encompassed by PM₁₀. *E.g.* 71 Fed. Reg. 61144, 61179-80 (Oct. 17, 2006).

Based on its review of the scientific literature, EPA found that short-term exposure to coarse particulate matter leads to hospitalizations for cardiovascular disease, chronic obstructive pulmonary disease and other respiratory ailments, and is associated with mortality. *Id.* at 61180. The California Air Resources Board agrees that PM₁₀ threatens public health, concluding that “[s]hort-term exposures to PM₁₀ have been associated primarily with worsening of respiratory diseases, including asthma and chronic obstructive pulmonary disease (COPD), leading to hospitalization and emergency department visits.”²¹

California explains its decision to adopt a strict short-term standard for PM₁₀ in addition to standards for PM_{2.5}:

[Fine particulate matter] PM_{2.5} is more likely to travel into and deposit on the surface of the deeper parts of the lung, while PM₁₀ is more likely to deposit on the surfaces of the larger airways of the upper region of the lung. Particles deposited on the lung surface can induce tissue damage, and lung inflammation.²²

These adverse health impacts may be exacerbated because the soils in the project area contain heavy metals, including mercury and arsenic, which result from natural land forms as well as human activities such as mining and smelting.²³

PM also adversely impacts the environment. As BLM acknowledges, PM impairs visibility. Draft PEIS at 3-12. Moreover, when it settles on plants and water, particulate matter harms vegetation, terrestrial and aquatic ecosystems and water quality and clarity. *E.g.* 71 Fed. Reg. at 61209. “The metal and organic compounds in PM have the greatest potential to alter plant growth and yield.”²⁴

Because BLM does not even acknowledge, much less analyze, the adverse health and environmental effects²⁵ of its extensive and long-term dust-generating activities, the agency has failed its NEPA obligations to take a hard look at the consequences of fuel reduction proposals.

Third, BLM neglects to address legal requirements and state and federal air quality standards that apply to the project area and is silent on if and how the agency might meet these obligations. For example, the primary and secondary 24-hour NAAQS for PM₁₀ is 150 µg/m³, which may not be exceeded more than once per year on average over 3 years.²⁶ These Clean Air Act standards are based on the adverse impacts that PM₁₀ has on health as well as the pollutant’s “visibility impairment, effects on vegetation

²¹ See <https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health>. CARB also notes that long-term exposure to PM₁₀ has been linked to adverse health impacts: “The effects of long-term exposure to PM₁₀ are less clear, although several studies suggest a link between long-term PM₁₀ exposure and respiratory mortality. The International Agency for Research on Cancer (IARC) published a review in 2015 that concluded that particulate matter in outdoor air pollution causes lung cancer.”

²² See <https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health>

²³ *E.g.* see Tchounwou, P. *Heavy Metals Toxicity and the Environment* (2012) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4144270/pdf/nihms414261.pdf>

²⁴ *Id.*

²⁵ BLM does acknowledge “Dust settling on nearby vegetation could suppress plant physiological processes.” Draft PEIS at 4-11.

²⁶ <https://www.epa.gov/criteria-air-pollutants/naaqs-table>

and ecosystems, materials damage and soiling, and effects on climate change.” 71 Fed. Reg. at 61210. Acknowledging the public health and environmental threats posed by PM₁₀, California has adopted a more restrictive 24-hour standard for PM₁₀ of 50 µg/m³ and an annual standard of 20 µg/m³ that apply throughout the state.²⁷

Yet, with no analysis of how it might control emissions of PM₁₀ generated by its colossal fuel reductions project over the short or long-term, BLM has failed to establish if it can and how it will meet state and federal air quality standards. This failure is particularly problematic given that the project area is characterized by highly erodible soils and already contains significant sources of fugitive dust.

Similarly, BLM does not acknowledge state requirements to control dust. For example, Utah Admin. Code Rule 307-205-5(2)(a) requires:

Any person engaging in clearing or leveling of land greater than one-quarter acre in size, earthmoving, excavation, or movement of trucks or construction equipment over cleared land greater than one-quarter acre in size or access haul roads shall take steps to minimize fugitive dust from such activities. Such control may include watering and chemical stabilization of potential fugitive dust sources or other equivalent methods or techniques approved by the director.

Utah Admin. Code Rule 307-309, which applies to all the PM₁₀ and PM_{2.5} nonattainment and maintenance areas in the state – areas included in the project area – is more stringent, requiring that when wind speeds are below 25 miles per hour, “opacity caused by fugitive dust shall not exceed 10% at the property boundary and 20% on site.” *Id.* at Rule 307-309-5(1). Rule 307-309 contains further constraints, including the mandate that operators of sources of fugitive dust greater than .25 acre submit a fugitive dust plan to the Director of the Utah Division of Air Quality and stabilize disturbed soils when wind speeds exceed 25 miles per hour. Utah Admin. Code R 307-309-6 & 309-5(3).

In Nevada, similar regulations apply. For example, under Nevada law,

no person may cause or permit the construction, repair, demolition, or use of unpaved or untreated areas without first putting into effect an ongoing program using the best practical methods to prevent particulate matter from becoming airborne. As used in this subsection, “best practical methods” includes, but is not limited to, paving, chemical stabilization, watering, phased construction and revegetation.

NAC 445B.22037.2. Furthermore,

no person may disturb or cover 5 acres or more of land or its topsoil until the person has obtained an operating permit for surface area disturbance to clear, excavate, or level the land or to deposit any foreign material to fill or cover the land.

NAC 445B.22037.3.

While this is not an exhaustive cataloging of the standards and rules that apply to BLM’s gigantic fuels reduction project, the provisions above show that BLM is obligated to undertake specific practices to

²⁷ <https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health>

stabilize any areas it disturbs and otherwise to implement strict measures to ensure that its activities do not generate more than minimal PM₁₀ emissions. Yet, with no analysis of how it might control emissions of PM₁₀ generated by its colossal fuel reductions project over the short or long-term, BLM has failed to establish if it can and how it will meet state and federal air quality standards. This is particularly true given that the project area is characterized by highly erodible soils and already contains significant sources of fugitive dust.

Thus, BLM has neglected to take a hard look at the impacts of its gigantic fuel reduction proposals on air quality. The agency has not taken advantage of common methods for quantified the uncontrolled and controlled emission of dust that will result from its ground disturbing activities. BLM has not acknowledged and addressed the depth of the public health and environmental impacts of its dust-generating activities. The agency has also neglected to recite the state and federal standards and regulations that apply to its expansive fuel reduction proposals and explained if and how it will comply with these requirements. As a result, BLM's PEIS is inadequate. To meet its NEPA and Clean Air Act obligations, BLM is duty bound to consider in detail the potential direct, indirect and cumulative impacts of fugitive dust emissions from its immense fuels reduction proposals on air quality, public health and the environment.

d. Non-Native Seeds vs genetically appropriate native seeds

It is critically important that the BLM use genetically appropriate native seed to restore treated landscapes. Both the 2015 Integrated Rangeland Fire Management Strategy (DOI 2015) and the National Seed Strategy (Plant Conservation Alliance 2015) highlight the importance of using native seed. When alien plants are released into a new environment, they are free from all of their native herbivores, commonly referred to as "enemy release" (Keene and Crawley 2002).

The BLM must comprehensively examine where past fuels treatments have resulted in restoration of sagebrush communities with native perennial grasses and forbs and why many have failed. Have they failed due to using the wrong species? Have they failed due to improper livestock grazing or inadequate rest from livestock grazing? Miller et al (2019) suggest that: "success for seeding with native species has often been low, which allows cheatgrass and other introduced species to become established and dominant a site quickly. This at least partially due to the use of seed from inappropriate sources—and the rate of success is closely tied to soil moisture and temperature regimes."

BLM should avoid planting non-native species like forage kochia and crested wheatgrass. Exotic forage grasses have already been seeded on large tracts of the Project area. While these non-native species may compete with other non-native grasses such as cheatgrass and medusahead, they can also form monocultures with little sagebrush cover and low diversity of understory vegetation (Heidinga & Wilson 2002). Consequently, "the cheatgrass-wildfire cycle has indirectly resulted in additional loss of native plant diversity as a result of the common practice of planting introduced wheatgrasses, primarily crested wheatgrass (*Agropyron cristatum*), after wildfires" (Pellant & Lynse 2005). Crested wheatgrass "hinder[s] colonization by native species while planted native grasses d[oes] not" (Bakker & Wilson 2004).

Section 2.2.7 Native Plant Material Policy of the DEIS states the following:

It is the policy of the BLM to manage for biologically diverse, resilient, and productive native plant communities to sustain the health and productivity of the public lands. This policy in BLM Handbook H-1740-2, Integrated Vegetation Management Handbook, and the National Seed

Strategy for Rehabilitation and Restoration (Plant Conservation Alliance 2019), requires that native plant material be used, except under limited circumstances, and provides the necessary procedures for compliance. It may be necessary to introduce nonnative plant materials to break unnatural disturbance cycles or to prevent further site degradation by invasive species. Using nonnative seeds as part of a seeding mixture are appropriate only if it is done under the following circumstances:

- 1. suitable native plant material is not available,*
- 2. the natural biological diversity of the proposed management area would not be diminished,*
- 3. exotic and naturalized species can be confined in the proposed management area,*
- 4. analysis of ecological site inventory information indicates that a site would not support reestablishment of a species that historically was part of the natural environment, and*
- 5. resource management objectives cannot be met with native species. For example, nonnative plant material may potentially be used in areas with low resistance and resilience that are invaded by invasive annual grasses.*

Primarily native plant species would be used in restoration treatments, however; areas where full restoration is unlikely (Section 2.2.9) could be improved using nonnative plant material to stabilize sites until adequate technology and/or funding for full restoration is available (BLM 2008b).

To ensure that circumstance #1 is met, the BLM must make all treatments contingent on the availability of genetically appropriate seeds collected from the areas to be treated before treatment.

Often, the BLM uses cultivars of native plants that have been selected for use as livestock forage and are much taller in stature than their native counterparts. Some of the cultivars have thicker cell walls than locally occurring plants that are adapted for the given soil type in an ecological site. The thicker cell walls make them less palatable for insects and other wildlife resulting in greater ground litter and fuels which defeats the purpose of planting “native” grasses. For example, the Secar cultivar of Snake River Wheatgrass, seeds well but has little grazing preference to livestock, wildlife, or insects and becomes fuel for future fires.

Native plants have coevolved in the geographic region, have ecological links to the biological community, and have important leaf chemistry that is often unique to the geographic region (Tallamy 2007). Exotic plants and cultivars, those not coevolved to the geographic region, lack ecological links to the biological community, have much different leaf chemistry and have different phenology than locally coevolved varieties. Local insects generally do not eat the exotic cultivars and local soil invertebrates ignore them so they are slow to decompose and become flammable ground litter. Exotic plants and cultivar communities exclude and hybridize with locally coevolved varieties and result in: declines in insect populations, soil biota, decomposition, soil organic matter, and nutrients, increase in plant litter and fine fuels, degraded quantity and quality of wildlife forage (Tallamy 2007).

Insects play an important role in breaking down plant materials but, because they have coevolved with a native plant community and have become specialized to utilized specific species, they don’t often utilize alien plants with alien leaf chemistry. Most “native plants support a full complement of herbivores and pathogens” but when they are moved to new areas, they are “released” from those herbivores and pathogens and few generalized insects utilize them. Additionally, when plantings of non-native plants replace native plants, the insects associated with those plants often disappear (Tallamy 2007).

"By definition, native insects have shared little or no evolutionary history with alien plants (although

some may have interacted with a species in a common genus), and they thus are not likely to possess the adaptations required for using these plants as nutritional hosts" (Tallamy 2004). In turn, when non-native plants are planted, the biomass of insects utilized by birds declines (Tallamy 2007).

When native insect species avoid the non-native plants, they build up and create litter (fuels). These plants tend to not decompose since insects are the first step in decomposition in the soil. Without insects breaking the plants up, fungi and bacteria cannot decompose the exotic grasses. The ranchers call this wolfie, or decadent. Ground squirrels, rabbits, and native insects do not eat these exotic grasses. The agencies have systematically killed grasshoppers and Mormon crickets, managed against ground squirrels and other rodents that are nature's natural fire fighters. In wet years, the voles and ground squirrels increase and eat the biomass that now threatens the ecosystem. Additionally, Halverson et al. 2008 found that "plant ploidy variation appears likely to have a major impact on insect community organization, and perhaps on plant-herbivore coevolution."

Many of the cultivars have coevolved in regions far from where they are being used for "restoration". The recommendations for some of them say that the cultivars should be selected based on resistance to local pests, which compounds the risk that they will become fuels because of the lack of connection to the local biological community and reduced decomposition rate.

Below are just a few examples of the cultivars used in Great Basin ESR and other restoration projects that are from areas outside of the Great Basin and have not coevolved with the local biological community. A longer list can be found in Shaw and Pellant 2013. Cultivars should be selected based on the local climate, resistance to local pests, and intended use. Consult with your local land grant university, local extension or local USDA NRCS office for recommendations on adapted cultivars for use in your area. (Ogle 2010)

Bluebunch Wheatgrass cultivars

Bluebunch Wheatgrass Releases (*Pseudoroegneria spicata*) (Ogle 2010)

Anatone Selected Class Germplasm - selected from seed originating near Anatone, Washington.

Goldar - selected from seed collected on Mallery Ridge of the Umatilla National Forest in Asotin County, Washington

P-7 Selected Germplasm - generated by open-pollinating 25 native populations of bluebunch wheatgrass from Idaho, Nevada, Oregon, Utah, Washington and British Columbia

Whitmar - selected by Pullman PMC from seed native to the Palouse grasslands near Colton, Washington.

Columbia - from K68, a population collected in 1980 in Adams County in eastern Washington.

Snake River Wheatgrass Releases (*Elymus wawawaiensis*) (Ogle 2010)

Discovery - The populations used to generate Discovery trace to materials collected in Whitman and Asotin counties in southeastern Washington and Idaho County in central Idaho.

Secar - The collection site for Secar is along the Snake River Gorge near Lewiston, Idaho.

Bottlebrush Squirreltail & Big Squirreltail (*Elymus elymoides*) (NRCS Plant Guide)

Fish Creek Germplasm - collected by T.A. Jones as accession T-1223 in Blaine County, Idaho.

Toe Jam Creek Germplasm - Toe Jam Creek was made in Elko County, Nevada west of Tuscarora.

Sand Hollow Germplasm - originally collected in 1984 in Gem County, Idaho.

Tusas Germplasm - a composite of eight accessions from throughout New Mexico.

Pueblo Germplasm and Wapiti Germplasm - southwest of Pueblo, Colorado in Pueblo County at an elevation of 7,200 feet in shallow, gravelly soils.

Flanders et al. 2006 documented declines in bird populations in areas heavily invaded by alien plants. When plots of native vegetation were compared to plots with alien plants, both bird and insect populations were more abundant in plots with native vegetation.

Chambers et al. 2017 states that “[I]ntroduced species can decrease establishment of desirable native perennial species resulting in an alternative seeded state (Davies et al. 2013; Knutson et al. 2014; Lesica and Deluca 1996). To maintain biodiversity and a predominance of native plants, several things are needed—increased development of native plant materials (Ott et al. 2003), improved methods of planting natives, and increased availability of local native seed for planting (Plant Conservation Alliance 2015; Steve Monsen, Retired Revegetation Specialist, USDA Forest Service, Rocky Mountain Research Station, Provo, Utah, personal communication, 2017).”

Crested wheatgrass, Siberian wheatgrass, and other non-native cultivars of other grasses should not be used for fuels reduction project because of their tendency to become monocultures and to compete with native grasses (Figure 1).



Figure 1. Siberian wheatgrass seeding near Oregon-Nevada border along highway 95 taken July 27, 2015 after ESR for the Long Draw Fire of 2014 (Ken Cole). The area remains a monoculture of Siberian wheatgrass.

Recommendations: The BLM must make all treatments contingent on the availability of genetically appropriate seeds collected from the areas to be treated before treatment. Cultivars should be selected based on the local climate, resistance to local pests, and intended use. Crested wheatgrass, Siberian wheatgrass, and other non-native cultivars of other grasses should not be used for fuels reduction project because of their tendency to become monocultures and to compete with native grasses

d. Pinyon-Juniper forests

Widespread removal of pinyon pine and juniper is authorized under all action alternatives. According to the Draft PEIS, pinyon and juniper would be removed through such methods as hand cutting with chainsaws, lopping with hand pruners, and mastication. The latter method involves the use of heavy equipment such as “skid steers” and “large excavators.” PEIS at 2-7. Moreover, “[s]hredding or grinding of pinyon-juniper produces woody slash that varies in depth, dependent on the amount of standing vegetation.” As a general matter, the Draft PEIS fails to adequately analyze the likely direct, indirect, and cumulative impacts of these treatment methods, which if implemented at the scale contemplated in the Draft PEIS may have significant adverse impacts to the ecology of treated areas (Jones et al. 2019). In addition, the Draft PEIS fails to specify a desired condition for native pinyon and juniper communities, which suggests that BLM’s preferred alternative would authorize a region-wide program of large-scale deforestation. See, e.g. PEIS at 2-4 (“Minimal, if any, cover of . . . pinyon-juniper would be present in the vegetation states under the desired condition”).

Pinyon and juniper, however, are native species that have coexisted with grassland and shrubland vegetation types for millennia (Jones 2019). If BLM's intent is truly to "enhance the long-term function, viability, resistance and resilience of sagebrush communities," Draft EIS at 1-3 (purpose and need statement), BLM should not remove native trees unless site-specific analysis shows that removal will have clear and demonstrable ecological benefits.

The purported benefits of pinyon and juniper removal have not been conclusively verified by the available scientific literature, and many questions on this topic remain unanswered (Jones. 2019). For instance, the term "encroachment" is used throughout the Draft PEIS to describe both the expansion of pinyon and juniper into sagebrush communities and infilling, but "encroachment" is not a recognized botanical or ecological term (Martin and Hines 2008; Allaby 2010). Resolving the drivers of infilling and expansion—at both local and regional scales—is a necessary precondition to designing appropriate management responses. Only after identifying the drivers of expansion can the ecological consequences of removal be fully understood.

Some factors that may have led to increasing tree density across the Great Basin and Colorado Plateau include cool and wet conditions in the early twentieth century (Shinneman and Baker 2009; Barger et al. 2009); recovery from extensive nineteenth-century woodcutting (Evans 1998) and production of charcoal for mining operations (Bhare and Hutchinson 1985; Ko et al. 2011; Morris and Rowe 2014); and disturbance from domestic livestock grazing (including impacts from grazing to natural fire cycles) (Miller et al. 2019).

For some communities, it can be difficult to determine in the field whether trees on a site are expanding into a sagebrush community or whether it is a stable association. In some cases, sagebrush has been found to be expanding into pinyon and juniper communities (Landeem et al. 2019). Additionally, disturbances could make persistent woodland sites appear to be "encroached." Hartsell et al. (2020), in their review of the literature, note the paucity of studies that have explicitly examined stand dynamics (tree establishment, mortality, and succession) or stand structure (tree age, tree density, or tree size) and their relation to historical climate variation drought, or fire.

Because recent pinyon-juniper expansion into a site might be the result of recolonization from past human removal, managers contemplating pinyon-juniper treatments should first examine historical records and site characteristics for the proposed project area to determine whether pinyon and juniper are in fact suitable and expected overstory species (Jones et al. 2019).

BLM should also consider the full spectrum of impacts from pinyon juniper treatments to native wildlife, including mule deer and sage-grouse. Pinyon and juniper woodlands are an important component of mule deer habitat and diet. According to a literature review by Jones (2019), many pinyon and juniper treatments improve mule deer forage values but at the expense of cover. Bombaci and Pejchar (2016) note that "most investigators found either non-significant or negative responses to tree removal by mule deer and elk." Coe et al. (2018, in Jones 2019), meanwhile, found that mule deer favored areas with forest cover and conclude that their findings "call into question the large-scale removal of western juniper . . . to enhance habitat." Mule deer and other ungulates utilize areas where woodlands intergrade with other vegetation along the edges of transition zones. They do not venture far from forest because the trees provide shelter. The actual area of home ranges is thus constrained to the edge zone. Consequently, large treatments may provide small to insignificant increases in functional habitat.

BLM also needs to carefully consider site-specific relationships between conifer communities and sage-grouse habitat. Research indicates that removing pinyon and juniper to improve understory conditions usually benefits sage-grouse (Connelly et al. 2000; Knick and Connelly 2011; Manzer and Hannon 2005; Severson et al. 2017). But even here the results are complex. Treatment success depends largely on-site potential and the phase of the pinyon-juniper community (Bates et al. 2017). The best outcomes are seen in areas with existing sagebrush understory and adjacent to occupied sage-grouse habitat (Cook 2015; Cook et al. 2017) (e.g., Phase I and Phase II sites). At some sites, the shrub-steppe successional phase may not be expressed (Miller et al. 2000), and thus treatments at these sites would not benefit sage-grouse.

In addition, some of the research purporting to show that pinyon-juniper treatments help sage-grouse, such as Severson et al. (2017), has serious flaws. For example, Severson et al. (2017) appears to be largely based on simulations and projected population growth rates. The paper is unclear but seems to indicate that sage-grouse females and nests were found in both treated and untreated areas. However, the model supposes increased survival in treated areas. The paper presents no maps of habitat or telemetered individuals or nests. Furthermore, this research had a very small sample size, short duration, and only considered one variable (treatment) in a multi-variable environment.

The Severson et al. (2017) model can also be critiqued in that their conclusions do not actually implicate conifer presence in sage-grouse habitat selections. In their Warner Mountains, Oregon study, Severson et al. (2017) used telemetry to locate sage grouse nests in 2010 and 2011. Researchers located and surveyed 160 nests and 167 available nest sites. They found that when conifer trees were present within 800 meters of potential nest sites, sage-grouse chose a site where trees were clustered rather than dispersed, suggesting selection for more open habitat. But the study admits that sage-grouse did not avoid tree groves. This data suggests unexplored complexity in how sage-grouse choose nesting habitat, and we suggest that much more study is needed before pinyon, juniper, and other trees are targeted as the culprit in sage-grouse declines to the exclusion of more significant anthropogenic stressors.

Indeed, sage-grouse populations in the Western Great Basin may be much better adapted to native tree cover than eastern populations in Wyoming. In the Bi-State area of northeastern California and western Nevada, there is extreme diversity in topography and vegetation, including a highly diverse community of conifers mixed with sagebrush-steppe and open meadows. These are very different environments from “typical” sage-grouse habitat, and these Eastern Sierra tree-rich habitats should be further studied to determine whether sage-grouse responses to conifer communities in this region are unique.

Because one of BLM’s primary goals in preparing this PEIS is to reduce wildfire frequency and severity, BLM must acknowledge that there is little evidence supporting the removal of pinyon and juniper for this purpose. Prior to European settlement, fire in pinyon and juniper communities was thought to be rare in general, and fire cycle in persistent pinyon-juniper communities were likely hundreds of years (Jones 2019). When fires did occur, they were often severe (Id.). Anthropogenic factors such as fire suppression, grazing, the spread of flammable invasive species, and climate change have altered the fire dynamics of these communities (Id.). At present, there is little research supporting the contention that removing pinyon and juniper reduces fire frequency (Id.). And because treatments often increase flammable non-natives, they may further shorten the fire cycle rather than restore the natural fire regime (Id.).

Large-scale tree removal, moreover, can have many unintended ecological consequences. For instance, pinyon and juniper communities provide essential habitat for the imperiled pinyon jay. From 1967 to 2015, Pinyon Jay populations have “declined by 3.69% annually for an estimated total loss of 83.5%,” and based on current trends the Pinyon Jay population is expected to decline by an additional 50% over the next 19 years (Somershoe 2020). Any widespread activity that could potentially accelerate this decline should be considered significant. The Pinyon Jay Multi-State Working Group, led by the U.S. Fish and Wildlife Service, recently released a Conservation Strategy for the Pinyon Jay (Id.). This strategy attempts to synthesize the best available science and help minimize the negative impacts to Pinyon Jays resulting from vegetation management. We strongly recommend that BLM follow the Conservation Strategy’s recommendations and incorporate them into all action alternatives at both programmatic and local scales.

Another negative, unintended consequence of pinyon juniper treatments may be an increase in invasive species, particularly annual grasses. Exotic annuals such as cheatgrass can outcompete the native forbs and grasses that treatments are intended to increase. Although many studies have found that pinyon and juniper treatments increase herbaceous production, much of this increase often comes in the form of invasive annuals, which do not improve overall ecological conditions (Jones 2019 and sources cited therein). Nor does post-treatment seeding necessarily guarantee a reduction in invasives. Many researchers report low post-treatment seeding success, particularly in arid and semi-arid sites (Beyers 2004 and Wilder et al. 2018, cited in Jones 2019). The PEIS also fails to mention the potential of post-treatment livestock grazing to increase invasive annuals. BLM should therefore conduct detailed site-specific analysis at all treatment sites to determine the potential for post-treatment invasion. At the very least, removal of Phase III pinyon-juniper should be excluded from all action alternatives, as treatments of Phase III communities have the highest potential to increase invasive annuals and have no known ecological justification.

Finally, The Draft PEIS fails to analyze or even mention the potential for large-scale removal of pinyon pine and juniper forests to transform these endemic forests of the American West into juniper-only communities.

In a study of the long-term outcome of 25 years of pinyon and juniper removal within the Grand Staircase-Escalante National Monument, Redmond et al. (2013) found that transformation to juniper communities may be occurring as a result of pinyon pine and juniper removal: Interestingly, treated areas had significantly less *Pinus edulis* (piñon pine) recruitment compared to untreated areas, while there was no change in *Juniperus osteosperma* (Utah juniper) recruitment. These results indicate that treated areas may become more *J. osteosperma* dominated in the future due to increased establishment of *J. osteosperma* compared to *P. edulis*.

The result of this degradation of pinyon pine and juniper populations to juniper may be due in part to the comparatively higher susceptibility of pinyon to drought compared to juniper. Breshears et al. (2005) describe losses of pinyon throughout southwestern woodlands in response to drought and associated bark beetle infestations. This trend may be exacerbated by climate change. If temperatures continue to warm, vegetation die-off in response to future drought may be further amplified.

Additionally, future production of piñon nuts, an important food source for several species of birds and small mammals and for local people is expected to be greatly reduced over an extensive area. Redmond, et al. (2012) also report that pinyon cone production has been declining over time in two intensively-

studied sites in New Mexico and Oklahoma and note the significance of this for presence of pinyon in southwestern woodlands:

As growing season temperatures are predicted to increase across this region over the next century, these findings suggest seed cone production may be an increasingly important bottleneck for future pinyon pine regeneration, especially in areas with greater increases in temperature.

Although pinyon seeds rarely survive over a year after dispersal from the parent, juniper seeds can persist in soil for decades (Miller et al. 2005, Johnsen 1962). Consequently, removal of juniper trees does not permanently remove the species from the site because of the persistent juniper soils seed bank.

The Draft PEIS fails to note the potentially irreversible impact of functionally removing pinyon from pinyon pine and juniper communities.

Recommendations: Detailed site-specific analysis (i.e. project-specific NEPA review) should be conducted at all treatment sites in order to address the concerns identified above. Treatments are not “one size fits all,” and managers must beware of applying the same mechanical treatments over vast swaths of pinyon-juniper woodlands with variable site characteristics. BLM should clearly identify the drivers of pinyon and juniper expansion before authorizing any mechanical treatments. Managers contemplating pinyon-juniper treatments should first determine whether pinyon and juniper are in fact suitable and expected overstory species. Small-scale, pilot field tests with the proposed treatment method should be conducted before applying the method on a larger scale; data gathered from such pilot tests is necessary to avoid resource degradation. Pilot studies should be followed by independent post-treatment scientific validation, ideally with long-term monitoring of the site, to ensure that the proposed treatment method achieves the intended ecological outcome. Livestock exclosures in post-treatment sites are essential for separating treatment effects from effects of treatment plus livestock grazing. Treatment efforts should be abandoned absent clear evidence of a demonstrable ecological benefit. All projects should fully incorporate recommendations contained in the Conservation Strategy for the Pinyon Jay. No treatments should be conducted in Phase III pinyon and juniper woodlands. And, crucially, managers should aim for more transparency and public involvement in the decisionmaking process to expectations for a project and the science guiding the planning effort.

d. Sagebrush and pinyon-juniper woodland wildlife species

i. The PEIS does not accurately analyze the potential for negative effects to pygmy rabbits

The pygmy rabbit (*Brachylagus idahoensis*) is a rare sagebrush obligate that requires intact sagebrush communities with a high cover of sagebrush to persist (Green and Flinders 1980). In Utah, Lee (2008), Pierce et al. (2011), and Wilson et al. (2011) studied the impact of sagebrush removal treatments that were included within mosaics of untreated areas. Pygmy rabbits utilized treatment areas but use was greater in non-treated areas (Lee 2008, Wilson et al. 2011). Wilson et al. (2011) and Pierce et al. (2011) attributed the reduction in use within treatment areas to an avoidance of habitat edges, which are associated with an increase in predators and competitors. To support pygmy rabbits, several authors concluded that mechanical sagebrush treatments should include large areas of untreated areas or mosaics (Lee 2008; Wilson et al. 2011). Treated patches should be small and connected by untreated

corridors to facilitate movement of rabbits to larger areas of untreated sagebrush (Wilson et al. 2011). The BLM should follow these prescriptions and include a design feature explicitly committing to these science-based recommendations.

The PEIS acknowledges that vegetation treatments may negatively affect pygmy rabbits by fragmenting or completely removing habitat (PEIS at 4-59), increasing exotic species, and reducing cover and structural diversity of sagebrush (PEIS at 4-60). But the BLM attempts to minimize these potentially dire consequences by assuming that vegetation treatments will be successful in the long-term and improved habitat conditions will ultimately benefit the species. However, treatments often take several years to recover after vegetation removal and surface disturbance. They often never do. Because unpredictable climate variables are one of the primary determinants of success, the BLM cannot foresee when or whether a treatment will improve pygmy rabbit habitat conditions with any degree of certainty. It is entirely possible that treatments will do more harm than good. The PEIS fails to document the rate of success and failure of their treatments at establishing native vegetation and desired wildlife habitat.

ii. Pinyon-Juniper dependent bird species

The BLM does not adequately protect birds that rely on pinyon-juniper woodland habitat. Several bird species have mutualistic relationships with pinyon pine and pinyon-juniper woodlands, such as Clark's nutcracker (*Nucifraga columbiana*), Steller's jay (*Cyanocitta stelleri*), Woodhouse's Scrub-jay (*Aphelocoma woodhouseii*), and pinyon jay (*Gymnorhinus cyanocephalus*) (Balda and Masters 1980). These birds depend on pinyon-juniper woodlands for food and are the primary agents of dispersal and regeneration of pinyon pines. Older trees are more valuable for these birds. Pinyon pines may bear cones at 25 years of age, but they only produce significant quantities of seeds each season after reaching 75 to 100 years old (Balda and Masters 1980).

The pinyon jay is currently a species of conservation concern because it is declining at an average rate of -3.6% from 1968 to 2015 (Boone et al. 2018). Despite a reduction of over half its population, the pinyon jay has not been widely studied, and little is known about the factors responsible for its decline. The relationship with the population decline of pinyon jays and current management in western pinyon-juniper woodlands, including removal of trees for fuel reduction or to create or protect shrublands for the benefit of sagebrush-associated wildlife, is largely unknown. Thus, Boone et al. (2018) call for further research to clarify the causes of the pinyon jay's decline and devise approaches for management of pinyon-juniper woodlands that balance the interests of the pinyon jay and other species of concern tied to pinyon-juniper woodlands.

The Fish and Wildlife Service recently published the *Conservation Strategy for the Pinyon Jay* (Somershoe et al. 2020) to guide managers in minimizing impacts to pinyon jay. One of their recommendations is to avoid nest colony sites, which are characterized by large trees with dense crowns that are used year after year. A 500-meter buffer of undisturbed habitat around a known breeding colony is recommended by Somershoe et al. 2020. The *Conservation Strategy* also recommends against thinning trees that produce pinyon nuts, which are critical to species survival. These are often older trees, but trees that are younger are important to retain for future pinyon nut production.

