WILDEARTH GUARDIANS
A FORCE FOR NATURE

June 3, 2016

By Fax

Mary Jo Rugwell
State Director
U.S. Bureau of Land Management
Wyoming State Office
5353 Yellowstone Road
Cheyenne, WY 82003
Fax: (307) 775-6203

Re: Supplemental Protest of August 2016 Competitive Oil and Gas Lease Sale

Dear Ms. Rugwell:

Pursuant to 43 C.F.R. § 3120.1-3, WildEarth Guardians hereby submits the following supplement to its June 3, 2016 protest over the Bureau of Land Management's ("BLM's") proposal to offer 85 publicly owned oil and gas lease parcels covering 88,897.80 acres of land in the High Plains and Wind River/Bighorn Basin District Offices of Wyoming for competitive sale on August 2, 2016.

We wish to provide the following supplemental protest raising concerns over sage grouse protection issues. The mailing address to which correspondence regarding this supplemental protest, as well as WildEarth Guardians original protest, should be directed is as follows:

Jeremy Nichols
Climate and Energy Program Director
WildEarth Guardians
2590 Walnut St.
Denver, CO 80205

STATEMENT OF REASONS

WildEarth Guardians files this supplemental protest over the BLM's failure to adequately analyze and assess impacts of leasing and reasonably foreseeable oil and gas development to sage grouse and sage grouse habitat.

NEPA is our "basic national charter for protection of the environment." 40 C.F.R. § 1500.1(a). The law requires federal agencies to fully consider the environmental implications of their actions, taking into account "high quality" information, "accurate scientific analysis," "expert agency comments," and "public scrutiny," prior to making decisions. *Id.* at 1500.1(b). This consideration is meant to "foster excellent action," meaning decisions that are well informed and that "protect, restore, and enhance the environment." *Id.* at 1500.1(c).

To fulfill the goals of NEPA, federal agencies are required to analyze the "effects," or impacts, of their actions to the human environment prior to undertaking their actions. 40 C.F.R. § 1502.16(d). To this end, the agency must analyze the "direct," "indirect," and "cumulative" effects of its actions, and assess their significance. 40 C.F.R. §§ 1502.16(a), (b), and (d). Direct effects include all impacts that are "caused by the action and occur at the same time and place." 40 C.F.R. § 1508.8(a). Indirect effects are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." *Id.* at § 1508.8(b). Cumulative effects include the impacts of all past, present, and reasonably foreseeable actions, regardless of what entity or entities undertake the actions. 40 C.F.R. § 1508.7.

An agency may prepare an environmental assessment ("EA") to analyze the effects of its actions and assess the significance of impacts. *See* 40 C.F.R. § 1508.9; *see also* 43 C.F.R. § 46.300. Where effects are significant, an Environmental Impact Statement ("EIS") must be prepared. *See* 40 C.F.R. § 1502.3. Where significant impacts are not significant, an agency may issue a Finding of No Significant Impact ("FONSI") and implement its action. *See* 40 C.F.R. § 1508.13; *see also* 43 C.F.R. § 46.325(2).

Here, the BLM fell short of complying with NEPA with regards to analyzing and assessing sage grouse impacts. In support of its proposed leasing, the agency prepared three EAs, one for the High Plains District parcels (DOI-BLM-WY-070-EA15-225, hereafter "High Plains EA"), one for parcels in the Wind River and Bighorn Basin Districts (DOI-BLM-WY-R000-2015-0002-EA, hereafter "Wind River-Bighorn EA"), and one for parcels in the High Desert District (DOI-BLM-WY-040-EA15-130, hereafter "High Desert EA").[1] In the EAs, however, the BLM failed to demonstrate that impacts to sage grouse would not be significant. Notably, the BLM failed to analyze and assess the impacts of reasonably foreseeable development in light of the fact that scientific studies continue to demonstrate that current management, even under revised RMPs, is insufficient to protect the grouse. Thus, there is no support for a FOSI. Either the BLM must prepare an EIS or it cannot proceed with the lease sale as proposed. Below, we detail our additional concerns.

[1] The High Plains and Wind River/Bighorn Basin EAs are available on the BLM's website at http://www.blm.gov/style/medialib/blm/wy/information/NEPA/og/2016/ver1.Par.90542.File.dat/EA_HPD.pdf and http://www.blm.gov/style/medialib/blm/wy/information/NEPA/og/2016/ver1.Par.90459.File.dat/EA_WRBBD.pdf. The High Desert EA is available on the BLM's website at http://www.blm.gov/style/medialib/blm/wy/information/NEPA/og/2016/05may/ver2.Par.21370.File.dat/V2_EA.pdf.

1. The BLM Failed to Appropriately Analyze and Assess Impacts to Sage Grouse

Parcels WY-1608-72, 73, and 74 are partially within sage grouse Priority Habitat Management Areas ("PHMAs"). Parcels WY-1608-1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 37, 38, 39, 40, 41, 42, 43, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 61, 63, 64, 65, 66, 67, 68, 69, 70, 71, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, and 87 are completely or partially within sage grouse General Habitat Management Areas ("GHMAs"). We remain concerned that sage grouse stipulations prescribed in BLM land-use plan amendments and revisions to protect greater sage grouse are scientifically unsound, legally invalid, and fail to grant an adequate level of protection to allow for the survival of greater sage grouse in the context of development on oil and gas leases, and therefore protest these parcels. Under BLM's greater sage grouse plan amendments and revisions, the agency made an explicit commitment to prioritize oil and gas leasing and development outside PHMAs (which include SFAs) and GHMAs. Particularly relevant to this lease sale:

> "Priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMAs and GHMAs. When analyzing leasing and authorizing development of fluid mineral resources, including geothermal, in PHMAs and GHMAs, and subject to applicable stipulations for the conservation of GRSG, priority will be given to development in non-habitat areas first and then in the least suitable habitat for GRSG." Casper, Kemmerer, Newcastle, Pinedale, Rawlins, and Rock Springs Field Offices Approved RMP Amendment for Greater Sage-Grouse at 24.
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> "MR:2.3 Priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMA and GHMA. When analyzing leasing and authorizing development of fluid mineral resources, including geothermal, in PHMA and GHMA, and subject to applicable stipulations for the conservation of Greater Sage-Grouse, priority will be given to development in non-habitat areas first and then in the least suitable habitat for Greater Sage-Grouse." Cody Field Office Approved RMP at 29.
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> "MR:2.3 Priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMA and GHMA. When analyzing leasing and authorizing development of fluid mineral resources, including geothermal, in PHMA and GHMA, and subject to applicable stipulations for the conservation of Greater Sage-Grouse, priority will be given to development in non-habitat areas first and then in the least suitable habitat for Greater Sage-Grouse." Worland Field Office Approved RMP at 29.

To comply with this direction, BLM should require leaseholders to diligently explore for and develop all existing fluid mineral leases, prioritizing those outside sage grouse habitats, before any new leases are offered at auction inside designated sage grouse habitats. Thus, all sage grouse parcels in this lease sale should be removed from the auction.

We agree with BLM's recommendations to defer in whole or in part the offering of Parcels previously identified as WY-1608-17, 24, 43, 73, 74, 75, 76, 77, 81, 82, 83, 84, 85, 91, and 103. It is a wise decision to defer the long-term commitment of mineral leases in areas that are sensitive sage grouse habitats. This is consistent with the Presidential Memorandum of November 6, 2015 titled "Mitigating Impacts on Natural Resources From Development and Encouraging Related Private Investment," which directs federal agencies "to avoid and then minimize harmful effects to land, water, wildlife, and other ecological resources (natural resources) caused by land- or water-disturbing activities… ." 80 Fed. Reg. 68743, 68744. This Presidential Memorandum also directs agencies to identify areas "where natural resource values are irreplaceable"; sage grouse habitats clearly fall into this category, as there is no demonstrated possibility of creating or restoring sage grouse habitats once they have been destroyed due to the fragility and long recovery times of the sagebrush habitats upon which the grouse depend.

