CENTER for BIOLOGICAL DIVERSITY Because life is good.

September 1, 2016

VIA FEDERAL EXPRESS OVERNIGHT MAIL

Mary Jo Rugwell
State Director
BUREAU OF LAND MANAGEMENT
Wyoming State Office
5353 Yellowstone Road
Cheyenne, Wyoming 82009

Re: Protest of BLM November 1, 2016 Wyoming High Desert Competitive Oil and Gas Lease Sale

Dear Director Rugwell:

The Center for Biological Diversity, Great Old Broads for Wilderness and the Sierra Club hereby file this Protest of the Bureau of Land Management's ("BLM") planned November 1, 2016 oil and gas lease sale, Environmental Assessment and Finding of No Significant Impact DOI-BLM-WY-D040-2016-0138-EA pursuant to 40 CFR §3120.1-3.

We formally protest the inclusion of each of the 21 parcels of federal minerals for oil and gas leasing, covering 32,422.020 acres administered by the Kemmerer, Pinedale, Rawlins, and Rock Springs Field Offices. The parcels are located in the High Desert District of southern Wyoming. Parcels included in this protest are listed as follows:

Kemmerer Field Office:

WY-1611-016 2560.000 Acres	WY-1611-017 640.000 Acres

Pinedale Field Office:

WY-1611-018 2399.000 Acres	WY-1611-019 557.560 Acres	WY-1611-020 2360.000 Acres	WY-1611-021 1960.000 Acres

Rawlins Field Office:

WY-1611-001 1056.350 Acres	WY-1611-002 585.130 Acres	WY-1611-003 2549.410 Acres	WY-1611-004 1609.340 Acres	WY-1611-005 307.590 Acres
WY-1611-006 640.000 Acres	WY-1611-007 1829.060 Acres	WY-1611-008 947.000 Acres	WY-1611-009 1287.380 Acres	WY-1611-010 1930.200 Acres
WY-1611-011 2548.070 Acres	WY-1611-012 2560.000 Acres	WY-1611-013 1936.650 Acres	WY-1611-014 1679.280 Acres	

Rock Springs Field Office:

WY-1611-015 480.000 Acres

PROTEST

I. Protesting Parties: Contact Information and Interests:

This Protest is filed on behalf of the Center for Biological Diversity, Great Old Broads for Wilderness and the Sierra Club by:

Diana Dascalu-Joffe
Senior Attorney
Center for Biological Diversity
1536 Wynkoop Street, Suite 421
Denver, CO 80202
720-925-2521
ddascalujoffe@biologicaldiversity.org

Shelley Silbert, Executive Director
Great Old Broads for Wilderness
Box 2924
Durango, CO 81302
Office: (970) 385-9577
Cell: (928) 600-6754
shelley@greatoldbroads.org

Katie Schaefer
Associate Attorney
Sierra Club
2101 Webster St. Suite 1300
Oakland, CA 94612
415.977.5745
katie.schaefer@sierraclub.org

The Center is a non-profit environmental organization with over 48,500 members, many of whom live and recreate in Wyoming. The Center uses science, policy and law to advocate for the conservation and recovery of species on the brink of extinction and the habitats they need to survive. The Center has and continues to actively advocate for increased protections for species and their habitats in Wyoming. The lands that will be affected by the proposed lease sale include habitat for listed, rare, and imperiled species that the Center has worked to protect including rare, endangered and threatened species like the Greater Sage-Grouse and big game such as mule deer and pronghorn. The Center's board, staff, and members use the public lands in Wyoming, including the lands and waters that would be affected by actions under the lease sale, for quiet recreation (including hiking and camping), scientific research, aesthetic pursuits, and spiritual renewal.

Great Old Broads for Wilderness is a national organization that engages and ignites the activism of elders to preserve and protect wilderness and wild lands. Broads gives voice to the millions of older Americans who want to protect their public lands as Wilderness for this and

future generations. We bring experience, commitment, and humor to the movement to protect the last wild places on Earth.

The Sierra Club is a national nonprofit organization of approximately 635,000 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 Wyoming Chapter of the Sierra Club has approximately 950 members. Sierra Club members use the public lands in Wyoming, including the lands and waters that would be affected by actions under the lease sale, for quiet recreation, aesthetic pursuits, and spiritual renewal. These areas would be threatened by increased oil and gas development that could result from the proposed lease sale.

II. Statement of Reasons as to Why the Proposed Lease Sale Is Unlawful:

BLM's proposed decision to lease the parcels listed above is procedurally and substantively flawed for the reasons discussed below and in the Center for Biological Diversity, et al. comments on the Environmental Assessment (EA) for the proposed lease sale, incorporated here by reference.[1]

A. The EA fails to properly apply BLM's Instruction Memorandum 2010-117 criteria to this leasing decision.

The EA improperly applies criteria in BLM's Instruction Memorandum 2010-117, *Oil and Gas, Planning, and National Environmental Policy Act (NEPA)* (May 17, 2010) ("IM 2010-117") to its analysis of whether leasing of the proposed parcels is appropriate. In response to public concern over lack of transparency in analyzing the environmental impact of leasing decisions, BLM finalized IM 2010-117 in an effort to reform federal leasing practices agency-wide. IM 2010-117 established a process for ensuring "orderly, effective, timely, and environmentally responsible leasing of oil and gas resources on Federal lands. The leasing process established in this IM will create more certainty and predictability, protect multiple-use values when the Bureau of Land Management (BLM) makes leasing decisions, and provide for consideration of natural and cultural resources as well as meaningful public involvement." *See* IM 2010-117, Purpose. Pursuant to IM 2010-117 BLM must take into account "other considerations…when determining the availability of parcels for lease," in addition to ensuring that leasing is consistent with RMP standards and other program guidance. IM 2010-117§ III.C.4. The EA's analysis of these factors, however, is wholly deficient.

As an initial matter, rather than applying the criteria to each parcel on an individual basis, BLM applies the criteria to the parcels offered for the sale collectively. In doing so, BLM suggests that because "most" or "the majority" of parcels meet a certain factor, leasing of all of the parcels is appropriate. EA at 78-79 (factors A, D, F). For example, with respect to factor F--whether "[c]onstruction and use of new access roads or upgrading existing access roads to an

[1] The Center for Biological Diversity et al., Comments on High Desert District Lease Auction: November 2016 Lease Parcels (submitted May 19, 2016).

isolated parcel would have unacceptable impacts to important resource values"—BLM concludes that "*[t]he majority* of the parcels are located within areas of existing oil and gas development, with existing roads and infrastructure and would not have impacts beyond what has already been identified in the subject RMP FEIS'." EA at 79 (emphasis added). This irrational approach completely undermines the intent of the BLM policy, which is to identify *specific*, *individual* parcels which should not be made available for leasing. By analyzing parcels in the aggregate, individual parcels escape meaningful review. For example, parcels WY-1611-012, WY-1611-013 and WY-1611-014 are fairly isolated from the other parcels, and have very little access to roads or infrastructure to support oil and gas development.[2] Had BLM applied factor F appropriately in this case, those three parcels would have been good candidates for deferral or withholding.

With respect to factor F, also, BLM reasons that because it does not have specific proposals for development, "BLM cannot determine whether or not road development to or within given parcels would or would not have unacceptable impacts." *Id*. But the very purpose of the IM 2010-117 guidance is to ensure that parcels on which development is inappropriate are identified *before* parcels are offered for leasing, and *before* an operator has an exclusive right to pursue site-specific development plans. BLM cannot, on the hand, purport to follow internal guidance and criteria to justify its leasing decisions, and on the other, completely ignore the criteria when their application would be inconvenient or not serve its proposed leasing decision.

With respect to factor B--"[i]n undeveloped areas, are non-mineral resource values greater than potential mineral development values?"—BLM also declines to apply this criterion on irrational grounds. It essentially reasons that making this call would be too "subjective," and that because the RMP already makes these lands available for leasing it need not make this call:

> All of parcels addressed in this EA have multiple surface resource values…. Whether the surface resource values for a given parcel are greater or less than the potential oil and gas development potential is subjective. Persons interested in preserving the surface resources would very likely say those values are greater than the potential mineral development value; whereas somebody interested in securing and developing one of the leases would likely say that the mineral value is greater. The Kemmerer, Pinedale, Rawlins, and Green River RMPs, as amended (2015) have addressed values of the lands containing the parcels in this EA and have made resource allocations. All parcels fall within areas that are available for oil and gas leasing as determined by the RMPs. All of the parcels have stipulations attached in conformance with the subject RMP, and are intended to mitigate impacts to the surface resource values.