The PEIS fails to consider and analyze potential significant cumulative impacts to pinyon jays and other pinyon-juniper woodland birds from millions of acres of treatments combined with millions of acres of wildfire. The BLM asserts without justification or data that pinyon jays and other species can simply

move to another pinyon-juniper site, even if this results in temporary overcrowding and increased competition for food and habitat. These and other species will therefore not “suffer from a slight reduction in pinyon-juniper vegetation...” PEIS at 4-60. Elsewhere, however, the PEIS acknowledges that wildfires in pinyon-juniper habitat have reduced the availability of this habitat (PEIS at 4-65) and that large-scale pinyon-juniper removal projects reduce cover and nesting sites used by the pinyon jay and other species, and these activities are increasing. PEIS at 4-80. Further, many of these projects are planned for lower elevation woodlands adjacent to sagebrush – prime habitat for pinyon jays.

Finally, the BLM should include a design feature that requires BLM to identify and protect important mast-producing trees and a design feature that buffers nesting colonies from treatment.

iii. Greater sage grouse

BLM’s analysis of the benefit of sagebrush treatments to Greater sage-grouse is erroneous and incomplete. BLM relies in part on a design feature prohibiting treatments in sage-grouse breeding habitat during breeding season to mitigate the disrupting effects of sagebrush treatments (Table D-1 page D-6). This ignores studies showing that removal of sagebrush in winter habitat also usually has negative or, at best, neutral effects on sage-grouse (Beck et al. 2012; Gates 1983). Also, even if sagebrush are removed outside the breeding period during treatment, the reduction of shrubs may affect sage-grouse during all seasons in the following years.

BLM’s analysis assumes that treatments in sagebrush communities will result in an improvement in sage-grouse habitat and ignores research showing negative effects of treatments on sage-grouse. Numerous studies have concluded that treatments of any type that removes sagebrush have predominantly negative effects on sage-grouse. See Appendix C to this letter.

The removal of big sagebrush in sage-grouse winter or breeding habitats usually will have a negative or, at best, neutral effect on sage-grouse (Beck et al. 2012; Gates 1983). Studies show that sage-grouse males on leks in treated areas dropped significantly over time (Wallestad 1975), or experienced population declines (Holloran and Belinda (2009). These results extended beyond the short-term. Hess and Beck (2010) investigated the effects of sagebrush mowing treatments on sage-grouse habitat 10 to 18 years after treatment. They found no positive structural changes in vegetation in the treatment areas and concluded that treatments do not result in improved, long-term habitat conditions for sage-grouse nesting and early brood-rearing habitat.

As a result of this and other research, many biologists have recommended against sagebrush treatment in important sage-grouse habitats. For example, Connelly et al. (2000) recommended treating no more than 20% of breeding habitat in Wyoming big sagebrush every 30 years. Beck et al. (2012) stated that “sagebrush is essential to maintaining native plants and limiting the invasion of non-native plants in sagebrush communities [and] future treatments should be limited to those that do not eliminate or greatly reduce sagebrush”. Hess and Beck (2010) stated “If sagebrush community characteristics in untreated communities do not meet the minimum Connelly et al. (2000) guidelines, managers should reconsider treatments in those areas, and instead consider other practices such as improved grazing management . . .”(emphasis ours).

The lack of progress in recovering sage-grouse populations despite attempts over many decades has recently prompted prominent sage-grouse scientists and policy makers to send a letter that highlights

on-going, persistent problems with BLM management of sagebrush habitats (Comments on Greater sage-grouse Draft Supplemental Environmental Impact Statements, 2020). Some issues that require attention include the lack of scientific justification for most BLM management decisions for sage-grouse management. The letter echoes calls from other scientists and the conservation community for “science-based planning, implementation, and monitoring, and strict adherence to adaptive management principles.” The letter cites the recent (2020) Great Basin Fuel Breaks project, a companion NEPA document to this PEIS. The analysis of the effects of fuel breaks on sage-grouse in that document “did not reflect the complexity of the issue and may do more harm than good”. These researchers fear that expediting treatment projects could result in “accelerated loss, fragmentation, and degradation of intact sagebrush habitat” and lead to the spread of invasives. The BLM says that monitoring for invasives and controlling any spread would mitigate the danger. But in practice, the BLM will likely lack staff and capacity to monitor and maintain treated areas.

Given the scientific research and the concerns of sage-grouse experts, it is clear that the PEIS’ proposal for treating sagebrush introduces high risks to this critical wildlife habitat community type. Not only may sage grouse fail to respond, as has been documented, but entire suites of other wildlife dependent on sage grouse may have a negative response.

The BLM must disclose and analyze this information in the PEIS and ensure that the risks of upscaled treatments, which have varying degrees of success as discussed elsewhere in this letter, are acknowledged and incorporated into the impact analysis.

e. Pollinators

The importance of pollinators in maintaining native vegetation communities and the ecosystems on which they depend is increasingly being recognized by federal agencies. Direction for management of this critical component of functioning ecosystems has been developed by the Pollinator Health Task Force, which produced the National Strategy to Promote the Health of Honey Bees and Other Pollinators (2015) and the Pollinator Research Action Plan (2015). Many rare plant species require specific pollinators, the loss of which will lead to their extinction. According to the National Research Council (2007), “the effects of pollinator decline on rare plant species or on those with small populations also should be given special attention.”²⁸ Given that one of the main reasons for pollinator decline is habitat fragmentation, the PEIS analysis of project effects on this suite of species is incomplete. It relies too much on chances that treatments will be successful at establishing native forbs that pollinators need, when treatment success is not assured.

The PEIS discloses that pollinators may experience negative short-term impacts from all treatments but that the long-term benefits will outweigh the risk. PEIS at 4-8. This analysis is too general and relies on a presumed high level of treatment success, which is neither documented nor assured especially as increasing temperatures and reduced precipitation in the region increase the risk of failure. The PEIS is using the Xerces Society’s publication to develop Best Management Practices for management (PEIS at 2-3) but more consideration should be given to the use of chemical treatments in particular. The Xerces

²⁸ National Research Council. 2007. Status of Pollinators in North America. Washington, DC: The National Academies Press. <https://doi.org/10.17226/11761>. Online version accessed 8/5/2019.

Society (2018) recommends replacing broadcast herbicide use with spot spraying, among other measures.

The PEIS assures us that design features for protecting Special Status Plants will be adequate to protect their pollinators as well. PEIS at 4-9 and 10. For example, designating undisturbed buffer zones around rare plant populations will benefit pollinators as well. But generalist pollinators need protection too. Native bees, butterflies, bats, and hummingbirds have all undergone severe declines (Xerces Society p. 13). If the BLM enacts protective design features (such as designating buffer zones, managing chemical drift, using lower rates of chemicals, choosing chemicals that are not easily carried back to nests, using chemicals that degrade quickly, and timing treatments when pollinators are least active), these measures need to be adopted throughout the project area to protect all pollinators, not just those in known rare plant populations. This practice would also be a beneficial precaution to avoid harm to those critical pollinators in undetected rare plant populations. Finally, the Xerces Society recommends increased monitoring of native pollinators, which they describe at this point as “minimal and inconsistent.”²⁹

After the BLM discusses the disastrous effects of habitat fragmentation on several sagebrush-dependent species, it assures us that “...not all species would be sensitive to gaps in shrub cover or unvegetated areas and those that are limited are not expected to be numerous since they are already adapted to habitat types that typically have intermediate disturbance frequencies (which also create shrub-depleted areas).” PEIS at 4-59. This sentence appears to be saying that those species that are limited by habitat fragmentation are not numerous because they are already adapted to fragmented habitats, and the increased disturbance from vegetation projects would not affect them. The sentence is almost unintelligible, but it is also inappropriate for several reasons. First, the BLM does not indicate how many or which species are “already adapted to habitat types that typically have intermediate disturbance”; second, the BLM cites no reference that might give clarity and a scientific basis for the claim; thirdly, the BLM fails to indicate what habitats are being referred to or what disturbances have “intermediate frequencies”; and fourth, the BLM fails to identify what species associated with pinyon and juniper are declining and may be sensitive to fragmentation of their habitats.

f. Slickspot peppergrass and rare plants

The PEIS at 3-20 inexplicably selected slickspot peppergrass (*Lepidium pappiliferum*) as a “representative” sagebrush species. Threatened slickspot peppergrass is an Idaho endemic with a narrow distribution range.³⁰ It has highly specialized habitat requirements. It grows in slickspots (small natric mini-playas) amid a Wyoming big sagebrush matrix. Much of its habitat has been lost to development, fires, BLM crested wheatgrass drill seeding, and overall habitat degradation by livestock grazing. Grazing promotes weeds that invade degraded slickspots. Trampling pocks slickspot soils burying seeds too deep for germination, and disrupts the slickspot interface with the sagebrush matrix.

²⁹ Xerces Society

³⁰ <https://www.federalregister.gov/documents/2014/02/12/2014-03133/endangered-and-threatened-wildlife-and-plants-threatened-status-for-lepidium-papilliferum-slickspot>

The PEIS is inexplicably silent on potential use of invasive exotic forage kochia in projects, and does not explain if the broad PEIS “shrub” categories would include forage kochia as a desirable percent of shrub cover. BLM seeding of forage kochia in fire rehab has been implicated in subsequent invasion of slickspots by forage kochia, and peppergrass elimination from the kochia-invaded slickspots. BLM highlighting slickspot peppergrass in the PEIS should have triggered a broader analysis of habitat degradation and impacts concerns related to land management and BLM rehab techniques, and greater concern in the context of all rare plants potentially impacted by the PEIS treatments. The very specific habitat requirements of slickspot peppergrass highlight the need for future site-specific NEPA analyses for all projects, as many of the hundreds of rare plant species across the project area will also have unique habitat requirements that treatments would significantly impact.

g. Chemical treatments

- i. *The PDEIS indicates herbicide use (as well as pinyon pine removal) could harm cultural plant use by tribes, but does not indicate the certainty or lead time tribes would have for consultation.*

At 4-85, the PDEIS notes that chemical treatments could have years-long impacts on cultural use of plants:

Chemical application could also limit the use of Tribal resources in the vicinity of treatments or result in chemical exposure (Ando et al. 2002). The duration of such impacts may be long term, especially in areas used for gathering plants for traditional cultural purposes, such as food, medicines, or basketmaking. Traditional users may be reluctant to gather in these areas for months or years after treatment.

Design feature #27 (Appendix D at D-5) indicates that tribes would be consulted per BLM Manual 1780. Manual 1780 notes under “Consulting During Grazing Permit Renewal and Other Vegetation Management Activities” that “The BLM should notify tribal contacts when initiating NEPA processes for range improvements, vegetation treatments” [underline added], but project-specific NEPA processes are not contemplated under this PEIS. The Manual also says “The BLM should notify tribes when it is planning range improvement structures or vegetation treatments” [underline added]. It is not clear whether this is simple notification (as opposed to consultation), and it is not clear what lead time would be given tribes who may use pinyon nuts or other culturally important plants for food, basketmaking, or medicines.

- ii. *The PDEIS information on 18 herbicides is not current.*

All discussion of the impacts of any of the 21 herbicides the BLM is indicating can be used without further public input is referenced to a 2007 BLM PEIS for 18 of the herbicides and a 2016 BLM PEIS for three herbicides; all use is proposed to proceed with no further public site-specific information. Design features are similarly referenced to these two PEIS's (Design Feature 6 at D-1.) The 2007 information cannot be considered current.

Many of the 18 herbicides assessed in the 2007 PEIS have been assessed much more recently, e.g., in a review of the highly persistent tebuthiuron in 2014 (EPA 2014) and a 2016 review of 2, 4-D was reviewed for its ecological risks. (EPA 2016) A 2018 USDA advisory committee recommended that a

buffer of no less than one mile be implemented between dicamba and any sensitive, non-target plant (USDA 2018).

In 2019, a recent chlorsulfuron herbicide product (Perspective) was found to have killed over 2,000 pines in Deschutes NF in Oregon, prompting a state review and sharp restrictions (Cureton 2019). Given that the 2007 PEIS reviewed active ingredients (e.g., chlorsulfuron), more recent formulations that contain that active ingredient would be allowed for use without further public review.

The BLM cannot rely on the two aforementioned PEIS' and must assemble the most recent scientific and other information on potentially significant impacts of herbicide applications.

h. Water and Riparian Resources

BLM claims that despite the sheer magnitude of its fuel reduction proposals, the agency need not consider the impacts of the alternative project scenarios on water or riparian resources because these resources “would not be affected by any of the alternatives.” Draft PEIS at 3-1. BLM further justifies its decision to forego any analysis of impacts to water and riparian resources because

[n]o significant effects on water quality or water quantity are expected, since this PEIS does not propose treatments within riparian conservation areas, and buffers would protect water resources from sedimentation. Treatments in other areas may cause short-term impacts on water quality, but buffers and best management practices would reduce these impacts to less than significant. Over the long term, fuels reduction and rangeland restoration projects would improve water quality by reducing the impacts from large-scale fire events.

Draft PEIS, Vol. 3 at F-5. The agency also claims that “[r]estoration treatments would lead to vegetation and the fire return interval more closely mimicking historical conditions, thereby preserving or improving these resources.” Draft PEIS at 3-1.

For several reasons, BLM’s assertion that it can avoid considering the impacts of its alternative fuel reduction proposals on water and riparian resources is invalid. The claim is not supported by the record and, indeed, conflicts with many of the agency’s conclusions about the consequences of the project alternatives.

First, BLM fails to provide a basis in the record for its claim that the designation of the “riparian exclusion areas” is adequate to ensure that its massive proposal will not impact water or riparian resources. Without a clear reference to support for this claim, the BLM’s assertion of “no impact” is without foundation.

Second, particularly given the lack of support in the record to suggest otherwise, the riparian exclusion areas are too narrow to accomplish what the BLM claims they will – protect water and riparian resources from all but minimal adverse impacts from the colossal fuels reduction project. For example, BLM includes within its riparian exclusion areas only those intermittent and ephemeral streams with riparian vegetation:

Seasonally flowing streams with riparian vegetation, including intermittent and ephemeral streams and wet meadows—150 feet on each side of the active channel, measured from the bank full edge of the stream, or the outer extent of riparian vegetation, whichever is greater.

Draft PEIS at 2-1. Initially, this description is too vague and fails to specify how much riparian vegetation needs to be present to qualify such a stream as an exclusion area. In addition, not all ephemeral or intermittent streams support riparian vegetation.³¹ However, in such cases, sediments and other contaminants introduced by nearby surface disturbing activities are likely to have a significant impact on reaches without riparian vegetation as well as downstream riparian environments and resources.³²

BLM also includes in its riparian exclusion areas streams in an inner gorge, where the “adjacent stream slopes [are] greater than 70 percent gradient,” and extends protective status to the “[t]op of inner gorge.” Draft PEIS at 2-1. Again, there is no evidence in the record to support the assertion that keeping the aggressive fuel reduction projects out of this area will ensure that water and riparian resources will not be adversely impacted. Indeed, because the exclusion area fails to incorporate the floodplain above the “inner gorge,” which may or may not contain riparian vegetation, it is likely that ground disturbing activities associated with fuel reductions will have a significant adverse impact on these streams. After all, according to BLM:

Floodplains are important for attenuating flood flows, stabilizing sediment and flood debris, groundwater recharge, nutrient buffering as well as providing valuable habitat for aquatic and terrestrial plants and animals. Floodplains in intermittent stream systems also play a vital role in capturing and storing sediment, attenuating flood flows and providing habitat for wildlife.³³

Similarly, because the riparian exclusion areas fail to encompass 100-year flood plains, and in light of the absence of any record evidence to support this failure, BLM has not established that the proposed fuel reduction alternatives will actually have no adverse impact on riparian and water resources.³⁴

BLM’s claim of no adverse impact is likewise unconvincing when the agency limits, without evidence in the record, its exclusion areas to 300 feet on each side of a perennial stream or special aquatic feature. Draft PEIS at 2-1. After all, BLM has established that “surface disturbance and occupation will be avoided” 500 feet from “perennial waters, springs, water wells, and wetland/riparian areas” in order to

maintain the vegetative, hydrologic, and geomorphic functionality of stream channels, water quality characteristics, spring function, water well integrity, proper wetland/riparian function,

³¹ E.g. Shaw, J. *Linkages among watersheds, stream reaches, and riparian vegetation in dryland ephemeral stream networks*, Journal of Hydrology (2008) 350, 68– 82.

³² E.g. <https://archive.epa.gov/water/archive/web/html/streams.html> (EPA noting “[s]mall streams, including those that don’t flow all of the time, make up the majority of the country’s waters. They could be a drizzle of snowmelt that runs down a mountainside crease, a small spring-fed pond, or a depression in the ground that fills with water after every rain and overflows into the creek below. These water sources, which scientists refer to as headwater streams, are often unnamed and rarely appear on maps. Yet the health of small streams is critical to the health of the entire river network and downstream communities. These small streams often appear insignificant, but in fact are very important, as they feed into and create our big rivers.”).

³³ BLM, Environmental Assessment for the White River Field Office June 2014 Competitive Oil & Gas Lease Sale (2014) at 23 (confirming that “Executive Order 11988 requires Federal agencies to avoid to the extent possible, both the long and short term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.”).

³⁴ *Id.* at 24 (“Any development that occurs within floodplains is likely to reduce the effectiveness of floodplains to attenuate flood flows by removing vegetation that reduces streamflow velocities, increasing compaction of soils, reducing infiltration and reducing the cross sectional area of the floodplain available to convey flood flows.”).

aquatic health, aquatic and wetland habitat, macroinvertebrate communities, downstream fisheries and natural sediment and salt processes.³⁵

Similarly, BLM has seen fit to protect major rivers by prohibiting surface disturbing activities within 2500 feet of major rivers.³⁶ In any case, without evidence in the record, BLM has not shown that high value or impaired streams, or streams surrounded by erodible soils will be sufficiently protected by such a buffer to guarantee no adverse impacts.

Third, when asserting that water resources will not be impacted by its colossal fuels reduction proposals, BLM does not determine whether there are any drinking water sources, public water supplies or municipal water sources in the project area. Yet, the high value and sensitivity of these water resources makes them susceptible to adverse impacts from surface disturbing activities like the vast fuel reduction alternatives. Indeed, recognizing the need to protect public health and water quality, BLM has prohibited surface disturbing activities, including road building, associated with oil and gas development, from areas within 1000 feet of classified surface water supply stream segments in Colorado.³⁷

Fourth, to insist that riparian exclusion areas and “buffers would protect water resources from sedimentation,” Draft PEIS, Vol. 3 at F-5, BLM is necessarily assuming that those buffer and riparian areas are functioning and intact. Yet, there is no evidence in the record to suggest that these buffers and riparian areas can indeed serve the purpose that BLM attributes to them – protecting water and riparian resources from the adverse impacts of its huge fuels reduction proposals. In the absence of such analysis, there is no reason to believe that all the rivers, streams, lakes, wetlands and other water resources and the vegetation surrounding them in the project area are robust enough to protect water quality, aquatic habitat and other values from the impacts of aggressive surface disturbing activities in flood plains or as close as 100 feet or 300 feet away. Without such analysis and support in the record, BLM cannot assert that its riparian exclusion areas and buffers will ensure that the mammoth fuel reduction projects will have no more minimal adverse impacts on water and riparian resources.

Sixth, based on the above, it is evident that BLM has not met its Section 313 Clean Water Act³⁸ obligation, which applies to point and nonpoint sources,³⁹ to adhere with state and local water quality requirements to the same extent as nongovernmental actors. Because BLM has offered no analysis or support for its contentions of no impact, the agency cannot claim its management activities will comply with state water quality standards. This is particularly true because BLM has neglected to recite the applicable state standards, determine where impaired streams are located vis-à-vis its proposed projects or in any way characterized the quality of the waters within the project area. As a result, BLM has failed its duties under NEPA and the Clean Water Act.

Seventh, without analysis and support in the record, BLM may not simply rely on the use of BMPs to contend that its enormous fuels reduction proposals will not adversely impact water and riparian

³⁵ BLM, Preliminary Environmental Assessment for the May 11, 2017 Competitive Oil & Gas Lease Sale (2016) at Attachment D, unnumbered WR-CSU-12; *see also id.* KFO-NSO-2, 4 and 5.

³⁶ *Id.* at KFO-NSO-2.

³⁷ *Id.* at KFO-NSO-3.

³⁸ 33 U.S.C. § 1323.

³⁹ *E.g. O.N.D.A. v. Dombeck*, 172 F.3d at 1098 (“Section 1323 plainly applies to nonpoint sources of pollution on federal land.”); *Center for Native Ecosystems v. Cables*, 509 F.3d 1310, 1332 (10th Cir. 2007).

resources. For example, as BLM has explained in the context of surface disturbances, including road building, resulting from oil and gas development:

BMPs are designed to reduce the potential for environmental impacts, however, during extreme storm events or if BMPs fail, erosion may reduce soil productivity and result in sedimentation downstream from pipelines, roads or pads. This indirect impact, although unlikely under normal conditions could occur along with the direct impacts of loss of productivity, mixing of soil horizons, and/or loss of topsoil from surface disturbance.⁴⁰

Finally, when assessing the environmental impacts of other fuel reduction projects that imposed similar buffers and excluded activities from riparian environments in a similar fashion, BLM acknowledged and evaluated the impacts the projects would have on water and riparian resources. For example, in the Jarbidge Fuel Breaks Project Environmental Assessment, which included a 300-foot buffer,⁴¹ BLM acknowledged that:

implementation of the Proposed Action could result in short-term increases in ash and sediment deposition, primarily into intermittent streams lacking riparian vegetation or ephemeral drainages within or adjacent to treated fuel break segments.⁴²

The agency further confirmed that this ash and sediment could be carried by the wind, as well as by water.⁴³ Given that the aggressive fuel reductions proposals contemplated by BLM would result in⁴⁴ and are often designed to achieve huge areas of disturbed soils and bare ground over the long-term and given that BLM's own analysis points to the high erodibility of much of the land forms in the project area,⁴⁵ it is certain that considerable ash and fine sediment will be blown and carried by water into the rivers, streams, riparian areas and wetlands of the project area, thereby impacting water quality. In addition, some of these soils contain heavy metals, including mercury and arsenic, which result from

⁴⁰ BLM, Environmental Assessment for the White River Field Office June 2014 Competitive Oil & Gas Lease Sale (2014) at 30-31; *id.* at 26 ("Impacts to surface hydrology are still likely in some areas where BMPs fail or where intense localized thunderstorms overwhelm drainage features.")

⁴¹ Importantly, BLM only determined that this buffer would "**reduce** or eliminate **direct** sediment deposition" into streams, wetlands and riparian areas." BLM, Jarbidge Fuel Breaks Project Environmental Assessment (2011) at 70 (emphasis added); *see also* BLM, Soda Fire Fuel Breaks Project Environmental Assessment (2017) at 164.

⁴² *Id.* at 70.

⁴³ *Id.*

⁴⁴ *E.g.* Draft PEIS at 4-45 (noting "[b]urned areas would be susceptible to windblown soil erosion until they are revegetated and the exposed soils are stabilized."); *id.* at 4-51 ("Domestic animals and associated infrastructure could damage biological soil crusts at treatment sites through physical disruption, including shearing and compacting soil. This would decrease water infiltration rates and increase soil erosion[.]"); *id.* ("Depending on the severity of soil disturbance, vegetation may reestablish in the first few years following prescribed fire treatments; if soils are sterilized, several years of soil deposition may be needed before soils would support vegetation again, thus affecting the growing conditions for future vegetation communities[.]"); *id.* at 4-53 ("Domestic animals used for targeted grazing treatments in would break the soil surface, including any biological soil crusts, with their hooves and expose the soil surface to wind and water erosion."). Notably, BLM has also failed to consider the impacts of impacts to infiltration rates on water and riparian resources.

⁴⁵ *E.g.* DEIS at 3-14 ("Erodible soils are particularly prevalent in the semiarid rangelands found in the project area (BLM 2007a). Portions of the project area that have been disturbed by events such as wildfire, road development, and extensive grazing, are now more susceptible to erosion.").

natural land forms as well as human activities such as mining and smelting.⁴⁶ Therefore, based on BLM's own analysis, the agency may not rely on riparian exclusion areas or buffers to guarantee that its multi-state fuels reduction proposals will not adversely impact water quality.

Thus, because there is nothing in the record to support BLM's claim that its gigantic fuel reduction proposals will not adversely impact water and riparian resources, the agency may not use this assertion to justify its decision to forego consideration of these resources in its NEPA analysis. Similarly, BLM cannot claim that it can guarantee that the various alternative proposals comply with state water quality standards. This is particularly true because BLM's assertion of no impact is contrary to the analyses and management actions cited here. Therefore, to meet its NEPA and Clean Water Act obligations, BLM is duty bound to consider in detail the potential direct, indirect and cumulative impacts of its immense fuels reduction proposals on the full suite of water and riparian resources, including water quality.

XII. Livestock grazing

- a. The PEIS must analyze and discuss the impacts of livestock grazing on vegetation, wildlife, soils, biological soil crust, and other resources affected by livestock use in treatment area

The PEIS does not adequately discuss the effects of grazing on the vegetation, soils, and wildlife habitat in the project area despite the potential for impacts (e.g., Belsky 1996, Burkhardt 1996; Filazzola et al. 2020; Fleischner 1994; Lanner 1981; Milchunas 2006; Miller et al. 2005). Livestock is a pervasive land use in the Great Basin. Without an analysis of its impacts, the PEIS is incomplete and leads to erroneous conclusions about the relative contributions of different stressors. BLM cannot successfully address the combined threat of invasives and fire without acknowledging the widespread, significant, and cumulative impacts of grazing.

This lack of analysis is surprising considering that the PEIS itself mentions throughout the document that grazing and its associated infrastructure have the potential to negatively affect multiple resources, including: vegetation condition (4-29); pinyon and juniper expansion (3-4); fire regimes and invasive annuals (4-41); surface disturbance (4-56, 57); and wildlife species and their habitats (4-79, 80).

The discussion does mention the effects of grazing in the wildlife section, but it dismisses its impact by assuring us that the direction in 43 CFR 412—4130 (Standards for Rangeland Health and Guidelines for Livestock Grazing Management) will be adequate to protect resources. (But only as long as they are followed, a significant caveat.) "Current and future livestock use at permitted levels would not be expected to compete with the forage and cover requirements for wildlife because Standards for Rangeland Health and Guidelines for Livestock Grazing Management are intended to reduce these effects. In areas where livestock grazing is not managed to improve rangeland health, habitat degradation for wildlife may occur." PEIS at 4-80. Relying on an adherence to Standards and Guidelines to reduce grazing impacts to wildlife and other resources is not reassuring. Despite the adoption of these provisions nearly 20 years ago, the condition of rangeland throughout the Great Basin tells us that current management is still doing damage (General Accounting Office 2016).

⁴⁶ E.g. see Tchounwou, P. *Heavy Metals Toxicity and the Environment* (2012)
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4144270/pdf/nihms414261.pdf>

Since the PEIS states that it supports the goals and objective of the Greater Sage-Grouse Resource Management Plan Amendments to provide habitat for sage-grouse, its failure to acknowledge that cattle grazing may constrain those habitat goals by increasing cheatgrass is a significant omission^{47,48,49}. Livestock grazing also consumes understory forage plants and thus reduces sagebrush steppe understory diversity and productivity. Sage grouse nesting success is higher where the grass cover is higher (Connelly et al. 2000). Forbs are important as well, since sage-grouse chicks depend on them and the protein-rich insects they consume early in life (Sveum et al. 1998).⁵⁰

The failure to consider, analyze, and address potentially significant impacts to mule deer and sage-grouse, mule deer, and other native herbivores from competition with livestock precludes the conclusion that the PEIS is not likely to result in any significant impacts.

- b. The PEIS must provide for more robust monitoring of post-treatment livestock management and land use.

One of the biggest research needs is a better understanding of the interaction between vegetation treatments and post-treatment livestock grazing. Few studies monitor success of treatments, especially mechanical ones, after livestock grazing is resumed⁵¹. Many published studies of the effects of mechanical treatments do not mention post-treatment grazing management at all. Miller (2008) showed that of the 507 sites evaluated for rangeland health conditions on the Grand Staircase-Escalante National Monument, treatments had by far the worst scores.⁵² These are where cattle congregated and where range managers allowed higher utilization, leading to poor soil and vegetation conditions.

The majority of studies that reported success in vegetation recovery following mechanical treatment were conducted in exclosures, or only sampled during the brief (often two years or two growing seasons) post-treatment livestock exclusion period. In studies where grazing did occur in the study area, it was usually characterized as light to moderate (e.g., Bates et al. 2009; Davies et al. 2018; Dittel et al. 2018). This level of use is not always explicitly described, but Davies et al. (2018) define it as between 35 to 45% utilization with non-consecutive season grazing and periodic rest. Holechek et al. (2006) recommend no greater than 40% utilization and lower in drought conditions or on rangeland in poor condition. However, ungrazed or lightly grazed conditions are atypical on public lands, particularly in sagebrush communities, so these results may not represent the common management situation. Most sagebrush communities on public lands are grazed, many at more than moderate levels. In practice,

⁴⁷ Reisner, MD, JB Grace, DA Pyke, and PS Doescher 2013. Conditions favouring *Bromus tectorum* dominance of endangered sagebrush steppe ecosystems. *Journal of Applied Ecology* 50(4):1039-1049.

⁴⁸ Williamson, M.A., Fleishman, E., Mac Nally, R.C., Chambers, J.C., Bradley, B.A, Dobkin, D.S., Board, D.I., Fogarty, F.A., Horning, N., Leu, M., Zillig, M.W. 2019. Fire, livestock grazing, topography, and precipitation affect occurrence and prevalence of cheatgrass (*Bromus tectorum*) in the central Great Basin, USA. *Biological Invasions*, <https://doi.org/10.1007/s10530-019-02120-8>.

⁴⁹ Bock, CE, JH Bock, L Kenney, and ZF Jones. 2007. Spread of non-native grasses into grazed versus ungrazed desert grasslands. *Journal of Arid Environments* 71:229-235.

⁵⁰ Sveum, C. M., J. A. Crawford, and W. D. Edge. 1998. Use and selection of broodrearing habitat by sage grouse in south-central Washington. *Great Basin Naturalist* 58(4):344-351.

⁵¹ Jones 2019.

⁵² Miller, M. E. 2008. Broad-scale assessment of rangeland health, Grand Staircase-Escalante National Monument, USA. *Rangeland Ecology and Management* 61:249-262.

many management units adhere to a “take half, leave half” strategy of 50% utilization (e.g., Ogle 2009; Oregon State University 1988; Pratt and Rasmussen 2001; Sprinkle, 2018) or even higher in seedings (Busby and Gifford 1981). Alternation of grazing season and periodic total rest of pastures is not a common management prescription. Moreover, the standard 2-year post-treatment deferment of grazing is not always adequate for recovery (Gottfried 2004), and it is not always complied with. The BLM should gather empirical data on treated areas before resuming grazing to support their determination that the seeding has achieved objectives.

Sometimes sites rapidly regress into pretreatment conditions depending on post-treatment management (Archer et al. 2011) when they should be managed to support long-term, resilient ecosystem processes. The BLM must address the underlying issues causing resource problems, not just respond to the symptoms. No treatment can be successful if post-treatment management, including livestock grazing levels, is not appropriate. Instead, the goal of treatments should be to maintain ecosystem function once processes are restored so as not to require treatment in the future.

Beck et al. (2012) and Bombaci and Pejchar (2016) point out that most vegetation treatment studies have been on specific, fine-scale management actions that only address short-term effects immediately post-treatment. They recommend that experiments be conducted over longer-term temporal and spatial scales. Another urgent need is reference areas for comparison with treatments, especially for sagebrush communities. Vegetation treatment projects should thus incorporate a system of large exclosures in the post-treatment study design. These will be invaluable in future attempts to understand the effects of management.

Without this information, post-treatment changes in a site’s resource condition cannot be definitively attributed to treatment effects. Failing to account for the effects of livestock grazing makes it difficult to assess the causal factors of ecosystem condition and draw implications for management. The PEIS should develop a more robust, transparent monitoring and research component to determine where, how, and whether treatments are successful. The risk of failing treatments is too high and the consequences of large-scale resource damage is too great for the BLM to be conducting millions of acres of treatments without a firmer grounding in science.