Portions of Parcels WY-1608-72, 73, and 74 fall entirely or partially within sage grouse Priority Habitat Management Areas based on our GIS analyses; it appears that WY-1608-073 and 074 are earmarked for deferral (Wind River – Bighorn Basin EA at 1-3), but according to GIS data all three parcels are not earmarked for even partial deferral. These parcels should be deferred from the lease auction to protect irreplaceable sage grouse habitats.

We request that all parcels listed above be deleted from the lease sale. BLM should do its best to keep largely unleased areas of public land in designated sage grouse habitats unleased, regardless of mineral ownership patterns. Since 1965, grouse populations have declined significantly, and these declines continue in recent years, with the risk of sage grouse extirpation a sizeable threat over large portions of the species' range.[2] These declines are attributable at least in part to habitat loss due to mining and energy development and associated roads, and to habitat fragmentation due to roads and well fields. Oil and gas development poses perhaps the greatest threat to sage grouse viability in the region. The area within 5.3 miles of a sage grouse lek is crucial to both the breeding activities and nesting success of local sage grouse populations. In a study near Pinedale, Wyoming, sage grouse from disturbed leks where gas development occurred within 3 km of the lek site showed lower nesting rates (and hence lower reproduction), traveled farther to nest, and selected greater shrub cover than grouse from undisturbed leks.[3] According to this study, impacts of oil and gas development to sage grouse include (1) direct habitat loss from new construction, (2) increased human activity and pumping noise causing displacement, (3) increased legal and illegal harvest, (4) direct mortality associated with reserve pits, and (5) lowered water tables resulting in herbaceous vegetation loss. These impacts have not been thoroughly evaluated with full NEPA analysis.

In addition, many parcels contain designated sage grouse GHMAs under the BLM sage grouse plan amendments and revisions, including Parcels WY-1608-1, 2, 4, 5, 6, 7, 8, 9, 10, 11,

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[2] Garton, E.O., A.G. Wells, J.A. Baumgardt, and J.W. Connelly. 2015. Greater sage-grouse population dynamics and probability of persistence. Final Report to Pew Charitable Trusts, 90 pp. Online at http://www.pewtrusts.org/~/media/assets/2015/04/garton-et-al-2015-greater-sagegrouse-population-dynamics-and-persistence-31815.pdf.

[3] Lyon, A.G. 2000. The potential effects of natural gas development on sage-grouse (*Centrocercus urophasianus*) near Pinedale, Wyoming. M.S. Thesis, Univ. of Wyoming, 121 pp.

12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 37, 38, 39, 40, 41, 42, 43, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 61, 63, 64, 65, 66, 67, 68, 69, 70, 71, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, and 87 are completely or partially within sage grouse General Habitat Management Areas ("GHMAs") according to our lease screens; we protest all of these parcels for the reasons set forth below. BLM's failure to note which parcels in the August 2016 EAs that overlap with sage grouse GHMAs (see, e.g., Wind River – Bighorn Basin EA at 3-15) is a failure of NEPA's baseline information and hard look requirements. All portions of these parcels falling within GHMAs should be deferred as well, in order to implement the Mitigation Policy outlined earlier in these comments. The scientific information outlined elsewhere in these comments applies equally to GHMA, and the potential for significant impacts to sage grouse lek populations from oil and gas development springing from this lease sale is just as legally required in GHMA as in PHMA or SFA areas. In particular, the 0.25-mile 'No Surface Occupancy' buffers and 2-mile Timing Limitation Stipulations prescribed for PHMAs under BLM plans have explicitly been tested and found to result in significant negative impacts to sage grouse populations in the context of oil and gas development.[4] According to Apa et al. (2008), "Buffer sizes of 0.25 mi., 0.5 mi., 0.6 mi., and 1.0 mi. result in estimated lek persistence of 5%, 11%, 14%, and 30%."[5] BLM's own NEPA analysis for a recent Miles City Field Office oil and gas leasing EA[6] provides a thorough synopsis:

> "Sage grouse are offered species specific protections through a stipulation. Under Alternative B, ¼ mile NSO buffers and 2 mile timing buffers would apply where relevant. Based on research, these stipulations for sage grouse are considered ineffective to ensure that sage grouse can persist within fully developed areas. With regard to existing restrictive stipulations applied by the BLM, (Walker et al. 2007a) research has demonstrated that the 0.4-km (0.25 miles) NSO lease stipulation is insufficient to conserve breeding sage-grouse populations in fully developed gas fields because this buffer distance leaves 98 percent of the landscape within 3.2 km (2 miles) open to full-scale development. Full-field development of 98 percent of the landscape within 3.2 km (2 miles) of leks in a typical landscape in the Powder River Basin reduced the average probability of lek persistence from 87 percent to 5 percent (Walker et al. 2007a).
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> According to Walker et al. (2007),[7]

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[4] Holloran 2005.

[5] Apa, T., J. Bohne, T. Christiansen, J. Herbert, B. James, R. Northrup, D. Olsen, A. Robinson, P. Schnurr, T.O. Smith, and B. Walker. 2008. Using the Best Available Science to Coordinate Conservation Actions that Benefit Greater Sage-grouse Across States Affected by Oil & Gas Development in Management Zones I-II (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming). Unpublished multi-state report of game and fish agencies, 10 pp. Online at http://www.ourpublicIands.org/files/upload/ti-State_ScienceGroupDocument_FINAL_01-28-08.pdf.

[6] Miles City October 2014 Oil and Gas Leasing EA, Environmental Assessment DOI-BLM-MT-C020-2014-0091-EA, May 19, 2014 at 60.

[7] Walker, B.L., D.E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71(8):2644-2654.

> Current lease stipulations that prohibit development within 0.4 km of sage-grouse leks on federal lands are inadequate to ensure lek persistence and may result in impacts to breeding populations over larger areas. Seasonal restrictions on drilling and construction do not address impacts caused by loss of sagebrush and incursion of infrastructure that can affect populations over long periods of time.

In its 2010 Final Rule[8] finding the greater sage grouse "warranted, but precluded" for listing under the Endangered Species Act, the U.S. Fish and Wildlife Service made the following observations based on the best available scientific and commercial information:

> The rationale for using a 0.4-km (0.25-mi) buffer as the basic unit for active lek protection is not clear, as there is no support in published literature for this distance affording any measure of protection.... this distance appears to be an artifact from the 1960s attempt to initiate planning guidelines for sagebrush management and is not scientifically based (Roberts 1991).

In light of the overwhelming scientific evidence that the application of 0.25-mile NSO buffers and 2-mile timing stipulations are grossly inadequate to conserve sage grouse and their habitats in GHMA (or indeed elsewhere), BLM cannot rely on such current, scientifically unsound and invalid stipulations for the issuance of oil and gas leases in GHMA.

Many parcels are located within 5.3 miles of one or more active sage grouse leks. The lands within 5.3 miles of active leks are typically used for nesting,[9] a sensitive life history period when sage grouse are sensitive to disturbance from oil and gas drilling and production activities. The current standard sage grouse stipulations that apply outside PHMAs are biologically inadequate, and their effectiveness has not been established by BLM. Indeed, scientific studies demonstrate that these mitigation measures fail to maintain sage grouse populations in the face of full-field development, and significant impacts in terms of displacement of sage grouse from otherwise suitable habitat as well as significant population declines have been documented.[10] BLM should not issue these sage grouse parcels unless a rigorous set of stipulations, far stronger than those provided in the EA (such as NSO stipulations), are applied to the parcels. This should

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[8] 75 Fed. Reg. 13978, March 23, 2010.

[9] Holloran, M. J. and S. H. Anderson. 2005. Spatial distribution of Greater Sage-grouse nests in relatively contiguous sagebrush habitats. Condor 107(4): 742-752.