EA at 78. But the fact that the lands are already available for leasing is not a reason to pass on weighing this factor. IM 2010-117 makes clear that this factor must be considered *in addition* to whether leasing conforms to the RMP. IM 2010-117, § III.F, explicitly refutes BLM's contention that all that BLM can do is determine whether the parcel is open for leasing under the RMP and review stipulations. IM 2010-117, § III.F, provides clear discretionary authority for BLM to

[2] *See* Exhibit A, Center for Biological Diversity, Map of roads and infrastructure within project area (2016).

make lease parcel deferral or withholding decisions based on the IM factors, and not only at the RMP stage.[3]

BLM commits the same error with respect to factor H—whether "[l]easing would result in unacceptable impacts to specially designated areas (whether Federal or non-Federal) and would be incompatible with the purpose of the designation." *See* EA at 79-80. Again, the fact that the area is available for leasing does not automatically mean it should be leased. For example, at least two parcels (WY-1611-004, WY-1611-005) overlap with key mule deer migration corridors and winter range habitat, as discussed in detail below in II.C.2. The Wyoming Game and Fish Department identified these two parcels as "crucial winter range, mule deer migration routes and a combination of those two for mule deer in the Baggs Biologist District" and recommended them be withheld from this lease sale. EA Appendix E at 1. Leasing and the subsequent development of this key mule deer habitat may be incompatible with its designation, but BLM failed to even analyze this under factor H of the IM. Another example of BLM's misapplication of factor H concerns parcels WY-1611-018, WY-1611-019, WY-1611-020 and WY-1611-021. These parcels adjoin public lands in the Bridger-Teton National Forest.[4] Although some of these parcels are split-estate, they have high wildlife values attributed to them as discussed below in II.C.2. BLM again failed to individually analyze these parcels and apply the factors in the IM-2010-117 to ensure appropriate leasing in areas compatible with existing designations and uses.

Finally, BLM's application of factor E—whether "[t]he topographic, soils, and hydrologic properties of the surface will not allow successful final landform restoration and revegetation in conformance with the standards found in Chapter 6 of the Gold Book, as revised" ignores recent studies showing that sagebrush communities are nearly impossible to restore. Drilling sites have not been restored to pre-drilling conditions even after having 20 or 50 years to recover.[5] EA at 79. A recent study found that 50 years or more would be required to recover sagebrush on disturbed sites, and that restoring heterogeneous soil conditions with patchy nutrient conditions, was necessary for recovery of large sagebrush and ecosystem resiliency.[6] There is no evidence, however, that any standards provide for attainment of these conditions.

---

[3] "Field office recommendations may include:
• Offering a lease parcel with standard stipulations only.
• Offering a lease parcel with existing, revised, and/or new stipulations.
• Offering a lease parcel with modification of parcel boundaries.
• *Deferring* a lease parcel from leasing, in whole or in part, pending further evaluation of specified issues.
• *Withholding* a lease parcel from offering in an area that is already closed in the existing RMP.
• Withholding a lease parcel from offering, in whole or in part.
• Withholding a lease parcel from offering, in whole or in part, and initiating a plan amendment to close the area to future leasing." (emphasis added).

[4] *See* Exhibit A, Center for Biological Diversity, Map of roads and infrastructure within project area (2016).

[5] Lester, Liza, Sagebrush Ecosystem Recovery Hobbled By Loss Of Soil Complexity At Development Sites, Ecological Society of America (Jan. 26, 2015), available at http://www.esa.org/esa/sagebrush-ecosystem-recovery-hobbled-by-loss-of-soil-complexity-at-development-sites/.

[6] *Id.*; Minnick, Tamara J., Plant–soil feedbacks and the partial recovery of soil spatial patterns on abandoned well pads in a sagebrush shrubland. Ecological Applications, 25(1), 2015, pp. 3–10, available at http://onlinelibrary.wiley.com/doi/10.1890/13-1698.1/full.

In response to comments on this issue, BLM stated that its application of IM 2010-117 was proper where:

> BLM…is proposing to offer only 21 parcels containing approximately 30,197 acres, which is 11% of the nominated acreage…[t]he cumulative impact and RMP decisions appropriately balance the concerns raised by the Comment, through application of areas where development is allowed against areas which are not allowed. This EA and its leasing recommendations are in compliance with FLPMAs mandate to provide for both conservation and resource use, and FOGRMA's requirements for quarterly lease sales… This EA has specifically considered the items identified in WO IM 2010-117 Leasing Reform.

EA Appendix E at 111, 112. BLM's comment response seems to suggest that the agency must balance application of their own Instructional Memorandum against their discretionary authority to hold quarterly lease sales, when in fact, current case law holds otherwise. BLM's application of IM 2010-117 for this leasing decision conflicts with the agency's mandates under NEPA and courts have held that this blatant disregard for an agency's own internal guidance is arbitrary and capricious.

The Tenth Circuit has held that an agency's failure to discuss and analyze all factors contained in a guidance document can constitute arbitrary and capricious decision-making. *Cotton Petroleum Corp vs. United States Department of the Interior, Bureau of Indian Affairs,* 870 F.2d 1515, 1527 (10th Cir. 1989). In *Cotton Petroleum*, the plaintiffs challenged the Assistant Secretary for Indian Affairs' (the "BIA") denial of an oil pool communitization agreement requested by a lessee with oil development rights to an Indian allotment. *Id.* at 1517. The BIA denied the communitization agreement, finding that the agreement was not in the best interest of the Indian-lessor. *Id.*

The BIA's decision, however, was subject to an internal memorandum that enumerated several factors that the BIA should consider "[in] determining whether the agreement is or is not in the best interests of the Indian lessor." *Id.* at 1518. Among these considerations were that "[t]he long term economic effects of the agreement must be in the best interest of the Indian lessor and we must be able to document these effects." *Id*. The memorandum also stated that BIA officials should rely on the recommendation of the Mineral and Management Service (MMS) "as to the engineering and technical aspects of the agreement." *Id*. The memorandum was prepared in response to a previous Tenth Circuit decision (the "*Kenai* decision"), which provided "some guidance on the scope of [BIA's] authority to approve communitization agreements of Indian oil and gas leases." *Id. See also, Kenai Oil & Gas, Inc. v. Dep't of Interior of U. S.*, 671 F.2d 383 (10th Cir. 1982).

The court held that the BIA acted arbitrarily where it "failed to discuss or analyze all of the relevant factors required in reaching [its] decision, *mandated under [its] guidelines* to all Superintendents and Area Directors." *Id*. at 1525 (emphasis added)("In *Kenai*, we observed that '[i]f the Superintendent considered all relevant factors in reaching his decision and made no clear error in judgment, his action cannot be overturned*" Cotton Petroleum*, 870 F.2d at 1525 (citing *Kenai Oil and Gas Inc*., 671 F.2d at 386.); "the same standard was applied in Citizens…where

the Court observed that it is required to determine '[w]hether the decision was based on all relevant factors and whether there is a clear error of judgment.'" *Id*. (quoting *Citizens to preserve Overton Park v. Volpe*, 401 U.S. 402, 416)). The court, in spite of the BIA's finding that denial of the communitization agreement was in the best interest of the Indian-lessor generally, noted several potential *long-term* adverse consequences to the interest of the Indian-lessor that might have resulted from denying the communitization agreement, which went undocumented by the BIA. *Id.* at 1525 ("[BIA] did not assess (a) the long term economic effects of the communitization agreement in relation to whether it would be in the best interest of the…Indian lessor, nor was any attempt made to document this matter."). The court also pointed to the failure of the BIA to rely on, or give reasons why it chose not to rely on the recommendation of the MMS as required in the memorandum. *Id* at 1525(The court also pointed to the failure of the BIA to consider an additional factor in the memorandum that required him to "assess whether the lessee had complied with the terms of the Rose lease in all respect[s].") The court stressed that "[an] administrative agency must explain its departure from prior norms (guidelines)." *Id.* at 1225 (citing *Atchison, Topeka & Santa Fe Railway Co. v. Wichita Bd. of Trade,* 412 U.S. 800, 808(1973)). For both factors, then, the court found that the BIA "did not address the very factors required under the guidelines…and [it] made no effort to explain his failure to do so." *Id.* Thus, this failure by itself was enough for that court to find arbitrary and capricious decision-making.

More recently, the Tenth Circuit has found that "an agency's unexplained failure to consult its own decisional guidelines can be the makings of a claim of arbitrary decision-making and the basis for reversal." *ACAP Fin., Inc. v. U.S. S.E.C.,* 783 F.3d 763, 767 (10th Cir. 2015) (citing *Cotton Petroleum Corp. v. U.S. Dep't of the Interior*, 870 F.2d 1515, 1527 (10th Cir. 1989)). That case resulted from a challenge to a Security and Exchange Commission (SEC) order levying fines against a stock brokerage firm for violating Financial Industry Regulatory Authority (FINRA) rules. *Id.* at 763. The firm maintained that the fines were excessive and that the SEC failed to consider certain mitigating factors laid out in FINRA internal guidelines. *Id.* at 767. While the court held that the SEC did in fact give due consideration to these factors, it explicitly allowed for the possibility of an arbitrary and capricious challenge to an agency's failure to consider and apply internal guidelines. *Id.*

In a case involving the same FINRA guidelines, the D.C. Circuit upheld a challenge to the SEC's cursory application of the FINRA's mitigating factors. There, the SEC only explicitly addressed some of the mitigating factors laid out in the FINRA guidelines, while passing over others without discussion. *Saad v. S.E.C.*, 718 F.3d 904, 914 (D.C. Cir. 2013). In response, the SEC argued that it "implicitly denied that [those factors] were [mitigating] when it stated that it denied all arguments that were inconsistent with the views expressed in the decision." *Id*. at 914. The court held that "[t]he Commission cannot use a blanket statement to disregard potentially mitigating factors… that are specifically enumerated in FINRA's own Sanction Guidelines." *Id.* This, according to the court, amounted to an abuse of discretion on the part of the SEC where it failed "to consider an important aspect of the problem" *Id.* (quoting *Motor Vehicle Mfrs. Ass'n of U.S. Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (U.S. 1983)).