Recommendations: BLM needs to provide a more robust discussion of the effects of grazing on the vegetation, soils, and wildlife habitat in the project area, and provide for more robust monitoring of post-treatment livestock management and land use. BLM should institute a network of monitoring exclosures in all treatment and vegetation types to better discern the interaction between grazing management and treatment type, and better predict treatment success. Data should be collected pre-treatment and then post-treatment indefinitely. In this manner, any natural resource degradation can be caught early and management changed if necessary. Waiting until the understory is depleted and replaced by cheatgrass may result in irreparable harm. BLM should consider, for all action alternatives, extending the customary two-year post-treatment rest period and reducing post-treatment livestock numbers. Introduction of livestock after juniper removal has not received adequate scientific scrutiny, and the two-year rest requirement following treatment has never been tested experimentally. As Miller et al. (2005) note, “[d]ecisions regarding livestock reintroduction should be made based on the response of vegetation following treatment. With slow community recovery, rest may be required beyond the standard 2-year time frame” (see also Miller et al. 2015). Resumption of livestock grazing should be supported with empirical data that are shared with the public.

XIII. Targeted grazing

Targeted grazing is unproven and may contribute to continued degradation and loss of sagebrush habitat. Targeted grazing lacks scientific support for use as a restoration tool in the sagebrush steppe ecosystem. The existing scientific literature identifies significant risks to utilizing targeted grazing as a treatment method, provides little support for its use in achieving PEIS objectives, and has the potential to result in the continued degradation and loss of sagebrush steppe.

Reisner et al. (2013) found that, even after controlling for other factors that may contribute to the spread of cheatgrass, there is a strong correlation between grazing effects and cheatgrass incursion (see also Reisner et al. 2015). Cattle grazing increases cheatgrass dominance in sagebrush steppe by decreasing bunchgrass abundance, altering and limiting bunchgrass composition, increasing gaps between perennial plants, and trampling biological soil crusts (Reisner et al. 2013; Knick et al. 2003; see Chambers et al. 2016a). “These annual grasses tended to fill vacant spaces among native perennial plants creating a continuous fuel for wildfires to burn and spread (Brooks and others, 2004), especially in areas where perennial herbs had been depleted by inappropriate livestock grazing (Reisner and others, 2013)” (Pyke et al. 2015: 4).

Bock et al. (2007: 233) similarly found that “livestock grazing facilitated the invasion [of exotic grasses] into native grasslands, such that the proportion of total grass cover consisting of exotics was 2.5-fold greater on grazed than on ungrazed areas 22 years after we began this study.” Their results demonstrated that livestock grazing served as an exogenous disturbance on the landscape in a manner that was more favorable to exotics than to most native southwestern grasses (Milchunas et al. 1988; Milchunas 2006; Bock et al. 2007). The latest research by Williamson et al. (2019: 12) further support these findings: “[o]ur results suggest a strong positive relation between the probability of presence and prevalence of cheatgrass and livestock grazing, particularly in unburned locations, where resistance to cheatgrass is greater than in burned locations.”

Livestock trampling can also reduce and fragment biological soil crust in sagebrush steppe (Warren and Eldridge 2001; Reisner et al. 2013), increasing the susceptibility of the landscape to invasion by *Bromus* and other weedy species in arid ecosystems (Chambers et al. 2016b). “Cheatgrass, however, may be less effective at invading areas with an intact biological soil crust (Kaltenecker et al. 1999). This notion is supported by field observations and growth chamber experiments that indicate that the presence of certain types of biological soil crusts decreases cheatgrass germination compared to bare soil (Larsen 1995; Serpe et al. 2006)” (Deines et al. 2007: 2). Damage to the soil crust by livestock hooves can lead to an increase in the number of safe sites in which annual grasses can emerge and establish (Pyke et al. 2016).

As summarized by Chambers et al. (2016a: 37):

Biological soil crusts, which are an important component of plant communities in warmer and drier sagebrush ecosystems, can reduce germination or establishment of cheatgrass (Eckert et al. 1986; Kaltenecker et al. 1999). Disturbances or management treatments that reduce abundance of native perennial grasses and biological soil crusts and increase the distances between these perennial grasses often are associated with

higher resource availability and increased competitive ability of cheatgrass (Chambers et al. 2007; Reisner et al. 2013, 2015; Roundy et al. 2014).

Excessive grazing may eventually lead to reductions in perennial plants, increases in *B. tectorum* dominance, and ultimately result in the conversion of sagebrush steppe habitats to (annual) grasslands (Pyke et al. 2016). Loeser et al. (2007: 87) found that high-intensity grazing had “strong directional effects that led to a decline in perennial forb cover and an increase in annual plants, particularly *B. tectorum*” in grasslands near Flagstaff, Arizona. In managing for “fire fuels” (including native plants), Chambers et al. (2016b: 294-295) cautioned that “any potential gains resulting from fine fuel removal by livestock may be counterbalanced by decreased resistance to *B. tectorum* due to herbivory of native plants that compete with *B. tectorum*, increased soil disturbance, and damage to biocrusts (Reisner et al. 2013).”

Lastly, multiple planning documents prepared as part of the National Greater Sage-Grouse Planning Strategy (BLM 2011) acknowledged that livestock grazing and “excessive grazing” can spread invasive plants (e.g., Buffalo DEIS 2013: 306; Bighorn Basin DEIS 2011, vol. 2: 4-146; Billings-Pompeys Pillar DEIS 2013: 3-88; Miles City DEIS 2013, vol. 1: 3-77; South Dakota DEIS, 2013: 361; Oregon DEIS 2013, vol. 1: 4-89). The draft Nevada/northeastern California plan observed that “[l]ivestock grazing is one of the vectors to introduce and or increase the spread of invasive weeds” and that “[m]ultiple factors can influence an area’s susceptibility to cheatgrass invasion, including livestock grazing, perennial grass cover and biological soil crusts” (Nevada DEIS 2013: ch. 4, 54, *citing* Reisner et al. 2013).

- a. The PEIS does not adequately define “targeted grazing” or how it would be implemented

The PEIS states that “[t]argeted grazing uses goats, sheep, or cattle or a combination thereof, intensively managed by a grazing operator, to consume targeted vegetation in a specific area, such as cheatgrass, medusahead rye (*Taeniatherum caput-medusae*), ventenata (*Ventenata dubia*) and nonnative perennial grasses such as crested wheatgrass (*Agropyron cristatum*).” PEIS at 2-8. The PEIS continues that “[t]o meet project objectives, the methods used to manage livestock, such as monitoring their numbers, fencing versus herding, and using water and mineral supplements, would be determined at the site-specific level.” PEIS at 2-9. This vague description (i.e., *such as*) of different management methods that *could* be adopted at the site-specific level fails to adequately define what constitutes targeted grazing, which is inconsistently described throughout the PEIS. (See PEIS at 4-53, describing that “[t]he BLM would intensively manage grazing under Alternative B *by fencing or herding to avoid surface disturbance on soils beyond targeted areas,*” *emphasis added*).

Furthermore, the PEIS fails to adequately describe what areas would qualify for targeted grazing treatment. It states that “[t]argeted grazing used as a fuels reduction treatment would manipulate vegetation (composition, fuel continuity, or fuel loading) in areas with over 10 percent invasive annual grass or nonnative perennial grass cover and when native perennial bunchgrass cover is below 20 percent.” PEIS at 2-8. However, no additional criteria (e.g., appropriate size, shape, design, other potential resource constraints) are provided to help determine what areas may qualify for this management tool. The omission leaves a great deal of uncertainty related to where treatments could be

implemented and at what scale. For example, it is unclear if a 20,000-acre fenced pasture that has over 10 percent annual grass or nonnative perennial grass cover throughout and less than 20 percent native perennial bunchgrass, could be target grazed in its entirety.

Lastly, the PEIS fails to consistently define when and for how long targeted grazing could be applied as a treatment. As discussed above, the PEIS reserves for managers certain decisions on when and where to target graze on a site-specific basis, considering “a number of factors, including vegetation type, desired vegetation objectives, terrain, and current year growing conditions (see Appendix D).” PEIS at 2-8. However, the PEIS provides contradictory information throughout about when animals *must* be removed (*compare* Appx. D at D-3 “[a]ll animals *must* be removed prior to growth by desired perennial plants” (*emphasis added*) and PEIS at 2-9 “grazing may need to extend past the time when desired perennial plants initiate current year growth.”).

The PEIS must include a clear definition of what “targeted grazing” is, including, but not limited to defining “intensively managed grazing”; establishing criteria for what qualifies as “intensive” for each management method (e.g., intensive herding: how many riders per head of cattle, how many days a week riders must be present, how many hours a day riders must be present); establishing acreage limits and supporting data for what size of treatment area is feasible for intensive management for each management method; clearly defining when livestock must be removed from a treatment area; and clarify that fencing and/or intensive herding are required for all targeted grazing treatments.

- b. The PEIS fails to describe how “targeted” grazing would differ from regularly permitted grazing use

The PEIS states that the BLM would “[c]oordinate with applicable permittees, state agencies, or other landowners in advance of targeted grazing treatment. This is to identify and minimize any potential conflicts of targeted grazing with regularly permitted livestock grazing. In case-specific situations, rest from regularly permitted grazing may be necessary in order to accomplish targeted grazing objectives (Hendrickson and Olson 2006).” PEIS Appx. D at D-2. Further, the PEIS states that “[a]ny changes to permitted grazing would be in accordance with 43 Code of Federal Regulations (CFR) 4110, 43 CFR 4120, and 43 CFR 4130 (2005). However, the BLM may work with permittees through voluntary agreements or coordination within the authorized permitted use to temporarily modify grazing to increase the success of vegetation restoration projects.” PEIS at 2-3. No other substantive information is provided as to how targeted grazing would differ from or interact with regularly permitted grazing use.

The PEIS must define what types of “case-specific situations” would result in rest from regular permitted grazing. The lack of clarity around when rest from permitted grazing would be required, in combination with the lack of information regarding what areas could qualify for a targeted grazing treatment (e.g., entire pasture vs. narrow corridor or patch), leaves a great deal of uncertainty as to what utilization levels the agency would consider acceptable under a targeted grazing treatment alone, and for areas where targeted grazing and regularly permitted grazing co-occur. Similarly, it is unclear if targeted grazing would allow for an area to exceed the number of regularly permitted AUMs or if rest would be required in order to adhere to the stipulations of an applicable permit(s).

Further, the PEIS fails to discuss whether targeted grazing would be allowed in areas that are failing to meet Standards for Rangeland Health due to livestock grazing, or in areas where range assessments and evaluations have not yet been completed. The agency's analysis determined that "[c]urrent and future livestock use *at permitted levels* would not be expected to compete with the forage and cover requirements for wildlife because Standards for Rangeland Health and Guidelines for Livestock Grazing Management are intended to reduce these effects." PEIS at 4-80 (emphasis added). However, given targeted grazing is an unpermitted use, it is unclear, however, whether Standards for Rangeland Health apply to targeted grazing, how the additional grazing use would interface with permitted grazing, and what potential impacts may occur.

The PEIS must provide further information about how targeted grazing would differ, and interface, with regularly permitted grazing, including but not limited to specific requirements for when rest from regular permitted grazing would be required; discussion of "case-specific situations" that would result in changes to permitted utilization levels; discussion of "case-specific situations" that would result in changes to regularly permitted AUMs; exclusion of targeted grazing from areas failing to meet Rangeland Health Standards due to livestock grazing or where assessments have not been completed; discussion of how Rangeland Health Standards apply to targeted grazing; and how management may adjust in cases where targeted grazing is or has caused any portion of a grazing allotment to fail Rangeland Health Standards.

- c. Cheatgrass has evolved with herbivory, rendering persistent and targeted domestic livestock grazing ineffective at controlling continued incursion in sagebrush habitat

Many annual grasses, including cheatgrass, have evolved grazing tolerance through adaptations over time, often selected through evolution with grazing animals (Strauss and Agrawal 1999). Even if successful, targeted grazing management might only impede the spread of cheatgrass temporarily. "As populations of *B. tectorum* decrease in one generation, and in the absence of competition from native perennial plants, the remaining individuals tend to produce more seeds for the next generation compensating for temporary population reductions (Mack and Pyke 1983; Hempy-Mayer and Pyke 2008)" (Pyke et al. 2016: 318-319). Moreover, "[s]eed banks in soil may not be impacted directly by grazing intensities (Clements et al. 2007); therefore, once *Bromus* becomes abundant within plant communities, their seed densities tend to dominate seed banks (Chambers et al. 2015)" (Pyke et al. 2016: 319).

In a study conducted to mimic the impact of frequent grazing, plants were clipped to 2.5 cm in height and then re-clipped two weeks later. Results from the study showed that cheatgrass seeds still dominated the landscape, "calling into question the potential for using livestock grazing as a biocontrol in *B. tectorum*-dominated areas (Hempy-Mayer and Pyke 2008). Grazing tolerance in *B. tectorum* may result from continued growth of its root system despite defoliation (Arredondo and Johnson 2009)" (Chambers et al. 2016b: 293).

- d. There is no scientific evidence that domestic livestock grazing can shift the dominance from invasive annual grasses to native perennial plants

Grazing system designs such as the Green-Brown grazing method (Smith et al. 2012), in which livestock graze when invasive annual grasses are green earlier in spring and native species are cured later in the year, is proposed as a biocontrol for annual grasses to help shift dominance to native sagebrush steppe. The U.S. Department of Agriculture (USDA) has investigated this method and determined that “there are no published papers demonstrating success of this method for sagebrush steppe. In addition, if locations for targeted grazing are sage-grouse nesting or brood rearing habitat, then adequate perennial grass height for maintaining habitat guidelines may be required” (Pyke et al. 2017: 27).

The USDA’s recent review of best management strategies for preventing unnatural fire in the sagebrush steppe also noted that “[i]n general, improper livestock use, such as heavy grazing during the critical growth period, can decrease perennial grasses and forbs, increase woody biomass (fuel loads), and elevate susceptibility to invasive annual grasses” (Chambers et al. 2016a: 83). Williamson et al. (2019: 2) concluded from 14 years of field research that “grazing corresponds with increased cheatgrass occurrence and prevalence regardless of variation in climate, topography, or community composition, and provide no support for the notion that contemporary grazing regimes or grazing in conjunction with fire can suppress cheatgrass.”

Similarly, there is no evidence that targeted grazing can shift a non-native perennial grass community (e.g., crested wheatgrass) to a native plant community. The PEIS states that “[t]ypically, no treatments would be needed in the desired condition vegetation states, **Perennial Grasses and Forbs** and **Perennial Grasses, Forbs, and Shrubs**. The exception is where perennial grasses, forbs or shrubs are reduced (**Table 2-1**) or where nonnative perennial grasses (seedlings) would be converted to native perennial grasses. The latter treatment would use targeted grazing and chemical treatments for the conversion to native species.” PEIS at 4-23. The PEIS provides no support for the conclusion that livestock grazing can successfully shift a non-native seeding to native plant community, and as discussed, the assumption runs counter to the best available science.

The PEIS asserts in numerous places that targeted grazing would benefit wildlife and other resources by “improving” non-target plant species. For example, the PEIS states that “[d]epending on timing and species targeted, nontargeted vegetation may improve and species that rely on nontargeted vegetation may experience an improvement in their habitat.” DEIS at 4-63. As discussed above, there is no scientific support that targeted grazing will “improve” non-target plant species or shift dominance from invasive annual grasses to native perennial grasses. Given the importance of statements such as this to the PEIS’ analysis, the agency has failed to conduct an informed decision-making process that utilizes the best available science, and as a result, conducted an inadequate analysis of the environmental impacts of targeted grazing.

Lastly, there is no evidence that targeted grazing is effective at reducing the “seed bank of invasive annual grasses to decrease competition against native plants.” PEIS at 2-8 (describing the objectives of targeted grazing treatments). In fact, the BLM has explicitly acknowledged this, finding that “[i]ntensive livestock grazing is often suggested for controlling cheatgrass competition. Although targeted grazing

may have some applications for fuels management, it is not effective in reducing cheatgrass competition.... During the short time when cheatgrass is highly palatable in the spring, a sufficient number of livestock cannot be concentrated on a small enough area to reduce the cheatgrass seed significantly or reduce cheatgrass seed lying on the soil surface. In addition, this type of grazing can be detrimental to remaining perennial grasses, opening the site up for further cheatgrass expansion in the future” (Idaho/SW Montana Greater Sage-Grouse DEIS 2014: 3-64 – 3-65).

Recommendations: In combination, the scientific literature documenting the negative impacts of grazing on native plant communities within the planning area, the scientific literature and previous agency analysis demonstrating the inability of targeted grazing to achieve the PEIS’ stated objectives, and the lack of scientific support for targeted grazing as an effective restoration tool more generally, highlight the significant concerns of including targeted grazing as a restoration tool across a 228 million-acre project area. Indeed, the BLM itself acknowledges that grazing has already altered 99 percent of the western sagebrush landscape (PEIS at 44, Table 4-1), and it is entirely unclear how additional, prescribed grazing is supposed to restore sagebrush steppe to natural reference conditions. Until targeted grazing is thoroughly researched and empirically tested to prove its efficacy as a restoration treatment, it should not be implemented outside of highly controlled research settings.

XIV. The PEIS’ Appendix F and Appendix H need to incorporate best available science

a. Vegetation Framework and Methodology (Appendix F)

Much research has been conducted to identify habitat requirements of sage-grouse and other wildlife and understand impacts of extensive habitat manipulation. See Braun 1998, Connelly et al. 2000, Welch and Criddle 2003, Connelly et al. 2004, Knick and Connelly 2011 including the Baker Chapter, Beck et al. 2012 and many other reviews. The PEIS, and its heavy reliance on Landfire FRCC and BPS models and use of broad Vegetative States and other categories disregards the findings of this work. The PEIS methodologies are not compatible with the actual habitat needs of sage-grouse, pinyon jay and many of the hundreds of sensitive species listed in Appendix I.

This PEIS was split off from the Fuel Breaks PEIS. BLM deems many mature sagebrush and pinyon-juniper vegetation communities across the project area “departed” and “uncharacteristic” through the use of FRCC and BPS models. This is not an effective basis for conserving existing sagebrush and pinyon-juniper habitats of importance, or for effective habitat restoration. Treatments conducted under these schemes will result in increased sensitive wildlife species habitat loss and fragmentation. The PEIS Vegetation States with very low shrub cover categories the perennial grass categories resemble fuel breaks, rather than wildlife habitat projects.

i. Cheatgrass and Grass Categories

BLM relies heavily on a Meador (2013) Wyoming cheatgrass handbook. BLM uses a crosswalk that supposedly aligns the cheatgrass cover classes used in the PEIS Vegetation State categories with Meador. BLM cover classes are on the right:

Invasion free	= BLM 0%,
Trace 1-5%	= BLM Low IAG 0-5%
Mild 6-25%	= BLM Moderate 6-25%
Moderate 26-50%/Invasion dominated state 51-100%	= BLM High 26%+

There is not a clear rationale why BLM altered an important descriptive term that changes how a category is perceived. Meador described cheatgrass cover of 6-25% as “mild.” The PEIS terms 6-25% cheatgrass cover “moderate.” This is surprising, because many BLM rangeland health assessments use much higher breakpoints of cheatgrass cover to identify land health problems. BLM may use this “moderate” designation to justify extensive manipulation of mature shrub communities with relatively little cheatgrass.

Table F-2 includes a “Shrubs, Perennial Grasses, Forbs, Invasive Annual Grasses” Vegetation State with cover of 6%+ cheatgrass as having “moderate to high” invasive annual grass cover. Thus, BLM categorizes vegetation communities with fairly low amounts of cheatgrass cover (as little as 6%) as having “moderate to high” cheatgrass cover. This very broad cheatgrass category may be used to justify treatment disturbance of large areas of mature sagebrush habitat on the basis of a “moderate to high” categorization.

Use of such broad categories and descriptive terminology may also make it easier for BLM to expand targeted grazing, including after treatment manipulation and seeding, if BLM uses crested wheatgrass in treatment seedings. The PEIS PRR (General Summary of Project) on p. 2 states that all treatments and methods could be used in all vegetation states within the 38.5-million-acre potential treatment area vs. PEIS DEIS p. 4-22 stating re: targeted grazing: “implementation would be limited to areas where invasive or nonnative perennial grasses are dominant or codominant in the vegetation states”. The PRR contradicts the PEIS. Further, BLM’s methodology considers grass Vegetation States with crested wheatgrass dominant/co-dominant as desirable and plans to largely leave them in that condition. These sites are likely to be subjected to targeted grazing.

Meador (2013) Figure 3.8 p. 52 displays a matrix “Departure from the Reference State” developed by Pyke. In this Matrix, “moderate” departure, where “some functional or structural plant groups are missing or under-represented, and invasive species common but not dominant,” Pyke deems the probability of recovery or restoration as “High.” Pyke includes “attempt passive restoration if feasible” as a strategy in these communities. The Pyke matrix used in the Meador reference highlights that the PEIS arbitrarily excluded the use of passive restoration from the PEIS analysis, even though the references BLM relies on in developing its convoluted methodologies specifically include use of passive restoration in vegetation communities with lower amounts of cheatgrass cover.

BLM's very broad vegetation categories set the stage for large-scale manipulation of sagebrush communities that currently have only small amounts of cheatgrass and a high potential for improvement and prevention of cheatgrass dominance if passive restoration, i.e. removal of grazing disturbance pressure, was applied.

Under the PEIS scheme, the vegetation state categorized as "Shrubs, Perennial Grasses, Forbs, and Invasive Annual Grasses" with 6+% cheatgrass cover is described as having "moderate to high" amounts of cheatgrass. An example of how this appears to be applied in PEIS mapping is found in PEIS Map 5b (Idaho). What appears to be the medium green color (colors are difficult to distinguish, see Appendix B) is shown throughout eastern Idaho's Pahsimeroi/Big Lost/Birch Creek/Lemhi Valleys, although these areas still have relatively little cheatgrass cover (Fite, field obs. in these areas). Passive restoration and removing grazing disturbance stress would allow recovery of understory grasses, forbs, and microbiotic crusts, and help buffer climate change stress. Challis and Salmon BLM have already authorized a sprawling sagebrush and Douglas fir treatment project across much of this eastern Idaho region, see Challis and Salmon Sagebrush-Steppe Vegetation Restoration project DOI-BLM-ID-I030-2015-0002-EA proposing treatment of 19,800 acres of conifers (largely Douglas fir) and 144,500 acres of sagebrush cover. The decision is under appeal. This highlights a fundamental problem with the PEIS as it fails to provide mapping and analysis necessary to understand where mature sagebrush and pinyon-juniper communities actually exist across this landscape, and also areas where treatments have already taken place, are authorized or are being planned.

ii. Sagebrush Categories

BLM Table F-2 "Description of the Vegetation States" applies a "Perennial Grass and Forb" state (which could include crested wheatgrass). In PEIS Table 3.6, BLM states: "the Perennial Grasses and Forbs and Perennial Grasses, Forbs, and Shrubs vegetation states are generally intact plant communities and are the desired condition for vegetation treatments within this PEIS." So BLM considers crested wheatgrass "intact" and desired, ignoring that it has long been viewed as a problem by wildlife biologists. Although the "Perennial Grass and Forb" state may support lots of livestock, perennial grass and forb communities will not support sage-grouse, pygmy rabbits or many other sensitive species.

BLM sets the PEIS bar for acceptable shrub astoundingly low in some of the Vegetation States it devises. Table F-1 shrub cover classes are Low – 0-5%, Intermediate – 6-14%, Moderate – 15-25%, and High - 26+%, and BLM cites Connelly et al 2000 Sage-grouse Guidelines and other literature. But when BLM "aggregated" info from Table F-1 into Table F-2, the breakpoint for acceptable shrub cover became as low as 6+% shrub cover in some shrub states. This is unsupported by the sage-grouse references BLM cites. The result in F-2 was: Invasive Annual Grasses and Shrub cover of 6-25% was termed low-moderate shrub cover; Perennial Grasses, Forbs and Shrubs 6+% was termed intermediate to high shrub cover; Shrubs, Perennial Grasses, Forbs and Invasive Annual Grasses shrub cover of 6+% was termed intermediate to high shrub cover; and Shrub with Depleted Understory was termed 15+% (moderate to high) shrub cover.

BLM does not provide a scientific basis for how it arrived at this. The diagram in Figure F-1 provides no citations. The very complex diagram at F-4 similarly provides little clarity and no clear rationales for the

methodology applied. Categorizing sagebrush communities in this manner (where 6+% cover = a shrub community) is divorced from the habitat needs of sage-grouse and other sensitive species. BLM sets the stage for managing for this very small amount of shrub cover which is highly inadequate for nesting Brewer's sparrow sage sparrows, sage thrasher, loggerhead shrike, gray flycatcher, and sage-grouse, and is uninhabitable by pygmy rabbit. See Welch and Criddle 2003. No scientific citations are provided and the basis for the categories appear to come from Landfire models.

BLM appears to have structured the PEIS "Vegetation States" percentages of woody plant cover (or lack thereof), to protect the millions of acres of crested wheatgrass seedings fragmenting sage-grouse and other sensitive and migratory bird species and other wildlife habitats across the region. By defining the grassland and other states with minimal shrub cover as desirable, BLM sets the stage for extensive shrub removal in treatments across the landscape, including purging rabbitbrush and/or sagebrush that may be recovering in seedings. A recent example of such purging shrubs from seedings is Ely BLM Bristlecone FO's Long and Ruby Valleys Watershed EA.

Throughout the PEIS and App. F Sec. F-3, BLM claims that grassland Vegetation States that it deems desirable would prevent fires. But BLM does not take a hard look and conduct a full fire science analysis (fuel characteristics, weather/climatological conditions, climate change effects, etc.) necessary to assess what is actually taking place on public lands with increasingly climate-driven fires. BLM fails to provide baseline information on the prevalence of fires in the grassland type communities it considers desirable. Many big wildfires in Idaho, northern Nevada and eastern Oregon have started in or burned rapidly through these supposedly less fire prone grass communities, and then spread into sagebrush or forests. BLM postfire rehabs that have continued to use crested wheatgrass have often suffered several repeated fires. While BLM claims crested wheatgrass provides a fuel break, the locations of fires on public lands tell a different story. Fires flash rapidly through hotter, drier, windier and often weedier grass communities and often expand to burn very large acreages. Further, these grass communities are more likely to burn under more moderate weather conditions than woody vegetation communities. Expanding rather than reducing grasslands is very likely to make the wildfire situation across the region worse. The PEIS use of, and emphasis on, these grassland categories as desirable, may prevent and hamper restoration focused on removing crested wheatgrass and other aggressive exotic grasses. Removal and diversification of crested wheatgrass and increasing shrub cover has long been proposed as a strategy to restore sagebrush habitats in the West, due to the reduced biodiversity in these exotic grasslands, and the highly competitive nature of crested wheatgrass.

Conservation strategies are vaguely mentioned, but BLM does not specify which strategies for which sensitive species, or explain how the PEIS's extremely broad vegetation states, the project emphasis on replacing shrubs and trees with grass, and the proposed scale of the habitat manipulation will effectively conserve sage-grouse or other sensitive species.

BLM also states it used a "historical vegetation layer" from Landfire, called Biophysical Settings, to identify the extent of sagebrush by extracting the sagebrush and associated habitats that occurred historically on the landscape, and that this layer was chosen over the Existing Vegetation in order to capture areas historically supporting sagebrush communities. The Landfire "historical vegetation layer" modeling relies heavily on range scientists and not foresters, and often ignores actual historical records.

Landfire models typically use short fire intervals that do not reflect the historical record, and the fire intervals accepted by many ecologists and wildlife biologists, such as those used in Welch and Criddle 2003, Connelly et al. 2004, Baker 2006, Baker Chapter in Knick and Connelly 2011. Also see Appendix A.

It is also a black box of sorts, where depending on the specific information BLM chose to use, different results could be obtained. Landfire also often relies on models with often extremely broad categories. BLM fails to provide an adequate description of specific steps it took to vet the validity of the assumptions that underlie the modeling it used, and the vegetation categories and descriptions in Appendices F and H, and the PEIS reliance on FRCC, BPS and other models for restoration.

It is essential that the EIS provide detailed project mapping of existing vegetation “EVT” across all land ownerships so the location and amount of extant sagebrush and pinyon-juniper vegetation across the project area can be understood and serve as part of the project baseline for understanding the current amount of habitat loss and fragmentation that the massive PEIS treatments would add on. This is also basic information necessary to develop a suitable range of alternatives, and to ensure that habitat loss and fragmentation does not exceed levels necessary to maintain viable local and regional populations of sensitive species like sage-grouse, pinyon jay, and other biota listed in Appendix I. Moreover, many migratory bird species that have been considered common are now known to be undergoing large-scale declines, as described in Rosenberg et al 2019. This study particularly found declines in forest and “grassland” birds (the latter category may include several sagebrush species).

While F-5 acknowledges that “species are likely to be more resilient if large populations exist in large blocks of high-quality habitat across the full breadth of environmental variability to which the species is adapted (Chambers 2014),” the vegetation categories and contrivances in Appendices F and H lay the groundwork for large-scale new loss and fragmentation of habitats, as does the PEIS failure to consider passive restoration for sagebrush communities not yet inundated with cheatgrass.

F-5 states that BLM identified Priority areas for conifer treatment using a 6.2-mile buffer around sage-grouse leks and mule deer winter habitat, without any explanation. PEIS at 3-20 states: “Over 90 percent of sage-grouse nesting habitats occur within 6.2 miles of occupied leks (Aldridge and Boyce 2017) ... 34,556,000 acres are within a 6.2-mile buffer of occupied leks.”

The PEIS relies on a theory that destroying forests far away from leks will revive plummeting sage-grouse populations. This theory is blind to the actual configuration of western landscapes in which sage-grouse evolved. Use of a 6.2-mile distance means most mountain ranges in Nevada and many other areas of the West could be radically deforested to fulfill the PEIS goals. Historical information provides abundant records of many Nevada Basin and Range mountain ranges being heavily forested. See Appendix A, Lanner 1981, Young and Svejcar 1999, Romme et al. 2009, Lanner and Frazier 2011, Lanner 2012. Sage-grouse likely could not have historically inhabited much of the project landscape if trees several miles from leks were a significant problem for populations. Recently Connelly et al. 2019 described sage-grouse populations across the West suffering significant declines: “agencies continue to disregard the evidence and recommendations of scientists and continue to support prescribed fire and other sagebrush treatments as generally appropriate management tools for sagebrush landscapes. Additionally, state and federal agencies pursue management programs including conifer control and

predator control that have questionable value for conserving sage-grouse at a landscape scale (Connelly 2013)."

F.2. BLM's methods for conifer phases ignored analysis of forest attributes, structural complexity and species habitat needs, and instead merely lumped trees into Phase I, II, III artificial categories based on cover, with even the highest cover class having only 31% tree cover. See Appendix A discussion of papers by Romme et al. 2009, Lanner and Frazier 2011 and others.

F-5. BLM fire history describes burn years 2008-2017 overlaid with the phases to identify the recently burned phase 1 areas, but it appears fires in Phase II and Phase III were inexplicably not overlaid and mapped?

b. Fuel Models, Fire Regimes, and Vegetation Departure (Appendix H)

The Landfire-derived Fire Regime Group descriptions often contain estimated historic fire/disturbance intervals that are very short, and sagebrush canopy cover percentages that are often too low to support sage-grouse and other sensitive species habitat needs. Yet these models form the basis of the EIS analysis. What are the underlying scientific sources that support the Landfire input models that BLM uses in Appendices F and H?

Use of the Landfire vegetation community models would often keep woody plant communities from existing on the land as late successional or climax stages, i.e. as fully developed forest and/or shrubland. Under the models, cheatgrass burns too frequently (which is true), but mature forests and sage have not burned frequently enough to fit the model, and the remedy is treatment disturbance. The modeling is based on the communities needing frequent disturbance.