[10] Walker, B.L., D.E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71(8):2644-2654; *see also* Apa, T., J. Bohne, T. Christiansen, J. Herbert, B. James, R. Northrup, D. Olsen, A. Robinson, P. Schnurr, T.O. Smith, and B. Walker. 2008. Using the Best Available Science to Coordinate Conservation Actions that Benefit Greater Sage-grouse Across States Affected by Oil & Gas Development in Management Zones I-II (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming). Unpublished multi-state report of game and fish agencies, 10 pp. Online at http://www.ourpubliclands.org/files/upload/ti-State_ScienceGroupDocument_FINAL_01-28-08.pdf.

include at minimum 4-mile No Surface Occupancy stipulations around active leks, in accordance with the recommendations of BLM's own subject-matter experts.[11] If these stipulations are implemented together with even stronger measures for PHMAs and Connectivity Areas, the BLM could make a credible case that impacts from leasing would not result in significant impacts.

Outside PHMAs, current sage grouse lease stipulations provide an NSO stipulation of ¼ mile around active sage grouse leks. This is known to bean inadequate amount of protection for the lekking grouse during the breeding period, nevermind for hens nesting on lands surrounding the lek. Studies have shown that the majority of hens nest within 3 miles of a lek, and that a 5.3-mile buffer would encompass almost all nesting birds in some cases. For Core Areas, the most scientifically supportable metric for NSO buffers would be 2 miles from the lek to protect breeding activities (after Holloran 2005, finding impacts from post-drilling production extend 1.9 miles from the wellsite)[4] and 5.3 miles to protect nesting birds, with the understanding that the impacts of drilling and production activity would extend into the NSO buffer area from wells arrayed along its edge.

Because leks sites are used traditionally year after year and represent selection for optimal breeding and nesting habitat, it is crucially important to protect the area surrounding lek sites from impacts. In his University of Wyoming dissertation on the impacts of oil and gas development on sage grouse, Matthew Holloran stated, "current development stipulations are inadequate to maintain greater sage grouse breeding populations in natural gas fields."[12] (Notably, these exact stipulations are being applied by BLM in this lease sale for GHMA sage grouse habitat parcels). The area within 5.3 miles of a sage grouse lek is crucial to both the breeding activities and nesting success of local sage grouse populations. At minimum, the prohibition of surface disturbance within 4 miles of a sage grouse lek is the absolute minimum starting point for sage grouse conservation.

Other important findings on the negative impacts of oil and gas operations on sage grouse and their implications for the species are contained in three studies recently accepted for publication.[13] Sage grouse mitigation measures have been demonstrated to be ineffective at maintaining this species at pre-development levels in the face of oil and gas development by

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[11] Sage-grouse National Technical Team. 2011. A Report on National Greater Sage-grouse Conservation Measures. Available at www.blm.gov/pgdata/etc/medialib/blm/co/programs/wildlife.Par.73607.File.dat/GrSG%20Tech%20Team%20Report.pdf.

[12] M. Holloran. Dec. 2005. Greater Sage-Grouse Population Response to Natural Gas Field Development in Western Wyoming, at 57.

[13] Doherty, K.E., D.E. Naugle, B.L. Walker, and J.M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. Journal of Wildlife Management 72:187-195. Walker, B.L., D.E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654. Walker, B.L., D.E. Naugle, K.E. Doherty, and T.E. Cornish. 2007. West Nile virus and greater sage-grouse: estimating infection rate in a wild bird population. Avian Diseases 51:In Press.

Holloran (2005) and Naugle et al. (2006).[14] This latter study found an 85% decline of sage grouse populations in the Powder River Basin of northeastern Wyoming since the onset of coalbed methane development there. BLM has repeatedly failed to provide any analysis, through field experiments or literature reviews, examining the effectiveness of the standard quarter-mile buffers where disturbance would be "avoided." There is substantial scientific information in recent studies describing the impacts of oil and gas development to sage grouse. It is incumbent upon BLM to consider the most recent scientific evidence regarding the status of this species and to develop mitigation measures which will ensure the species is not moved toward listing under the Endangered Species Act. It is clear from the scientific evidence that the current protections are inadequate and are contributing to the further decline of the bird's populations. This information constitutes significant new information that requires amendment of the Resource Management Plans before additional oil and gas leasing can move forward.

State agency biologists have reached a consensus that the Timing Limitation Stipulations proposed for sage grouse in this lease sale are ineffective in the face of standard oil and gas development practices.[15] These stipulations have likewise been condemned as inadequate by the U.S. Fish and Wildlife Service and renowned sage grouse expert Dr. Clait Braun. The BLM itself has been forced to admit that "New information from monitoring and studies indicate that current RMP decisions/actions may move the species toward listing...conflicts with current BLM decision to implement BLM's sensitive species policy" and "New information and science indicate 1985 RMP Decisions, as amended, may not be adequate for sage grouse."[16] Continued application of stipulations known to be ineffective in the face of strong evidence that they do not work, and continuing to drive the sage grouse toward ESA listing in violation of BLM Sensitive Species policy, is arbitrary and capricious and an abuse of discretion under the Administrative Procedures Act.

The restrictions contained in the recent Wyoming Greater Sage-Grouse Resource Management Plan Amendments and revisions are scientifically unsound and ineffective, even for PHMA areas. Within PHMAs, the plans allow surface disturbing activity and surface occupancy just six tenths (0.6) of a mile from occupied sage-grouse leks, a far cry from the science-based 4-mile buffer recommended by the BLM's own National Technical Team, and inconsistent with the findings of Manier et al. (2014), who described the range of appropriate lek buffers as 3.1 to

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[14] Naugle, D.E., B.L. Walker, and K.E. Dougherty. 2006. Sage-grouse population response to coal-bed natural gas development in the Powder River Basin: Interin Progress Report on region-wide lek count analyses. BLM Report BLM-2664, 10 pp.

[15] Apa, T., J. Bohne, T. Christiansen, J. Herbert, B. James, R. Northrup, D. Olsen, A. Robinson, P. Schnurr, T.O. Smith, and B. Walker. 2008. Using the Best Available Science to Coordinate Conservation Actions that Benefit Greater Sage-grouse Across States Affected by Oil & Gas Development in Management Zones I-II (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming). Unpublished multi-state report of game and fish agencies, 10 pp. Online at http://www.ourpubliclands.org/files/upload/ti-State_ScienceGroupDocument_FINAL_01-28-08.pdf.

[16] Sage grouse plan amendment land user information meeting PowerPoint, available online at http://www.blm.gov/pgdata/etc/medialib/blm/wy/information/NEPA/bfodocs/sagegrouse.Par.94571.File.dat/May28_InfoMtg.pdf.

5 miles.[17] By acreage, a 0.6-mile buffer encompasses less than 4% of the nesting habitat contained within the 4-mile buffer recommended by agency experts, and therefore does essentially nothing to protect sensitive nesting habitats. Even less protective, restrictions outside Core or Connectivity Areas allow surface disturbing activities and surface occupancy as close as one quarter (0.25) of a mile from leks.[18] BLM has too great an abundance of data to the contrary to continue with scientifically unsound stipulations. BLM should apply the recommendations of the National Technical Team instead, and in the meantime defer leasing until these recommendations can be formally adopted through the plan amendment/revision process.

The vague stipulations included in BLM's Notice of Competitive Oil and Gas Lease Sale for particular parcels do little to clarify to the interested public or potential lessees what restrictions might actually apply to protect sage grouse populations. For example, for some parcels, BLM imposes a Timing Limitation Stipulation and a Controlled Surface Use Stipulation. Such acceptable plans for mitigation of anticipated impacts must be prepared prior to issuing the lease in order to give the public full opportunity to comment, and to abide by the Department of Interior's stated new policy to complete site-specific environmental review at the leasing stage, not the APD stage. Without site-specific review and opportunity for comment, neither the public nor potential lessees can clearly gauge how restrictive or lax "acceptable plans for mitigation" might be, and whether they comply with federal laws, regulations, and agency guidelines and policies. Thus, absent such review, the leases should not issue at all.

BLM has the scientific information needed to recognize that any use of these parcels will result in further population declines, propelling the sage grouse toward a listing under the Endangered Species Act, a ruling that is slated to be revisited in 2020. Again, it is in all interested parties favor (conservation groups, potential lessees, BLM and other federal agencies) for BLM to determine specific "modifications" prior to issuing leases, such as NSO restrictions. If the BLM fails to do so through site-specific environmental review before the APD stage, the agency will not adhere to the directive of Secretary Salazar and the Department of Interior's announced leasing reforms.