Finally, a recent case from the Utah District Court allowed for two NEPA claims against BLM based on its failure to apply IM 2010-117. *S. Utah Wilderness All. v. United States DOI,* 2016 U.S. Dist. LEXIS 42696, 14-15 (D. Utah Mar. 30, 2016). Specifically, the plaintiff there

challenged BLM's decision to issue four oil and gas leases to a private third party. *Id.* at 2. Two of the four claims brought by the plaintiff alleged NEPA violations resulting from BLM's failure to apply certain factors contained in IM 2010-117. *Id*. at 5. (Plaintiff's first claim also involved the failure of the BLM to consider a Secretarial Order (Secretarial Order 3310) in addition to IM 2010-117. The Secretarial Order stated, "that the policy of the DOI is to avoid impairment to lands with wilderness characteristics and requires documentation of efforts to avoid impairments when making resource management decisions.")

The court denied the defendant's motion to dismiss the plaintiff's first NEPA claim that BLM failed to take a hard look at the environmental impacts of its actions, holding that "[Plaintiff] alleges that the BLM did not take into account Instruction Memorandum 2010-117 and Secretarial Order 3310 in preparing its environmental assessment nor adequately explain its rationale for not following these directives. These allegations are sufficiently particular to survive [defendant's] motion to dismiss." *Id.* at 14-15. As to the first NEPA claim, the court did not elaborate on plaintiff's allegations as to how or to what extent the BLM had departed from IM 2010-117. It nonetheless held that the plaintiff had put forth allegations, based on BLM's failure to follow IM 2010-117 and Secretarial Order 3310, sufficient to survive a motion to dismiss.

Similarly, the court refused to dismiss the plaintiff's second NEPA claim that BLM failed to consider an appropriate range of alternatives as required under IM 2010-117. IM 2010-117 directs: "The EA will analyze a no action alternative (no leasing), a proposed leasing action…and any alternative to the proposed action that may address unresolved resource conflicts."[7] The court held that, because "[BLM] failed to explain its reasons for departing from the IM 2010-117 directive…[plaintiff] alleges a plausible NEPA claim." *Id.* at 16. For this claim, the court began by reviewing the substantive standard by which courts evaluate an agency's alternative analysis within an EA prepared pursuant to NEPA. It reiterated that review of an agency's alternative analysis is governed by the "rule of reason." *Id.* at 15 (citing *Wyoming v. U.S. Dept of Agric*., 661 F.3d 1209, 1243 (10th Cir. 2011)). This means that an agency must consider a reasonable range of alternatives, as well as "briefly discuss the reasons for eliminating other alternatives from detailed study." *Id.* at 15. For the court, BLM's failure to apply the relevant factors from IM 2010-117 amounted to "a failure to consider a wider range of alternatives and a failure to explain its rationale for not doing so," and therefore constituted a plausible NEPA claim. *Id.* at 15-16.

The court in *Southern Utah* suggests that BLM's total failure to explain why it departed from its own guidelines violates NEPA and is arbitrary and capricious. In the Wyoming High Desert leasing EA, BLM commits the same failure to apply its own Instructional Memorandum 2010-117, in violation of NEPA.

B. The EA fails to take a "hard look" at direct, indirect and cumulative environmental and climate change impacts that would result from new leasing in the Wyoming High Desert region.

[7] "The EA will analyze a no action alternative (no leasing), a proposed leasing action…and any alternative to the proposed action that may address unresolved resource conflicts." Bureau of Land Management, IM 2010-117, Oil and Gas Leasing Use Planning and Lease Parcel Reviews (2010) at III(E).

BLM's Environmental Assessment ("EA") for analyzing the impacts of the Wyoming High Desert leasing parcels is riddled with flaws. The EA fails to clearly analyze the direct, indirect and cumulative impacts stemming from new oil and gas development on the High Desert parcels and arbitrarily fails to analyze lifecycle greenhouse gas emissions and climate change impacts from foreseeable development of these leased parcels.

The National Environmental Policy Act (NEPA) establishes action-forcing procedures that require agencies to take a "hard look" at environmental consequences of the proposed action. *Pennaco Energy, Inc. v. U.S. Dep't of Interior*, 377 F.3d 1147, 1150 (10th Cir. 2004); *see also N.M. ex rel. Richardson v. BLM*, 565 F.3d 683, 714 (10th Cir. 2009). In the matter at hand, BLM has not taken any look, let alone the requisite "hard look," at the potential impacts of oil and gas development on the parcels. Instead, the agencies' decision to proceed with the November 2016 lease sale is based solely on the analysis contained in the Leasing EA, which tiers to and incorporates by reference Wyoming's approved Kemmerer, Pinedale, Rawlins, and Green River Resource Management Plans (RMPs) and Federal Environmental Impact Statements (FEIS), and the Approved Resource Management Plan Amendment (ARMPA) for Greater Sage-Grouse (GRSG).

The Leasing EA performs only broad and generalized analysis of the RMPs' effects on resources throughout the planning area. The EA provides only a highly general overview of the range of possible impacts on a very broad scale – the analysis area in the RMPs FEISs covers approximately 9.4 million acres of public land and 10.7 million acres of federal minerals within the planning area, which is too general to meaningfully address the foreseeable site-specific impacts to the parcels at issue. Many of these RMPs are outdated, and do not address the latest data with respect to site-specific air quality monitoring and climate change impacts from induced oil and gas development activities due to leasing.

The Leasing EA therefore does not contain any of the required analysis of environmental impacts likely to occur from oil and gas development *in the areas to be leased*. Any and all significant environmental consequences of site-specific projects such as this one must be reviewed and disclosed. The analysis of site-specific impacts must occur at the leasing stage, because leasing is highly likely to result in development of the parcels at issue and production of fluid mineral resources. A multitude of effects are readily foreseeable as discussed in detail in the subsequent sections.

The argument that BLM cannot precisely determine the type and amount of development that could occur on these lease parcels is a red herring. NEPA requires "reasonable forecasting," which includes the consideration of "reasonably foreseeable future actions…even if they are not specific proposals." *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1079 (9th Cir. 2011). "Because speculation is . . . implicit in NEPA," agencies may not "shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as crystal ball inquiry." *Id*. Further, while specific development plans have not yet been proposed, such plans are not necessary to predict that development in these areas would entail significant impacts. The problem of degradation of air quality, water pollution, greenhouse gas emissions, and wildlife impacts from new oil and gas leasing are "readily apparent," and there are "enough specifics to permit productive analysis of [oil and gas development], including proposals for

alternative ways of dealing with the problem." *Kern v. BLM*, 284 F.3d 1062, 1073 (9th Cir. 2002).

Indeed, all impacts of induced oil and gas production are indirect effects of any BLM lease sale. *See* 40 C.F.R. § 1508.8(a). Indirect impacts may include "growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." *Id.* BLM has an obligation to consider all reasonably foreseeable indirect effects of leasing including the fact that this lease sale will induce additional oil and natural gas production, transmission and end-user impacts that contribute to environmental degradation, climate change, and destruction of critical wildlife habitat.

The EA is deficient because it fails to consider critical indirect effects associated with this lease sale, including the environmental and climate change consequences of increasing oil and natural gas production. New downstream fossil fuel development is fairly understood as indirectly caused by project development or more specifically, leasing, and thus the environmental and climate effects of leasing must be considered in the EA. *Native Village of Point Hope v. Salazar*, 730 F. Supp. 2d 1009, 1017 (D. Alaska 2010) (requiring consideration of induced development of natural gas drilling in EIS for offshore oil and gas lease sale that caused the gas development); *see also Sierra Club v. Marsh*, 976 F.2d 763, 767 (1st Cir. 1992) (a future impact is reasonably foreseeable if it is "sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision"); *Natural Res. Def. Council, Inc. v. Fed. Aviation Admin.*, 564 F.3d 549, 559-60 (2d Cir. 2009) (agency properly considered indirect and cumulative impacts of induced growth caused by construction of new airport); *City of Davis v. Coleman*, 521 F.2d 661, 674-77 (9th Cir. 1975) (environmental review for highway project needed to analyze impact of induced development despite uncertainty about pace and direction of development); *Border Power Plant Working Group v. Dept. of Energy*, 260 F. Supp. 2d 997, 1028-29 (S.D. Cal. 2003) (requiring consideration of environmental impacts, such as increased carbon dioxide and ammonia emissions, from additional electricity generation spurred by construction of energy transmission lines subject to federal approval).

1. <u>The EA fails to analyze air quality impacts that would result from new leasing in the Wyoming High Desert region.</u>

Oil and gas operations emit numerous air pollutants, including volatile organic compounds (VOCs), NO_X, particulate matter, hydrogen sulfide, and methane. Hydraulic fracturing ("fracking") operations are particularly harmful, emitting especially large amounts of pollution, including air toxic air pollutants. Permitting fracking and other well stimulation techniques will greatly increase the release of harmful air emissions in these and other regions. BLM failed to analyze air quality impacts from new development in conjunction with the existing air quality landscape for the Wyoming lease parcels. BLM must analyze increased emissions from foreseeable oil and gas development for these lease parcels in order to prevent further degradation of local air quality, respiratory illnesses, premature deaths, hospital visits, as well as missed school and work days.