Mature sagebrush communities often exceed the amount of canopy cover the Landfire BPS models typically allow or consider "characteristic." Sagebrush with good microbiotic crust cover but sparser grass cover, and sites where grazing has depleted understory plants, are considered "departed" and found to be "uncharacteristic." The end result of using these models to identify woody vegetation communities for drastic disturbance treatments is that mature sagebrush that provides the necessary canopy cover and structural complexity to provide habitat suitable for pygmy rabbit, Brewer's sparrow, sage thrasher, sage sparrow and sage-grouse will be mowed, roller-beat or otherwise reduced or removed. See Welch and Criddle 2003. Passive restoration, removing grazing disturbance to heal understories, is ignored, even though one of the only sources (Mealor 2013 citing Pyke matrix) that BLM relies on in deriving its cheatgrass methodology refers to using passive restoration in communities with lesser amounts of cheatgrass.

Sec. H.3 provides Fire Regime Group descriptions (pps. H-9 to H-24). Some Examples in PEIS H-3 "Fire Regime Group" descriptions:

Big sagebrush fire regime III Inter-Mountain Sagebrush Steppe and Shrublands. "Sagebrush cover varies between 3- 25% in the mature stage, but averages around 12%." How can an area be considered a sagebrush community with only 3% sagebrush cover? An "average cover" of 12% Wyoming sagebrush is

also low. See https://www.fs.fed.us/rm/pubs/rmrs_rp040.pdf. Countering the range theories that underlie the modeling of fire regimes and vegetative cover categories BLM uses, Welch and Criddle (2003) examined “what do the animals that coevolved with big sagebrush suggest to us concerning canopy cover ... sagebrush obligates such as sage thrasher (*Oreoscoptes montanus*), Brewer’s sparrow (*Spizella breweri*), and sage sparrow (*Amphispiza belli*) prefer big sagebrush canopy cover of 20 to 36 percent (Best 1972; Feist 1968; Grinnell and others 1930; Knick and Rotenberry 1995; Petersen and Best 1986, 1991; Reynolds and Trost 1980, 1981; Winter and Best 1985).” Welch and Criddle pps. 2003 1-2.

H-9. “Fires may have occurred as frequently as every 10 years to as infrequently as every 150 years.” It would be impossible to have a Wyoming Big sagebrush community persist with 10-year fire return intervals. Perhaps BLM is referring to a statement in the Stebleton and Bunting (2009) reference mentioned elsewhere in this Appendix? “Cheatgrass dominance has shifted the mean fire return interval from several decades to 100+ years, in healthy Wyoming big sagebrush-dominated communities (Wright and Bailey 1982), to less than 10 years in many places (Whisenant 1990).” Wouldn’t this mean a site with such low intervals is no longer a sagebrush community?

Also, from the Stebleton and Bunting publication that BLM relies on: “Woodland encroachment by pinyon pine and juniper has caused a major shift in species assemblages and altered fire regimes of sagebrush steppe landscapes (McIver et al. 2010). The average fire return interval has shifted from 10–50 years, in healthy mountain big sagebrush-dominated communities, to more than 50 years (Miller et al. 1999, Miller and Tausch 2001).” Stebleton and Bunting use outdated short fire return intervals and other assumptions for sagebrush and pinyon-juniper communities in their assumptions and modeling. This also serves to illustrate how the underlying Landfire models BLM uses work: If you plug in short fire intervals (as BLM invariably seems to do), they predict a sagebrush community. If you plug in longer intervals, they predict a forest.

Regarding sagebrush communities: How would the PEIS mapping and analysis differ if the fire rotations described in Baker (2011) were used in its mapping, modeling and analysis for sagebrush? Baker (2011) states: “To better understand the historical range of variation (HRV) of fire in sagebrush ecosystems and whether sagebrush fire regimes today have too much or too little fire, I estimate **fire rotation (expected time to burn the area of a landscape)** in sagebrush ecosystems under the HRV. Estimates derived from five sources are >200 yr. in little sagebrush (*Artemisia arbuscula*), 200–350 yr. in Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*), 150–300 yr. in mountain big sagebrush (*A. tridentata* ssp. *vaseyana*), and 40–230 yr. in mountain grasslands containing patches of mountain big sagebrush with longer rotations in areas where sagebrush intermixes with forests. Landscape dynamics under the HRV were likely dominated in all sagebrush areas by infrequent episodes of large, high-severity fires followed by long interludes with smaller, patchier fires, allowing mature sagebrush to dominate for extended periods.”

How would the PEIS modeling, analysis and mapping differ if BLM used Wyoming big sagebrush canopy cover values found in Connelly et al. 2000 for shrub cover in Vegetative States? Or the canopy covers necessary for sagebrush sensitive species, as described in Welch and Criddle (2003) ? How would it differ if BLM applied the concept of persistent pinyon-juniper communities (Romme et al 2009) Intermountain Society of American Foresters Position paper (2013)?

H-9. The PEIS also advances a “poke hole” fire theory for fire return intervals. “Fire played a role in the disturbance history of these sites although the dry nature and inherently low productivity of these plant communities limits the fire occurrence. Fires may have occurred as frequently as every 10 years to as infrequently as every 150 years ...The smaller sized fires served to “poke holes” in the general canopy of denser stands, preserving an overall average canopy closure that is considered open ... historical average fire return interval was 30-60 years.” The sagebrush fire return interval poke hole theory is akin to the juniper savanna claims discussed in Romme et al. 2009.

BLM fails to address the weather-driven wildfires and climatological features that are responsible for very large acreages burning in recent years. See comments submitted by Western Watersheds et al. dated August 5, 2019 on the Great Basin Fuel Breaks Draft Programmatic Environmental Impact Statement. Weather-driven fires do not behave like the BLM’s “poke hole” theory of fire causing relatively limited and predictable disturbances to sagebrush vegetation communities.

H-15. There are only two juniper habitat types within the categories used in PEIS Appendix H. There is no discussion or identification of persistent pinyon-juniper communities. See Romme et al. 2019, Intermountain Society of American Foresters Position Paper 2013 and Appendix A.

Regarding fire and the Appendix information underlying it, PEIS p. 4-5 “Wildland Fire and Fuels” is confusing. It reveals the underlying conflict between BLM claims that this PEIS is being conducted to benefit sage-grouse (whose habitats are suffering from too much fire), and the PEIS’s use of the Landfire FRCC, BPS and other modeling that often uses short fire return intervals and other model inputs fraught with assumptions that may bear little reality to conditions on the land. The Landfire FRCC and BPS models were developed based on the underlying assumption that there often has not been enough fire taking place, and “fire severity” is factored into FRCC categories, with assumptions that fires won’t be as severe in grassier states. In the words of Ely BLM, the system is “out of whack” because of the lack of fire/disturbance, so more disturbance (i.e. treatments) is needed.

Sec. H.4 Fire Regime and Departure Methodology describes a series of steps BLM took, based on the models and info on Landfire (successional class layers, vegetation associated with departure classes, identifying departure and “uncharacteristic” vegetation).

H-25 shows BLM used Vegetation Departure layers from Landfire “to determine how far existing vegetation has departed from historical reference conditions.”

PEIS Table 3.4 displays the fire return intervals based on Schmidt et al. 2002, a publication related to the Landfire site. Concerns about use of Schmidt Landfire techniques are raised by Romme et al. (2009) pinyon-juniper Synthesis p. 211 which states: “We emphasize that historical fire rotations and point intervals were much longer than is often assumed for pinon or juniper vegetation in general (e.g., Schmidt et al. 2002).”

It is not clear how, or if, BLM considered the sagebrush historical fire regime information in Baker (2011) in considering the sagebrush habitat needs of sage-grouse and other sensitive species that the PEIS is supposed to be restoring habitat for. The most recent sage-grouse article by wildlife biologists in

Appendix F-4 is a 17-year old habitat monitoring paper from 2003. The Baker (2011) paper is also absent from the general PEIS literature Appendix.

Recommendations: BLM must clearly describe its methodologies and assess the scientific information they are based on including considering alternative scientific viewpoints. An EIS for restoration of sagebrush and pinyon-juniper ecosystems must use sound baseline mapping and biologically meaningful categories for existing sagebrush, pinyon-juniper and other often diverse habitats across all land ownerships. Accurate mapping of sensitive species habitat and baseline species surveys must take place as part of the EIS process. Analysis must consider the diversity and complexity of native woody vegetation communities and the habitats they provide for the several hundred sensitive species listed in Appendix I. It must not adopt broad one-size-fits-all treatment schemes. It must consider actual historical records of forest occurrence. See Romme et al. 2009, Lanner and Frazier 2012, Appendix A. Vegetation categories and breakpoints relevant to the life history needs of sensitive species must be used in any analysis effort. BLM should abandon this Programmatic EIS effort and rely on more localized EISs with projects developed by sage-grouse biologists and by biologists with expertise on the habitat needs of pinyon jay and other pinyon-juniper wildlife to conduct actual restoration, emphasizing passive restoration in communities not yet overrun with cheatgrass or seeded with created wheatgrass, while protecting a broad range of sensitive species habitats, biodiversity and a wide range of public land values.

XV. The PEIS must assure that post-treatment management will not undo restoration treatments

After spending significant amounts of taxpayer money on restoration projects, it only seems prudent to make sure that future management activities do not degrade the project areas and that the restoration investment is maintained. Further, doing so is cited as restoration best practice (e.g., see McDonald et al. 2016 stating that site selection should include an assessment of the potential for adequate arrangements for ongoing prevention of impacts and maintenance on the site after completion of the project to ensure that the site does not regress into a degraded state.). The PEIS should establish that one criterion for siting projects is the potential for maintaining ecological conditions post treatment and require accountability for the claim (e.g., see Pyke et al 2018, page 41 and Crist et al. 2019, page 190). This might require as part of or subsequent to the implementation project an RMP amendment (for instance, to remove lands from oil and gas leasing or shift grazing post-treatment), a travel management plan to reduce or remove OHV activity, an allotment management plan amendment to address potential grazing impacts, or permit modification to rest lands from grazing.

Recommendation: The PEIS establishes that 1) projects are sited where post-treatment land management practices will enable sustainability of desired ecological conditions, and 2) post-treatment management of the project area sustains desired conditions. This may require amending existing plans or permits.

XVI. The Project Area improperly includes lands within the Colorado Plateau

The BLM's reasoning underlying the need for the proposed EIS is that "sagebrush communities are disappearing within the Great Basin due to the interactions of increased wildfires, the spread of invasive annual grasses, and the encroachment of pinyon-juniper."⁵³ However, the area encompassed by the proposed EIS extends far east, including nearly all of Utah and overlapping significantly with the Colorado Plateau.⁵⁴ It is generally agreed that the western boundary of the Colorado Plateau extends far into southwest Utah and is separated from the Great Basin by the Wasatch Fault (i.e., Wasatch Mountains).⁵⁵ The Plateau's boundaries encompass famous sites within Utah like Zion National Park, Bryce Canyon National Park, and Grand Staircase-Escalante National Monument.

The BLM itself recognizes the distinction between the two regions, noting in its Rapid Ecoregional Assessments program that the Colorado Plateau is a separate ecoregion from the Great Basin.⁵⁶ The following shows how BLM visualizes the Plateau's boundaries:

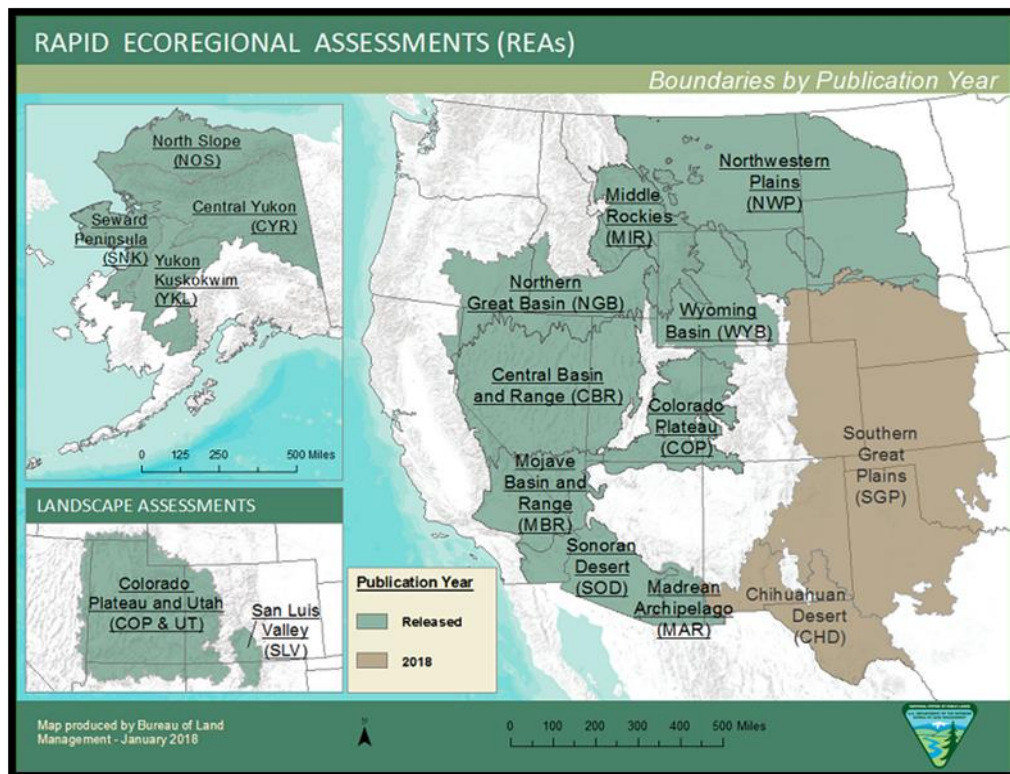


Figure 1: BLM Rapid Ecoregional Assessment Boundaries, Which Separate the Colorado Plateau and the Great Basin

⁵³ PEIS, 1-3.

⁵⁴ PEIS, Appendix A, Map 1.

⁵⁵ Richard F. Miller et al., *The Ecology, History, Ecohydrology, and Management of Pinyon and Juniper Woodlands in the Great Basin and Northern Colorado Plateau of the Western United States*, 6 (2019).

https://www.fs.fed.us/rm/pubs_series/rmrs/gtr/rmrs_gtr403.pdf

⁵⁶ BLM, *Data for Public Land Management*, <https://www.blm.gov/about/how-we-manage/data-for-public-land-management>.

Despite this generally agreed upon distinction between the Great Basin and Colorado Plateau, the Draft PEIS includes tens of thousands of acres of the Colorado Plateau within its “Great Basin” planning area but failed to provide any analysis specific to the Colorado Plateau. Due to the unique geomorphology of the Colorado Plateau, this portion of the existing project area either must be removed from the Project and Analysis Areas, or be given its own specific treatment in the PEIS.

a. Soils

One of the differences between the Great Basin and the Plateau are soil types and the role of soil systems in supporting the very different arid ecosystems.

The soils of the Great Basin are, on average, much more saline than those of the Plateau.⁵⁷ This increased salinity has an “overriding effect...on plant distribution in the Great Basin,” an effect that is largely absent from the Plateau.⁵⁸ This should concern BLM because soil salinity affects what types of sagebrush communities will be found in an area.

On the Colorado Plateau, the ecosystem is held together by biological soil crust. This crust is formed by living microbiotic organisms and plays a critical role in capturing rainwater, preventing flash flooding and erosion, and retaining moisture in the ground, allowing native plants to thrive. These soil crusts are incredibly delicate, and the heavy machinery used in mechanical vegetation removal leaves areas that rely on these soil crusts denuded and susceptible to wind and water erosion. Biological soil crusts provide stability to water and nutrient cycles that is essential to reducing the risk of desertification. Even prompt reseeding of an area damaged by surface-disturbance (such as chaining, mastication, and other treatments that utilize heavy machinery) does not rectify a high risk of increased desertification, because cryptobiotic soil takes decades to grow. It is the soil-disturbing nature of these treatments that imparts inherent dust-production risk, leaving large areas of exposed, disturbed soils.⁵⁹

b. Vegetation

Vegetation also differs significantly between the Great Basin and the Colorado Plateau. This is another reason that the Colorado Plateau should not be included in the PEIS.

“The Colorado Plateau differs from the Great Basin in having greater amounts of summer rainfall, in some regions less predictable rainfall, sandier soils, and streams which drain into river systems rather than closed basins and salt playas.”⁶⁰ A result of these differences is that the Colorado Plateau has “a

⁵⁷ Comstock, Jonathon P. and Ehleringer, James R. (1992) "Plant adaptation in the Great Basin and Colorado Plateau," Great Basin Naturalist: Vol. 52: No. 3, Article 1, 197. <https://scholarsarchive.byu.edu/gbn/vol52/iss3/1>

⁵⁸ *Id.*

⁵⁹ Duniway, M.C., Pfennigwerth, A. A., Fick, S. E., Nauman, T. W., Belnap, J., & Barger, N. N. (2019). Wind erosion and dust from US drylands: a review of causes, consequences, and solutions in a changing world. *Ecosphere* 10(3), e02650. doi: 10.1002/ecs2.2650

⁶⁰ Comstock at 195.

somewhat greater diversification of plant habit, phenology, and physiology” as compared to the Great Basin.⁶¹

A specific example of these vegetation differences are the variations of pinyon and juniper found in the two provinces. While western juniper (*Juniperus occidentalis*), Utah juniper (*Juniperus osteosperma*), and singleleaf pinyon pine (*Pinus monophylla*) occur in the Great Basin, the Colorado Plateau is host to Utah juniper, one seed juniper (*Juniperus monosperma*), and two needle pinyon (*Pinus edulis*).⁶² These differences in species are more than nomenclature; they matter and have an observable effect on vegetation distribution.

One study found that pinyon and juniper woodlands in areas of the Colorado Plateau have actually been in decline over the past century, while at the same time those woodlands within the Great Basin have experienced increased tree density.⁶³ The study noted that findings of pinyon-juniper woodlands expanding in the Great Basin were concentrated on western juniper, while findings supporting the decline on the Plateau focused on Utah juniper and two needle pinyon.⁶⁴ Other studies have also recognized that the rates of woodland expansion and increase in tree density was possibly less on the Colorado Plateau than the rates observed in the Great Basin.⁶⁵

One of BLM’s primary reasons for undertaking these fuels reductions is to respond to the encroachment of pinyon-juniper woodlands. Because that encroachment is not occurring in some areas of the Colorado Plateau and occurring at a slower pace in other areas of the Plateau as compared to the Great Basin, it is inappropriate for any areas of the Colorado Plateau to be included in the Great Basin PEIS.

c. Fire Regime

There is a significant difference in fire regime between the Great Basin and Colorado Plateau, with less frequent fires and a longer fire return interval for the Plateau.

A Rocky Mountain Research Station General Technical Report on fire ecology in southern Utah states that fire may have been less frequent in many areas of the Colorado Plateau compared to the Great Basin.⁶⁶ In a study of trends of large wildfires in the West, the Colorado Plateau ecoregion had too few large fires to be included in the trend analysis.⁶⁷ In terms of fire return intervals, a summary of studies

⁶¹ *Id.*

⁶² Chambers, Jeanne C., Leger, Elizabeth, and Goergen, Erin (2009) Cold Desert Fire and Invasive Species Management: Resources, Strategies, Tactics, and Response, *Rangelands*, 31(3): 14-20.

⁶³ Arendt, P. A., and W. L. Baker. 2013. Northern Colorado Plateau pinon-juniper woodland decline over the past century. *Ecosphere* 4(8):103. <http://dx.doi.org/10.1890/ES13-00081.1>

⁶⁴ *Id.* at 13.

⁶⁵ Hood, Sharon M. & Miller, Melanie, editors. 2007. Fire ecology and management of the major ecosystems of southern Utah. Gen. Tech. Rep. RMRS-GTR-202. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 110:59. Available: http://www.sagestep.org/educational_resources/bibliographies/articles/rmrs_gtr202.pdf.

⁶⁶ *Id.* at 59.

⁶⁷ Dennison, P. E., S. C. Brewer, J. D. Arnold, and M. A. Moritz (2014), Large wildfire trends in the western United States, 1984–2011, *Geophys. Res. Lett.*, 41, 2928–2933.

done by the Rocky Mountain Research Station found that the mean fire return intervals near some sagebrush communities “tended to be shorter for sites in the Central Basin and Range (24.8 years) than the Colorado Plateaus (61.3 years) or Wasatch and Uinta Mountains (39.9 years) ecoregions.”⁶⁸

These differences in fire regime are confirmed by data from LANDFIRE, a shared program between USDA and the Department of the Interior. The most recent data available from LANDFIRE shows a significant difference in Mean Fire Return Interval between the Colorado Plateau and Great Basin. The following map depicts this difference within the planning boundary for this project:

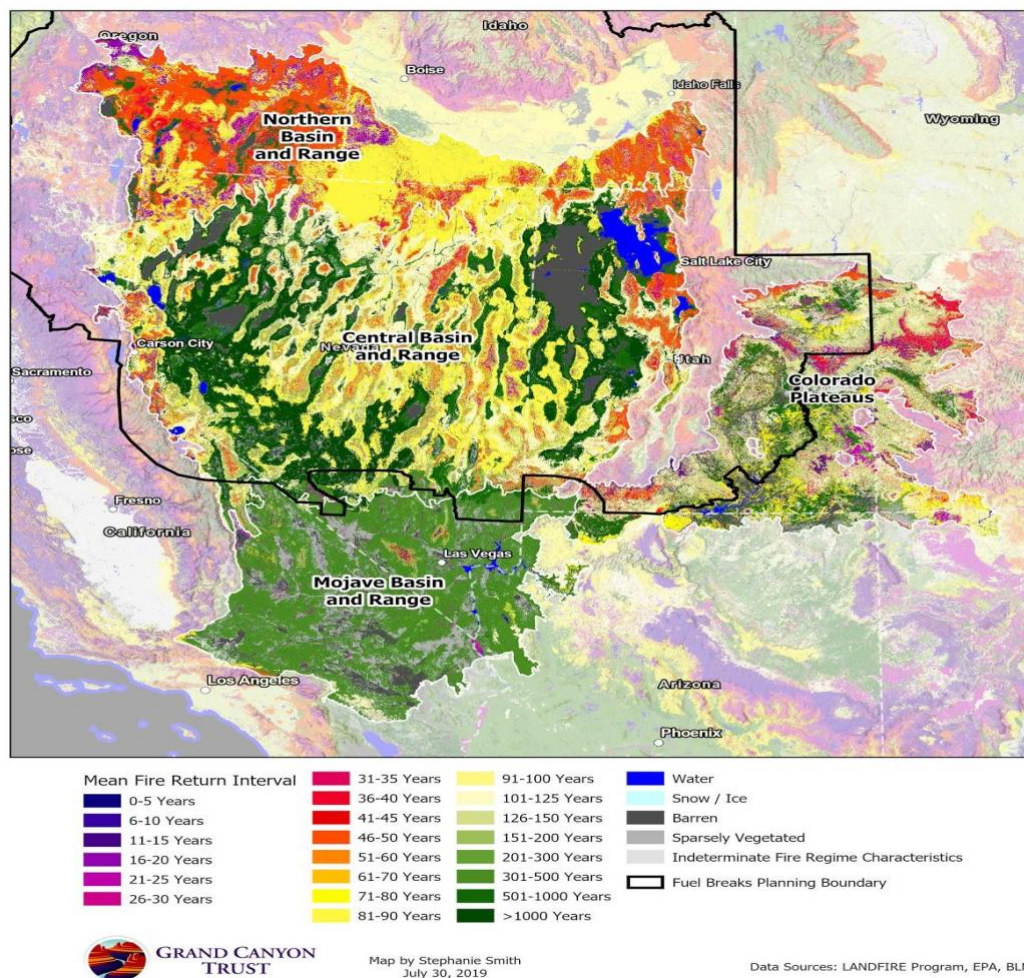


Figure 2: LANDFIRE Mean Fire Return Intervals for the Colorado Plateau Compared with the Basin and Range Ecoregions

⁶⁸ Innes, Robin J.; Zouhar, Kris. 2018. Fire regimes of mountain big sagebrush communities. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/fire_regimes/mountain_big_sagebrush/all.html.

The following graph shows the quantitative differences in Mean Fire Return Interval between the Colorado Plateau and Basin and Range ecoregions:

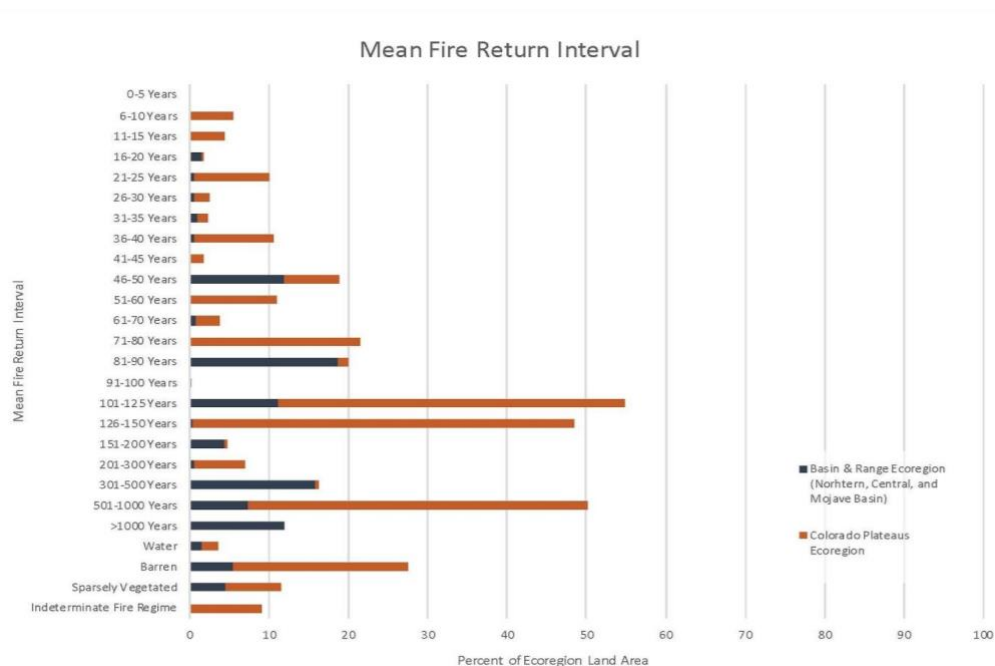


Figure 3: LANDFIRE Mean Fire Return Intervals for the Colorado Plateau and Basin and Range Ecoregions

If these ecoregions had similar fire regimes, one would expect the ecoregions to have a similar percentage of land in the various fire return interval categories. Instead, as one can see in Figure 3, this is not the case when comparing these ecoregions, and there are very few fire return interval categories for which the percentage of land area in the ecoregions is similar.

Additionally, a significant difference in Percent Replacement-Severity Fire is also seen between the two ecoregions. This corresponds to the concern about high-severity wildfire mentioned in the Purpose and Need of the Draft PEIS. Percent Replacement-Severity Fire is not only much more variable across the Colorado Plateau compared to the Great Basin, it is also generally lower.

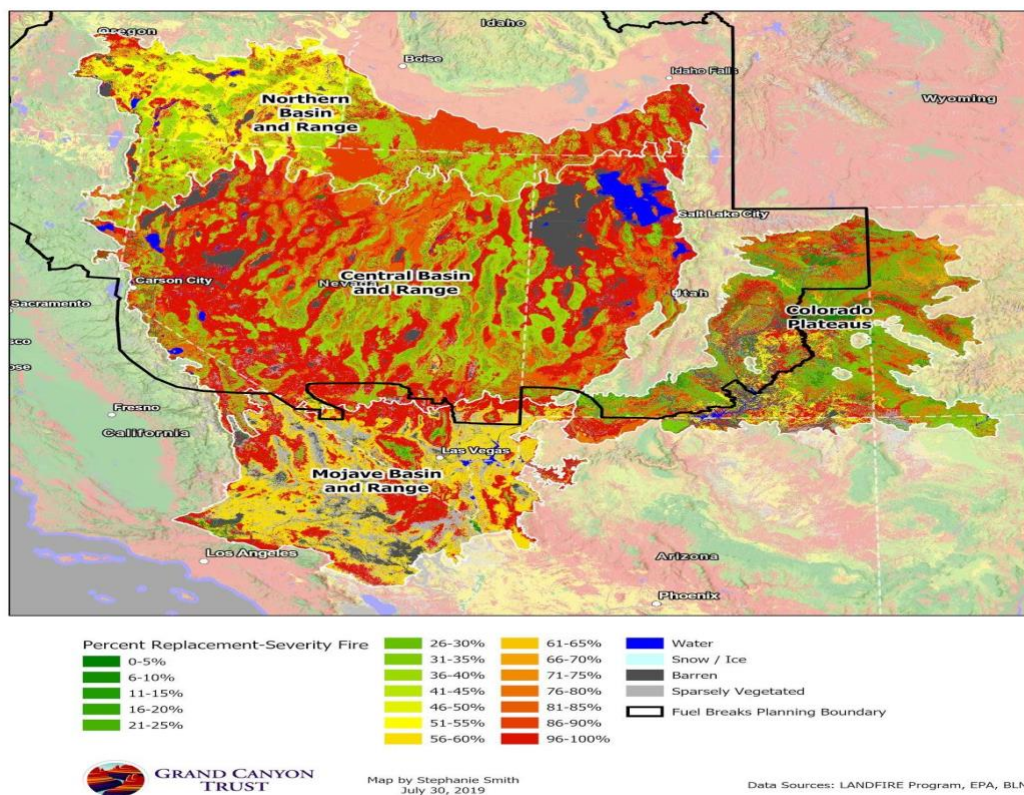


Figure 4: LANDFIRE Percent Replacement-Severity Fire Data for the Colorado Plateau and Basin and Range Ecoregions

The following graph shows the quantitative differences in Percent Replacement-Severity Fire between the Colorado Plateau and Basin and Range ecoregions:

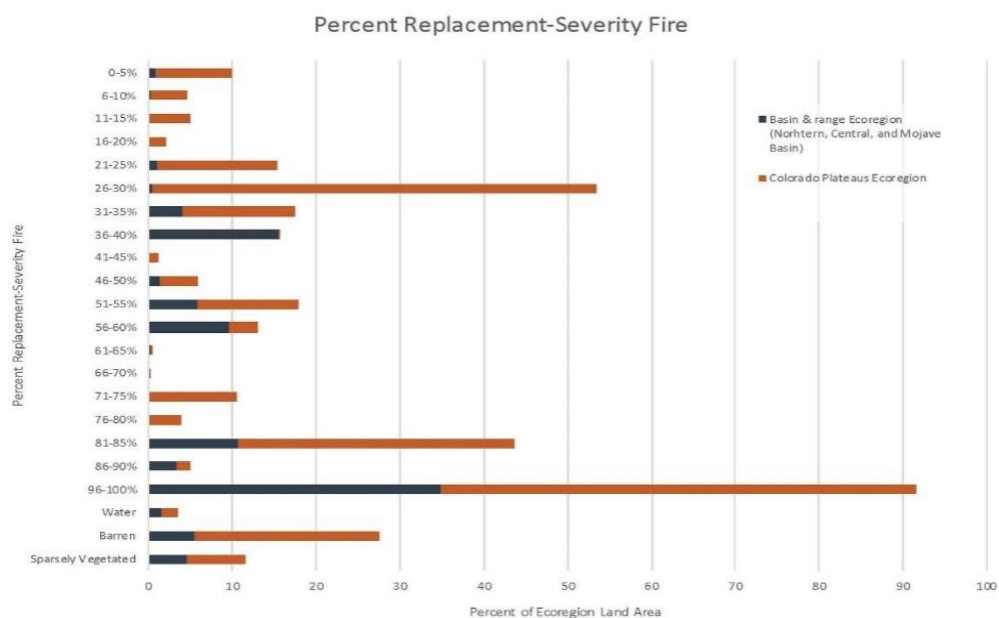


Figure 5: LANDFIRE Percent Replacement-Severity Fire Data for the Colorado Plateau and Basin and Range Ecoregions

Again, if these ecoregions had similar fire regimes, one would expect the ecoregions to have a similar percentage of land in the various replacement-severity fire categories. Instead, as one can see in Figure 5, this is not the case when comparing these ecoregions, and the vast majority of replacement-severity fire categories show a markedly different percentage of land area between the ecoregions.