No parcels which contain sage grouse leks, nesting habitat, breeding habitat, wintering habitat and brood-rearing habitat should be offered at auction. We request that these parcels be withdrawn from the lease sale. Failing withdrawal of the parcels, parcel-by-parcel NEPA analysis should occur (we have seen no evidence of this in the High Plains, High Desert, and Wind River-Bighorn Basin Leasing EAs in question), and 4-mile NSO buffer stipulations must be placed on all lease parcels with sage grouse leks. It is critical that these stipulations be attached at the leasing stage, when BLM has the maximum authority to restrict activities on these crucial habitats for the protection of the species, and that no exceptions to the stipulations be granted. BLM's failure to do so will permit oil and gas development activities which will contribute to declining sage grouse populations and ultimately listing by the U.S. Fish and

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[17] Manier, D.J., Bowen, Z.H., Brooks, M.L., Casazza, M.L., Coates, P.S., Deibert, P.A., Hanser, S.E., and Johnson, D.H. 2014. Conservation buffer distance estimates for Greater Sage-Grouse—A review: U.S. Geological Survey Open-File Report 2014–1239, 14 p., *http://dx.doi.org/10.3133/ofr20141239*.

[18] *Id.*

Wildlife Service as a threatened or endangered species, in violation of BLM's duty to take all actions necessary to prevent listing under its Sensitive Species Manual.

We remain concerned that development activities on the sage grouse parcels noted above will result in significant impacts to sage grouse occupying these parcels and/or the habitats nearby, and the BLM's programmatic NEPA underlying this lease sale does not adequately address these significant impacts.

The parcels protested in this section are entirely or partially within PHMAs and GHMAs designated for sage grouse protection. In addition to the concerns outlined above, these parcels cannot be legally offered for sale because the Resource Management Plan and EIS underlying them contain significant legal deficiencies. In the past, BLM has noted that the deferral of sage grouse PHMA (sometimes termed "Core Area" in Wyoming parcels is largely responsible for overall reductions in PHMA acreage leased and therefore reduced threats to sage grouse:

> The relatively subdued pace of new leasing in Core Areas is the direct result of the application of the BLM's sage-grouse leasing screen, whereby many parcels in recent sales have been deferred from sale until the sage-grouse RMP amendments and ongoing plan revisions are completed.

Wind River – Bighorn Basin [WY] August 2015 Lease EA at 4-44, and see graph on same page. The cessation of deferral for PHMAs in this lease auction will reverse this progress.

Since the greater sage grouse is a BLM Sensitive Species and remains an open possibility for listing under the Endangered Species Act in 2020, the leasing of these lands under biologically inadequate stipulations is a violation of BLM Sensitive Species Policy, and constitutes undue degradation of sage grouse habitats and populations. Because alternate stipulations that are indeed biologically sufficient are available, and their implementation would avert significant impacts to sage grouse populations, the impacts incurred as a result of developing the leases in question are completely unnecessary.

The No Surface Occupancy stipulation of 0.6 miles surrounding lek locations for PHMA and the even smaller 0.25-mile NSO that applies in GHMA are insufficient to prevent significant impacts to lek populations based on the best available science. No scientific study has ever recommended a 0.6-mile lek buffer. In Wyoming, Holloran (2005) examined thresholds of distance from oil and gas wells and access roads (accessing 5 or more wellpads), and found that significant impacts to sage grouse lek populations occurred when a well or access road was sited within 1.9 miles of a sage grouse lek, irrespective of whether the intrusion was visible from the lek itself.[19] Manier et al. (2014) reviewed the available scientific literature and determined that buffers in the range of 3.1 to 5 miles from the lek were appropriate based on the best available science.[20] A 0.6-mile NSO buffer does not fall within this range. The agency's own experts

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[19] M. Holloran. Dec. 2005. Greater Sage-Grouse Population Response to Natural Gas Field Development in Western Wyoming, at 57.

[20] Manier, D.J., Bowen, Z.H., Brooks, M.L., Casazza, M.L., Coates, P.S., Deibert, P.A., Hanser, S.E., and Johnson, D.H. 2014. Conservation buffer distance estimates for Greater Sage-Grouse—

conducted an earlier review of the best available science (National Technical Team 2011) and recommended no future leasing in sage grouse Priority Habitats, and applying a 4-mile No Surface Occupancy buffer around leks for previously existing leases.

The programmatic RMP allows a 5% level of surface disturbance within sage grouse Core Areas, a level of surface disturbance that is incompatible with maintaining sage grouse populations and preventing population declines caused by excessive habitat destruction and fragmentation. No scientific study supports this level of surface disturbance. The National Technical Team (2011) recommended a 3% disturbance cap, to be applied on a per-square-mile-section basis. Knick et al. (2013) found that virtually all active leks were surrounded by lands with less than 3% surface disturbance.[21] No scientific study supports the 5% threshold.

The recently adopted Greater Sage-Grouse RMP Amendments and Revisions RMP also prescribe the use of a Disturbance Density Calculation Tool (DDCT) or equivalent method (often called "project analysis area") to arrive at the density of wellsites as well as the overall disturbance percentage. Because the DDCT area is always much larger than the project area when sage grouse leks are present within 4 miles of the project area boundary, this method always underestimates the density of disturbances in cases where sage grouse breeding habitat is potentially affected by development. This allows a density of development inside the project area that far exceeds scientifically determined thresholds at which significant sage grouse population declines occur. No scientific study has ever tested what would be the thresholds of disturbance causing significant impacts to sage grouse populations using a DDCT. The National Technical Team (2011), by contrast, recommends that well and disturbance densities be calculated on a square-mile-section basis, not using a larger area.

Current stipulations to protect sage grouse from oil and gas-related noise are inadequate. Noise can mask the breeding vocalizations of sage grouse (Blickley and Patricelli 2012),[22] displaces grouse from leks (Blickley et al. 2012a),[23] and causes stress to the birds that remain (Blickley et al. 2012b).[24] According to Blickley et al. (2010),

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A review: U.S. Geological Survey Open-File Report 2014–1239, 14 p., http://dx.doi.org/10.3133/ofr20141239.

[21] Knick, S.T., S.E. Hanser, and K.L. Preston. 2013. Modeling ecological minimum requirements for distribution of greater sage-grouse leks – Implications for population connectivity across their western range, USA. Ecology and Evolution 3: 1539-1551.

[22] Blickley, J.L., and G.L. Patricelli. 2012. Potential acoustic masking of greater sage-grouse (*Centrocercus urophasianus*) display components by chronic industrial noise. Ornith. Monogr. 74: 23-35.

[23] Blickley, J.L., D. Blackwood, and G.L. Patricelli. 2012a. Experimental Evidence for the Effects of Chronic Anthropogenic Noise on Abundance of Greater Sage-Grouse at Leks. Conserv. Biol. 26:461-471.

[24] Blickley J.L., Word K.R., Krakauer A.H., Phillips J.L., Sells S.N., et al. 2012b. Experimental Chronic Noise Is Related to Elevated Fecal Corticosteroid Metabolites in Lekking Male Greater Sage-Grouse (*Centrocercus urophasianus*). PLoS ONE 7(11): e50462. doi:10.1371/journal.pone.0050462.

> The cumulative impacts of noise on individuals can manifest at the population level in various ways that can potentially range from population declines up to regional extinction. If species already threatened or endangered due to habitat loss avoid noisy areas and abandon otherwise suitable habitat because of a particular sensitivity to noise, their status becomes even more critical.

Noise must be limited to a maximum of 10 dBA above the ambient natural noise level after the recommendations of Patricelli et al. (2012); the ambient noise level in central Wyoming was found to be 22 dBA (Patricelli et al. 2012) and in western Wyoming it was found to be 15 dBA (Ambrose and Florian 2014, Ambrose 2015; Ambrose et al. 2015).[25] Attachment 1 provides a review of the relevant literature on noise including analysis that indicates sage grouse lek population declines once noise levels exceed the 25 dBA level. With this in mind, ambient noise levels should be defined as 15 dBA and allowable cumulative noise should be limited to 25 dBA in occupied breeding, nesting, brood-rearing, and wintering habitats, which equates to 10 dBA above the scientifically-derived ambient threshold.