The EA provides a cursory review of air monitoring for criteria pollutants to establish compliance with health-based federal Clean Air Act standards called the National Ambient Air Quality Standards (NAAQS), and state-based Wyoming Ambient Air Quality Standards

(WAAQS). The EA does acknowledge that air emissions from future oil and gas development could increase, but provides absolutely no mitigation plan or additional analysis as to the impact these increased emissions will have on meeting the NAAQS and WAAQS in the future. The EA states that:

> The administrative act of offering any of these parcels and the subsequent issuing of leases would have no direct impacts to air quality. Any potential effects to air quality would occur if and when the leases were developed. Any proposed development project would be subject to additional analysis of possible air effects before approval. The analysis may include air quality modeling for the activity in accordance with the National BLM, EPA and NPS Air Quality Memorandum of Understanding (MOU). Over the last 10 years, the development on federal oil and gas mineral estate in the Kemmerer, Rawlins, Pinedale and Rock Springs field offices has resulted in an average of 545 wells being spudded annually (approximately 15 in KFO, 180 in RFO, 235 in PFO, and 115 in RSFO). These wells would incrementally contribute a small percentage of the total emissions (including GHGs) from oil and gas activities in Wyoming.

EA at 55. According to data collected between 2010-2014 at 10 southern Wyoming monitoring stations, ozone NAAQS/WAAQs were exceeded at a number of Upper Green River Basin monitoring stations that are representative of the existing air quality landscape at least one lease parcel in this sale. EA at 18-21. Current development trends could lead to additional exceedances of the ozone standards, but BLM makes no attempt to quantify or forecast potential increased emissions from oil and gas development spurred by this leasing decision because "… it is unknown how many wells or what type (oil, gas or both)may be proposed for development, the types of equipment needed if a well were to be put into production (e.g., compressor, separator, dehydrator), or what technologies may be employed by a given company. The degree of impact will also vary according to the characteristics of the geologic formations from which production occurs." EA at 55. Contrary to BLM's unsupported reasoning, forecasting air quality impacts from the leasing and resource management of fossil fuel development is required by well-established law. *WildEarth Guardians v. United States Office of Surface Mining Reclamation & Enforcement,* 104 F. Supp. 3d 1208, 1227-1228 (D.Colo. 2015). ("The question posed by the plaintiff is not whether the increased mining will result in a release of particulate matter and ozone precursors in excess of the NAAQS, but whether the increased emissions will have a significant impact on the environment. One can imagine a situation, for example, where the particulate and ozone emissions from each coal mine in a geographic area complied with Clean Air Act standards but, collectively, they significantly impacted the environment. It is the duty of OSM to determine whether a mining plan modification would contribute to such an effect, whether or not the mine is otherwise in compliance with the Clean Air Act's emissions standards.")(internal citations omitted). Further, such faulty logic would always circumvent a cumulative emissions analysis. Based on this flawed reasoning, the only time the cumulative impacts of oil and gas development projects could be analyzed is when the last oil and gas well in a given area is proposed—a result that contravenes NEPA's intent, to study and analyze potential significant and cumulative environmental effects of a proposed action before they occur.

BLM must review both (a) the foreseeable site-specific emission sources for ozone from the proposed lease parcels and (b) the sources of ozone emissions from existing, permitted, and other leased sources, and analyze how increased emissions from future oil and gas development will impact, cause or contribute to exceedances of the NAAQS. BLM's failure to address this trend towards a foreseeable future violation of health-based air quality standards in their environmental review of this lease sale violates the mandates of NEPA.

BLM can readily identify oil and gas volume estimates for lease parcels by utilizing their own EPCA Phase III spatial data and overlaying the lease parcel boundary map provided in the lease sale notice.[8] For the November 2016 Wyoming High Desert lease sale, this simple calculation yields an estimated oil volume of 8.64463MMbbl and an estimated gas volume of 347.747546 Bcf that could stem from development of these lease parcels. Estimating emissions from production of oil and gas wells per volume produced can be readily calculated using a number of EPA emissions inventory calculation tools.[9] The type, quantity and future impact of additional air emissions from this new potential development can and must be analyzed in conjunction with the existing air quality landscape in this region. Failure to do so renders BLM's EA inadequate for purposes of NEPA review. BLM's air quality analysis must include the following information for public review:

a. Types of Air Emissions

Unconventional oil and gas operations emit large amounts of toxic air pollutants,[10] also referred to as Hazardous Air Pollutants, which are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.[11] The reporting requirements recently implemented by the California South Coast Air Quality Management District ("SCAQMD") have shown that at least 44 chemicals known to be air toxics have been used in fracking and other types of unconventional oil and gas recovery in California.[12] Through the implementation of these new reporting requirements, it is now known that operators have been using several types of air toxics in California, including crystalline silica, methanol, hydrochloric acid, hydrofluoric acid, 2-butoxyethanol, ethyl glycol monobutyl ether, xylene, amorphous silica fume, aluminum oxide, acrylic polymer, acetophenone, and ethylbenzene. Many of these chemicals also appear on the U.S. EPA's list of hazardous air

[8] United States Department of Agriculture, United States Department of Energy, United States Department of the Interior, Inventory of Onshore Federal Oil and Natural Gas Resources and Restrictions to Their Development ("EPCA Phase III Inventory") (2008) *available at* http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/EPCA_III.html.

[9] James Russell, Alison Pollack and Greg Yarwood, *An Emission Inventory of Non-point Oil and Gas Emissions Sources in the Western Region*, ENVIRON International Corporation, available at https://www3.epa.gov/ttnchie1/conference/ei15/session12/russell.pdf. *See also*, Amnon Bar-Ilan, et al., *A Comprehensive Emissions Inventory of Upstream Oil and Gas Activities in the Rocky Mountain States*: available at https://www3.epa.gov/ttnchie1/conference/ei19/session8/barilan.pdf.

[10] Sierra Club et al., Comments on New Source Performance Standards: Oil and Natural Gas Sector; Review and Proposed Rule for Subpart OOOO (Nov. 30, 2011) ("Sierra Club Comments") at 13.

[11] U.S. EPA, Hazardous Air Pollutants, *available at* http://www.epa.gov/haps (accessed Jan. 10, 2016).

[12] Center for Biological Diversity, Air Toxics One Year Report, p. 1 (June 2014).

pollutants.[13] EPA has also identified six "criteria" air pollutants that must be regulated under the National Ambient Air Quality Standards (NAAQS) due to their potential to cause primary and secondary health effects. Concentrations of these pollutants—ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and lead—will likely increase in regions where unconventional oil and gas recovery techniques are permitted.

VOCs, from car and truck engines as well as the drilling and completion stages of oil and gas production, make up about 3.5 percent of the gases emitted by oil or gas operations.[14] The VOCs emitted include the BTEX compounds – benzene, toluene, ethyl benzene, and xylene – which are listed as Hazardous Air Pollutants. 42 U.S.C. § 7412(b). There is substantial evidence showing the grave harm from these pollutants.[15] Recent studies and reports confirm the pervasive and extensive amount of VOCs emitted by unconventional oil and gas extraction.[16] In particular, a study covering sites near oil and gas wells in five different states found that concentrations of eight volatile chemicals, including benzene, formaldehyde and hydrogen sulfide, exceeded risk-based comparison values under several operational circumstances.[17] Another study determined that vehicle traffic and engine exhaust were likely the sources of intermittently high dust and benzene concentrations observed near well pads.[18] Recent studies have found that oil and gas operations are likely responsible for elevated levels of hydrocarbons such as benzene downwind of the Denver-Julesburg Fossil Fuel Basin, north of Denver.[19] Another study found that oil and gas operations in this area emit approximately 55% of the VOCs in northeastern Colorado. [20]

VOCs can form ground-level (tropospheric) ozone when combined with nitrogen oxides ("NO_X"), from compressor engines, turbines, other engines used in drilling, and flaring,[21] and

[13] U.S. Environmental Protection Agency, The Clean Air Act Amendments of 1990 List of Hazardous Air Pollutants, Technology Transfer Network Air Toxics Web Site, http://www.epa.gov/ttnatw01/orig189.html (accessed July 29, 2015).
[14] Brown, Heather, Memorandum to Bruce Moore, U.S.EPA/OAQPS/SPPD re Composition of Natural Gas for use in the Oil and Natural Gas Sector Rulemaking, July 28, 2011 ("Brown Memo") at 3.
[15] Colborn, Theo et al., Natural Gas Operations from a Public Health Perspective, 17 Human and Ecological Risk Assessment 1039 (2011) (Colborn 2011); McKenzie, L. et al., Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources, 424 Science of the Total Environment 79 (2012); Food and Water Watch, The Case for a Ban on gas Fracking (June 2011) ("Food & Water Watch 2011")
[16] McCawley, M., Air, Noise, and Light Monitoring Plan for Assessing Environmental Impacts of Horizontal Gas Well Drilling Operations (ETD-10 Project), West Virginia University School of Public Health, Morgantown, WV (2013) ("McCawley 2013"), *available at* http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/legislativestudies/Documents/WVU%20Final%20Air%20Noise%20Light%20Protocol.pdf; Center for Biological Diversity, Dirty Dozen: The 12 Most Commonly Used Air Toxics in Unconventional Oil Development in the Los Angeles Basin (Sept. 2013).
[17] Macey, G.P. et al., Air Concentrations of Volatile Compounds Near Oil and Gas Production: A Community-Based Exploratory Study, 13 Environmental Health 82 (2014) at 1.
[18] McCawley 2013.
[19] Pétron, G. et al., Hydrocarbon Emissions Characterization in the Colorado Front Range – A Pilot Study, 117 J. Geophysical research D04304 (2012), at 8, 13 ("Pétron 2012").
[20] Gilman, J.B. et al., *Source Signature of Volatile Organic Compounds from Oil and Natural Gas Operations in Northeastern Colorado*, 47 Envtl. Sci & Tech. 1297, 1303 (2013) ("Gilman 2013").
[21] *See, e.g.*, U.S. Environmental Protection Agency, Oil and Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution: Background Technical Support Document for Proposed Standards at 3-6 (July 2011); Armendariz, Al, Emissions for Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements (2009) ("Armendariz") at 24.