BLM must analyze these differences in fire regime and explain how the Plateau's fire regime, with longer return intervals and less frequent fires, justifies the same fuels reductions measures as the Great Basin. BLM has not done so in the PEIS and therefore cannot include the Colorado Plateau within the project area.

d. Climate (Weather)

Although the Plateau and the Great Basin have similar general climates, precipitation is a major climatic difference between the two regions. A Rocky Mountain Research Station General Technical Report on fire effects in the Great Basin highlights that the climate of the Great Basin differs from that of the Plateau.⁶⁹ The Report notes that summer precipitation in the form of monsoon rains is different between the two provinces, with the monsoonal influence being weak in the Great Basin compared to the Colorado Plateau.⁷⁰ More specifically, the Great Basin typically gets less than 25 percent of its total annual precipitation during the summer months with some areas receiving less than 5 percent.⁷¹ In contrast, the summer precipitation on the Plateau accounts for 25-55 percent of the total annual precipitation.⁷² The Great Basin, on the other hand, receives most of its precipitation through snow in the winter months and then snow melt in the warmer months.

These climatic differences influence growing season, vegetation and soil moisture, and susceptibility to fire. Many of the BLM's assumptions underlying the purpose and need for these fuel reductions (i.e., increased wildfires, invasive annual grasses, encroaching pinyon-juniper) are all heavily influenced by the cycles of precipitation in the region. The key differences in precipitation between the Great Basin and Colorado Plateau, and how those differences affect BLM's assumptions, must be analyzed if BLM wants to include areas of the Plateau within the PEIS. Because this analysis has not been done, any areas of the Plateau must be excluded.

Recommendations: Due to all the differences highlighted above and more, BLM cannot include the Colorado Plateau within the project area of these fuels reductions concentrated on the Great Basin. The two are distinct ecoregions and geologic provinces. The BLM is taking a regional strategic approach to protecting, conserving, and restoring sagebrush communities in the Great Basin.⁷³ That approach should remain regional to the Great Basin and leave any areas of the Colorado Plateau out.

⁶⁹ Miller et al., 5 (2013).

⁷⁰ *Id.* at 6.

⁷¹ *Id.*

⁷² *Id.* at 7.

⁷³ PEIS, 1-2.

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APPENDICES

Appendix A – Historical and Ecological Information Related to Pinyon-Juniper Forest Vegetation Community

Appendix B – Mapping Concerns and Uncertainty

Appendix C - Sagebrush treatments in Greater Sage Grouse Habitat

Appendix D - Letter from scientists to BLM state sage grouse coordinators dated April 6 entitled “Comments on Greater sage-grouse Draft Supplemental Environmental Impact Statements

Appendix E – Recent, current and Reasonably Foreseeable Disturbances to the Sage Brush Biome in the Great Basin

Appendix A – Historical and Ecological Information Related to Pinyon Pine and Juniper Forest Vegetation Community

Overview

There is little evidence that pinyon-juniper forest has expanded dramatically across much of the Great Basin (Lanner 1981, Romme et 2009, Lanner and Frazier 2011, Lanner 2013). The region underwent widespread 1800s and early 1900s mining and settler era deforestation, and has suffered long-term livestock grazing and ranching impacts including burning, and other human disturbance.

In visiting Nevada during the mining boom, Sargent (1879) in “The Forests of Central Nevada” lamented the magnitude of deforestation taking place:

The forests of Nevada consisting of a few species are of immense age [and] reach maturity only after centuries of exceedingly slow growth ...large areas of forest-covered mountain ranges are still held by the general government ...

Sargent continued, describing the forests as: “...reservoirs of moisture on the existence of which the future of this region depends, it would seem wise to check or at least to regulate the terrible destruction of forests which follows on both public and private domain, every new discovery of precious metals”.

Young and Svejcar (1999) “Harvesting Energy from Great Basin Woodlands” describe 1800s mining era and continued white settler impacts across the region, including the widespread practice of promiscuous burning by stockmen: “Deforestation by cutting and promiscuous burning continued unabated until the 1920s and 1930s.”

Across the region, the large-scale deforestation and other degradation associated with settlement was accompanied by serious soil erosion, watershed degradation, stream flow loss and harmful impacts to the habitats and populations of many wildlife species.

Early exploration and scientific records, investigation of historical accounts, and Interior’s own General Land Office survey records demonstrate the historical prevalence of pinyon-juniper forests. Settlement of the region ran on wood. Since that era, trees in some areas have re-occupied sites where they were cut for charcoal, fuelwood, fence posts, railroads and other uses, or sites where they were burned in fires purposefully set by stockmen trying to increase grass production for livestock on ever more depleted ranges. The region’s forests now face significant new threats of warmer temperatures associated with climate change (Comer et al. 2012), drought and other stressors, plus the onslaught of federal agency manipulation and eradication projects.

The picture of pinyon-juniper forest extent and fire intervals obtained from historical records sharply differs from those of the convoluted models and assumptions BLM makes in assigning diverse forests into three simplistic cover “Phases”. BLM assumptions and models peg forests as “departed” and “uncharacteristic” from the historical condition, and thus in need of treatment. In contrast, foresters and forest ecologists recognize that pinyon-juniper fire return intervals often span several centuries, that the forests naturally burn in stand replacing fires with very long fire return intervals., that claims of expansion are often overblown, that what BLM terms “encroachment” and “invasion” may really be re-occupation, and they recognize persistent pinyon-juniper forest types. Romme et al. 2009, Bauer and Weisberg 2010, Lanner and Frazier 2011, Lanner 2013.

Interior houses the General Land Office records. They have considerable utility in understanding historical vegetation communities - in particular the earliest surveys and surveyors notes and mapping where available. BLM fails to use these records in obtaining a more accurate understanding of pinyon-juniper forests. For example, Bukowski and Baker (2013) reviewed largely sagebrush vegetation communities in 1800s General Land Office survey records across significant portions of four western states to examine fire return intervals, and found dense sage frequently occurred, and that sagebrush was often adjacent to forested vegetation. In another instance, when wildlife advocates reviewed BLM General Land Office records for an area in western Owyhee County, it was found that western juniper forest historically extended across the Juniper Mountain landscape in an area where BLM Ecosite models that used short fire return intervals (using methods similar to those in the PEIS) had modeled that forests should not exist. FRCC and other information, similar to that found on the Landfire site, was used in the BLM Juniper Mountain modeling where nearly all forested areas were modeled to be sagebrush. (Fite, pers. obs.). It is very difficult to track the methods and inputs used by agencies in deriving supposed historical disturbance intervals used in FRCC, BPS and Ecosite models, and how they are being applied to a landscape.

If short fire return intervals are used in BLM projects like the PEIS, then the modeling predicts a forest could not exist on a site because the site burns too frequently. Hence the site is classified as a sagebrush community, and not a forest. Or, the models predict tree cover should be sparse because of frequent fires. This modeled “desired” community is then compared to the forest that actually does exist on the site. The real-world forest does not fit the model. BLM uses its modeling to create an alternate reality where late successional plant communities are “departed” and “uncharacteristic” and must be chained, cut, bulldozed, burned and cleared away altogether or greatly thinned. Mature sagebrush fares the same. Modeling shows it as being too dense, and in need of disturbance. So sagebrush is mowed, crushed, thinned to levels unsuitable for sagebrush sensitive species. The maps used in BLM projects often depict not the actual sagebrush or forest vegetation present on the landscape, but the vegetation community the modeling predicts should be present.

While this modeling may achieve range goals of increased grass forage production, these goals are very often incompatible with sensitive species wildlife habitat and population needs and biodiversity conservation.

BLM, USFS and Other Agency Past Treatments

A later era of deforestation and sagebrush eradication took place in the 1950s-1970s. Federal agencies destroyed vast areas of trees and sagebrush to try to eke out more forage for domestic livestock on depleted public lands. Agencies forthrightly stated the tree and sage eradication was being conducted to produce more forage. Lands were often re-seeded with crested wheatgrass and other exotic cattle forage grasses. (Lanner 1981, Connelly et al. 2004, Romme et al. 2009). These treatments led to large-scale declines in sage-grouse.

In many areas where BLM and range specialists (who often have a perspective biased towards maximizing grass cover), claim trees are invading, expanding and encroaching, the trees are re-occupying sites that where white settlement deforestation and/or federal agencies had removed forest cover that BLM itself had previously destroyed in past treatments.

The PEIS mapping, models and analysis fails to provide a baseline of 1960s-70s era and other treatments, including the new recent wave of increased treatments that accompanied federal fire policies of the early 2000s, and now have expanded dramatically as agencies undertake efforts promoted to forestall ESA listing of sage-grouse.

Lack of Research, Reliance on Unproven Theories

Lanner (2012) describes 1950s and 1960s era agency hysteria over pinyon-juniper invasion and encroachment, and the arsenal of treatments using bulldozer chaining, burning, clearcutting and herbicides that BLM used, identical to those of the PEIS.

The alternate hypothesis to the range perspective pinyon-juniper invasion theory is that “expanding” forests represent successful re-establishment of resilient forests destroyed in the past. Historical accounts of extensive pinyon-juniper vegetation in Nevada are found in “reports of federal explorers, mineralogists, biologists, dendrologists, naturalists”, in timber trespass records and John Muir’s account of mountain ranges forested “from base to summit “in elevations spanning 5000 to 9000 ft., with trees as they remain today. Lanner also discounts the savanna juniper hypothesis.

The Abstract from Lanner and Frazier (2011) “The Historical Stability of Nevada’s Pinon-Juniper Forests” includes:

The early descriptions indicate that the pinyon-juniper forest was widespread, continuous over many mountain ranges throughout much of the state, and frequently dense. A comparison of lower forest border elevations reported in the 19th century with those currently mapped show no evidence of downward expansion. Three case studies of areas documented to have been deforested in the 19th century, have naturally re-forested, showing the resilience of the forest. Deforestation for restoration reasons is not justified in the absence of site-specific evidence that shrubland invasion has occurred in historic times.

Lanner and Frazier found little evidence that the lower forest boundary had expanded – i.e. that pinyon-juniper was invading sagebrush habitat at the “interface”. Instead of expanding, the forests were recovering from deforestation, were widespread, continuous and often dense. They cite an example of the enormity of the mining era deforestation -Young and Budy estimated 600,000 acres near Eureka were cleared of trees to feed the mining boom in that area of central Nevada.

BLM’s PEIS seeks to radically alter vast areas of the remaining arid forest native to, and emblematic of, the Great Basin. This parallels a global pattern of deforestation, often for “forage” production. Steinfeld et al. 2006. <https://faunalytics.org/livestocks-long-shadow-environmental-issues-and-options/>

David Charlet describes the bleakness of such landscapes
http://www.fs.fed.us/rm/pubs/rmrs_p052/rmrs_p052_005_024.pdf

Sites that BLM claims are being “invaded” and “encroached” based on modeling and use of Landfire and ID Team inputs may just be areas where trees have naturally re-occupied sites in the elevation and precipitation zones where pinyon-juniper forests naturally grow, and where pinyon-juniper is the native climax vegetation community resulting from plant community succession processes. pinyon-juniper is often complexly interspersed with low sage and other sage communities, and pinyon-juniper communities themselves vary depending on elevation, soils, aspect and other environmental factors.

Romme Synthesis: Pinyon-Juniper Forest Attributes, Ecology and Values

The Romme et al 2009 “Synthesis Paper: Historical and Modern Disturbance Regimes, Stand Structures, and Landscape Dynamics in Piñon–Juniper Vegetation of the Western United States” provides a basis for understanding the ecology of pinyon-juniper forests, and the serious scientific omissions and flaws of the PEIS. See <https://agsci.oregonstate.edu/biblio/historical-and-modern-disturbance-regimes-stand-structures-and-landscape-dynamics-piñon>. Excerpts are included below, with commentary related to the PEIS

P. 203: The Abstract shows much uncertainty about forest processes: “Persistent woodlands are found where local soils, climate, and disturbance regimes are favorable for pin on, juniper, or a mix of both; fires have always been infrequent in these woodlands. Piñon–juniper savannas are found where local soils and climate are suitable for both trees and grasses; it is logical that low-severity fires may have maintained low tree densities before disruption of fire regimes following Euro-American settlement, but information is insufficient to support any confident statements about historical disturbance regimes in these savannas. Wooded shrublands are found where local soils and climate support a shrub community, but trees can increase during moist climatic conditions and periods without disturbance and decrease during droughts and following disturbance. Dramatic increases in tree density have occurred in portions of all three types of piñ on–juniper vegetation, although equally dramatic mortality events have also occurred in some areas. The potential mechanisms driving increases in tree density—such as recovery from past disturbance, natural range expansion, livestock grazing, fire exclusion, climatic variability, and CO₂ fertilization—generally have not received enough empirical or experimental investigation to predict which is most important in any given location.”

P. 203: “Despite a considerable amount of research in piñ on–juniper vegetation, our under- standing of historical conditions and of both historical and current ecological processes is often inadequate to answer the management questions now being posed.”

P. 204: “Uncertainties about historical stand structures and disturbance regimes in piñ on–juniper vegetation create a serious conundrum for land managers and policy makers who are charged with overseeing the semiarid landscapes of the West. Vegetation treatments are often justified, in part, by asserting that a particular treatment (e.g., tree thinning or prescribed burning) will contribute to restoration of historical conditions, i.e., those conditions that prevailed before the changes wrought by Euro-American settlers. However, in the absence of site-specific information about historical disturbance regimes and landscape dynamics, “one-size-fits-all” treatments are likely to be ineffective, and some well-meaning “restoration” efforts may actually move piñ on–juniper ecosystems further from their historical condition. Some kinds of vegetation treatments may even reorganize ecosystems in such a way that restoration of historical patterns and processes becomes more difficult.”

[The PEIS is based on a one size fits all approach. The risk of serious adverse outcomes and irreversible harm from applying the PEIS’s one-size-fits-all approach is increased by parallel changes BLM’s is proposing to limit NEPA analysis. The PEIS states BLM plans to use DNAs, tiered to the PEIS. BLM is also proposing to further shortcut site-specific review of projects by applying minimal Categorical Exclusions/DNAs to pinyon-juniper projects up to 10,000 acres in size. Use of DNAs will result in minimal checklist review of site-specific conditions, minimal largely in-front-of-the-bulldozer surveys for sensitive species, and no integrated look at existing wildlife habitat condition, degree of fragmentation, how much habitat will remain in a local area following treatment, and the project impacts to populations. If the PEIS goes forward, the end result will be: BLM applies a vague highly generalized management

scheme based on questionable modeling using highly invasive treatment methods that will radically alter, clear and fragment woody vegetation communities across 38,000,000 acres of wild public lands and wildlife habitats, often making lands more susceptible to flammable weeds like cheatgrass. The PEIS will be used to fast-track destruction of native woody plant communities that often take a century (or much longer) to develop the complex structural attributes and habitat characteristics that sensitive species require. The project will foreseeably cost billions of dollars].

“We present a brief overview of the variability in dominant species, climate, stand structure, and potential fire behavior of piñon–juniper vegetation across the West to emphasize one of our key points— that piñon–juniper is a diverse vegetation type for which a simple model of historical structure and dynamics is inadequate.”

[The PEIS mapping and NEPA analysis use extremely generalized Vegetative State and other often arbitrary categories, derived from models and limited set of range literature, and are based on a simplistic view of structurally complex and biodiverse forests and woody plant communities].

P. 205: “... nearly all management goals, including those other than restoration per se, will be accomplished more successfully and economically if those goals and the techniques used to achieve them are informed by an understanding of how a particular landscape came to be the way it is today (Swetnam et al. 1999).”

[The PEIS presents a one-sided range-centric view of forests. The analysis and modeling on which it is based ignore the historical record and major human disturbances that have taken place across the region that have shaped the forests and other woody vegetation communities].

P. 205: “Throughout this extensive region, woodlands of piñon or juniper or a mix of both are found on almost all landforms, including ridges, hill and mountain slopes, terraces, tablelands, alluvial fans, broad basins, and valley floors. Soils are similarly variable, ranging from relatively deep soils often high in clay or sand content, to shallow rocky soils, to rock outcrops where no soil is present, but the trees are rooted in deep cracks of the bedrock. Woodlands of piñon or juniper or both occupy a broad zone of intermediate moisture and temperature conditions between the hot arid deserts of lower elevations and the cool mesic forests of higher elevations. Accordingly, soil temperature regimes range from mesic to frigid, and soil moisture regimes include aridic, xeric, and ustic (e.g., Gedney et al. 1999; Ramsey 2003; Miller et al. 2005).”

[This broad natural occurrence of pinyon-juniper contradicts EIS claims of encroachment and invasion, including in lower elevation areas].

P. 205: “Woodlands dominated by various combinations of piñon and juniper species represent some of the most extensive and diverse vegetation types in western North America ... P. 205: NatureServe ... lists 77 plant associations in the West in which a piñon is the dominant species (with or without junipers) and 71 associations in which junipers dominate (typically without piñon or with piñon as a minor component).”

[The PEIS ignores the natural diversity of pinyon-juniper communities, lumping them into two categories and three Phase I, II, III models. The Phase models (Phases II and III) pigeonhole highly diverse communities (including those with ancient trees), into categories to be cleared, greatly thinned, and converted to grass].

The PEIS lumps diverse pinyon-juniper and other woody vegetation communities into simplistic categories that do not reflect inherent forest or other native community biodiversity].

P. 207: “We identify three fundamentally different kinds of piñon– juniper vegetation, based primarily on canopy structure, understory characteristics, and historical disturbance regimes. The three kinds— persistent piñon–juniper woodlands, piñon– juniper savannas, and wooded shrublands.”

P. 208: Table 1 lists Persistent pinyon-juniper, Pinyon-juniper savanna, Wooded Shrublands based on ecological attributes.

“Wooded shrublands: Associated with a wide variety of substrates and topographic settings, including shallow, rocky soils on mountain slopes to deep soils of intermontane valleys; site conditions are inherently favorable for shrub growth; thus, the tree component naturally waxes and wanes over time in response to a variety of climatic and disturbance factors (“areas of potential expansion and contraction” in Romme et al. 2007).

Persistent pinyon-juniper woodlands: Associated with a wide variety of substrates and topographic settings but most commonly found on rugged uplands with shallow, coarse-textured, and often rocky soils that support relatively sparse herbaceous cover; site conditions (soils and climate) and disturbance regimes (notably infrequent fire) are inherently favorable for tree growth. Found in appropriate upland locations throughout the West. Persistent woodlands appear to be especially prevalent on portions of the Colorado Plateau, where precipitation is bimodal, with small peaks in winter and summer.”

Pinyon-juniper Savannas: Largely occur in AZ, NM.

[The PEIS does not identify persistent forests – or indicate where, if any place, BLM believes pinyon-juniper forests should exist across this landscape].

P. 208: “Spreading, low-intensity, surface fires (as opposed to stand-replacing fires) have been observed only rarely in piñon–juniper vegetation during the recent period since Euro-American settlement (Baker and Shinneman 2004). Apparently, such fire behavior was also rare in persistent woodlands and wooded shrublands before Euro-American settlement. Definitive fire-history evidence of a spreading, low-intensity, surface fire would include cross-dated fire scars at two or more locations along with intervening age-structure evidence that trees generally survived the fire (Baker and Shinneman 2004). However, few places provide such evidence. On the contrary, fire scars are conspicuously absent or rare in most piñon–juniper stands (Baker and Shinneman 2004; but see Burkhardt and Tisdale 1976; Wilkinson 1997; Brown et al. 2001; and Camp et al. 2006 for examples of studies where some fire scars were found) ... Even when one finds fire-scarred trees, that evidence, by itself, does not necessarily confirm a history of low-severity, spreading fire in piñon–juniper woodland.”

[A handful of studies of fire scars, often by range specialists, have been used to advance the juniper savanna theory that underlies BLM pinyon-juniper management paradigms].

209: “A major reason why low-severity fires apparently are unimportant in most piñon and juniper vegetation is that the fuel structure, especially in persistent woodlands and in wooded shrublands, is not typically conducive to a spreading, low-severity fire that would spread via fine fuels without killing the dominant trees or shrubs. Fine fuels are usually discontinuous (Floyd et al. 2000, Baker and Shinneman 2004), and the major fuel components are the crowns of live shrubs and trees, which, if ignited, tend to burn completely with considerable heat release (Baker 2006; R. Tausch, personal observations). Thus, fires typically kill all of the trees and top-kill all the shrubs and herbs within the areas that burn; usually, the only surviving plants are those in patches that do not burn.”

210: “Consequently, we were unable to develop any confident statements about the frequency or importance of fire, insect, disease, or climatic variability in the dynamics of piñon and juniper savannas in the historical landscape.”

[Fire return intervals/disturbance regimes and modeled plant communities based on the unproven theory that pinyon-juniper existed over vast areas of the West as a savanna have long underlaid the range papers BLM has relied upon in justifying treatments, such as the work of range scientists R. Miller and R. Tausch].

P. 210: “... available evidence indicates that low-severity fires were generally absent in most piñon and juniper woodlands, and if they did occur, they were likely patchy and of small extent (Baker and Shinneman 2004).”

[The PEIS claims it is restoring communities, so one would assume restoration would involve the natural fire regimes and characteristics. But the fire regimes and fire characteristics described in several sections of the PEIS are not supported by forest ecology].

P. 210: “In contrast to the lack of evidence for spreading, low-severity fires, there is abundant evidence that fires in piñon and juniper woodlands, since Euro-American settlement, have been pre- dominantly high-severity fires, commonly killing all the trees and top-killing the shrubs and herbs within the fire perimeter but often leaving some unburned islands of woodland (Baker and Shinneman 2004). Fire-history studies and historical evidence also document high-severity fires in multiple locations around the West during the pre-Euro-American era (Eisenhart 2004; Floyd et al. 2004, 2008; Bauer 2006; Shinneman and Baker 2009). Limited evidence suggests that fires could, occasionally, have been variable in severity, resulting in some low-severity areas on the margins of large, high-severity fires, or in small islands not burned at high severity (Baker and Shinneman 2004). Nevertheless, high-severity fire was likely the dominant type of fire in these woodlands in both historical and modern eras because of fuel structure and the trees themselves provide evidence as they are fire intolerant.”

P. 210. “In many piñon and juniper woodlands, stand dynamics are driven more by climatic fluctuation, insects, and disease than by fire. Although increases in piñon and juniper density have received much attention in many areas (see statement 5 below), loss of piñon and juniper (especially from marginal sites) has also occurred recently and in the past.”

[The West is currently in the grips of a mega-drought.

<https://www.usatoday.com/story/news/nation/2020/04/16/drought-worst-western-megadrought-here-study-says/5145929002/>

There have been frequent reports of pinyon-die-offs, often exacerbated by drought. There is evidence of both pinyon and juniper trees at lower elevation dying out. Climate change-caused range retractions may already be taking place (SE Idaho) https://www.postregister.com/news/local/what-s-killing-idaho-s-pinyon-pines-public-invited-to/article_079f4afc-fd2e-5a0b-9d52-32751d495ea1.html.

Comer et al. 2012 “Central Basin and Range Rapid Ecoregional Assessment” predict climates change-caused range retraction. https://landscape.blm.gov/REA_General_Docs/CBR_1_ReportBody.pdf

Significant damage and injury to trees often results from BLM treatments injuring standing trees. Treatments result in sap-filled wood and wood piles littering the ground (and also cause significant collateral damage to, or elimination of, sagebrush and other shrubs). Forest pest insects are attracted to tree sap in wounds. Insects then may kill remnant trees in surrounding forests including those in “leave patch” islands or stringers that BLM claims will provide wildlife habitat mitigating deforestation effects.

The PEIS fails to provide mapping information and analysis necessary to understand how much pinyon-juniper forest currently is present, and how much mature forest would remain untreated under all Alternatives].

P. 210: “Scientists and managers have traditionally placed greater emphasis on wildfire as a shaper of piñon and juniper ecosystems than on other types of natural disturbance. Increasingly, however, there is awareness that the dynamics in many piñon and juniper woodlands are driven more by drought stress and its accompanying suite of diseases, insects, and parasites than by fire. Indeed, studies of old piñon and juniper woodlands often reveal an accumulation of coarse wood in the understory from trees that were killed by agents other than fire and have persisted because of the absence of fire (Betancourt et al. 1993; Waichler et al. 2001; Floyd et al. 2003; Eisenhart 2004).”

“Although recent woodland expansion has received much attention (see statement 5), contraction of woodlands has also been documented ... for thousands of years, tree expansion and contraction may have been a normal part of climatically driven fluctuations in woodland densities.”

P. 211. “Historical fire rotations (i.e., the time required for the cumulative area burned to equal the size of the entire area of interest) and fire intervals, at the stand level, varied from place to place in piñon and juniper woodlands but, in many places, were very long (generally measured in centuries). Indeed, some piñon and juniper woodlands have been stable for hundreds of years without fire, other than isolated lightning ignitions that burned only single trees or small patches and produced no significant changes in stand structure. Many piñon and juniper woodlands today show no evidence of past widespread fire, although they may have burned extensively in the very remote past (many hundreds or thousands of years ago).”

[This provides insight into the significant wildfire risk associated with the PEIS scheme to replace pinyon-juniper forests with shrubs and grass, and/or scattered trees and grass. Shrub and grass communities are more fire prone. Lightning strikes in forests often go out. In contrast, fires spread rapidly in grass communities and grow in size. These fires are likely to then spread into post-treatment forest remnants].

P. 211. “Examples include 410 yr. or 427 yr. (depending on the method of calculation) in Barrett Canyon of central Nevada (Bauer 2006), 480 yr. in southern California (Wangler and Minnich 1996), 400–600+ yr. on the Uncompahgre Plateau in western Colorado (Shinneman and Baker 2009), and 400+ yr. on Mesa Verde in southwestern Colorado and on the Kaiparowits Plateau of southern Utah (Floyd et al. 2004, 2008). Huffman et al. (2008) estimated shorter rotations of 340 yr. and 290 yr. at two sites in northern Arizona and New Mexico, respectively, but these sites represented ecotones between piñon–juniper woodlands and ponderosa pine forests. Note that fire rotation is a different concept and metric than mean composite fire interval. Because the latter metric may be influenced strongly by sampling intensity and scale (Hardy 2005; Reed 2006), we emphasize here the fire rotation concept, which is roughly equivalent to the average fire interval at a small point on the ground. We emphasize that that historical fire rotations and point intervals were much longer than is often assumed for piñon or juniper vegetation in general (e.g., Schmidt et al. 2002). We also note that modern fire intervals may be getting shorter, as explained in statement 4 below.”

[Romme et al highlight problems with the Schmidt et al. 2002 fire intervals. The Schmidt reference that the PEIS relies on extensively is the Landfire FRCC and BPS modeling scheme used in significant part to derive the PEIS Vegetation States and other categories PEIS analysis relies on.

Recent research in other forest types, such as Bradley et al. 2016, have found that thinning reducing forest cover makes sites more fire prone by producing hotter, drier, windier micro-site conditions.

This highlights contradictions and unresolved conflicts in analysis and environmental impacts that pervade the PEIS. The public is told the PEIS projects will both restore habitats and reduce fire. The treatments proposed destroy woody pinyon-juniper and shrub vegetation in the hopes of replacing it with a significant amount of grass. The grass is more likely to burn frequently in fires. – dries out sooner and has a longer fire season, sites conditions are hotter, site conditions are windier, etc. The Landfire models BLM uses for grass communities show these very short fire intervals. BLM deems large areas of grass vegetation communities as desirable. Fires that start in grass and spread rapidly often consume adjacent sage and/or forest. BLM fails to conduct analysis necessary to understand the real-world impacts on fire frequency and conditions of the PEIS’s massive woody vegetation purges. Further, it appears that the models BLM’s fire behavior analysis is based on are largely focused on “tame” fairly predictable fires (the fire intervals from Landfire, the “poke hole” theory from Appendix H), and not large, or climate-driven fires. Time after time, the PEIS makes sweeping assertions related to fire, but provides no clear rationales for these claims, and/or relies on limited information and perspectives].

P. 212: “Recent, large, severe (stand-replacing) fires in piñon and juniper woodlands are, for the most part, similar to fires that occurred historically”.

[What agencies have termed “catastrophic” fires are how pinyon-juniper historically burned].

P. 212:” Invasion by highly flammable annual grasses (e.g., cheatgrass, *Bromus tectorum* L.) has increased horizontal fuel continuity and likelihood of extensive fire spread in many semiarid vegetation types, including piñon– juniper woodlands and shrublands of the Great Basin and Colorado Plateau (Whisenant 1990; Knapp 1996)”.

[The BLM PEIS plans to replace woody vegetation with larger amounts of bunchgrass. These grass understories will provide more fuel continuity at ground level, and seedlings may also have cheatgrass in interspaces. This may increase fire frequency and risk, with fires spreading into untreated remnant sites].

P. 212: “Given the very long fire rotations that naturally characterize piñon and juniper woodlands, especially persistent woodlands (see statement 3), we cannot yet determine whether the recent increase in frequency of large fires occurring in this vegetation type represents genuine directional change related to changing climate or fuel conditions or is simply a temporary episode of increased fire activity, comparable to similar episodes in the past. In any event, the suite of current and upcoming broad- scale environmental changes—warming temperatures, increasing tree densities in some areas (see statement 5), and expansion of fire-promoting species, such as cheatgrass—may all interact to dramatically increase the amount of burning in piñon– juniper and other vegetation types over the next century”.

Climate change stress includes hotter temperatures, less precipitation falling as snow and other weather perturbations that will make sites hotter and dry out sooner. Under these conditions, the Central Great Basin Rapid Ecoregional Assessment (Comer et al. 2012) shows the geographic range of pinyon contracting.

Unfortunately, the PEIS fails to consider the dramatic losses in pinyon-juniper forest that are likely to result from the combined effects of all these stresses on available habitats for the pinyon jay, migratory birds and other forest species, the availability and sustainability of pine nuts and the sustainability of other important values of the public lands. It fails to take a hard look at the cumulative losses from all of these factors, at the same time as the proposed treatments, supposedly for sage-grouse or mule deer (a generalist species), are proposed to clear and fragment an immense area of forests.

It fails to provide current mapping and analysis of intact pinyon-juniper forests still in existence on BLM, USFS, state and private lands so that a 2020 forest cover and wildlife habitat baseline can be established. This is necessary so effects of the project on habitat available for pinyon jay and other forest biota can be understood, and a proper effects analysis conducted].

P. 212: “Tree density and canopy coverage have increased substantially during the past 150 yr. in many piñon and juniper woodlands but have not changed or have declined in others ... P. 213. Trees are increasing in density in some areas, and in others they are not”.

[The “too dense” part of BLM’s basis is uncertain, and site-specific analysis is necessary. Density increases canopy cover, which is used in BLM’s segregation of forests into Phases that are then used to determine their management fate. Density is not fully supported].

P. 213: An important management question is whether any particular woodland on the landscape today has long been occupied by trees—either as persistent woodland or savanna or wooded shrubland—or represents a former grassland or shrubland that has been converted to woodland via tree expansion during the past 150 yr.

[BLM will not be able to address this management uncertainty on the basis of the mile high very general overview and one-size-fits-all programmatic management scheme and analysis of the PEIS, followed by use of minimal site-specific DNAs]. BLM’s planned use of DNAs tiered to the PEIS will not involve any hard look at individual site characteristics. BLM never considered basic forest ecology concepts, never identified Persistent pinyon-juniper forest types, and casts aside the wildlife habitat values forests of all types provide].

P. 214. “Evidence includes presence of old stumps, burned wood, charcoal activity, elevation and precipitation zones, and soil structure (mollic epipedon)”.

[Use of a DNA tiering to a PEIS will thwart any hard look at actual site characteristics. The PEIS ignores the concept of persistent pinyon-juniper forests, and treats trees generally as weeds, considering any trees within a 6.2-mile radius of sage-grouse leks and/or mule deer habitat to be priority areas for deforestation treatments, PEIS p. F-5.].

P. 214. “One of the strongest forms of evidence that a local area was persistently occupied by grassland, shrub-grassland, or low-density savanna in the past is the presence of a mollic epipedon, which typically develops where grasses are a dominant vegetation component over long periods. However, in some areas the upper soil horizons have been entirely lost through previous erosion (sometimes as a consequence of poor grazing practices), thus complicating accurate soils interpretations (Romme et al. 2008)”.