In addition, it is critically important for BLM to identify and protect winter concentration areas. *See* Attachment 2. Oil and gas development has known impacts on sage grouse (Doherty et al. 2008).[26] Thus far, the location of these habitats remains largely undetermined. These lands should be closed to fluid mineral leasing, with Conditions of Approval applying NSO stipulations inside and within 2 miles of these areas. The proposal to simply apply timing stipulations to these areas is insufficient because it allows construction of wellpads and roads known to be deleterious to wintering sage grouse inside these key habitats as long as construction/drilling occurs outside the winter season, and further allows production-related activities throughout winter. Thus, the sage grouse may return to their winter habitats to find an industrialized, fragmented habitat that no longer has any habitat function due to the birds' avoidance of such area

Sincerely,

Jeremy Nichols

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[25] Ambrose, S. 2015. Review of Greens Hollow Sound Study by Tetra Tech (2008), and Summary of Sound Level Measurements at Wildcat Knolls Lek, March 29-31, 2015. Unpublished report, 11 pp.; Ambrose, S., and C. Florian. 2014. Sound levels at greater sage-grouse leks, Pinedale Anticline Project Area, Wyoming, April 2013. Unpublished report prepared for the Wyoming Game and Fish Department, 133 pp. Available online at http://www.wy.blm.gov/jio-papo/papo/wildlife/reports/sage-grouse/2013GSGacoustic-rpt.pdf; Ambrose, S., C. Florian, and J. MacDonald. 2014. Sound levels at greater sage-grouse leks in the Pinedale Anticline Project Area, WY, April 2013-2014. Unpublished report prepared for the Wyoming Game and Fish Department, 79 pp.

[26] Doherty, K.E., D.E. Naugle, B.L. Walker, and J.M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. J. Wildl. Manage. 72:187-195.

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Review of Wyoming Governor's Executive Order 2011-5, Noise **April 19, 2015**

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Wyoming Governor's Executive Order 2011-5, Greater Sage-grouse Core Area Protection.

> Attachment Paragraph No. 6. Noise: New noise levels, at the perimeter of a lek, should not exceed 10 dBA above ambient noise (existing activity included) from 6:00 pm to 8:00 am during the initiation of breeding (March 1 - May 15). Ambient noise levels should be determined by measurements taken at the perimeter of the lek at sunrise.

Although this section appears straightforward and logical, there are some important issues with the manner in which the section is worded that could lead to decreasing protection for greater sage-grouse. There are two fundamental problems with the current wording that should be addressed: 1) the manner in which "existing ambient" is established at "sunrise" (i.e. using the sunrise time period of 5 am to 7 am when grouse are displaying); and 2) using "existing ambient" as described in the EO as the basis for impact assessment. Below we explain both problems, and then offer recommendations for new language which avoids these problems and provides more clarity about how compliance should be assessed. We also address other issues: use of a fixed, state-wide ambient; use of 10 dBA over ambient as a threshold; situations where ambient currently exceeds threshold levels; adjusting hours of lekking; and addressing hours outside lekking.

Problem 1: Using the Time Period 5 am to 7 am to Establish "Existing Ambient"
Grouse display sounds can significantly increase sound levels when measured at the perimeter of a lek during display periods (Patricelli et al. 2013; Ambrose and Florian 2014). Although grouse often display from 1800-0900, the most intense period of display is 5 am to 7 am, making this time period particularly problematic for measurement of other sounds. For example, sound level measurements were made at two leks west of the Pinedale Anticline Project Area in April 2013 (Ambrose and Florian 2014). There were no gas field sounds audible at these leks, but common rural Wyoming sounds were present, including birds, insects, and wind through vegetation, as well as distant vehicles, aircraft, and common ranching/farming sounds. Sound levels from 5-7 am averaged 24.2 dBA, while sound levels during the entire lekking period averaged 15.8 dBA. Sound levels during the 5-7 am period were 2.6 times greater than sound levels measured over the longer time period from 6 pm to 8 am. These increases in sound levels during the 5-7 am period were attributable solely to grouse display sounds (determined via digital recordings). For this reason, the time period around sunrise, roughly 5-7 am during late March to early May, is not an appropriate time period to use for establishing existing ambient sound level.

Sound levels for the time period 6 pm to 5 am (to exclude grouse sounds) averaged 14.8 dBA (1.0 dBA different from 6 pm to 9 am). Thus, use of all hours during the display period, 6 pm to 9 am, to establish ambient and/or assess compliance will not be unduly influenced by grouse sounds and will represent sound levels for the entire display period.

Problem 2: Use of Changing or Fixed "Existing Ambient" for Assessing Impacts

The approach used in the current Executive Order is to include "existing activity" when establishing ambient sound levels. The problem with this approach is that existing ambient sound levels almost always increase incrementally over time, and with an ever increasing ambient sound level, protection for greater sage-grouse is reduced (Patricelli et al. 2013).

For example, assume sound levels at a lek in rural Wyoming are 15 dBA during the lekking period, 1800-0900. Assume in year 1 a gas drilling operation is proposed 4.0 miles away, leading to an increase in the sound level at the lek to 21 dBA. This is less than 10 dBA over existing ambient of 15 dBA, and thus would be in compliance with the EO. The new existing ambient at this lek would become 21 dBA. Then assume in year 2 a gas drilling operation is proposed 2.0 miles away, leading to an increase in the sound level at the lek to 27 dBA. This is less than 10 dBA over the existing ambient of 21 dBA, and thus would be in compliance. The new existing ambient would become 27 dBA. Then assume in year 3 a gas drilling operation is proposed 1.0 miles distant, leading to an increase in the sound level at the lek to 33 dBA. This is less than the 10 dBA over existing ambient of 27 dBA, and thus would be in compliance. The new existing ambient would become 33 dBA. And so on. In this example, the "existing ambient" increases incrementally with each new and closer activity, even though no single annual increase exceeded the 10 dBA over ambient threshold. This could continue until the drilling operation was 100 feet from the lek, with the same assessment of "no impact." However, the best available evidence suggests that additional noise will increase the impact on these leks, because sage-grouse do not adapt to the presence of noise over time (Patricelli et al. 2013). In a 3-year experimental introduction of noise to leks, Blickley et al. (2012a) found an immediate decline in male lek attendance, which did not abate over time, and increased stress hormones in the second and third years of playback (Blickley et al. 2012b). The inclusion of existing noise into ambient values clearly does not protect greater sage-grouse.

RECOMMENDED LANGUAGE FOR THE EXECUTIVE ORDER

Noise: Noise levels should not exceed 25 dBA at the perimeter of the lek during lekking hours (6 pm to 9 am) during the initiation of breeding (March 1 to May 15). This metric will be calculated using the median of all hours during the lekking period, 6 pm to 9 am. Using this metric, one or more hours may exceed 25 dBA, but the median of all hours will be <25 dBA. Outside of these times, reasonable efforts should be made to keep noise as close to these limits as possible. In situations where existing noise levels at leks exceed 25 dBA before project initiation, new projects should not contribute to an increase in sound levels at leks; this can be accomplished through noise mitigation measures, such as pad siting and sound baffles that limit the combined noise exposure. 25 dBA represents a level 10 dBA above existing ambient noise levels in sage-grouse habitats in rural Wyoming.

All measurement should be made at the perimeter of the lek, with a Type I Sound Level Meter (capable of measuring the acoustic environment of the study area), for a minimum of 7 days (to cover normal variability due to different meteorological conditions), during the lekking period (6 pm to 9 am). Microphone height should be 12" to approximate ear height of greater sage-grouse. The median of hourly L_{50} values during monitoring period should be used to assess compliance. Measurement methods should follow published standards of the American National Standards Institute (ANSI) or specified by the SGIT.