sunlight. This reaction can diminish visibility and air quality and harm vegetation. Tropospheric ozone can also be caused by methane, which is leaked and vented at various stages of unconventional oil and gas development, as it interacts with nitrogen oxides and sunlight.[22] In addition to its role as a greenhouse gas, methane contributes to increased concentrations of ground-level ozone, the primary component of smog, because it is an ozone precursor.[23] Methane's effect on ozone concentrations can be substantial. One paper modeled reductions in various anthropogenic ozone precursor emissions and found that "[r]educing anthropogenic CH_4 emissions by 50% nearly halves the incidence of U.S. high-O_3 events . . . ."[24]

Like methane, VOCs and NO_X are also ozone precursors; therefore, many regions around the country with substantial oil and gas operations are now suffering from extreme ozone levels due to heavy emissions of these pollutants.[25] Ozone can result in serious health conditions, including heart and lung disease and mortality.[26] A recent study of ozone pollution in the Uintah Basin of northeastern Utah, a rural area that experiences hazardous tropospheric ozone concentrations, found that oil and gas operations were responsible for 98 to 99 percent of VOCs and 57 to 61 percent of NO_X emitted from sources within the Basin considered in the study's inventory.[27]

Oil and gas operations can also emit hydrogen sulfide. The hydrogen sulfide is contained in the natural gas and makes that gas "sour."[28] Hydrogen sulfide may be emitted during all stages of operation, including exploration, extraction, treatment and storage, transportation, and refining. Long−term exposure to hydrogen sulfide is linked to respiratory infections, eye, nose, and throat irritation, breathlessness, nausea, dizziness, confusion, and headaches.[29]

The oil and gas industry is also a major source of particulate matter. The heavy equipment regularly used in the industry burns diesel fuel, generating fine particulate matter[30] that is especially harmful.[31] Vehicles traveling on unpaved roads also kick up fugitive dust,

---

[22] Fiore, Arlene et al., Linking Ozone Pollution and Climate Change: The Case for Controlling Methane, 29 Geophys. Res Letters 19 (2002) ("Fiore 2002")
[23] U.S. Environmental Protection Agency, Oil and Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews Proposed Rule, 76 Fed. Reg 52,738 (Aug 23, 2011).
[24] Fiore 2002; *see also* Martin, Randal et al., Final Report: Uinta Basin Winter Ozone and Air Quality Study Dec 2010 - March 2011 (2011) at 7.
[25] Armendariz at 1, 3, 25-26; Wendy Koch, *Wyoming's Smog Exceeds Los Angeles' Due to Gas Drilling*, USA Today (May 9, 2011); Craft, Elena, Environmental Defense Fund, Do Shale Gas Activities Play a Role in Rising Ozone Levels? (2012); Colorado Dept. of Public Health and Environment, Conservation Commission, Colorado Weekly and Monthly Oil and Gas Statistics (July 6, 2012) at 12.
[26] U.S. Environmental Protection Agency, Integrated Science Assessment (ISA) for Ozone (O3) and Related Photochemical Oxidants (2013).
[27] Lyman, Seth and Howard Shorthill, Final Report: 2012 Uintah Basin Winter Ozone & Air Quality Study, Utah Department of Environmental Quality (2013); *see also* Gilman,2013.
[28] Sierra Club Comments.
[29] USEPA, Office of Air Quality Planning and Standards, Report to Congress on Hydrogen Sulfide Air Emissions Associated with the Extraction of Oil and Natural Gas (EPA-453/R-93-045) at i (Oct. 1993) ("USEPA 1993").
[30] Earthworks, Sources of Oil and Gas Pollution (2011).
[31] Bay Area Air Quality Management District, Particulate Matter Overview, Particulate Matter and Human Health (2012).

which is particulate matter.[32] Further, both NO_X and VOCs, which as discussed above are heavily emitted by the oil and gas industry, are also particulate matter precursors.[33] Some of the health effects associated with particulate matter exposure are "premature mortality, increased hospital admissions and development of chronic respiratory disease."[34]

Fracking results in additional air pollution that can create a severe threat to human health. One analysis found that 37 percent of the chemicals found at fracked gas wells were volatile, and that of those volatile chemicals, 81 percent can harm the brain and nervous system, 71 percent can harm the cardiovascular system and blood, and 66 percent can harm the kidneys.[35] Also, the SCAQMD has identified three areas of dangerous and unregulated air emissions from fracking: (1) the mixing of the fracking chemicals; (2) the use of the silica, or sand, as a proppant, which causes the deadly disease silicosis; and (3) the storage of fracking fluid once it comes back to the surface.[36] Preparation of the fluids used for well completion often involves onsite mixing of gravel or proppants with fluid, a process which potentially results in major amounts of particulate matter emissions.[37] Further, these proppants often include silica sand, which increases the risk of lung disease and silicosis when inhaled.[38] Finally, as flowback returns to the surface and is deposited in pits or tanks that are open to the atmosphere, there is the potential for organic compounds and toxic air pollutants to be emitted, which are harmful to human health as described above.[39]

BLM's environmental review of the Wyoming High Desert November 2016 lease parcel sale should study the potential for oil and gas operation sites in the leasing area to emit such air toxics and any other pollutants that may pose a risk to human health, paying particular attention to the impacts of air pollution on environmental justice communities that already bear the burden of disproportionately high levels of air pollution. The EA should have relied on the most up-to-date information regarding the contribution of oil and gas operations to VOC and air toxics levels.

b. Sources of Air Emissions

Harmful air pollutants are emitted during every stage of unconventional oil and gas recovery, including drilling, completion, well stimulation, production, and disposal. Drilling and casing the wellbore require substantial power from large equipment. The engines used typically

[32] U.S. Environmental Protection Agency, Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Particulate Matter (June 2012), http://www.epa.gov/ttnecas1/regdata/RIAs/PMRIACombinedFile_Bookmarked.pdfat 2-2, ("EPA RIA").
[33] EPA RIA at 2-2.
[34] U.S. Environmental Protection Agency, National Ambient Air Quality Standards for Particulate Matter Proposed Rule, 77 Fed. Reg. 38,890, 38,893 (June 29, 2012).
[35] Colborn 2011 at 8.
[36] South Coast Air Quality Management District, Draft Staff Report on Proposed Rule 1148.2 - Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers (January 2013).at 15 ("SCAQMD Revised Draft Staff Report PR1148-2").
[37] *Id.*
[38] South Coast Air Quality Management District, Response to Questions re Air Quality Risks of Hydraulic Fracturing in California, Submission to Joint Senate Hearing (2013) at 3.
[39] South Coast Air Quality Management District, Revised Draft Staff Report on Proposed Amended Rule 1148.2 - Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers (June 2015) at 15.

run on diesel fuel, which emits particularly harmful types of air pollutants when burned. Similarly, high-powered pump engines are used in the fracturing and completion phase. This too can result in large volumes of air pollution. Flaring, venting, and fugitive emissions of gas are also a potential source of air emissions. Gas flaring and venting can occur in both oil and gas recovery processes when underground gas rises to the surface and is not captured as part of production. Fugitive emissions can occur at every stage of extraction and production, often leading to high volumes of gas being released into the air. Methane emissions from oil and gas production is as much as 270 percent greater than previously estimated by calculation.[40] Recent studies show that emissions from pneumatic valves (which control routine operations at the well pad by venting methane during normal operation) and fugitive emissions are higher than EPA estimates.[41]

Evaporation from pits can also contribute to air pollution. Pits that store drilling waste, produced water, and other waste fluid may be exposed to the open air. Chemicals mixed with the wastewater—including the additives used to make fracking fluids, as well as volatile hydrocarbons, such as benzene and toluene, brought to the surface with the waste—can escape into the air through evaporation. Some pits are equipped with pumps that spray effluents into the air to hasten the evaporation process. Even where waste fluid is stored in so-called "closed loop" storage tanks, fugitive emissions can escape from tanks.

As mentioned above, increased truck traffic will lead to more air emissions. Trucks capable of transporting large volumes of chemicals and waste fluid typically use large engines that run on diesel fuel. Air pollutants from truck engines will be emitted not only at the well site, but also along truck routes to and from the site.

c. Impact of Increased Air Pollution

The potential harms resulting from increased exposure to the dangerous air pollutants described above are serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the U.S. EPA's website:

> *Nitrogen oxides* (NOx) react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. NO_x and volatile organic compounds react in the presence of heat and sunlight to form ozone.
>
> *Particulate matter* (PM) – especially fine particles – contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including: premature death in people with heart or lung disease, increased

[40] Miller 2013.
[41] Allen, David et al., Measurements of methane emissions at natural gas production sites in the United States, PNAS Early Edition, doi:10.1073/pnas.1304880110 (2013).; Harriss, Robert et al., Using Multi-Scale Measurements to Improve Methane Emission Estimates from Oil and Gas Operations in the Barnett Shale Region, Texas, Environ. Sci. Technol., 2015, 49 (13), pp 7524–7526.

mortality, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.[42]

Sulfur Dioxide (SO_2) has been shown to cause an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms.[43] Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.[44]

Carbon Monoxide (CO) can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death.[45] Exposure to CO can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress.[46] For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion.[47]

Ozone (O_3) can trigger or worsen asthma and other respiratory ailments.[48] Ground level ozone can have harmful effects on sensitive vegetation and ecosystems. Ozone may also lead to loss of species diversity and changes to habitat quality, water cycles, and nutrient cycles.