P. 214: “Fire exclusion cannot be the principal mechanism in persistent woodlands because fires were never frequent in these ecosystems, but in general, there is much uncertainty about the ecological processes driving tree-density increases in any particular location”.

P. 214: “Infill and expansion are often attributed primarily to effects of fire exclusion; consequently vegetation treatments designed to reduce or eliminate piñons and junipers are often justified in part by the assumption that past and present land uses have produced “unnatural” increases in tree density. Although this assumption is probably correct in some situations, clearly, it is not correct in all. For example, exclusion of low-severity surface fires during the 20th century cannot be the primary reason for infill of persistent woodlands, because low-severity fire was never frequent in these ecosystems, even before Euro- American settlement (statement 1). Furthermore, in many places, we can explain

increasing tree density as recovery from severe fire or anthropogenic clearing in the past or as natural range expansion near the biogeographical limits of a tree species”.

[This highlights the importance of actually looking at the historical record, and collecting detailed site-specific analysis looking at the land, rather than using contrived elaborate models that ignore the historical record in a PEIS that claims to aim to restore historical ecological conditions].

P. 215: “In areas where infill/expansion are occurring – what is driving it?: direct and indirect effects of livestock grazing, 2) fire exclusion, and 3) effects of climatic variability and rising atmospheric CO₂.”

[Romme et al describe how areas of claimed tree expansion/encroachment/invasion/ density increase may actually be forests recovering from past agency treatment disturbance, the uncertainty related to pinyon-juniper forest processes, and tree response to climate change-caused CO₂ increases].

P. 215: “Similarly, many areas that were chained in the 1950s and 1960s now support dense stands of young piñons or junipers that can give the appearance of expansion into grasslands or shrublands (e.g., Paulson and Baker 2006:143–146); however, closer inspection often reveals windrows of large, dead tree boles that were piled up during the chaining operation, along with stumps and seeded nonnative grasses.”

[The PEIS fails to identify sites of past agency treatments across the project area landscape].

P. 215: “Such a stand of young trees does not represent abnormal expansion of trees into nonwoodland habitats but is another example of natural recovery from severe disturbance. Widespread harvest also occurred during the Euro-American settlement era to provide materials for fence posts, firewood, construction materials, and charcoal to support the mining industry, e.g., in the Nevada Great Basin, (Young and Budy 1979) and in territorial New Mexico (Scurlock 1998:128–129). Sallach (1986) interpreted 20th century increases in tree density in many places in New Mexico as recovery of preexisting woodlands following severe human disturbance (wood-cutting and clearing for pasture improvement) rather than infill or invasion of previously sparse woodlands and grasslands.”

P. 215: “If a burned or cleared stand was a persistent woodland, then local site conditions are inherently favorable for trees, and we should expect trees to reestablish naturally on the disturbed site”.

[Since the Romme et al Synthesis paper, recent research is raising the specter that cheatgrass and other flammable annual exotic grasses that thrive in areas disturbed by livestock grazing, fire, road edges, mining/energy project soil disturbance and in the disturbed soils of sites revegetated by BLM/USFS treatments may come to dominate sites, locking the ecosystem into a highly unnatural very frequent fire regime that precludes recovery of forested vegetation. pinyon-juniper covered mountains and mountain slopes may in fact become treeless. Fusco et al. 2019, Kerns et al. 2020. Thus, the pinyon-juniper forests destroyed in this project may be replaced by weeds that overrun areas of disturbed soils, crusts and native vegetation, and/or treatments may alter conditions to such a degree that with the addition of climate stress and hotter temperatures, trees may not ever recover].

P. 215: “The presence of young piñon and juniper trees near the species’ current geographical range limits may represent natural, long- term change in biogeographical extent, rather than unnatural expansion into nonwoodland habitats. Studies of subfossil pollen deposits and pack rat middens reveal that many low- elevation conifer species, including junipers, piñons, and ponderosa pine, have been expanding their ranges throughout the Holocene (the past ,12 000 yr.) from glacial refugia in the Southwest and in northern Mexico. In response to increasing temperatures and perhaps aided by moist periods, piñons expanded rapidly into the central and northern parts of the western United States at the

end of the Pleistocene (Betancourt 1987; Nowak et al. 1994; Swetnam et al. 1999; Wigand and Rhode 2002), whereas junipers may have expanded with increasing temperatures but during drier periods (Lyford et al. 2003)”.

P. 215. “Extensive livestock grazing began in the late 1800s in many parts of the western United States (Wootton 1908; Oliphant 1968; Dahms and Geils 1997; Scurlock 1998; Allen et al. 2002; Hessburg and Agee 2003), and extensive infill and expansion of piñon and juniper began at the same time in many areas (e.g., Miller and Rose 1999; Fuchs 2002; Landis and Bailey 2005; C. D. Allen, unpublished data, 2008). The coincidence in time between the onset of grazing and the increasing of tree density suggests a direct cause–effect relationship. Two mechanisms may be involved. First, heavy grazing may reduce herbaceous competition with tree seedlings and thereby enhance seedling survival”.

[PEIS treatments clearing trees and seeding grasses are likely to expand more intensive grazing into previously less used areas, including remnant stands of undisturbed forests, and thus promote increased tree densities, cause exotic flammable cheatgrass invasion and spread, and further reduce site resilience and resistance, and the ability of the site to buffer climate change stress].

P. 216: “Fire exclusion cannot be the principal mechanism responsible for infill of persistent woodlands because fires were never frequent in these ecosystems (statements 1–3 in section II above)”.

P. 217: “Following another line of investigation, historical fire rotations (time required for cumulative area burned to equal the size of the entire area of interest) in Wyoming big sagebrush (*Artemisia tridentata* Nutt. subsp. *wyomingensis* Beetle & Young) and little sagebrush (*Artemisia arbuscula* Nutt.), which formed the matrix within which many of the woodland communities existed, are estimated to have been 100–450 yr. (Baker 2006). With such long rotations, it would seem that fire was not frequent enough historically to prevent extensive tree establishment and that the long fire intervals observed during the 20th century are not far outside the historical range of fire intervals—all implying that fire exclusion cannot be the major driver of piñon and juniper infill and expansion”.

[The management paradigms that BLM pinyon-juniper treatments, including the PEIS, are based on view “treatment” disturbance – chaining, bullhogging, mastication, clearcutting, herbicide poisoning, as a “surrogate” for fire disturbance. They are based on claims of a need for the disturbance to duplicate supposed historical disturbance patterns - based on a modeled historical fire regime that are not based on actual historical information. BLM uses the Landfire FRCC and BPS model information very similar this PEIS’s methodology. to generate very short fire return intervals and rotations as the ideal desire states, and then justifies treatments claiming the ecosystem is “out of whack” and needs more disturbance – all at the same time the agency claims its treatments will minimize fire risk. Examples: Ely BLM Cave-Lake, Egan-Johnson, Long-Ruby and other Watershed Assessments and EAs].

P. 217: “... sagebrush community is very heterogeneous, and a single, broad characterization of historical fire rotations cannot adequately convey the complex historical role of fire in these ecosystems”.

[This again highlights the problems with the PEISs extremely broad lumping diverse sage and pinyon-juniper communities into very broad categories to use as a basis for treatments across 38,000,000 acres of public lands].

P. 217-218: “It is possible that some, or even much, of the infill and expansion of piñon and juniper that has occurred during the past 150 yr. is a natural response to short-term and long-term climatic fluctuation ... CO₂ may potentially be driving infill”.

[And these infilling trees are sequestering carbon, helping to mitigate the climate crisis].

p. 218: “It is widely assumed that infill and expansion of piñon and juniper represent primarily an “unnatural” consequence of human land use, in particular the effects of fire exclusion. It is important to stress, however, that human land use in the western United States since the mid to late 1800s has occurred ...”.

P. 218: “The variability in ecosystem structure and processes that exists among the diverse combinations of piñons, junipers, and associated shrubs, herbs, and soil organisms throughout this extensive vegetation type; 2) prehistoric and historic disturbance regimes; and 3) mechanisms driving recent changes in vegetation structure and composition.”

[Given the variability in structure and processes, the PEIS’s extreme lumping of vegetation communities into very general categories based on models of vegetation and desirability factors is extremely risk-prone and highly flawed].

P. 218: “Dramatic tree expansion and infill have occurred during the past 150 yr. in portions of all three types of piñon–juniper vegetation, although equally dramatic mortality events have also occurred recently in some areas. The potential mechanisms driving increases in tree density—notably recovery from past disturbance, natural range expansion, livestock grazing, fire exclusion, climatic variability, and elevated atmospheric CO₂— generally have not received enough empirical or experimental investigation to predict which is most important in any given location.”

[This further highlights the ecological uncertainty and risk associated with the PEIS project]

Vale Historical Sagebrush Characteristics

In “Pre-settlement Vegetation in the Sagebrush-Grass Area of the Intermountain West,” Vale reviewed the historical accounts of: Beckwith, Abert, Perkins, Cross, Dale, Delano, DeSmet, Duncan, Farnham, Ferris, Field, Franchere, Fremont, Gass, Harris, Humphreys, James, Palmer, Parkman, Platt and Slater, Root, Schiel, Shaw, Simpson, Spaulding, Stansbury, Torrey, Townsend and Wislizenus. He found the pristine lower elevation vegetation was dominated by shrubs, not grass in the northern Intermountain West (records reviewed overlapped most of the PEIS project area). It was not covered by grass but was dominated by shrubs. There are also frequent references to dense shrubs.

FRCC Schmidt et al. 2010

The PEIS relies on Schmidt et al. 2002, a more recent version is now found on the Landfire site.

https://www.landfire.gov/frcc/documents/FRCC_Guidebook_2010_final.pdf This includes FRCC assessments describe general landscape fire regime and vegetation characteristics. During FRCC assessments, current fire regime and vegetation conditions are compared to those of the reference period as estimated through modeling.

Fire regime groups: A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human intervention but including the possible influence of aboriginal fire use (Agee 1993; Brown 1995; Brown and Smith 2000).

This uses 5 very broad fire regime groups with very broad fire frequency intervals.

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landfire.gov

LANDFIRE Program: FRCC Guidebooks

https://www.landfire.gov/frcc/documents/FRCC_Guidebook_2010_final.pdf

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Table 2-1. Fire regime groups and descriptions.

Group	Frequency	Severity	Severity description
I	0 – 35 years	Low / mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory
II	0 – 35 years	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation
III	35 – 200 years	Mixed / low	Generally mixed-severity; can also include low-severity fires
IV	35 – 200 years	Replacement	High-severity fires
V	200+ years	Replacement / any severity	Generally replacement-severity; can include any severity type in this frequency range

[I 0-35 yrs., II 0-35 yrs., III-35-200 yrs., IV 35-200 Yrs., 200+yrs. It estimates fire severity for each of these classes. Here, as with the Vegetation States used in the PEIS, extremely broad categories are used—How is it possible to make much of a prediction when the category used is 35-200 years?].

“Departure & condition classes”

Fire regime condition classes reflect the current conditions’ degree of departure from modeled reference conditions. FRCC assessments measure departure in two main components of ecosystems: 1) fire regime (fire frequency and severity) and 2) associated vegetation. Managers can use the departure and condition class data to document possible changes to key ecosystem components (Schmidt and others 2002). Examples include vegetation characteristics (species composition, structural stage, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances, such as insect and disease mortality, grazing, and drought. Common causes of departure include advanced succession, effective fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, and introduced insects and disease (Brown and Smith 2000; Schmidt and others 2002; Brown and others 2004; Hood and Miller 2007; Tausch and Hood 2007; Stambaugh and others 2008; Keane and others 2009).”

This provides some of the many concerns with the PEIS process and the—as “advanced succession,” i.e. mature sagebrush and/or pinyon-juniper and other woody plant communities that would normally be considered the climax successional community on a site are viewed as a symptom of “departure” from the theorized reference conditions, Mature and old growth communities are then unlabeled uncharacteristic, and they become the focus of vegetation manipulation treatments across the 38,000,000 acre PEIS landscape.

This results in projects that are branded as restoration projects actually being projects that disturb and destroy later successional woody vegetation communities. These destroy and fragment habitats that sensitive species like pinyon jay sage-grouse and pygmy rabbit rely on.

Many BLM pinyon-juniper and sage treatment projects over the past 15-20 years have relied on this modeling to claim that mature and old growth plant communities required by many species are, “unhealthy,” and need to be “treated.”

The PEIS is based on, and infused with, these theories and modeling. Then, BLM “aggregates” the information in highly uncertain and confusing ways. See Vol. III, F-2 and F-3, sprawling chart on F-4.

The EIS’s meaning of “restoration” and the outcome of projects branded as restoration under it, are not actually aimed at restoring the habitat characteristics that many sensitive species rely upon. Instead they are restoring the supposed fire regime characteristics and modeled BPS vegetation communities that were developed using these methods.

The use of fire severity in fire regime condition classes appears to result in mature woody cover being considered a problem, as woody veg burns with more severity than grass, so this elevates the desirability of grassy communities with limited woody vegetation in modeling outcomes.

Fire regime Conditions Classes I and II are often viewed as management goals, with the result that the structurally complex mature shrub and/or tree characteristics that sensitive species rely on are destroyed in these projects branded as “restoration.”

The PEIS, at a time when sage-grouse and pinyon jay populations are in sharp decline, is managing habitat for restoration of vegetation conditions that do not meet the species survival needs, but instead meet the “desired” conditions derived from heaping upon model. The end result of all this modeling and “aggregating” vegetation into broad categories is often highly uncertain and is likely to be disastrous for species whose habitats are already significantly degraded and fragmented.

Also from Schmidt et al. 2010:

The three fire regime condition classes have been defined (Schmidt and others 2002) as follows: 1) FRCC1 represents ecosystems with low (<33 percent) departure and that are still within an estimated historical range of variation as determined by modeling for the pre-Euro-American era (discussed below); 2) FRCC 2 indicates ecosystems with moderate (33 to 66 percent) departure; and 3) FRCC 3 indicates ecosystems with high (>66 percent) departure from reference conditions (Hann and Bunnell 2001; Hardy and others 2001; Schmidt and others 2002). As discussed below, departure is based on a central tendency (or mean) metric that represents a composite estimate of the reference condition vegetation and fire regime characteristics.

It is important to note that FRCC is not a fire hazard metric (Hardy 2005; Odion and Hanson 2006; Hammer and others 2007). Instead, FRCC is a tool for measuring ecological trends. Nonetheless, indirect inferences about fire risk can sometimes be made after examining fuels data in tandem with FRCC data (Hann and others 2003; pps. 16-17).

“FRCC assessments provide a relatively simple and efficient way to characterize landscape health in terms of vegetation and fire regimes in relation to those that existed during the historical reference era.”

Biophysical settings (BpS) are the primary environmental descriptors used for determining a landscape's natural fire regimes, vegetation characteristics, and resultant FRCC diagnoses. Biophysical settings can be classified based on a single attribute, such as vegetation, soils, or geomorphology, or they can be classified based on integrated attributes, such as ecological types (Winthers and others 2005), ecological sites (NRCS 2003), or ecological systems (Comer and others 2003). For FRCC purposes, biophysical settings use dominant vegetation types and their associated fire regimes as a proxy for the integration of a landscape's biotic and abiotic components. Note that FRCC assessments incorporate natural disturbances because most BpS types in the U.S. are fire-adapted ecosystems. p. 18.

An important FRCC principle centers on the concept of historical vegetation. Historical vegetation is the flora that existed during the reference period prior to EuroAmerican settlement, and these ecosystems were sometimes influenced by Native American fire use (Barrett and Arno 1982; Gruell 1985; Barrett and Arno 1999; Boyd 1999; Vale 2002; Mann 2006). Note, however, that the onset of EuroAmerican settlement varies throughout the United States, from the early 1600s in coastal Virginia and New England to the late 1700s in the Appalachians to the late 1800s throughout much of the Northern Rockies and the Pacific Northwest. For this reason, the length of the reference period for describing historical vegetation varies according to geographic location. For example, the Interior Columbia Basin Ecosystem Management Project scientific assessment (Keane and others 1996; Quigley and Arbelbide 1997) in the Pacific Northwest used a time frame of 400 years, from 1450 to 1850 (the latter being the approximate date of the onset of EuroAmerican settlement). p. 19.

Despite so much of this convoluted theorizing and modeling relying on supposed historical vegetation, the native woody vegetation characteristics reflected in the accounts of the early settlement era is ignored or downplayed in this process.

Biophysical settings (BpS) have been modeled for FRCC purposes based on fire regimes and associated vegetation seral stages, or succession classes (S-Classes). For example, a state and transition model (also referred to as a visual dynamics model or 5-box model) is used to characterize S-Class composition and structural traits (figs. 2-1 and 2-2) in response to successional advancement and periodic disturbances, such as fire (described below). Note that the term 5-box model refers to the fact that modelers use up to five S-Classes per BpS, ranging from early seral (post-disturbance) stages to late seral stages, such as old growth forest.

The state and transition model is defined as follows: 1) S-Class A: early-seral, post-replacement; 2) S-Class B: mid-seral, closed canopy; 3) S-Class C: mid-seral, open canopy; 4) S-Class D: late-seral, open canopy; and 5) S-Class E: late-seral, closed canopy. Note, however, that not all biophysical settings conform to the standard 5-box model. For example, some grassland types might have only two or three succession classes. P. 20.

The modelers estimated BpS reference conditions by using a non-spatial vegetation and disturbance dynamics model called the Vegetation Dynamics Development Tool (VDDT; Beukema and others 2003a). Each model was developed based on literature reviews, expert opinion, and field data, where available. P. 21.

- P. 22. Biophysical settings (BpS) are the primary landscape units used for FRCC assessments.

- Vegetation and associated fire regimes are used as proxies for describing the biophysical setting.
- FRCC assessments incorporate natural disturbances because most BpS types in the U.S. are fire-adapted ecosystems.
- Vegetation is a proxy representing the collective attributes of a given BpS, and historical vegetation represents the reference benchmark for FRCC assessments.

[Pinyon-Juniper and sagebrush are not “fire-adapted ecosystems,” further calling into question the use of these techniques to determine the fate of pinyon-juniper and sagebrush communities].

Appendix B – Mapping Concerns and Uncertainty

The PEIS maps are not adequate for a viewer be able to determine what will take place. They lack any reference areas other than state lines, and sometimes a blank white space that may correspond to a block of USFS land. The colors on several of the maps portraying crucial differences between vegetation communities are nearly impossible to distinguish. Some maps are so cluttered it is impossible to distinguish what is being shown (big game map for example).

BLM lumps exotic crested wheatgrass and other exotic forage grasses in with native vegetation communities, making it impossible to distinguish exotic seedings which should be very important areas for restoration, vs. more recently burned native vegetation communities where woody plant recovery and natural plant succession has not yet taken place, and where native woody plant recovery could be assisted by planting sage/shrubs. There is no map directly showing fires, only a chart is provided.

Vast areas of southern Idaho, eastern Oregon, northern Nevada and Utah have been seeded with crested wheatgrass. In the 1950s-1970s, sagebrush and pinyon-juniper were treated by methods similar to those proposed in the EIS. As wildfire rehab seedings gained prominence, BLM continued and expand acres of crested wheatgrass in post-fire rehab efforts. Many of these areas have burned repeatedly in large-scale fires, and many have been re-seeded repeatedly with more exotic species. See USDI BLM Jarbidge AMS 2007.

BLM fails to identify areas of both past BLM forage vegetation manipulation projects and BLM ESR seedings, particularly seedings of exotic species like crested wheatgrass and forage kochia.

The PEIS uses very broad Vegetative State categories and does not distinguish important shrub species/community differences. Examples; Sagebrush/bitterbrush very important to big game is not mapped, rabbitbrush, an early successional stage to sagebrush is not mapped, other essential veg communities are not mapped such as mountain mahogany and mountain shrub that will suffer impacts from treatments (collateral damage, herbicide drift, etc.). Will seeded exotic species like the non-native half-shrub forage kochia meet BLM's criteria for a "desirable" shrub category across the PEIS shrub Vegetation States? Please clarify if forage kochia will be viewed as a desirable shrub (and potentially seeded) across all types of projects, and across all sage-grouse habitat types. Forage kochia may aggressively invade rare plant and adjacent native vegetation communities, and largely excludes any other perennial plant establishment in areas where it is seeded. PEIS Appendix E, described as "Additional Resources" that staff may rely on in implementing projects, contains several forage kochia references. The cumulative impacts of sagebrush and pinyon-juniper habitat conversion to crested wheatgrass and/or forage kochia under both the fuel breaks and the Restoration PEIS, on top of all the existing seedings of these species across the project area, must be addressed with a hard look analysis. Baseline mapping must also be provided showing where forage kochia has already been seeded across public lands.

Many existing BLM crested wheatgrass sites are managed for maximizing grass, and sagebrush is periodically purged to reduce competition with livestock forage (see the 2020 Ely BLM Long-Ruby Valley EA Paris Seeding "Restoration" project), or where higher levels of livestock use are allowed (see the 2020 Jarbidge BLM Devil Creek EA often doubling AUMs based on crested wheatgrass production). Such seedings often provide minimal values for wildlife. Biologists have long proposed diversifying these seedings by planting sagebrush and thinning/eliminating crested wheatgrass.

As a baseline for restoration activities BLM must identify: All lands in the project area where post-fire ESR/Rehab has been conducted. Where are areas that were seeded with native vegetation? Seeded with non-native vegetation like crested wheatgrass and forage kochia? Seeded only with native species? Allowed to recover naturally without human intervention? What is the current vegetation on these sites? Where were cheatgrass-suppressing herbicides used? What is the current percentage of cheatgrass cover across all of these sites? It is essential that BLM provide a baseline of its rehab projects and scrutinize their outcome before plunging into a massive pinyon-juniper and sagebrush manipulation EIS that would radically alter the ecosystem and wildlife habitats for many decades or centuries and foreseeably irreversibly if cheatgrass invasion occurs in the wake of treatments. See Arkle et al. 2014, summarized here: <https://www.esa.org/blog/2014/04/02/sage-grouse-losing-habitat-to-fire-as-endangered-species-decision-looms/>

Identifying areas where BLM has conducted post-fire rehab efforts that are now mapped as annual invasive grass and/or perennial bunchgrass is essential, as both BLM's fuel breaks PEIS and it appears also the Restoration PEIS would rely on use of typical rehab species and methods (crested wheatgrass, crested wheat mixed with cultivars of native species – typically resulting in crested wheatgrass out-competing seeded natives, cultivars of native species which are often bred to be larger in size than local native ecotypes to increase forage values and/or forage kochia). Mapping of areas where cheatgrass-suppressing herbicides were used, and comparing cheatgrass cover approx. 10 years following fires would also be very informative, as this project would likely entail use of vast quantities of herbicides that appear to do very little to prevent cheatgrass prevalence following fires after grazing has resumed for a few years.

REVIEW OF STATE MAPS

IDAHO

The mapping shows very large areas with annual grasses, and annual grasses extending into sites where these grasses have not been present previously in significant amounts including many sites where recent fire disturbance has not occurred, where chronic livestock grazing is the primary disturbance.

Examples: Portions of Birch Creek, Lemhi, Big Lost River, Pahsimeroi Valleys.

Nearly the entire area is shown as Vegetation States: Dark Brown: Shrubs, Perennial Grasses, Forbs and Invasive Annual Grasses. Medium Green: Shrubs, Perennial Grasses, Forbs, and Invasive Annual Grasses. What is the distinction?

BLM has long denied invasive annual grass problems when conducting FRH assessments in this area, and in addressing public comments on livestock grazing analyses in this region. This mapping depicts considerable areas with relatively low amounts of cheatgrass as having invasive grass problems.

The vegetation in these central Idaho valleys and across the landscape is far more complex than the simplistic "shrub" category depicts. There are several species of very short-statured sagebrush, Wyoming big sagebrush, mountain big sagebrush, sagebrush-bitterbrush and very often complex interspersions of both short and taller sagebrush (for example, mima mound habitats with taller dense big sagebrush on mounds and shorter statured sagebrush in between). This has been identified as an important habitat type of the sensitive pygmy rabbit. Mapping this general makes it impossible to determine project impacts on sensitive species like pygmy rabbit.

The mapping depicts the lava areas of Craters of the Moon as: Shrubs, Perennial Grasses, Forbs, and Invasive Annual Grasses Green, and Shrubs, Perennial Grasses, Forbs and Invasive Annual Grasses Brown (much this brown area is BLM ESR post-fire crested wheatgrass seedings). This highlights the failure of crested wheatgrass to restrict invasive annual grass expansion, which BLM has frequently claimed as a reason for seeding the crested wheatgrass in the first place.

The mapping appears to show significant areas of the Idaho Falls District lands near Craters of the Moon (especially SE) that have burned in recent fires containing shrubs. What type of shrubs are shown?

The mapping shows Twin Falls BLM District (Burley, Jarbidge, Twin Falls) and the western portion of the Idaho Falls District BLM lands to be:

Shrubs, Perennial Grasses, Forbs and Invasive Annual Grasses; Perennial Grasses, Forbs, and Invasive Annual Grasses. Much of this perennial grass” is actually crested wheatgrass. :Likely a hundred million dollars or more has spent over the past couple decades in fire rehab in the Jarbidge, and almost the entire area is shown as needing “treatment”. But the methods BLM plans to use are similar to those that have failed in the past, and the PEIS refuses to address grazing conflicts with rehab success, especially successful recovery of vegetation components necessary for sage-grouse and other sensitive species.

Nearly the entire northern and central Jarbidge BLM FO is mapped as: Pale green: Perennial Grasses and Forbs and Orange: Perennial Grasses, Forbs, and Invasive Annual Grasses. When we compare this to the Idaho Falls District mapping of lands near Craters of the Moon and the Snake River Plain, it appears that different BLM offices may have classified these general vegetation categories differently? The biologically depauperate crested wheat seedings of the Jarbidge are similar to the biologically depauperate crested wheatgrass seedings around Craters of the Moon.

Owyhee County: We are struck by how much dark brown there is: Shrubs, Perennial Grasses, Forbs and Invasive Annual Grasses. Yet BLM in efforts such as the recent Bruneau Battle Creek EA has claimed that “high, moist” sites (largely the sagebrush vegetation across the Owyhee plateau area) are not facing problems from cheatgrass.

Were parts of the northern area in this dark brown category the site of BLM’s \$67,000,000 Soda fire rehab effort (which involved extensive aerial herbicide application and aerial seeding including often with exotic grasses).

The area south of Jordan Valley is indeed being very rapidly overrun with medusahead. The medusahead is invading old BLM crested wheatgrass seedings, smaller burned areas, and cheatgrass sites. It is also invading sites that have not burned in recent fires, but that do suffer significant levels of chronic livestock grazing disturbance. Despite a dramatic expansion of medusahead, many of the FRH analyses BLM conducted several years ago minimized concerns about medusahead expansion and continued to allow high levels of grazing and trailing disturbances. The PEIS treatments are not likely to have positive habitat outcomes given the grazing burden on many sites.

On the southern flanks of Juniper Mountain, BLM maps lands are mapped as: Shrubs, Perennial Grasses, Forbs and Invasive Annual Grasses. Some of this area burned in the Crutcher/Fire 12 or so years ago. Some did not, and trees remain. BLM appears to have classified forested areas as sage.

Then, further to the east in Owyhee County, in the Bruneau Field office, the great majority of the area is mapped as Veg State: Medium green Shrubs, Perennial Grasses, Forbs, and Invasive Annual Grasses, with significant areas of brown: Shrubs, Perennial Grasses, Forbs and Invasive Annual Grasses. There are limited annuals in many of these sites, and they are largely low sage and other short-statured sagebrush. It would be disastrous for BLM to rip them up with seedings, when the primary restoration needed is to remove grazing impacts before cheatgrass does really become a problem. Can BLM point to successful rehab of low sage using the battery of treatments possible under the PEIS?

Also, areas of Owyhee County and adjacent Malheur County are targeted for major fuel breaks under both the fuel breaks PEIS and the Tri-State fuel breaks EIS adding to sagebrush species habitat loss, fragmentation and weed risk across this landscape.

How were areas of non-depleted vs. depleted understories determined in the PEIS mapping? Were FRH assessments used in this analysis? For example, all the Owyhee FRH analyses?

OREGON

Map 5d. shows a stark difference between Veg States.

To the west: Medium Green: Shrubs, Perennial Grasses, Forbs, and Invasive Annual Grasses, Dark Green: Shrubs with Depleted Understory to the West.

To the East: Orange Perennial Grasses, Forbs, and Invasive Annual Grasses; Tan Invasive Annual Grasses and Shrubs; Dark Brown Shrubs, Perennial Grasses, Forbs and Invasive Annual Grasses.

What is the explanation for this?

PINYON-JUNIPER

IDAHO

Map 6b, Pinyon-juniper vegetation states, shows pinyon-juniper habitat appears to already be extremely fragmented. Vast areas have already been cleared/treated and/or treatment is planned or authorized. Is the mapping showing portions of the BOSH project, where deforestation has already been authorized? What about areas in eastern Idaho -have sites shown as having trees targeted for deforestation in other projects? The mapping also appears to show Douglas fir in central and eastern Idaho in some areas as pinyon-juniper. The mapping does not show Phase III in Idaho. Why not? (Compare to Nevada).

BLM must provide current detailed project baseline mapping of the present extent of pinyon-juniper cover across the project area and overlay the proposed treatments on this. This is necessary to determine how much forested habitat is actually still present, and how fragmented pinyon-juniper habitat currently is. BLM must also provide mapping of tree cover 20 years ago, or other similar analyses so the recent rate of pinyon-juniper deforestation can be understood, and detailed mapping of areas where treatment has already taken place, been authorized and/or is planned under BLM NEPA project /activity plan documents such as the Ely BLM projects listed above.

This is necessary to understand the impacts of the proposed alternatives, and to enable BLM to develop a reasonable range of alternative actions to prevent endangerment and extirpation of many native wildlife species that rely upon pinyon-juniper forests, and to take a hard look at project cumulative impacts on public lands values, sensitive species like pinyon jay, and migratory birds.

BLM finalized the BOSH deforestation project across the Owyhee and Bruneau region. It appears this mapping depicts some areas to be treated in the BOSH as extant forest. Is that the case? If one adds the BOSH and this mapping together, it appears BLM plans to effectively wipe out western juniper forests in Idaho. Is that the case? These forests have high habitat value for a broad diversity of migratory birds, including wintering flocks of American robins and Townsend's solitaires, and dozens of nesting species.

NEVADA

The mapping appears to show large areas of pinyon-juniper in the Ely BLM District as targeted for treatment under alternatives of the PEIS. Ely BLM has been conducting a series of large-scale deforestation "Watershed Assessments" over the past 15 or so years. These Assessments use FRCC and BPS models to find native pinyon-juniper and sagebrush woody plant communities unhealthy, "uncharacteristic", or not "desirable" in comparison to ideal modeled vegetative states. Once the native woody veg is found to be uncharacteristic, it is targeted for large-scale treatment disturbances similar to those proposed under the PEIS. The Ely BLM Watershed EAs plan to carry out the treatments over a period of 10-20 years. Projects include:

- Stonehouse Habitat Improvement and Fuels Reduction Project EA (DOI-BLM-NVL020-2008-0028-EA) (BLM 2010)
- South Steptoe Watershed Restoration Plan EA (DOI-BLM-NV-L020-2011-0013-EA) (BLM 2011)
- Cave Valley and Lake Valley Watershed Restoration Plan EA (DOI-BLM-NV-L020-2011-0021-EA) (BLM 2012)
- Overland Pass Habitat Improvement Project EA (DOI-BLM-NV-L010-2011-0036-EA) (BLM and U.S. Forest Service 2015)
- Newark and Huntington Watersheds Implementation and Restoration Plan EA (DOI-BLM-NV-L010-2012-0033-EA) (BLM 2015)
- Egan and Johnson Basins Restoration Project EA (DOI-BLM-NV-L010-2013-0014-EA) (2018)
- Duck Creek Basin Hazardous Fuels Reduction and Habitat Improvement Project DOI-BLM-NV-L060-2019-0016-EA) (BLM 2019)

Also, Antelope Watershed, North Schell, South Spring Valley, South Steptoe Watershed, Hamblin Valley, projects proposed in Wilson Creek EA and others.