BACKGROUND ON RECOMMENDATIONS FOR REVISED LANGUAGE

Use of a Fixed, State-wide Ambient Sound Level

We recommend using a fixed "existing ambient" value state-wide rather than measuring ambient on a lek-by-lek or site-by-site basis for the following reasons: 1) because accurate measurement of ambient noise levels at each lek or development site is difficult and expensive, 2) because nearly every error in the choice, placement and maintenance of the equipment will lead to overestimation of ambient values, thus higher allowable noise limits (Patricelli et al. 2013), and 3) because even accurate measures would include existing activity in the baseline, leading to incremental increases in impacts to sage-grouse, as discussed above. The State of Wyoming, though the Sage-grouse Local Working Groups (LWGs), funded a recent effort to measure ambient noise levels in sage habitats in four of the eight LWG Areas in Wyoming in April 2014 (13-22 days, total of 1805 hours). The four working LWG areas were: Bighorn Basin, Wind River/Sweetwater River Basin, Bates Hole/Shirley Basin, and Upper Green River Basin. Lekking hours (6 pm to 8 am) averaged 14.2 dBA (L_{90}) and 15.4 dBA (L_{50}) (Ambrose et al. 2014a). Common sounds included in these L_{50} measurements were birds, insects, and wind through vegetation, as well as farming, ranching, vehicles, and aircraft (but absent oil and gas development or other continuous noise sources). Therefore, this value represents ambient noise levels in typical sage-grouse habitat in Wyoming with some audible anthropogenic sounds, but does not include sounds of developed industrial areas. American National Standards Institute (ANSI) recommends using the L_{90} as the "residual noise level" or "background ambient" and L_{50} as "existing ambient." In rural areas of Wyoming, prior to development, L_{90} and L_{50} values are very similar (<1.0 dBA difference), thus the choice is inconsequential.

It is important to note sound levels reported in Ambrose et al. (2014a) were often near the lower limit (noise floor) of the sound level meters used (13.5 dBA). This means that actual environmental sound levels were lower than reported by the meters. At one location, a very sensitive, 1" low-noise microphone (noise floor = 0 dBA) was deployed simultaneously with a standard ½" microphone system. For this 7-day measurement period, the ½" microphone system reported L_{90} and L_{50} levels of 14.5 dBA and 16.7 dBA, respectively. For the same time period, the 1" microphone system reported L_{90} and L_{50} levels of 7.2 dBA and 14.0 dBA, respectively. In all likelihood, sound levels in rural, undeveloped Wyoming are lower than reported by Ambrose et al. (2014a) during lekking hours.

Recommendation: For the purposes of establishing noise stipulations relative to greater sage-grouse, we recommend using a state-wide ambient of 15 dBA.

Threshold Level of Impacts to Greater Sage-grouse due to Anthropogenic Sounds

Noise levels >10 dBA over ambient has been found to impact populations of songbirds (Nicholoff 2003, Dooling and Popper 2007). Several studies have suggested that anthropogenic noise is also detrimental to greater sage-grouse (Rogers 1964; Braun 1998; Holloran 2005) and recent studies demonstrate this impact by experimentally introducing industrial noise to otherwise undisturbed leks, finding declines in lek attendance as well as increased stress hormones and altered behaviors (Blickley 2012; Blickley et al. 2012a; Blickley et al 2012b). However, these studies did not establish the noise levels at which these impacts occur. Recent research in the Pinedale Anticline Project Area south of Pinedale, WY, provides insight into this question. In the PAPA, 22 leks (19 in PAPA, 3 outside PAPA) were studied by counting male grouse at the leks (2000-2014) (Wyoming Department Game and Fish, unpublished data) and measuring sound levels at the leks (2013-2014) (Ambrose et al. 2014b). L_{50} dBA sound levels at the leks were strongly associated with Poisson transformed trends in grouse counts ($R^2 = 0.552$, $P < 0.001$); the higher the L_{50} dBA, the greater the likelihood of

a declining trend. Of the 19 leks in the PAPA, 6 had sound levels <25 dBA and 13 had sound levels >25 dBA. Of the 6 leks with sound levels <25 dBA, 3 had increasing trends and 3 had declining trends. Of the 13 leks with sound levels >25 dBA, 3 were increasing and 10 were declining (7 of these had no grouse present for the last 2 or more years). Average decline at leks with L_{50} >25 dBA was 61%. These data suggest that at L_{50} sound levels >25 dBA, negative impacts to grouse due to anthropogenic sounds begin to occur (see Figure 1).

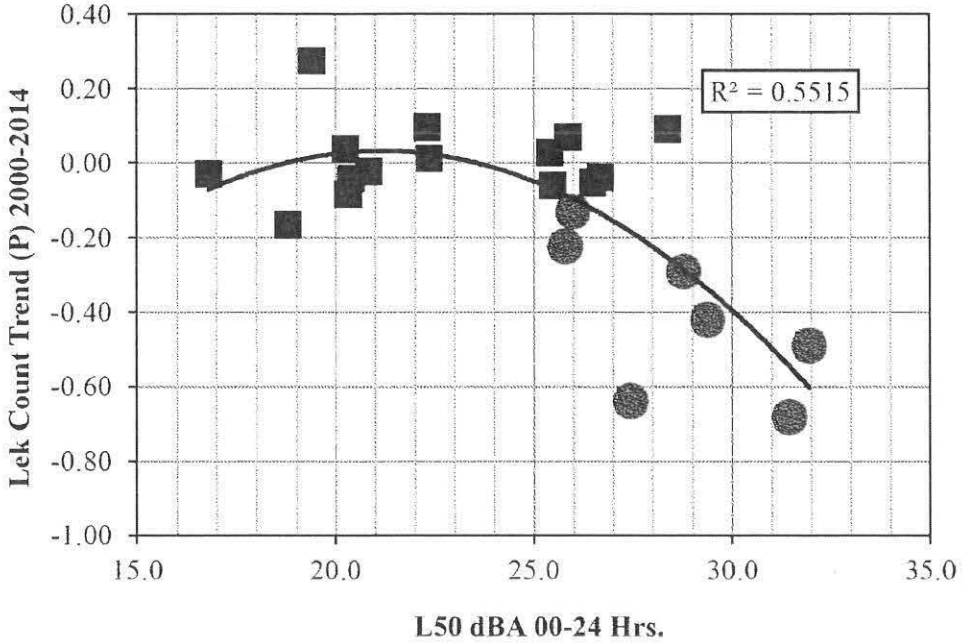

Figure 1. Trends of grouse counts (2000-2014) and L_{50} dBA levels (2013-2014) at 22 leks (19 in the PAPA and 3 outside the PAPA). Larger, red symbols indicate that the leks have been inactive for 2 years or more. Trend lines are polynomial regression analysis.

The use of 25 dBA is further supported by comparisons of the leks that have remained active or become inactive. We examined whether the proportion of leks that were inactive for at least the past 2 years (during noise measurement) was higher for leks exposed to median noise levels (L_{50}) of >25 dBA compared to leks exposed to <25 dBA. Of the leks that had L_{50} values <25 dBA, no leks (0%) were inactive; of the leks that had L_{50} values >25 dBA, 7 of 13 leks (54%) were inactive. Even in this small sample, this represents a significant increase in the probability of a lek becoming inactive when exposed to >25 dBA of noise (Fisher's Exact Test, $p=0.034$). Further, the median L_{50} of inactive leks (28.8 dBA) was significantly higher than the median L_{50} of active leks (23.9 dBA) (Mann-Whitney $U=8$, $p<0.005$).