Air toxics and hazardous air pollutants, by definition, can result in harm to human health and safety. The full extent of the health effects of exposure is still far from being complete, but already there are numerous studies that have found these chemicals to have serious health consequences for humans exposed to even minimal amounts. The range of illnesses that can result are summarized in a study by Dr. Theo Colburn, which charts which chemicals have been shown to be linked to certain illnesses.[49]

Natural gas drilling operations result in the emissions of numerous non-methane hydrocarbons (NMHCs) that have been linked to numerous adverse health effects. A recent study

---

[42] U.S. Environmental Protection Agency, Particulate Matter, (PM) http://www.epa.gov/airquality/particlepollution/health.html (accessed July 30, 2015); Ostro, Bart et al., Long-term Exposure to Constituents of Fine Particulate Air Pollution and Mortality: Results from the California Teachers Study, 118 Environmental Health Perspectives 3 (2010).
[43] U.S. Environmental Protection Agency, Sulfur Dioxide http://www.epa.gov/airquality/sulfurdioxide/health.html, *available at* (accessed July 29, 2015).
[44] *Id.*
[45] U.S. Environmental Protection Agency, Carbon Monoxide, *available at* http://www.epa.gov/airquality/carbonmonoxide/health.html (accessed July 29, 2015).
[46] *Id.*
[47] *Id.*
[48] U.S. Environmental Protection Agency, Ground Level Ozone, *available at* http://www.epa.gov/airquality/ozonepollution/health.html (accessed July 29, 2015).
[49] Colborn 2011. Colborn, Theo, et al., An Exploratory Study of Air Quality near Natural Gas Operations, Human and Ecological Risk Assessment: An International Journal doi:10.1080/10807039.2012.749447 (2012) ("Colborn 2012"); *see* note 120 & accompanying text below.

that analyzed air samples taken during drilling operations near natural gas wells and residential areas in Garfield County, detected 57 chemicals between July 2010 and October 2011, including 44 with reported health effects.[50] For example:

> Thirty-five chemicals were found to affect the brain/nervous system, 33 the liver/metabolism, and 30 the endocrine system, which includes reproductive and developmental effects. The categories with the next highest numbers of effects were the immune system (28), cardiovascular/blood (27), and the sensory and respiratory systems (25 each). Eight chemicals had health effects in all 12 categories. There were also several chemicals for which no health effect data could be found.[51]

The study found extremely high levels of methylene chloride, which may be used as cleaning solvents to remove waxy paraffin that is commonly deposited by raw natural gas in the region. These deposits solidify at ambient temperatures and build up on equipment.[52] While none of the detected chemicals exceeded governmental safety thresholds of exposure, the study noted that such thresholds are typically based on "exposure of a grown man encountering relatively high concentrations of a chemical over a brief time period, for example, during occupational exposure."[53] Consequently, such thresholds may not apply to individuals experiencing "chronic, sporadic, low-level exposure," including sensitive populations such as children, the elderly, and pregnant women.[54] For example, the study detected polycyclic aromatic hydrocarbon (PAH) levels that could be of "clinical significance," as recent studies have linked low levels of exposure to lower mental development in children who were prenatally exposed.[55] In addition, government safety standards do not take into account "the kinds of effects found from low-level exposure to endocrine disrupting chemicals…, which can be particularly harmful during prenatal development and childhood.[56]

Another study reviewed exposures to emissions from unconventional natural gas development and noted that trimethylbenzenes are among the largest contributors to non-cancer threats for people living within a half mile of a well, while benzene is the largest contributor to cumulative cancer risk for people, regardless of the distance from the wells.[57]

d. Air Modeling

BLM should have used air modeling to understand what areas and communities will most likely be affected by air pollution in any environmental review of this lease parcel sale. It is

---

[50] Colborn et al., An Exploratory Study of Air Quality Near Natural Gas Operations, Human and Ecological Risk Assessment: An International Journal, Vol. 20, Iss. 1, 2014, pp. 21-22 (pages refer to page numbers in attached manuscript and not journal pages) ("Colborn 2014"), *available at* http://www.tandfonline.com/doi/full/10.1080/10807039.2012.749447.
[51] Colborn 2014, p. 11.
[52] *Id*., p. 10.
[53] *Id*., pp. 11-12.
[54] *Id*. p. 12.
[55] *Id*., p. 10-11.
[56] *Id*., p. 12.

crucial to gather independent data rather than relying on industry estimates, which may be inaccurate or biased. Wind and weather patterns, and atmospheric chemistry, determine the fate and transport of air pollution over a region, over time. Any BLM environmental review document should be informed by air modeling to show where the air pollution will flow.

2. <u>The EA fails to address greenhouse gas emissions and climate change impacts that would result from new leasing in the Wyoming High Desert region.</u>

Meaningful consideration of greenhouse gas emissions (GHGs) is clearly within the scope of required NEPA review. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008). As the Ninth Circuit has held, in the context of fuel economy standard rules:

> The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct. Any given rule setting a CAFE standard might have an "individually minor" effect on the environment, but these rules are "collectively significant actions taking place over a period of time" *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin*., 538 F.3d 1172, 1216 (9th Cir. 2008)(quoting 40 C.F.R. § 1508.7).

The courts have ruled that federal agencies consider indirect GHG emissions resulting from agency policy, regulatory, and leasing decisions. For example, agencies cannot ignore the indirect air quality and climate change impact of decisions that would open up access to coal reserves. *See Mid States Coal. For Progress v. Surface Transp. Bd*., 345 F.3d 520, 532, 550 (8th Cir. 2003); *High Country Conservation Advocates v. U.S. Forest Serv*., 52 F.Supp. 3d 1174, 1197-98 (D.Colo. 2014).

The EA fails to fully analyze the impacts of increased oil and gas development on greenhouse gas (GHG) emissions and climate change based on the Wyoming High Desert November 2016 lease parcel sale. It makes no attempt to even identify the various sources of greenhouse gas pollution that could result from new leasing, much less quantify potential emissions. It relies on The Center for Climate Strategies (CCS) *Wyoming Greenhouse Gas Inventory and Reference Case Projection 1990-2020* (Inventory) for the Wyoming Department of Environmental Quality, as well as the *Approved Resource Management Plan Amendment* (ARMPA) for Greater Sage-Grouse ROD (September 21, 2015). These documents are incorporated by reference into the EA. EA at 3, 39. However, while the *Wyoming GHG Inventory and Reference Case* document provides a clear inventory of present and future greenhouse gas emissions from a number of sectors across the state, it does not provide the level of site-specific emissions analysis that is possible for the Wyoming High Desert lease parcel sale at issue here.

Ironically, BLM acknowledges that "offering the proposed parcels may result in the development and production of new wells" but refuses to analyze potential GHG emissions from these reasonably foreseeable new wells because "the assessment of GHG emissions and climate change is in its formative phase. While it is not possible to accurately quantify potential GHG

emissions in the affected areas as a result of making the proposed tracts available for leasing, some general assumptions can be made….Wyoming's total GHG emissions are expected to continue to grow to 69 MMtCO2e by 2020, 56% above 1990 levels." EA at 57. In the same sentence, BLM dismisses any attempt at quantifying GHGs on a site-specific level even though they acknowledge that the tools to identify and quantify those sources on a state level exist and are specifically cited in their EA.

NEPA requires "reasonable forecasting," which includes the consideration of "reasonably foreseeable future actions…even if they are not specific proposals" *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1079 (9th Cir. 2011) (citation omitted). Full development of the areas for lease is entirely foreseeable in light of the Reasonably Foreseeable Development Scenarios for each of the field offices and existing development patterns. That BLM cannot "accurately" calculate the total emissions expected from full development is not a rational basis for cutting off its analysis. "Because speculation is . . . implicit in NEPA," agencies may not "shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as crystal ball inquiry." *Id.* Indeed, the EA for a recent lease sale in Utah undercuts BLM's assertion here that GHGs cannot be quantified at the leasing stage[58]. *See High Country Conservation Advocates v. United States Forest Serv.*, 52 F. Supp. 3d 1174, 1196 (D. Colo. 2014) (decision to forgo calculating mine's reasonably foreseeable GHG emissions was arbitrary "in light of the agencies' apparent ability to perform such calculations").

The final CEQ *Guidance on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA review* is dispositive on the issue of federal agency review of greenhouse gas emissions as foreseeable direct and indirect effects of the proposed action. 81 Fed. Reg. 51,866 (Aug. 5, 2016). The CEQ guidance provides clear direction for BLM to conduct a lifecycle greenhouse gas analysis because the modeling and tools to conduct this type of analysis are readily available to the agency:

> If the direct and indirect GHG emissions can be quantified based on available information, including reasonable projections and assumptions, agencies should consider and disclose the reasonably foreseeable direct and indirect emissions when analyzing the direct and indirect effects of the proposed action. Agencies should disclose the information and any assumptions used in the analysis and explain any uncertainties. To compare a project's estimated direct and indirect emissions with GHG emissions from the no-action alternative, agencies should draw on existing, timely, objective, and authoritative analyses, such as those by the Energy Information Administration, the Federal Energy Management Program, or Office of Fossil Energy of the Department of Energy. In the absence of such analyses, agencies should use other available information. 81 Fed. Reg. 51,866 at 16 (Aug. 5, 2016)(citations omitted).