Thus, there are already hundreds of thousands of acres in this BLM District alone that have already been treated, are authorized for treatment, are undergoing treatment or where treatment is foreseeable. It is essential for the PEIS to identify, along with the mapping of current pinyon-juniper forests, the areas where deforestation is already planned. Are any of these areas mapped in the PEIS as sites for treatment

under the PEIS? Have projects listed in the FIAT documents already been carried out or authorized? If so, where? Where are any FIAT projects that may have already been conducted and/or are authorized or pending located in relation to the treatments under the PEIS alternatives? This information is necessary for BLM to conduct a hard look NEPA analysis, including analysis of cumulative effects. It is also necessary to understand if there is a need for the PEIS project, and to determine the magnitude of habitat loss and fragmentation that sensitive species may already face across the project area.

Where Are Species to Live? How Will Population Viability Be Maintained? How does BLM Define, Track, and Assess Viability Populations of Sensitive Species Populations?

Throughout the series of Ely Watershed EAs, BLM claimed in its sensitive species and wildlife evaluations that species could find somewhere else to live, as there was ample remaining pinyon-juniper and sage habitat in the surroundings that was not being treated. This premise has been part of all the Ely, Elko BLM, Humboldt-Toiyabe Forest and other project FONSI (and DNAs) that have been signed claiming there would be no significant impacts to sensitive species, wildlife, migratory birds, forestry resources, pine nut values, etc. from the pinyon-juniper deforestation and sagebrush treatments already taking place. The analyses relied on claims that there was ample remaining habitat for sensitive species, migratory birds, and for sustainability of all the other values of public lands.

Now the Restoration PEIS appears to target forests including nearly all the pinyon-juniper habitats BLM claimed were places the species suffering habitat loss from the series of Watershed Treatments were supposed to make an exodus to, and be able to find unoccupied ample habitat.

Nearly all the sensitive avian and other species that inhabit both pinyon-juniper and sage vegetation communities rely upon mature and old growth forest and/or mature and older big sagebrush with complex vegetation structure for nesting, in the case of the pygmy rabbit for year-round habitat needs, or in the case of several species of rare bats that inhabit pinyon-juniper for roosting in cavities in older trees.

The Watershed EAs arbitrarily assumed there were “empty” habitats, ignored the impacts of habitat fragmentation, ignored the basic biology and natural history of the species and the vegetation community attributes that these animals rely upon. For example, many migratory bird and other species are territorial, and the habitat is highly likely to already be occupied, i.e. there is no empty habitat. In those EAs, BLM failed to provide any evidence there was empty habitat for species to move off to, or that more animals could be compressed into the remnant habitat, or that populations would not decline. Basic pre-decisional species inventories were not conducted for nearly all sensitive species and raptors, so there was no proper baseline established to gauge losses. For small mammals like the pygmy rabbit dependent on dense mature and old growth big sagebrush, BLM never considered whether dispersal corridors existed.

Ely BLM based its EA claims of minimal impacts to pinyon jay, migratory birds and other sensitive species on habitat somewhere else being available to the animals. Now the PEIS targets vastly more habitat for treatment degradation, destruction and fragmentation, under the banner of “restoration”.

OREGON

There has been drastic loss of western juniper forest in Oregon in the past 20 years – a combination of huge areas of BLM treatments, and also wildfire. How much western juniper forest has been lost in Oregon since 2000?

How much western juniper has been lost or has already been authorized for deforestation across the species range in the past 20 years? How much more is foreseeable – including for biomass feedstock in Lakeview?

There does not appear to be any Phase III juniper mapped in Oregon (vs. Nevada). Why?

RESISTANCE AND RESILIENCE MAP 7

There appears to be a great disparity between states in how this was mapped. Owyhee County shows large areas of higher resistance and resilience.

Compare this to Nevada. Yet the understory characteristics, elevation and precipitation zones are similar in many areas to those in Owyhee County.

Please explain the difference.

FIGURE 8 FIRES

Effects of the recent mega-drought should be considered re: number of fires from 2000 to 2018.

MAP 9. HISTORIC VEGETATION.

This is supposed to depict historic vegetation (apparently based on the Landfire and other models). It maps Big Sagebrush, Low Sagebrush, Pinyon-Juniper/Sagebrush Interface Steppe and Grassland. But no pinyon-juniper non-interface. How was the pinyon-juniper interface determined? Please provide the specific inputs into models that were used, and the underlying scientific literature that was used in support of plant community categorization. What were the fire return and disturbance intervals and assumptions were made? What comparative reference sites were used? Was any field work involved in vetting this? For example, verifying data and models by ground-truthing sites, including close examination for presence of old stumps, evidence of earlier agency treatments, and other areas where pinyon-juniper may be re-occupying sites that were deforested? See Romme et al. 2009.

How will past and planned treatments affect the “interface”? In many areas in Nevada, older crested wheatgrass seedings extend upslope on alluvial fans, and it is obvious (stark straight lines, location of trees in sites outside the seeding in the same local area) that pinyon-juniper was cleared and replaced with seedings. Thus the existing “interface” in many areas is an artificial manipulated state. Given the huge number of Nevada BLM and USFS treatments of pinyon-juniper in recent years, the interface areas are highly likely to already be riddled with forest fragmentation from these previous treatments.

Why is there no pinyon-juniper forest shown, just interface? Is this similar to the Ecosite models used in the Owyhee region where juniper is largely mapped out of existence by using modeling that finds the communities to be sage and not the real-world juniper?

This map is one of the many examples of how the broadness and artificial nature of the vegetation categories BLM uses renders any analysis largely meaningless in a biological sense.

The mapping uses categories that are so broad, general and simplistic as to be essentially meaningless for applying effective NEPA analysis, impacts assessment, minimization and mitigation measures. It doesn't show the vegetation actually present – but instead the modeled vegetation based on the Landfire FRCC and BPS historic disturbance intervals that ignore history?

WHERE did all the low sagebrush vanish to? There is extensive low (short statured) sagebrush in areas of Idaho, Nevada and Oregon, yet only Oregon shows a little bit of low sage, but certainly not all that is present. Have the Landfire models somehow modeled the low sagebrush away, like they have the juniper, based on greatly inaccurate fire return interval model inputs?

Didn't anyone making these maps notice that the entire Owyhee plateau with its extensive low sagebrush communities has no low sagebrush shown? How was this mapping vetted?

Has it been mapped out of existence because it has very long fire return intervals, is very slow to recover following fire and other disturbance, and so somehow was shoehorned in to another category to mask how disastrous treatments in large areas would actually be? How could BLM, claiming the EIS was aimed at sage-grouse habitat, map away low sagebrush, which is a crucial habitat type for the birds?

MAP 10. Uncharacteristic Vegetation Compared to Historic Condition within the Treatment Area

This mapping of uncharacteristic veg does not really mesh with what the EIS proposes to do. Isn't much of the area shown as uncharacteristic recent large wildfires? Yet the EIS is based on frequent disturbance/fire intervals, so how can fires be uncharacteristic?

It appears to show crested wheat seedings and cheat, too in some areas as uncharacteristic, and not the vast majority of the lands BLM proposes to treat. Is this actually showing more of a crested wheatgrass layer?

Why is BLM proposing a 38 million acres project, when only this relatively smaller area is "uncharacteristic"?

MAP 11. Uncharacteristic Vegetation Compared to Historic Condition within the Treatment Area: Grasslands.

RE: Low to moderate departure Uncharacteristic vegetation. It appears that different BLM Districts may have defined/categorized vegetation communities differently? How does BLM explain why Oregon and Washington have so much area it considers "grasslands" vs. none in other states?

MAP 12. Uncharacteristic Vegetation Compared to Historic Condition within the Treatment Area: Low Sagebrush.

Low to moderate departure, Uncharacteristic vegetation. Why do the Little Lost, Birch Creek, southern portions of the Big Lost i.e. lands managed under Idaho Falls District have low sagebrush categorized as "uncharacteristic" vs. other areas of Idaho that also have "low sagebrush" vegetation types? Example: Owyhee plateau. Also, "low sage" subsumes several short-statured sage species that typify eastern Idaho valleys and alluvial fans within it.

This situation illustrates how bizarre the mapping and PEIS vegetation schemes are -as vast areas of low sagebrush have vanished from the face of the earth in the mapping.

Why is there no mapping of all low sagebrush communities across the project area? As with pinyon-juniper, there must be mapping of the veg currently in these categories on the land outside the sites targeted for treatment (and this includes on adjacent USFS land too) for a hard look NEPA analysis of project impacts to biotic communities to take place.

MAP 13. HISTORIC FIRE RETURN INTERVALS.

Historic Fire Return Intervals used in the PEIS are: 0-35 years, 36-100 years, 101-200 years, 201 years or greater. But doesn't the Landfire modeling use even broader ranges for some communities?

First, it is nearly impossible to distinguish the 2 red hues used in mapping. Distinguishing them is critical for the public to understand, for example, which Veg State has a 36-100-year fire return interval vs. a 100-200-year interval.

It appears the only sites where BLM maps 200+ year fire return intervals for shrub communities are salt desert shrub communities. Is that the case?

It appears that nearly all Wyoming big sagebrush vegetation communities are categorized as 36-100-year fire return/disturbance interval sites (the more orange red hue?). If so, then the PEIS project appears to reject the fire return intervals in Knick and Connelly et al. 2011, such as the William Baker paper, and rely on some other source? Please provide the specific sources. Also, vast areas of low sagebrush (and other short-statured sagebrush taxa that are widely recognized to have very long fire return intervals) also appear to be mapped by BLM in this same red hue signifying 36-100-year fire return intervals vs. the intervals in Baker.

It also appears that the BLM has mapped some mountain big sagebrush communities (at least in Idaho) as having 0-35-year fire return intervals. Is that the case? How can there be a structurally complex sagebrush vegetation community that supports sagebrush sensitive species like Brewer's sparrow or pygmy rabbit, as some of these communities do, with such a short fire return interval?

The mapping also fails to identify the full extent of each type of broad vegetation category BLM uses, and fails to identify the extent of each community in the treatment area and targeted to be treated under each alternative, and to provide this mapping in clearly distinguishable colors and format.

Preceding PEIS maps have at times distinguished a "low sagebrush" category. Why doesn't this mapping do so? Why aren't disturbance intervals clearly laid out and explained for all Vegetative states. For all mapping, the scientific references, methodologies and assumptions used must be clearly explained. Appendices provide often vague and unclear information on specific data used, and how the BLM ID Team actually determined categories, breakpoints, etc. must be provided. BLM falls back on its ID Team as an explanation for how some components of the analysis were conducted, arrived at use of particular elements of the PEIS. Example, the veg states in Table 2.2. What role and input did sage-grouse or migratory bird biologists have in providing inputs?

Also, in comparing PEIS mapping of Idaho and Oregon to much of Nevada: There appears to be only limited orange hued red in 2/3 of Nevada, vs, orange-hued red being the dominant vegetation type across Wyoming big sagebrush, various low sagebrush communities, and some mountain big sage sites in Idaho. Is there a difference between BLM Districts or states in how these categories were applied to vegetation communities in the project area? If so, what is the reason for this?

Further, why aren't the cheatgrass areas and the crested wheat seedings shown as "perennial grasslands" veg states used in other mapping identified here, and shown as 0-35-year fire return intervals? What fire return intervals does BLM use for cheatgrass/medusahead? For forage kochia? What intervals does it use for crested wheatgrass? What are the differences in fuel characteristics? BLM's existing crested wheatgrass seedings in Idaho, eastern Oregon and Elko/northern Nevada have suffered repeated large-scale fires that have flashed rapidly across the landscape, and often expanded into adjacent sagebrush.

MAP 14.

Historic fire regime groups. BLM uses 5 broad categories. These may also have been arbitrarily applied differently by different BLM management offices. Compare Oregon and Idaho, where similar Wyoming big sagebrush communities are classified differently. Nearly all of Oregon is placed in Fire regime group III, vs. large areas of Idaho are in Fire regime group IV, yet vegetation communities are often similar. Also, higher elevation sage sites in south-central and southeastern Idaho.

MAP16.

Erodible soils. It's very surprising there is so little area of erodible soils shown. How did BLM arrive at this mapping? What are the erodibility factors for soils under both wind and water erosion that served as the breakpoint for erosion categories here? There is no concrete information on what category of soil erosion severity is mapped - is the category shown "severe" or other extreme erosion?

MAP 17.

Wildlife habitat. Here too the Vegetation categories BLM uses are much too generalized and simplified, and include such extremely broad cover ranges, that the mapping is largely meaningless, and is no basis for planning massive treatment disturbance. The several hundred sensitive species in PEIS Appendix I have complex habitat needs, and the EIS's gross lumping of veg communities in to such broad groups has no real utility for an effective hard look impacts analysis

The map uses Grasslands, Shrublands, Pinyon-Juniper Shrublands, Pinyon-Juniper Grasslands and Pinyon-Juniper and Other categories. Does the mapping reflect modeled idealized plant communities, i.e. what BLM wants to see on the land based on supposed fire return and disturbance intervals and other model inputs? Does it accurately reflect areas of extant pinyon-juniper currently on the land?

The limited area colored darker purple does not appear to be the historical extent of pinyon-juniper. What is the basis for delineating pinyon-juniper historical extent shown on the map? Does the mapping in Oregon and Nevada depict extant pinyon-juniper with trees currently present on the lands colored purple? If so, it appears there has already been a shocking loss of pinyon-juniper. Please clarify this, as it appears this does not depict the habitat vegetation currently present on the land, but is instead a modeled habitat that often does not exist?

The "shrublands" category vs. the "grasslands" category in mapping appears to somewhat track extant sagebrush vs. large seedings/burned areas in portions of NV and OR. In Idaho, it does not appear to show the Soda Fire and some other recent fires.

It is difficult to distinguish the purple color from the pink color.

MAP 18. Big game habitat

It is impossible to really distinguish elk and other habitats. Please provide clear mapping.

MAP 19. Sage-grouse habitat

Bi-State GHMA IHMA OHMA PHMA.

There have been recent large-scale declines in GRSG populations since the 2015 ARMPAs were finalized. See Knick and Connelly 2019. GRSG population triggers have been tripped over large areas in Idaho and Oregon, including in places that have not suffered new wildfires. This has resulted in IHMA being managed as PHMA and other habitat protection upgrades. BLM should provide mapping that reflects this. Where have GRSG population triggers been tripped? How does this change the habitat management categories, and what implications does this have for the EIS analysis? Shouldn't much of the IHMA in Idaho's Owyhee County, the Big Desert country, and Mountain-Valley populations now be shown as PHMA? Won't the proposed scale of PEIS treatments trip triggers in more places?

ADDITIONAL PEIS MAPS

Potential Treatment Areas Sage Grouse Habitat Grasslands, Pinyon-juniper Grassland and pinyon-juniper at https://eplanning.blm.gov/epl-front-office/projects/nepa/122968/20015569/250020720/19a-FuelRRR_AE_GRSG_TreatmentAreas_B_V14.pdf

This mapping seems to show that BLM plans to treat nearly all pinyon-juniper communities. Given that it also shows purple colors in the Lemhi, Pahsimeroi Big Lost country, it also appears to show Douglas fir targeted for treatments? Is that correct?

Please provide detailed comparative information on how BLM arrived at the "treatment" acreage in the FIAT process, vs. the treatment acreage in Alts C and D of the EIS. https://eplanning.blm.gov/epl-front-office/projects/nepa/122968/20015571/250020722/19c-FuelRRR_AE_GRSG_TreatmentAreas_D_V14.pdf

How many of the FIAT areas have already had treatment NEPA documents planned or finalized?

Appendix C - Sagebrush treatments in Greater Sage Grouse Habitat Based on Jones 2019

In sagebrush communities, mechanical mowing or chaining treatments are sometimes used to alter sage-grouse habitat. Sagebrush treatments are designed to reduce cover of sagebrush, often with the goal of allowing perennial grasses and forbs to increase. However, our summary chart shows a positive response by sage-grouse in only 36% of the data points. Negative (27%) and not significant (36%) responses were the majority. While our summary chart reports roughly equal numbers of data points that found positive versus negative versus non-significant effects on sage-grouse, many researchers have concluded that removal of sagebrush through a variety of means can have negative impacts on sage-grouse (Beck et al. 2012; Braun et al. 1977; Connelly et al. 2000; Fischer et al. 1996; Peterson 1995; Pyrah 1972; Swenson et al. 1987; Wallestad 1975).

Several studies found that mowing treatments do not lead to an increase in critical sage-grouse early brood-rearing requirements such as forb abundance, forb nutritional content, perennial grass cover or height (Hess, 2011; Hess and Beck, 2010, 2012, 2014), or weight or abundance of beetles and grasshoppers (Christiansen 1988; Scoggan and Brusven 1973).

The removal of big sagebrush by any means in sage-grouse winter or breeding habitats usually will have a negative or neutral effect on sage-grouse (Beck et al. 2012; Gates 1983; Martin 1990; Robertson 1991). Dahlgren et al. (2006) found no significant difference in sage-grouse use between mechanically treated plots and control plots, although sage-grouse brood use was higher in chemically treated than control plots, which the authors attributed to increased forb cover. However, in all treated plots, sage-grouse use was greatest within 10 m of the edge of the treatments where adjacent sagebrush cover was still available. In Colorado, Braun and Beck (1996) found that after 28% of the sagebrush in their study area was treated (from 1965 to 1970), the mean 5-year average of attending males on leks dropped 25%. And in a study of both mechanical and chemical treatments within a 0.5 km radius around four leks in Montana, the resulting loss of 10 to 30% of suitable sage-grouse habitat within a 1.5 km radius around those leks led to a 65% drop in males attending those leks (Wallestad 1975). A study by Holloran and Belinda (2009) found that sage-grouse populations in Wyoming began declining with as little as 3.4% of the sagebrush cover removed. Autenrieth (1969) summarized the impacts of big sagebrush control on sage-grouse and recommended that sagebrush reduction treatments should never be conducted within 2 miles of a lek, in known sage-grouse wintering concentration areas, nor along streams, meadows, or secondary drainages, both dry and intermittent.

In Utah, Graham (2013) examined the removal of sagebrush in occupied sage-grouse habitat for the purpose of “green-stripping” and establishing fire breaks by seeding forage kochia (*Bassia prostrata*). She found that, similar to other studies, sage-grouse selected for untreated areas. While treated areas were used to expand the size of the active lek to a larger area than was previously used, it was not reported whether this equated to an increase in males using the lek.

Several studies report that sagebrush treatments have positive effects on sage-grouse. Dahlgren et al. (2006) found that, at first, sage-grouse lek counts increased in sagebrush treatment sites relative to surrounding populations in untreated sites. At the time they were studying them, sage-grouse broods used plots of <200 ha treated sagebrush mosaics more than untreated sites. The higher lek counts in the treatment sites were sustained for nearly 15 years. However, with continued sagebrush treatments and adverse winter conditions, lek counts then declined to levels similar to surrounding areas. Dahlgren et al. (2006) hypothesized that sagebrush treatments increased availability of grasses and forbs to sage-

grouse, but that cumulative annual reductions in sagebrush may have reduced availability of sagebrush cover for sage-grouse seasonal needs. Stringham (2010) similarly reported sage-grouse use of sagebrush treatment sites during the breeding and early brood-rearing periods, but not winter. Baxter et al. (2017) developed resource selection function models using a 19-year telemetry data set (1998–2016) from northeastern Utah to evaluate response of sage-grouse to treatments. Statistical models were built using 418 locations to assess the influence of mountain big sagebrush treatments on sage-grouse habitat selection during the brooding period. They found that post-treatment sage-grouse selected areas that were inside treated areas or near treatment edges. In Utah, Ritchie et al. (1994) examined sage-grouse nests in areas that had been chained and seeded 25 years previously and compared those to areas that were untreated. They found that predation rates of artificial nests were higher in areas of untreated sagebrush, even though these areas had greater sagebrush cover, taller shrubs, and greater horizontal plant cover. They hypothesized that untreated sites may contain greater abundance of potential prey species, such as lagomorphs, and thus, may attract greater densities of sage-grouse predators.

Some studies have specifically investigated the effects of sagebrush mowing treatments on sage-grouse habitat. Hess and Beck (2010) evaluated treatments in the Bighorn Basin in Wyoming for sage-grouse habitat 10 to 18 years after treatment. They found no positive structural changes in vegetation in the treatment areas and concluded that treatments do not result in improved, long-term habitat conditions for sage-grouse nesting and early brood-rearing habitat.

**Appendix D - Letter from scientists to BLM state sage grouse coordinators dated April 6 entitled
"Comments on Greater sage-grouse Draft Supplemental Environmental Impact Statements"**

April 6, 2020

A copy of the letter sent to the following State sage-grouse leads in the Bureau of Land Management:

Mr. Jonathan Beck; Idaho Sage-grouse Implementation Lead
Ms. Arlene Kosic; California Greater Sage-grouse Implementation Coordinator
Ms. Jenny Marzhuf; Wyoming Greater Sage-grouse Coordinator
Mr. Jim Regan-Vienop; Oregon Planning and Environmental Coordinator
Ms. Carolyn Sherve; Nevada Greater Sage-grouse Implementation Coordinator
Ms. Leah Waldner; Colorado Sage-grouse Coordinator
Ms. Mellissa Wood; Utah Sage-grouse Plan Implementation Coordinator

Re: Comments on Greater sage-grouse Draft Supplemental Environmental Impact Statements

Dear BLM Greater Sage-grouse State Leads,

This letter expresses our concerns regarding how the Bureau of Land Management (BLM) is addressing conservation of greater sage-grouse (herein sage-grouse) and sagebrush habitats. The Department of Interior (DOI) appears to be ignoring current science, which threatens its federal trust responsibility to conserve and manage our natural resources and may have severe consequences for sage-grouse.

In response to a U.S. District Court decision last October, on February 11, 2020 the BLM published six Draft Supplemental Environmental Impact Statements (SEIS) in support of the 2019 sage-grouse Resource Management Plan (RMP) amendments in Idaho, Wyoming, Colorado, Utah, Oregon, and Nevada/northeastern California. While BLM issued its SEISs in response to a narrow scope of issues recognized in that District Court decision, the initiation of the SEIS processes presents the BLM an important opportunity to address significant new information concerning recent sage-grouse population declines and loss of sagebrush habitats.

Sage-grouse populations have been in decline since the 1960s. Average declines in populations across the range of the species are estimated at 2% per year from 1965 to 2015, a rate of decline suggesting a reduction in total average population size of 66% over that time period. These declines prompted several Endangered Species Act listing petitions and led to the development and implementation of state and federal management strategies that included targeted sage-grouse management actions. However, recent population trends suggest that rates of decline are continuing and may be increasing. Over the last 4 years (2015-2019), state-level data suggest sage-grouse populations have declined 44% on average. Numbers of sage-grouse in population strongholds (not just in periphery areas) are decreasing with estimated statewide declines of between 33 and 52% in Oregon, Idaho, Nevada, Montana, and Wyoming from 2015 to 2019. Projections are for sage-grouse populations to continue to decline given current trends in habitat loss and degradation.

Wildland fires are one of the most immediate and pervasive threats to sage-grouse, especially throughout western portions of the species' range. The threat to population and habitat persistence posed by the proliferation of invasive annual grasses and resulting increases in fire frequency, which ultimately results in long-term and often functionally permanent loss of fire-intolerant species such as sagebrush from the landscape, cannot be overstated. Data from the Great Basin Coordination Center suggest that fires on BLM lands are increasing. From 2016 to 2019, approximately 3 million acres of BLM lands burned in Idaho, Nevada and Utah alone, which was a 43% increase in annual BLM acres burned in these states compared to the previous 4-year period (2012-15). Over the next 20 years, median annual area burned is projected to increase by 5 to over 11 times in states supporting sage-grouse populations, suggesting that increasing trends in acres of BLM lands burned are likely to continue.

Sage-grouse population declines and habitat loss represent significant new environmental information that bears on the management actions established in the 2015 and 2019 sage-grouse RMP amendments. BLM must address these circumstances through supplements to the EISs used to inform those RMPs as prescribed in 40 CFR 1502.9(c)(1)(ii) of the National Environmental Policy Act (NEPA). Specifically, the regulations require agencies to:

“prepare supplements to either draft or final environmental impact statements if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.”

The Draft SEISs released February 11, 2020 do not reflect the reality of these new circumstances and provide no scientific justification for the majority of BLM management decisions given the current situation. Accordingly, BLM must expand the scope of these SEISs to address this new information and set of circumstances facing sage-grouse and sagebrush habitat.

Alignment of Federal and State Management Approaches

We agree in principle with the overall goal of 2019 efforts to align federal and state management approaches; coordination among those managing sage-grouse and sagebrush habitats is important for landscape-scale effect. However, effective coordination requires that each management body fulfills its distinct obligations in such a way that the overall goal is met as a product of the aggregate of actions. As such, the BLM should take into account two potential limitations to blanket alignment with state-level efforts: (1) the BLM should recognize and fulfil its unique role and trust responsibility in sage-grouse management; and (2) the BLM should establish that individual state plans are robust to ensure combined efforts across states are adequate to attain the goal of conserving sage-grouse across the range of the species.

Effective management of sage-grouse requires local, regional and range-wide perspectives. Consideration of range-wide population dynamics is a critical aspect of local and regional efforts addressed through federal engagement in sage-grouse conservation. By relying solely on state-level strategies and local project-level management of federal lands, the BLM is shirking its mandated responsibility of managing at broader scales. Narrowing the agency’s focus will likely result in the ineffective management of landscapes essential for conserving sage-grouse populations.

State-level approaches to managing sage-grouse differ substantially across the range of the species. While some of these programs have been evaluated for effectiveness at statewide or smaller scales, other state plans are untested. Further, the potential collective effectiveness of these programs has not been examined, and the BLM provides no assessment of broad-scale applicability of these programs to meet the management goals the agency has established for itself. It is critical that the BLM evaluates the local programs it relies on and aligns only with programs that rigorously demonstrate that the conservation efforts collectively have a high probability of maintaining the long-term viability of sage-grouse populations across the range of the species.

Habitat Protection and Restoration

We also agree with BLM’s recent emphasis on the need to manage wildfire in order to minimize future habitat loss for all sagebrush-dependent wildlife. However, effective protection and enhancement of the function, resistance and resilience of sagebrush habitats requires long-term dedication to science-based planning, implementation and monitoring, and strict adherence to adaptive management principles. We are concerned that recent planning efforts (e.g., the Record of Decision (ROD) associated with fuel breaks in the Great Basin signed March 27, 2020) do not reflect the complexity of the issue, and may do more harm than good. For example, BLM is expediting fuel breaks along roads and right-of-ways with little prioritization to select locations that are valuable to fire fighters, feasible to maintain, or appropriate for conditions of the surrounding landscape. This could result in accelerated loss, fragmentation, and degradation of intact sagebrush habitat without providing benefit to fire fighters. Soil disturbance associated with the construction

of fuel breaks can fragment what habitat remains and provide a conduit for the spread of invasive species. Failure to maintain treated areas and control invasive species long-term will almost certainly result in higher fuel loads leading to increased man and lightning-caused ignitions. Fuel breaks and other treatments can be part of a resource manager's tool box, but should be used in a limited, strategic manner that minimizes sagebrush loss and the spread of invasive species.

Science-based Decision Making

Data-driven, statistically-sound assessments of potential responses of sage-grouse populations and habitats to proposed management are necessary to ensure informed decision-making. Yet, the BLM in the 2020 Draft SEISs does not offer any substantive analysis of the indirect and cumulative impacts to sage-grouse of its management decisions. Given current circumstances, rigorous cumulative impact assessments are especially important because of BLM's reliance on the largely disjunct set of management approaches being implemented across the species' range (i.e., state-to-state coordination is limited). The BLM has failed to inform its decision making by not conducting rigorous impact analyses. This oversight will likely jeopardize the agency's ability to meet sage-grouse management goals.

The BLM needs to expand the scope of the Draft SEISs to address new circumstances described and substantiated with recent population and sagebrush habitat trends. Expansion of the scope provides an opportunity for the BLM to more rigorously analyze and assess the direct, indirect and cumulative impacts of management decisions on sage-grouse populations and habitats. Accomplishing such assessments is entirely feasible given the expertise, data, and analytical tools currently available to the BLM. The U.S. Geological Survey (USGS) in their synthesis of relevant literature published from 2015 to 2017 describe several decision-support tools that would apply directly to such analyses. The BLM itself has developed the Assessment, Inventory, and Monitoring (AIM) strategy and the Fire and Invasives Assessment Tool (FIAT) which are expressly meant to provide the agency with analytically-derived information for making impact and habitat management decisions. Further, in each of the 2015 Final EISs the BLM included a Greater Sage-grouse Monitoring Framework which established metrics and approaches for monitoring response of sage-grouse to management actions. The data and analytical tools established in this framework are also directly applicable to analyses we suggest.

Landscape-Scale Management

Because priority habitat management areas (PHMAs) are discrete areas located throughout the range of sage-grouse, large-scale conservation strategies being pursued by BLM depend not only on maintaining suitable habitats within each priority area, but also in large part on maintaining the range-wide connectivity of populations among these priority areas. The loss of connectivity among sage-grouse population strongholds due to human-related or naturally occurring disturbance is a strong predictor of long-term population declines. BLM has a critical role in managing connectivity and other broad-scale issues. Yet, the agency's recent push towards project-specific evaluations and the elimination of its avoidance options (e.g., prioritization of oil and gas leasing outside of important sage-grouse habitats has been discontinued in practice by BLM [Instructional Memorandum 2018-026]) suggest that the BLM has no viable landscape-scale approach to managing impacts to sage-grouse or its habitats. Furthermore, the BLM currently is not requiring compensatory mitigation and has deferred to state plans. While deference to state authority and mitigation programs may work, we remain skeptical as to not only compliance but also effectiveness for achieving a no-net-loss standard. In other words, the lack of a broad perspective on management, restoration and mitigation will likely lead to continued degradation and loss of sage-grouse habitats as development in these habitats proceeds. The SEISs offer no analyses related to mitigation or restoration, which represents a fatal flaw in BLM's analysis of new information and circumstances.

Conclusion

Long-term conservation of sage-grouse requires large, interconnected expanses of sagebrush habitats be managed for invasive annual grasses and other broad-scale factors. To succeed, these efforts need the

proactive participation of the Federal Government. Recent declines in numbers of sage-grouse coupled with long-term negative population trend, and increasing and continued loss of habitat establish the need for the BLM to reexamine the Final EISs relied upon to inform the 2015 and 2019 RMP amendments. It is imperative the scope of the current SEIS process be expanded to include robust examinations of multi-scaled assessments of sage-grouse population-level response to direct, indirect, and cumulative impacts associated with management alternatives. Informed decision-making requires scientifically-valid approaches to assessing these impacts that expressly take into account the uncertainty and risk inherent in sagebrush habitat management.

As scientists and sagebrush policy experts who have collectively spent over 630 years studying sage-grouse and sagebrush habitats, we have been intimately engaged in federal, state, and local efforts to manage and conserve sagebrush landscapes critical to this species. We, and the broader scientific community, remain committed to providing ongoing consultation about the science as well as how we can collectively move forward with a science-based approach to managing and conserving sage-grouse and sagebrush habitats on our federal public lands. Additional details relevant to the points we make in this letter can be found in letters we sent to the Secretary of Interior on October 13, 2017 and June 8, 2018.

NEPA mandates that BLM prepare SEISs to address the significant new circumstances and information the underscored sage-grouse and sagebrush experts present herein. The SEIS processes the BLM is currently engaged in must address these new circumstances and information. We look forward to participating in this process to ensure that agency decisions are robustly informed and incorporate the best available science following a preponderance of evidence approach to decision-making.

We appreciate your consideration of our comments,

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Appendix E – Recent, Current and Reasonably Foreseeable Disturbances to the Sage Brush Biome in the Great Basin

In this appendix, we quantify and visually display some (but not all) of the past, present, and reasonably foreseeable future disturbances to the sage brush biome. The calculations do not include disturbances to non-federal land (with the possible exception of federal oil and gas leasing on non-federal surface estates). We used the US Geological Survey 2019 sage brush distribution⁷⁴ to define the sage brush biome (160,575,593 acres) for the purposes of this analysis.