Recommendation: For the purposes of assessing acoustic impacts to greater sage-grouse, we recommend using 25 dBA as the threshold for noise exposure (ambient 15 dBA + 10 dBA). For compliance with this limit, we recommend that measurement be made at the perimeter of the lek, with a Type I Sound Level Meter (capable of measuring the acoustic environment of the study area), for a minimum of 7 days (to cover normal variability due to different meteorological conditions) during the lekking period. The sounds of lekking birds will have minimal impacts on these measures (as discussed above). Pater et al. (2009) recommend noise measurement at the height most relevant to

assessing noise impacts on wildlife (see also Delaney et al. 1999, Patricelli et al 2013, and others), which is also consistent with ANSI standards (1994, Section 7.3.2.4), therefore we recommend that SLM microphone height should be 12" to approximate ear height of greater sage-grouse; this microphone placement will also reduce the impact of wind, which could artificially inflate measures and count against compliance. We recommend that the median of hourly L_{50} values during monitoring period should be used to assess compliance. Using this metric, one or more hours may exceed 25 dBA, but the median of all hours should be <25 dBA.

Situations When Existing Ambient Exceeds 25 dBA

There may be situations where sound levels at leks exceed an L_{50} of 25 dBA before project initiation due to existing noise sources, though recent data suggest that this is unlikely outside of heavily-developed areas (Ambrose et al. 2014a and 2014b). In these cases, the best available evidence suggests that additional noise will increase the impact on these leks, as sage-grouse do not adapt to the presence of noise over time (as discussed above; Patricelli et al. 2013). Therefore, to limit impacts on sage grouse, new projects should not contribute to an increase in sound levels at leks already exceeding the noise limits. This rule would not preclude further development at sites that already have sources exceeding 25 dBA due to the non-additive way that multiple sound sources combine to determine overall noise levels. For example, a new source with an L_{50} 9 dB quieter than the L_{50} of an existing source at the measurement site would add only 0.5 dB to the total noise exposure. Therefore new projects could proceed by increasing the distance to the lek or through the use of noise-mitigation technology.

Recommendation: New projects must not contribute to an increase in sound levels at leks already exceeding the noise limits.

Lekking hours of Greater Sage-grouse

The Executive Order currently applies to the hours between 6 pm to 8 am during the lekking season, but this leaves a significant portion of on-lek activity unprotected. Based on observations of attendance patterns and behaviors over 12 lek-years (5 leks, some in multiple years, between 2006 and 2014) near Hudson, WY, an average of 17% of copulations in a lek-year were observed to occur after 8am (this ranged from 4% in one lek-year to 41% in another lek-year) (Patricelli and Krakauer, unpublished data). Further, this same study found that the mean departure time of birds from their leks is approximately 9:00 am, with activity extending some days until 11 am. Studies of lek attendance in Colorado and Montana also found that lek activity commonly continues past 8 am (Jenni and Hartzler 1978; Walsh et al. 2004).

Recommendation: To protect lekking activities, we recommend that the protected period be extended to include 6 pm to 9 am.

Hours Outside the Lekking Period

Maintaining lek activity involves males and females foraging, roosting, nesting and brood-rearing before and after lekking times on a daily and seasonal basis, and noise impacts may also occur during these off-lek activities (e.g. Vehrencamp et al. 1989; Wallestad and Schladweiler 1974; Schoenberg 1982; Patricelli et al. 2013).

Recommendation: Outside of lekking times, reasonable efforts are recommended to keep noise as close to these limits as possible.

References

Ambrose, S., and C. Florian. 2014. Sound Levels at Greater Sage-grouse Leks in the Pinedale Anticline Project Area, WY, April 2013. Unpublished report to Wyoming Department of Game and Fish, Cheyenne, WY

Ambrose, S., C. Florian, and J. MacDonald. 2014a. Ambient Sound Levels in Sage Habitats in Wyoming, April 2014. Unpublished report to Wyoming Department of Game and Fish, Cheyenne, WY.

Ambrose, S., C. Florian, and J. MacDonald. 2014b. Sound Levels at Greater Sage-grouse Leks in the Pinedale Anticline Project Area, WY, April 2013-2014. Unpublished report to Wyoming Department of Game and Fish, Cheyenne, WY.

Blickley, J. L. (2012). The effects of anthropogenic noise on lek attendance, communication, and behavior in greater sage-grouse (*Centrocercus urophasianus*). Department in Evolution and Ecology, University of California, Davis, California, USA. Ph.D Thesis. 126 pp.

Blickley, J. L., et al. (2012a). "Experimental Evidence for the Effects of Chronic Anthropogenic Noise on Abundance of Greater Sage-Grouse at Leks." Conservation Biology 26(3): 461-471.

Blickley, J. L., et al. (2012b). "Experimental chronic noise exposure is related to elevated fecal corticosteroid metabolites in lekking male greater sage-grouse (*Centrocercus urophasianus*)." PLoS ONE 7(11): e50462. doi:50410.51371/journal.pone.0050462.

Braun, C. E. 1998. Sage-grouse declines in western North America: what are the problems? Proceedings of the Western Association of State Fish and Wildlife Agencies 78:139–156.

Delaney, D. K., et al. (1999). Effects of helicopter noise on Mexican spotted owls. Journal of Wildlife Management 63(1): 60-76.

Dooling, R. J., and A. N. Popper. 2007. The Effects of highway noise on birds. California Department of Transportation Division of Environmental Analysis, Sacramento, California, USA.

Holloran, M. J. 2005. Greater sage-grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. Dept. Zoology and Physiology, Univ. Wyoming.

Nicholoff, S. H., compiler. 2003 Wyoming Bird Conservation Plan, Version 2.0. Wyoming Partners in Flight, Wyoming Game and Fish Department, Lander, Wyoming, USA.

Pater, L. L., et al. (2009). Recommendations for improved assessment of noise impacts on wildlife. Journal of Wildlife Management 73(5): 788-795.

Patricelli, G. L., et al. (2013). Recommended management strategies to limit anthropogenic noise impacts on greater sage-grouse in Wyoming. Journal of Human–Wildlife Interactions 7(2): 230–249.

Rogers, G. E. 1964 Sage Grouse investigations in Colorado, vol. 16. Technical Publication No. 16, Colorado Game, Fish and Parks Department, Denver.

Schoenberg, T. J. 1982 Sage grouse movements and habitat selection in North Park, Colorado: Colorado State University, Fort Collins, CO.

Literature review of the science on wintering grouse ecology and anthropogenic influences

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We examined 15 peer-reviewed studies addressing wintering sage-grouse ecology and movement, especially in relationship to the effects of anthropogenic disturbances. All studies reviewed utilized GPS collar, VHF telemetry or aerial transect data to draw inferences about sage-grouse wintering or migrating habitat requirements. Researchers have stressed the overall importance of wintering areas to sage-grouse because sage-grouse rely solely on sagebrush for nutrition during the winter months (Connelly et al. 2000), have fidelity to wintering areas (Berry and Eng 1985) and tend to congregate in areas that are small relative to overall annual use areas (Beck 1977, Swenson et al. 1987, Caudill et al. 2013, Smith et al. 2014). For example, Beck (1977) found that 80% of the winter use was in 7% of the total area. Eng and Schladweiler (1972) conclude that "a winter use area appears to be both a key habitat segment and a major factor in sage grouse distribution over a large area."

Sage-grouse migration from late brood-rearing to wintering habitat is an important component in ensuring that sage-grouse can actually get to their preferred winter range (Connelly J W et al. 1988, Fedy et al. 2012). Fedy et al. (2012) found that the mean distance travelled in all movement studies in Wyoming was 14.4 km; but noted that the max recorded movement was 83 km in the Pinedale (SW Wyoming). This is important because as is noted by Connelly et al (2000), "protection of sagebrush within a 3.2-km radius of leks is not sufficient (Beck 1977) because protecting sagebrush habitats associated with leks will not ensure that year-long habitat requirements are met for migratory populations of sage grouse."