CEQ's guidance even provides an example of where a lifecycle analysis is appropriate in a leasing context at footnote 42:

[58] U.S. Bureau of Land Management, Environmental Assessment for West Desert District, Fillmore Field Office, August 2015 Oil and Gas Lease Sale, pp. 57-58 (Dec. 2015); U.S. Bureau of Land Management, Greenhouse Gases Estimate (West Desert District Nov 2015 Lease Sale), http://www.blm.gov/style/medialib/blm/ut/natural_resources/airQuality.Par.38

> The indirect effects of such an action that are reasonably foreseeable at the time would vary with the circumstances of the proposed action. For actions such as a Federal lease sale of coal for energy production, the impacts associated with the end-use of the fossil fuel being extracted would be the reasonably foreseeable combustion of that coal. *Id*.

Again, as described above in II.B.1, the number of future wells and volume of potential oil and gas from these lease parcels are knowable and calculating the direct emissions impact from these lease parcels are also quantifiable. Utilizing BLM's own potential volume data for the November 2016 Wyoming High Desert lease sale, the estimated oil volume of 8.64463 MMbbl represents lifecycle greenhouse gas emissions of up to 3,028,442.86 tons of CO2e and the estimated gas volume of 347.747546 Bcf represents lifecycle greenhouse gas emissions of up to 25,928,839.60 tons of CO2e. Potential lifecycle greenhouse gas emissions for resultant oil and gas volumes were generated using a peer-reviewed carbon calculator and lifecycle greenhouse gas emissions model developed by EcoShift consulting.[59] This model is not novel in its development or methodology. Numerous greenhouse gas calculation tools exist to develop lifecycle analyses, particularly for fossil fuel extraction, operations, transport and end-user emissions .[60] Indeed, the Department of Energy has historically utilized these types of lifecycle emissions analyses in NEPA review of oil and gas infrastructure projects.[61] Other federal agencies have begun to employ upstream, downstream and lifecycle greenhouse gas emissions analyses for NEPA review of energy-related projects.[62] Courts have upheld the viability and

---

[59] *See* Ecoshift Consulting, The potential Greenhouse Gas Emissions of U.S. Federal Fossil Fuels, Center for Biological Diversity and Friends of the Earth (2015), http://www.ecoshiftconsulting.com/wp-content/uploads/Potential-Greenhouse-Gas-Emissions-U-S-Federal-Fossil-Fuels.pdf.

[60] *See* Council on Environmental Quality, Revised draft guidance for greenhouse gas emissions and climate change impacts (2014), https://ceq.doe.gov/current_developments/GHG-accounting-tools.html.

[61] U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States, DOE/NETL-2014/1649 (May 29, 2014) *available at* http://energy.gov/sites/prod/files/2014/05/f16/Life%20Cycle%20GHG%20Perspective%20Report.pdf. *See also*, U.S. Department of Energy National Renewable Energy Laboratory, Life Cycle Greenhouse Gas Emissions from Electricity Generation Fact Sheet, Pub No. NREL/FS-6A20-57817 (2013) *available at* http://www.nrel.gov/docs/fy13osti/57187.pdf; U.S. Department of Energy National Energy Technology Laboratory Role of Alternative Energy Sources: Natural Gas Technology Assessment, Pub No. DOE/NETL- 2012/1539 (NETL, 2012) *available at* https://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/Life%20Cycle%20Analysis/LCA-2012-1539.pdf; U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Greenhouse Gas Inventory of Natural Gas Extraction, Delivery and Electricity Production, Pub No. DOE/NETL-2011/1522 (NETL, 2011) *available at* http://www.fossil.energy.gov/programs/gasregulation/authorizations/2013_applications/sierra_club_13-69_venture/exhibits_44_45.pdf; U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Analysis: Natural Gas Combined Cycle (NGCC) Power Plant, Pub No DOE/NETL-403-110509 (Sep 10, 2012) (NETL, 2010) *available at* https://www.netl.doe.gov/energy-analyses/temp/FY13_LifeCycleAnalysisNaturalGasCombinedCycle(NGCC)PowerPlantFinal_060113.pdf.

[62] U.S. Bureau of Land Management, Final Supplemental Environmental Impact Statement for the Leasing and Underground Mining of the Greens Hollow Federal Coal Leas Tract, UTU-84102, 287 (Feb 2015) (BLM expressly acknowledged that "the burning of the coal is an indirect impact that is a reasonable progression of the mining activity" and quantified emissions from combustion without any disclaimer about other sources of coal. *Id* at 286. In that same EIS, BLM also acknowledged that truck traffic to haul coal would be extended as a result of the proposed lease approval, and this would generate additional emissions.) *See also*, U.S. Forest Service, Record of Decision and Final Environmental Impact Statement, Oil and Gas Leasing Analysis, Fishlake National Forest, 169 (Aug 2013) (Table 3.12-7: shows GHG emissions from transportation, offsite refining and end use; and total direct and indirect emissions. *See also id*., Appendix E/SIR-2 (more detailed calculations of direct and indirect emissions.)) U.S. Army

usefulness of lifecycle analyses, and adoption of this trend is clearly reflected in the CEQ Guidance on Climate Change . 81 Fed. Reg. 51, 866 at 11 (Aug. 5, 2016) ("This guidance recommends that agencies quantify a proposed agency action's projected direct and indirect GHG emissions. Agencies should be guided by the principle that the extent of the analysis should be commensurate with the quantity of projected GHG emissions and take into account available data and GHG quantification tools that are suitable for and commensurate with the proposed agency action").[63]

BLM acknowledges in the EA that "[P]otential impacts of development could include increased airborne particulates associated with the construction of new well pads, pipelines, or roads, exhaust emissions from drilling and completion equipment/activities, compressors, vehicles, and dehydration and separation facilities, as well as releases of GHG and volatile organic compounds during many of these activities." EA at 55. Thus, it is reasonably foreseeable, as opposed to speculative, that this lease sale will induce oil and natural gas production, transmission and ultimate end-user climate change impacts. The effects of this induced production must be considered in the EA, and in fact, necessitate a more robust review under an EIS. *See, e.g.*, *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1081-82 (9th Cir. 2011) (finding that NEPA review must consider induced coal production at mines, which was a reasonably foreseeable effect of a project to expand a railway line that would carry coal, especially where company proposing the railway line anticipated induced coal production in justifying its proposal); *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549-50 (8th Cir. 2003) (environmental effects of increased coal consumption due to construction of a new rail line to reach coal mines was reasonably foreseeable and required evaluation under NEPA). The development of an area for lease and subsequent oil and gas production would certainly result in combustion of the extracted product, which the EA

Corps of Engineers, Final Environmental Impact Statement: Alaska Stand Alone Gas Pipeline, Volume 2 Sec. 5.20-70–71 (Oct. 2012) The Corps, in a 2012 EIS for an intrastate natural gas pipeline in Alaska, estimated downstream emissions from combustion of the natural gas that would be transported, and also discussed the potential for natural gas to displace other, dirtier fuel sources such as coal and oil.) U.S. Department of State, Final Supplemental Environmental Impact Statement for the Keystone XL Project, § 4.14.3, Appendix U (Jan. 2014)(The Department of State, as lead agency on the Keystone XL Pipeline Review conducted a relatively comprehensive life-cycle greenhouse gas analysis for the proposed pipeline, alternatives, and baseline scenarios that could occur if the pipeline was not constructed.) U.S. Environmental Protection Agency Region X, Letter from Dennis McLerran, Regional Administrator, to Randel Perry, U.S. Army Corps of Engineers Seattle District, re Gateway Pacific Projects (Jan 22, 2013) *available* at http://www.eisgatewaypacificwa.gov/sites/default/files/content/files/EPA_Reg10_McLerran.pdf#overlay-context=resources/project-library. (EPA submitted comments on the scope of impacts that should be evaluated in the coal terminal EIS that the Corps is preparing, in which it urged the Corps to conduct a lifecycle emissions analysis of GHG emissions from the coal that would be transported via the terminal.)

[63] *High Country Conservation Advocates v. United States Forest Serv.*, 52 F. Supp. 3d 1174 (D. Colo. 2014) (Court held that the agencies' failure to quantify the effect of greenhouse gas (GHG) emissions from the mining lease modifications was arbitrary in violation of NEPA because the social cost of carbon protocol tool existed for such analysis under 40 C.F.R. § 1502.23 but the agencies did not provide reasons in the final EIS for not using the tool; and that the agencies' decision to forgo calculating the foreseeable GHG emissions was arbitrary in light of their ability to perform such calculations and their decision to include a detailed economic analysis of the benefits.) See also, *Dine Citizens Against Ruining Our Env't v. United States Office of Surface Mining Reclamation & Enf't*, 82 F. Supp. 3d 1201, 1213-1218 (D. Colo. 2015) (Court held that the agency failed to adequately consider the reasonably foreseeable combustion-related downstream effects of the proposed action. Also held that that combustion emissions associated with a mine that fed a single power plant were reasonably foreseeable because the agency knew where the coal would be consumed).

implicitly acknowledges. As courts have held in similar contexts, combustion emissions resulting from opening up a new area to development are "reasonably foreseeable," and therefore a "proximate cause" of the leasing. See *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549 (8th Cir. 2003) (holding that agency violated NEPA when it failed to disclose and analyze the future coal combustion impacts associated with the agency's approval of a railroad line that allowed access to coal deposits); *High Country Conserv'n Advocates v. United States Forest Serv.*, 52 F. Supp. 3d 1174, 1197 (D. Colo. 2014) (same with respect to GHG emissions resulting from approval of coal mining exploration project); *cf. S. Fork Band Council of W. Shoshone v. United States Dep't of the Interior*, 588 F.3d 718, 725 (in reviewing authorization of gold mining project, "[t]he air quality impacts associated with transport and off-site processing of the five million tons of refractory ore are prime examples of indirect effects that NEPA requires be considered.").