- I. Cumulative recent, current, and reasonably foreseeable disturbances to the sage brush biome from oil and gas leasing, rights of ways, fuel breaks, wildfires, grazing, and fuel breaks

We did two analyses. In the first, we calculated recent, current, and reasonably foreseeable disturbances in the sage brush biome resulting from oil and gas leasing (sold between 4th Q 2015 and 1st Q 2020), rights of ways, wildfires (since Jan. 1, 2010), and fuel breaks (as specified in the Great Basin Fuel Breaks PEIS and the Tri-State PEIS). In the second, we added BLM lands where livestock grazing is authorized and rangeland health standards are not being achieved (as of 2012). See Charts 1 and 2 below. Chart 4 provides metadata.

These analyses do not include disturbances resulting from oil and gas leasing prior to the 4th quarter of 2015, oil and gas development, off-highway vehicle and other recreation, and areas disturbed by BLM vegetation management activities (among other things). While these activities result in disturbances and impacts, we did not have comprehensive data that we could include in the spatial and quantitative calculations. In sections II, III, and IV of this appendix, however, we display and describe the data related to some of these disturbances that was available.

Regarding rangeland health, we did not include acres where rangeland health evaluations have not been conducted or there was not enough information and hence the condition of the range is not documented even though it is reasonable to presume that a subset of these lands are in substandard

⁷⁴ Jeffries, M.I., Bobo, M.R., Finn, S.P., Hanser, S.E., Remington, T., Titolo, A., Welty, J.L., and Wiechman, L.A., 2019, Sagebrush Distribution within the Biome Range Extent, as Derived from Classified Landsat Imagery: U.S. Geological Survey data release, <https://doi.org/10.5066/P9QSQPUU>.

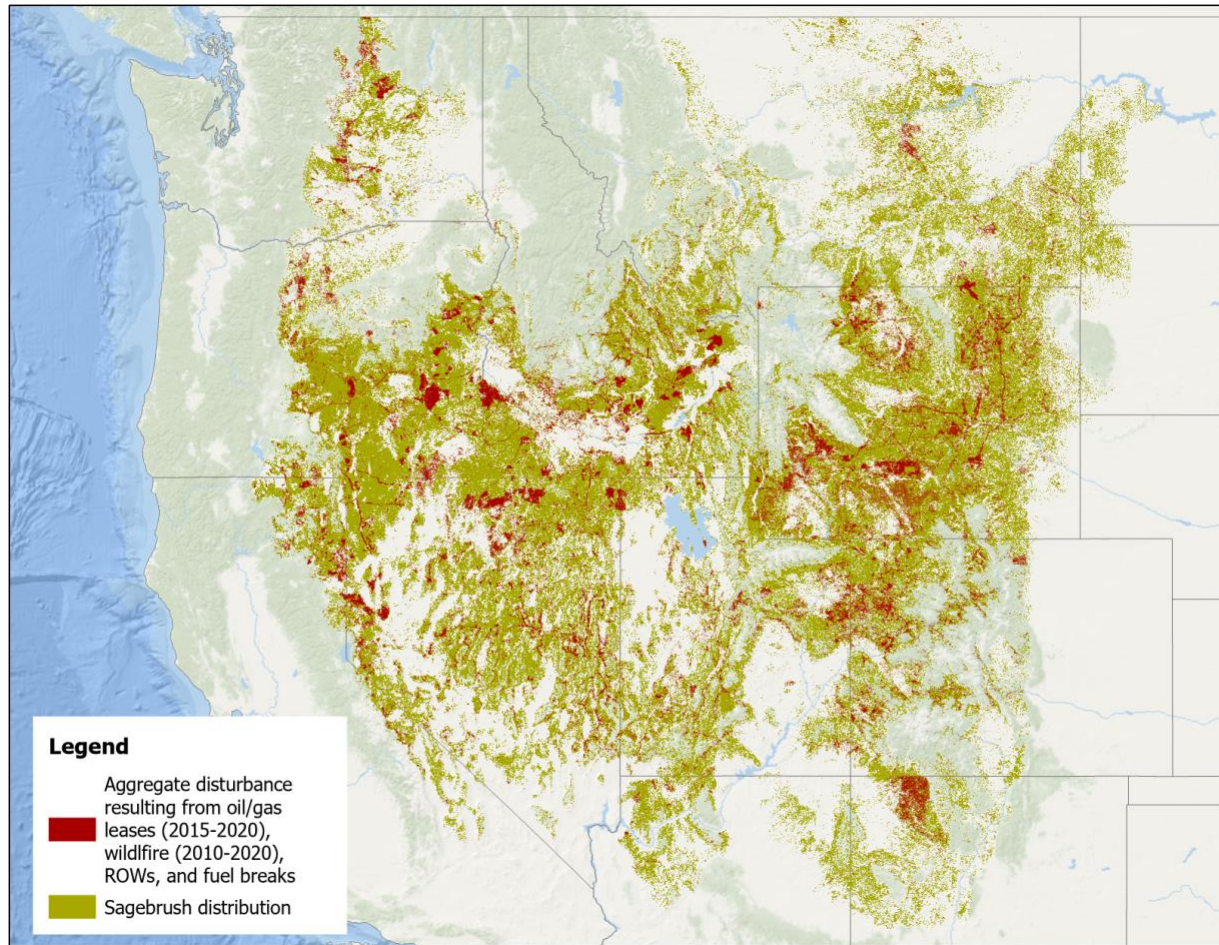
condition. Map 3 shows lands open to grazing where land health evaluations are not documented or where rangeland health standards are not being achieved.

Results

We found that cumulatively oil and gas leasing (sold between 4th Q 2015 and 1st Q 2020), rights of ways, wildfires (since Jan. 1, 2010), and fuel breaks (as specified in the Great Basin Fuel Breaks PEIS and the Tri-State PEIS) impacted 22,447,935 acres. This is approximately 14% of the sagebrush biome. See Map 1.

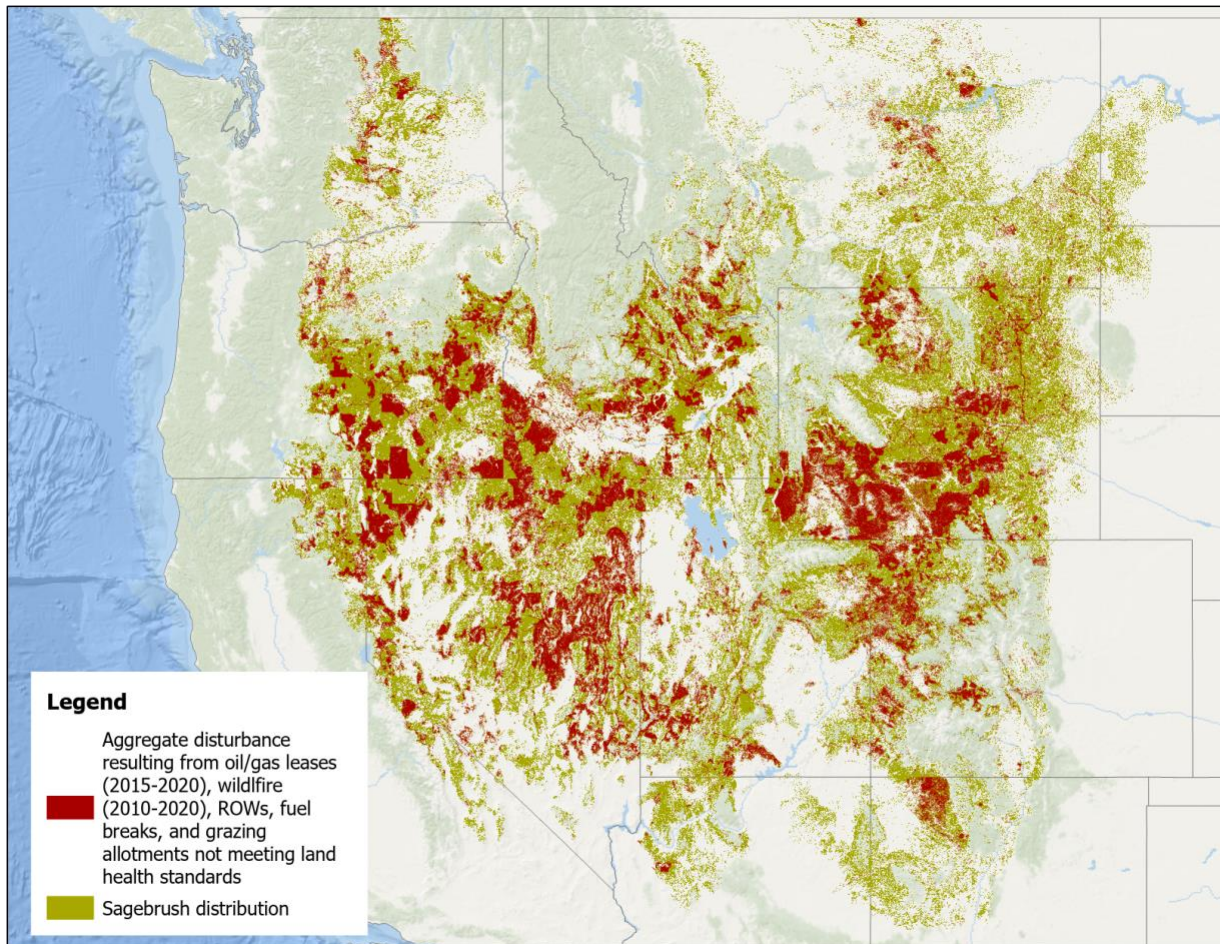
When we added grazed lands not meeting land health standards, cumulative disturbed acres amounted to 48,092,234 acres. This is approximately 30% of sagebrush biome. See Map 2.

Map 1. Acres within the sage brush biome disturbed by oil and gas leasing (sold between 4th Q 2015 and 1st Q 2020), rights of ways, wildfires (since Jan. 1, 2010), and fuel breaks (as specified in the Great Basin Fuel Breaks PEIS and the Tri-State PEIS).



Map 2. Acres within the sage brush biome disturbed by oil and gas leasing (sold between 4th Q 2015 and 1st Q 2020), rights of ways, wildfires (since Jan. 1, 2010), and fuel breaks (as specified in the Great Basin Fuel Breaks PEIS and the Tri-State PEIS) and grazed lands not meeting land health standards.

Map 2.



Map 3. Grazing allotments and their condition as of 2012.

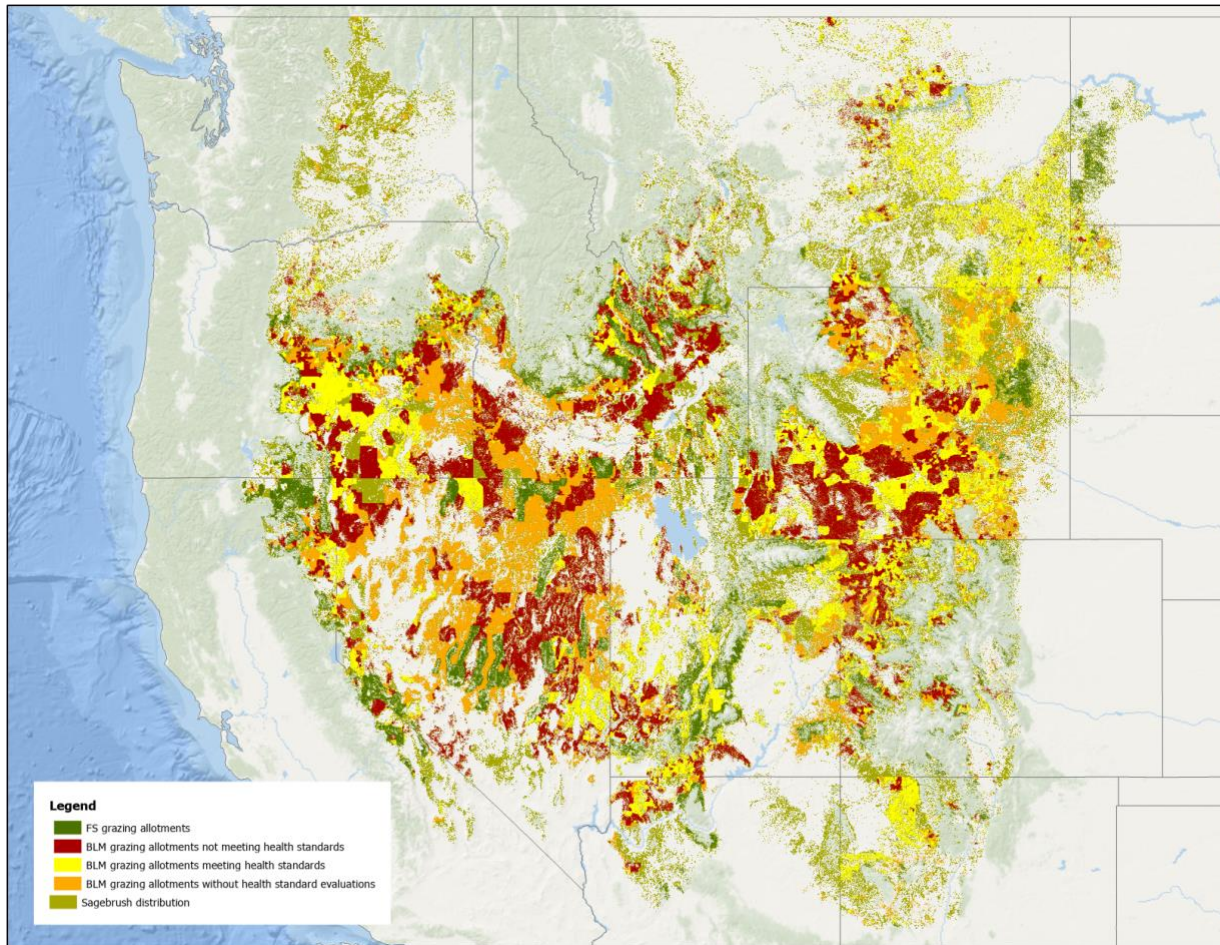


Chart 1. Recent, pending, and reasonably foreseeable disturbances related to oil and gas leasing, rights of ways, wildfire, and fuel breaks.

Disturbance Type	Data Source	Timeframe Represented	Total Acres within USGS Sage Brush layer	Percent Acres within USGS Sage Brush Layer	Notes
Oil and gas leases	Center for Biological Diversity	Sold between 4 th Q 2015 and 1 st Q 2020	2,280,797	1.4%	
Rights of Ways	<u>BLM Rights of Way</u>		15,753,311	9.8%	Includes those listed as authorized and pending and expired and closed
Wildfire	National Interagency Fire Center layers: <u>Historic GeoMAC Perimeters 2019</u> <u>US HIST FIRE PERIMTRS 2000 2018</u>	Since 1/1/2010 – 12/31/2019	6,806,383	4.2%	
Fuel Breaks (500 feet wide)	<u>BLM Great Basin Fuel Breaks PEIS</u> <u>BLM Tri-State Fuel Breaks PEIS</u>		720,331	0.45%	From Great Basin Fuel Breaks PEIS (FEIS and ROD) and Tri-State Fuel Breaks PEIS (FEIS)

Chart 2. Acres with authorized livestock grazing within the sage brush biome.

Agency	Total Allotment Acres Overlapping USGS Sage Brush Layer	Allotment Acres not Meeting Land Health Standards Overlapping USGS Sage Brush Layer	Allotment Acres not Evaluated for Land Health Standards Overlapping USGS Sage Brush Layer ⁷⁵
BLM	98,380,459	31,533,705	34,743,740
FS	16,082,244	n/a	16,082,244
Total	114,462,703	n/a	50,825,985

⁷⁵ For BLM, this includes the data categories in the data set labeled Not Met – insufficient information”, “No data” and “Determination Not Complete.” All Forest Service lands are included in this category because there is not consistent reporting of allotment condition.

II. Cumulative recent, current, and reasonably foreseeable disturbances to the sage brush biome from OHV activity

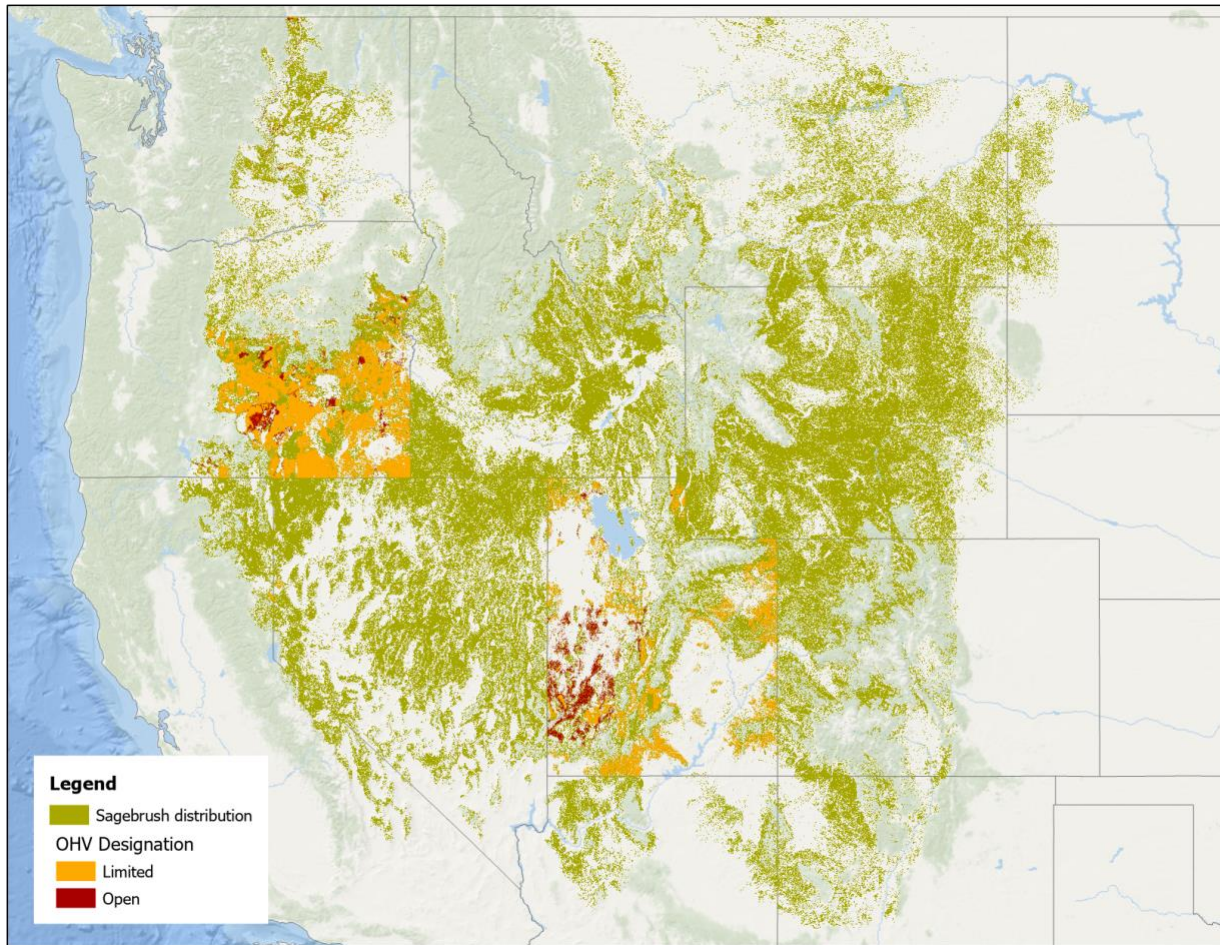
The BLM zones lands for off highway vehicle (OHV) activity. It uses three zones: 1) closed, 2) limited, and 3) open. Spatial data showing these zones was only available for four states. Hence, we did not include OHV disturbed lands in the above analyses. Nevertheless, OHVs can hugely disturb ecosystems (e.g., see Ouren et al. 2007) and the impacts from this activity should be included in a cumulative impact analysis.

Chart 4 and Map 4 quantify and show the OHV limited and open areas in four of the six states affected by this PEIS.

Chart 4. OHV limited and open areas overlapping the sage brush biome in four of the six states affected by this PEIS.

States with BLM OHV Data Available	Category	Acres Overlapping USGS Sage Brush Layer
California, Utah, Oregon & Washington	Limited	13,591,267.83
	Open	2,441,619.67
	Total	16,032,887.50

Map 4. OHV limited and open areas overlapping the sage brush biome in four of the six states affected by this PEIS.



III. Previous Land Treatment in the Sage Brush Biome

The US Geological Survey maintains a Land Treatment Digital Library on behalf of the BLM. The data base includes information on land treatments that have taken place on BLM lands. The data is not

comprehensive and is reported inconsistently (for instance, as point or polygons). As discussed at length in the body of the comment letter, treatments often are not successful and therefore should be regarded as disturbances in a cumulative impact analysis. Map 5 shows treatment projects since 2000 that fall within the sage brush biome.

Map 5. Vegetation projects reported in the USGS Land Treatment Digital Library within the sage brush biome since 2000.

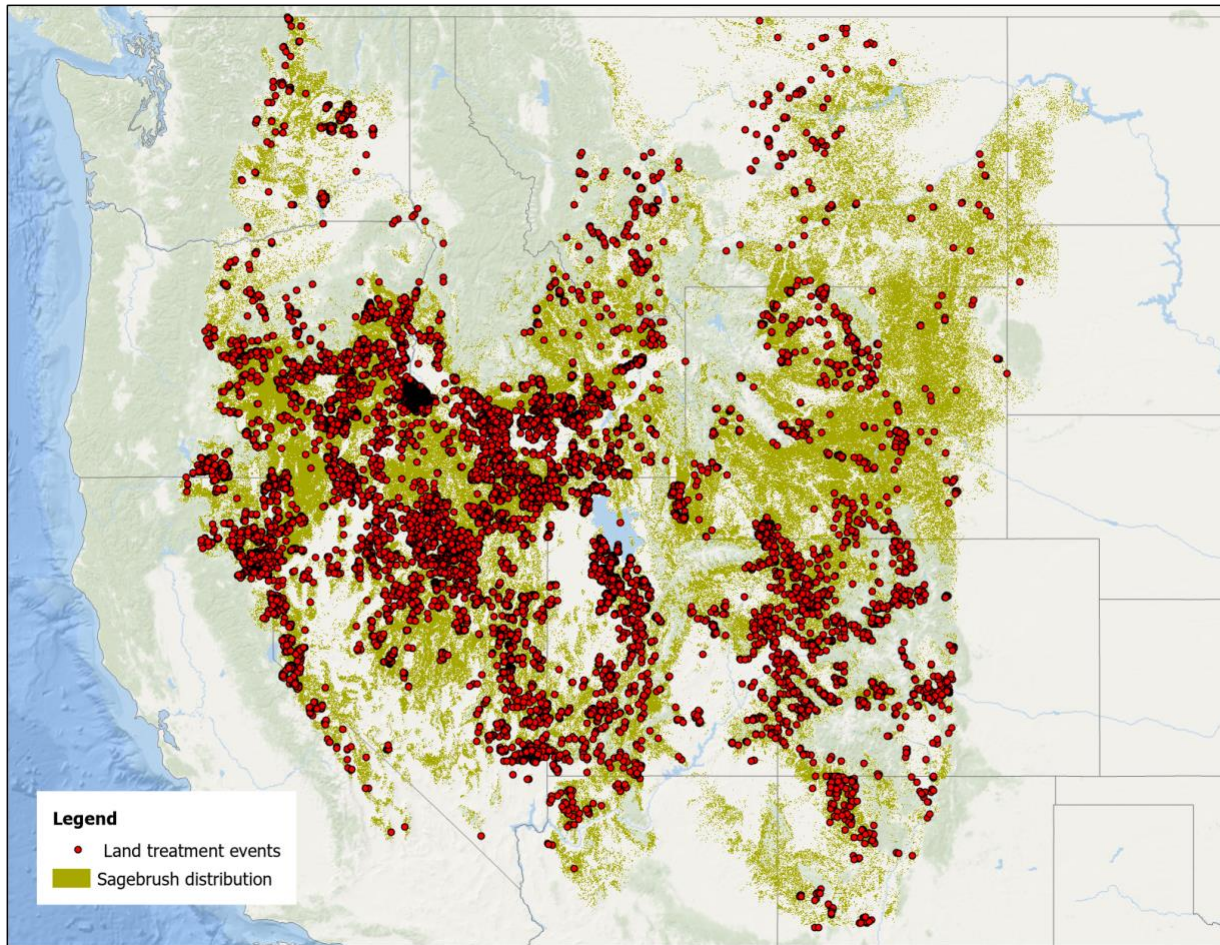


Chart 4. Metadata used in analyses.

Layer	Metadata	Links
USGS 2019 Sagebrush distribution	This raster portrays the distribution of sagebrush within the geographic extent of the sagebrush biome in the United States. It was created for the Western Association of Fish and Wildlife Agency's (WAFWA) Sagebrush Conservation Strategy publication as a visual for the schematic figures and to calculate summary statistics. This distribution incorporates the most recently available sagebrush cover mapping (Xian et al. 2015, Rigge et al. 2019) and classified LANDFIRE EVT (Department of Ecosystem Science, University of Wyoming 2016). Both datasets were rigorously evaluated and extensive ground measurements taken to evaluate accuracy by the respective authors. We created a combined binary sagebrush distribution by classifying the Rigge et al. (2019) product to a binary form where sagebrush cover was greater than 5%, which is equal to the root mean squared error of the analysis (RMSE = 5.09). The Rigge et al. (2019) raster is not complete across the sagebrush biome, so we filled in the areas of NoData with the 'Sagebrush-dominated Ecological Systems' pixels from binary sagebrush raster (Department of Ecosystem Science, University of Wyoming 2016) to create a continuous raster across the sagebrush biome. The input layers are informative to conditions circa the beginning of 2015.	https://www.sciencebase.gov/catalog/item/5d1cfecae4b0941bde64ce9f

Oil and gas leases	BLM Oil & Gas lease parcels between 4th Quarter 2015 - 1st Quarter 2020. This layer was created by downloading shapefiles from BLM eplanning pages for each sale. The layer was queried to only reflect parcels that were offered and sold at auction	
Rights of Way	These layers represent the Public Land Survey System (PLSS) polygonal data that were joined to Rights-of-Way (ROW) tabular data queried from LR2000 on the highest resolution legal land description available. It contains the merged PLSS intersected feature class containing all aliquot parts for the LR2000 query dissolved on case serial numbers. LR2000 data without corresponding PLSS data will not yield geospatial data. Each of the four map layers represent 'AUTHORIZED', 'PENDING', 'CLOSED', & 'EXPIRED' case dispositions. The Not Matched Table show the unmatched records from the LR2000 to PLSS process described in the "ROW Data Processing Report". LR2000 data without corresponding legal land description PLSS data will not yield geospatial data. These records are meant to help prioritize areas that may need some data improvement. This dataset is intended for public display and sensitive information has been removed.	https://gis.blm.gov/arcgis/rest/services/lands/BLM_Natl_RightsOfWay_Public_Display/MapServer
Wildfire	National Interagency Fire Center layers: The Geospatial Multi-Agency Coordination Group, or GeoMAC, is an internet-based mapping tool originally designed for fire managers to access online maps of current fire locations and perimeters in the US. Perimeters are submitted to GeoMAC by field offices. The GeoMAC team	Historic GeoMAC Perimeters 2019 US HIST FIRE PERIMTRS 2000 2018

	attributes the perimeters using various sources, and then posts them on the GeoMAC website and to an HTTP site for downloading. These files contains all the latest fire perimeters that were processed by the GeoMAC team between 2000 and 2019. The projection is geographic and the datum is NAD83. These two layers were merged then queried to only display wildfires between January 2010 - December 2019	
Fuel Breaks (500 feet wide)	Tri-State Fuel Breaks Alt 5: This feature class shows the fuel break route centerlines for the Tri-State Fuel Break Strategy Project in the Vale and Boise Districts. Note that fuel breaks may be proposed for one side or both sides of the route centerlines. This feature class was last edited in February 2020. BLM Great Basin Fuel Breaks Alt D: Fuel Breaks Programmatic EIS and Fuels Reduction and Rangeland Restoration Programmatic EIS. Fuel Breaks Alternative D consists of treatment in pinyon-juniper woodland and sagebrush habitat along a 500 ft corridor of existing interstates, state highways, county roads, BLM-administered roads, BLM-administered ROWs, and primitive roads. Treatment areas exclude specially designated areas, riparian conservation areas, lynx habitat, and wolverine habitat.	<u>BLM Great Basin Fuel Breaks PEIS</u> <u>BLM Tri-State Fuel Breaks PEIS</u>

BLM Grazing allotments	The Bureau of Land Management’s Land Health Standards (LHS) evaluations assess the conditions of BLM lands with respect to a number of “Fundamentals of Rangeland Health,” defined in <u>43 CFR 4180.1</u>, that include properly functioning watersheds (the condition of soils and vegetation, which impact water filtration and water quality), maintenance of ecological processes (how the hydrologic cycle, nutrient cycle, and energy flow are maintained) to support healthy biotic populations and communities, maintenance of the quality of surface waters, and maintenance of habitats for native plant and animal communities and listed or at-risk species. In its evaluations, the BLM determines whether allotments are meeting standards, are failing to meet standards, and if failing, whether impacts of livestock grazing are identified as a significant cause, or are failing to meet standards due to factors other than livestock. Public Employees for Environmental Responsibility (PEER) through Freedom of Information Act requests acquired land health data from 2012 and compiled it into one data base. See https://www.peer.org/blm-grazing-data/ for an explanation of PEER’s methods. Because BLM does not maintain a formal data base containing land health evaluation records, we used PEER’s data from 2012 in this analysis.	https://www.peer.org/blm-grazing-data/
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FS Grazing allotments	FS Grazing allotments: Allotment is a feature class in the Range Management Unit (RMU) data set. It represents the area boundaries of livestock grazing allotments. Designates boundaries to establish extent of livestock distribution and management within the allotment. This is a published layer created by combining GIS data managed by each National Forest and attribute data stored in the Forest Service Infra database application. This dataset is designed for reporting and analysis and is not used to enter or edit data.	https://data.fs.usda.gov/geodata/edw/edw_resources/meta/S_USA.Allotment.xml
OHV Layers: CA	California: This feature class shows the boundaries for existing BLM Off-Highway Vehicle (OHV) polygons. Description: This polygon feature class represents the spatial extent and boundaries for existing BLM Travel Management Areas and Plans (TMAP) Off-Highway Vehicle (OHV) polygons. They are purposed to show the existing OHV designation of the OHV area. An existing OHV polygon can have an Open, Limited, Closed or Undesignated status. Queried to only show Limited & Open	https://www.blm.gov/site-page/services-geospatial-gis-data-california
OHV Layers: OR & WA	This publication dataset represents areas where OHV (Off-Highway Vehicle) use on BLM lands is described in terms of Code of Federal Regulation (CFR) 8342 as Open, Limited, or Closed and any special restrictions (designated routes only, seasonal use only). The designations are determined through the Land Use Planning process (Resource Management Plan (RMP)). Queried to only show Limited & Open	https://navigator.blm.gov/api/download/251842

OHV Layers: UT	This publication dataset represents areas where OHV (Off-Highway Vehicle) use on BLM lands in Utah is described in terms of Code of Federal Regulation (CFR) 8342 as Open, Limited, or Closed and any special restrictions (designated routes only, seasonal use only). The designations are determined through the Land Use Planning process (Resource Management Plan (RMP)). Queried to only show Limited & Open	https://gis.blm.gov/utarcgis/rest/services/Transportation/BLM_UT_OHV_Cat_MapService/MapServer
Land Treatment Database	The USGS Land Treatment Digital Library (LTDL) is a collection of land treatment data acquired from individual BLM field offices. The database contains geospatial features representing specific land treatment actions such as vegetation removal, herbicide application, or seeding. Point and polygon treatment features were clipped to a bounding box representing the spatial extent of the USGS 2019 Sagebrush Distribution layer. These layers were then queried to only show treatments with a start date from 2000 onward (the "Init_Date" field).	https://www.sciencebase.gov/catalog/item/5ebdc19082ce476925e44775