Winter survival of sage-grouse is typically high (Connelly et al. 2011), but it is understood that severe winters can contribute to reduced annual survival (Moynahan et al. 2006), as can changes to the quality and availability of winter habitats where removal of sagebrush from ploughing resulted in reductions in sage-grouse populations (Swenson et al. 1987). Ensuring that high quality winter use areas remain available will likely help buffer sage-grouse population declines from severe winter conditions. As Moynahan et al (2006) emphasize: "Our observations during the severe winter of 2003–2004 underscore these beliefs and demonstrate that occasionally, even in areas of expansive, high-quality habitat such as south Phillips County [Montana], winters may be so severe as to have clear and substantial population-level impacts. We echo other researchers' recommendations that Sage-Grouse managers prioritize the identification and conservation of wintering areas"

Nine studies examined habitat selection of wintering sage-grouse and six considered anthropogenic disturbance as a factor in selection. Overall, the 6 studies investigate sage-grouse response to anthropogenic disturbance during the winter suggest that sage-grouse strongly select for sagebrush cover above snow and use is influenced by sagebrush height, canopy cover and topography (Doherty et al. 2008, Carpenter et al. 2010, Dzialak et al. 2012, Dzialak et al. 2013b, Holloran et al. 2015). Each of these studies found that wintering grouse avoided anthropogenic disturbances in some way and were influenced by development density, distance, and/or human activity levels associated with infrastructure (Doherty et al. 2008, Carpenter et al. 2010, Dzialak et al. 2012, Dzialak et al. 2013b, Smith et al. 2014, Holloran et al. 2015). The window size examined between these studies differed and ranged from approximately 0.75 - 25 km^2, and not all studies examined a range of scales of influence (which makes it difficult to infer a potential threshold). These studies also differ in how development was quantified and measured (e.g.

density, distance effects or human activity). Below we provide a summary of the aforementioned studies stratified by these categories:

- **Density** - Smith et al. (2014) found that the relative probability of occurrence decreased by approximately 3.3% for every 1% increase in surface disturbance (including energy infrastructure) within 0.75 km^2. Holloran et al. (2015) reported that well pad density was a better predictor of sage-grouse habitat selection, and reported that sage-grouse avoided areas with increasing well density; the authors reported that for each additional well pad within 2.8 km of a location, the number of individual sage-grouse detected decreased by between 1 and 4. Doherty et al. (2010) found that sage-grouse were 1.3 times more likely to occupy sagebrush habitats that lacked coalbed methane wells within a 4-km^2 area, compared to those that had the maximum density of 12.3 wells per 4 km^2 allowed on federal lands.
- **Distance** - Carpenter et al. (2010) examined the continuous distances of development influence and found that the relative probability of habitat selection by sage-grouse dropped sharply for habitats within 1,900 m of an energy well. Among all the studies reviewed, this study is the closest to indicating a possible threshold for sage-grouse in terms of distance to development. Holloran et al. (2015) found a distance effect from development and reported that for each 1-km increase in distance from a given location to a well pad the number of individual sage-grouse detected increased by between 13 and 17. Dzialak et al. (2013) examined the distance to nearest anthropogenic feature and concluded that it was an important factor in regulating sage-grouse occurrence, but did not analyze whether there was a threshold for this distance.
- **Activity** – Dzialak et al. (2012) built selection models for both daytime and nighttime sage-grouse habitat selection and found that sage-grouse avoided natural gas wells during the day, but did not find the same nighttime effect, suggesting that "avoidance of human activity appears to be a general feature of winter occurrence among sage-grouse." Holloran et al. (2015) compared sage-grouse avoidance of LGS (liquid gathering systems – well pads with LGS have less human activity associated with them during production phases of development because condensate and produced water are transported off-site via underground pipelines alleviating the need to visit pads for removal of these liquids) versus conventional wells and found a stronger response to conventional wells, suggesting that they are sensitive to human activity levels associated with infrastructure.

There is considerable science to support the conclusion that wintering sage-grouse avoid areas that 1) have high densities of infrastructure, 2) are within 1.9 km of infrastructure and 2) have high levels of human activity. Furthermore, there is evidence to suggest that the removal of sagebrush in winter concentration areas could lead to population declines. However, for management purposes, an exact threshold for disturbance levels and the amount of sagebrush required on the landscape is not yet fully understood. Lacking data for a specific threshold, authors *repeatedly caution* managers to avoid or greatly minimize disturbances in wintering areas due to the reliance and fidelity of grouse on these areas (Moynahan et al. 2006, Carpenter et al. 2010, Dzialak et al. 2013a, Holloran et al. 2015). Dzialak et al. (2013) summarize the current state of knowledge well: "A conservation plan…should aim to retain big sagebrush throughout large areas and constrain human activity to the greatest extent feasible within patches that have been identified as critical habitat."

Beck, T. D. I. 1977. Sage-grouse flock characteristics and habitat selection in winter. Journal of Wildlife Management **41**:18-26.

Berry, J. D., and R. L. Eng. 1985. Interseasonal movements and fidelity to seasonal use areas by female sage grouse. Journal of Wildlife Management **49**:237-240.

Carpenter, J., C. Aldridge, and M. S. Boyce. 2010. Sage-Grouse Habitat Selection During Winter in Alberta. Journal of Wildlife Management **74**:1806-1814.

Caudill, D., T. A. Messmer, B. Bibles, and M. R. Guttery. 2013. Winter habitat use by juvenile greater sage-grouse on Parker Mountain, Utah: implications for sagebrush management. Human-Wildlife Interactions **7**:250-259.

Connelly, J. W., C. A. Hagen, and M. A. Schroeder. 2011. Characteristics and dynamics of greater sage-grouse populations. Pages 53–67 *in* S. T. Knick and J. W. Connelly, editors. Greater sage-grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, USA.

Connelly, J., M. Schroeder, A. Sands, and C. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin **28**:967–985.

Connelly J W, H. W. Browers, and R. J. Gates. 1988. Seasonal Movements of Sage Grouse in Southeastern Idaho. Journal of Wildlife Management **52**:116-122.

Doherty, K. E., D. E. Naugle, B. L. Walker, and J. M. Graham. 2008. Greater Sage-Grouse winter habitat selection and energy development. Journal of Wildlife Management **72**:187-195.

Dzialak, M. R., C. V. Olson, S. M. Harju, S. L. Webb, and J. B. Winstead. 2012. Temporal and hierarchical spatial components of animal occurrence: conserving seasonal habitat for greater sage-grouse. Ecosphere **3**:art30.

Dzialak, M. R., C. V. Olson, S. M. Harju, and J. B. Winstead. 2013a. Spatial generality of predicted occurrence models of nesting habitat for the greater sage-grouse. Ecosphere **4**:art41.

Dzialak, M. R., S. L. Webb, S. M. Harju, C. V. Olson, J. B. Winstead, and L. D. Hayden-Wing. 2013b. Greater Sage-Grouse and Severe Winter Conditions: Identifying Habitat for Conservation. Rangeland Ecology & Management **66**:10-18.

Eng, R. L., and P. Schladweiler. 1972. Sage Grouse Winter Movements and Habitat Use in Central Montana. Journal of Wildlife Management **36**:141-146.

Fedy, B. C., C. L. Aldridge, K. E. Doherty, M. S. O'Donnell, J. L. Beck, B. Bedrosian, M. J. Holloran, G. D. Johnson, N. W. Kaczor, C. P. Kirol, C. A. Mandich, D. Marshall, G. McKee, C. Olson, C. C. Swanson, and B. L. Walker. 2012. Interseasonal movements of Greater sage-grouse, migratory behavior, and an assessment of the core regions concept in Wyoming. Journal of Wildlife Management **76**:1062-1071.

Holloran, M. J., B. C. Fedy, and J. Dahlke. 2015. Winter habitat use of greater sage-grouse relative to activity levels at natural gas well pads. The Journal of Wildlife Management **79**:630-640.

Moynahan, B. J., M. S. Lindberg, and J. W. Thomas. 2006. FACTORS CONTRIBUTING TO PROCESS VARIANCE IN ANNUAL SURVIVAL OF FEMALE GREATER SAGE-GROUSE IN MONTANA. Ecological Applications **16**:1529-1538.

Smith, K. T., C. P. Kirol, J. L. Beck, and F. C. Blomquist. 2014. Prioritizing winter habitat quality for greater sage-grouse in a landscape influenced by energy development. Ecosphere **5**.

Swenson, J. E., C. A. Simmons, and C. D. Eustace. 1987. Decrease of sage grouse Centrocerus urophasianus after ploughing of sagebrush steppe. Biological Conservation **41**:125-132.

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