In both *Mid States Coalition* and *High Country*, the courts rejected the government's rationale that increased emissions from combustion of coal was not reasonably foreseeable because the same amount of coal would be burned without opening up the areas at issue to new coal mining. Both courts found this argument "illogical at best" and noted that "increased availability of inexpensive coal will at the very least make coal a more attractive option to future entrants into the utilities market when compared with other potential fuel sources, such as nuclear power, solar power, or natural gas." See *High Country*, 52 F. Supp. 3d at 1197 (quoting *Mid States Coalition*, 345 F.3d at 549). On similar grounds, the development of new wells over the proposed areas for lease will increase the supply of [oil and natural gas]. At some point this additional supply will impact the demand for [oil and gas] relative to other fuel sources, and [these minerals] that otherwise would have been left in the ground will be burned. This reasonably foreseeable effect must be analyzed, even if the precise extent of the effect is less certain." *Id. See also WildEarth Guardians v. United States Office of Surface Mining, Reclamation & Enf't*, 104 F. Supp. 3d 1208, 1229-30 (D. Colo. 2015) (coal combustion was indirect effect of agency's approval of mining plan modifications that "increased the area of federal land on which mining has occurred" and "led to an increase in the amount of federal coal available for combustion.")[64]

Even if it were true that potential emissions cannot reasonably be estimated, it is possible for BLM to identify significant sources of greenhouse gas emissions, which would enable the identification of specific measures to reduce emissions and an understanding of the extent to which certain emissions are avoidable. The extreme urgency of the climate crisis requires BLM to pursue all means available to limit the climate change effects of its actions. Any emissions source, no matter how small, is potentially significant, such that BLM should fully explore mitigation and avoidance options for all sources.

---

[64] *See also*, Council on Environmental Quality, Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews, 81 Fed. Reg. 51,866 at 14 (Aug. 5, 2016) (For example, NEPA reviews for proposed resource extraction and development projects typically include the reasonably foreseeable effects of various phases in the process, such as clearing land for the project, building access roads, extraction, transport, refining, processing, using the resource, disassembly, disposal, and reclamation. Depending on the relationship between any of the phases, as well as the authority under which they may be carried out, agencies should use the analytical scope that best informs their decision making.)

BLM suggests that quantification of GHGs would occur when actual drilling is proposed. But by delaying quantification until after a lease is issued, BLM may prejudice the consideration of alternatives or leasing stipulations that would avoid or reduce greenhouse gas emissions to an extent not otherwise available after leasing. BLM has long (but incorrectly) maintained that leasing stipulations can only be imposed with the issuance of the lease. Thereafter, purportedly, its authority to condition drilling is limited to "reasonable measures" or "conditions of approval" that may not be "[in]consistent with lease rights granted." 43 C.F.R. § 3101.1-2. Cost-prohibitive measures could therefore potentially be barred. Further, measures to "minimize" impacts may be imposed, but those may not necessarily avoid impacts altogether. *Id*. Waiting until the drilling stage could also be too little too late, as various other actions may occur between leasing and drilling, such as the execution of unit agreements, or construction of roads or pipelines, all of which may narrow mitigation options available at the drilling stage. *See William P. Maycock et al.*, 177 I.B.L.A. 1, 20-21 (Dec. Int. 2008) (holding that unit agreements limit drilling-stage alternatives).

Natural gas emissions are generally about 84 percent methane.[65] Methane is a potent greenhouse gas that contributes substantially to global climate change. Its global warming potential is approximately 33 times that of carbon dioxide over a 100 year time frame and 105 times that of carbon dioxide over a 20 year time frame.[66]

Oil and gas operations release large amounts of methane. While the exact amount is not clear, EPA has estimated that "oil and gas systems are the largest human-made source of methane emissions and account for 37 percent of methane emissions in the United States or 3.8 percent of the total greenhouse gas emissions in the United States." [67] For natural gas operations, production generates the largest amount; however, these emissions occur in all sectors of the natural gas industry, from drilling and production, to processing, transmission, and distribution.[68] Fracked wells leak an especially large amount of methane, with some evidence indicating that the leakage rate is so high that shale gas is worse for the climate than coal.[69] In fact, a research team associated with the National Oceanic and Atmospheric Administration recently reported

[65] Howarth, Robert, et al., "Methane and the greenhouse-gas footprint of natural gas from shale formations," *Climactic Change* (Mar. 31, 2011) ("Howarth 2011"); Shindell, Drew, "Improved Attribution of Climate Forcing to Emissions," 326 *Science* 716 (2009).

[66] *Id*.

[67] U.S. Environmental Protection Agency, Natural Gas STAR Program, Basic Information, Major Methane Emission Sources and Opportunities to Reduce Methane Emissions ("USEPA, Basic Information"); *see also* Petron, Gabrielle, et al., "Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study," 117 *Journal of Geophysical Research* (2012).

[68] USEPA, Basic Information.

[69] Howarth 2011; Brune, Michael, Statement of Sierra Club Executive Director Michael Brune Before the Committee on Oversight & Government Reform (May 31, 2012); Wang, Jinsheng, et al., Reducing the Greenhouse Gas Footprint of Shale (2011); Alvarez, Ramon et al., Greater focus needed on methane leakage from natural gas infrastructure, Proc of Nat'l Acad. Science Early Edition (Feb. 13, 2012) at 3; *see also* Howarth, Robert, et al., Venting and Leaking of Methane from Shale Gas Development: Response to Cathles et al. (2012); Hou, Deyi, et al., Shale gas can be a double-edged sword for climate change, 2 Nature Climate Change 385, 386 (2012)

that preliminary results from a field study in the Uinta Basin of Utah suggest that the field leaked methane at an eye-popping rate of nine percent of total production.[70]

For the oil industry, emissions result "primarily from field production operations . . . , oil storage tanks, and production-related equipment."[71] Emissions are released as planned, during normal operations and unexpectedly due to leaks and system upsets.[72] Significant sources of emissions include well venting and flaring, pneumatic devices, dehydrators and pumps, and compressors.[73]

Contrary to CEQ's guidance, the EA improperly declines to analyze the contribution to climate change of additional Wyoming federal oil and gas leasing, instead dismissing those impacts by asserting the site-specific tools to quantify the emissions and impacts from this leasing decision are in a "formative phase" of development. EA at 57. The very purpose of oil and gas leasing is the production, and subsequent combustion, of hydrocarbon fossil fuels. It is simply not credible to assert in 2016 that BLM has no way of estimating a range of possible production levels for leases within established industry plays and currently producing geological formations. Although there are certainly geological, technological, and economic uncertainties that could affect the production from the leases in question, these uncertainties do not relieve BLM of the obligation to analyze and disclose, at the very least, a range of possible production scenarios and their resulting emissions. In its recent NEPA guidance, CEQ directs agencies, at a minimum, to "use projected GHG emissions as a proxy for assessing potential climate change effects when preparing a NEPA analysis for a proposed agency action." 81 Fed. Reg. 51,866, 51,866 (Aug. 5, 2016). BLM has failed to meet even this low bar in its climate analysis.

The Leasing EA's failure to quantify reasonably foreseeable GHG emissions that could result from new leasing within the Wyoming High Desert region—including emissions from construction, operating fossil-fuel powered equipment during production, reclamation, transportation, processing and refining, and combustion of the extracted product—is unlawful and unsupported by evidence or reasoned analysis.

3. <u>The EA improperly tiers to the Kemmerer, Pinedale, Rawlins, and Rock Springs/Green River Resource Management Plans' Federal Environmental Impact Statements.</u>

Case law and NEPA itself make clear that BLM is required to perform and disclose an analysis of environmental impacts before the issuance of an oil and gas lease. *N.M. ex rel. Richardson v. BLM*, 565 F.3d 683, 716 (10th Cir. 2009). In the Tenth Circuit, "assessment of all 'reasonably foreseeable' impacts must occur at the earliest practicable point, and must take place before an irretrievable commitment of resources' is made." *Id*. at 718 (citations omitted).

---

[70] Tollefson, Jeff, "Methane leaks erode green credentials of natural gas," *Nature News* (Jan. 2, 2013).

[71] Williams, Megan & Cindy Copeland, Earthjustice, Methane Controls for the Oil and Gas Production Sector (2010).

[72] *Id.*

[73] U.S. Environmental Protection Agency, National Gas STAR Program, Basic Information, Major Methane Emission Sources and Opportunities to Reduce Methane Emissions, http://www.epa.gov/gasstar/basic-information/index.html#sources (last updated May 24, 2012).

Rather than conduct any environmental review of the parcels before proceeding with the lease sale, BLM states in response to comments on the final EA, that it may postpone analysis until an Application for Permit to Drill ("APD") is submitted for a specific well. EA Appendix E, at 156-162. In *Richardson*, the Tenth Circuit rejected the contention that site-specific analysis may be deferred until the APD stage in all cases. Rather, the inquiry of whether site-specific analysis is required is "necessarily contextual" and "fact-specific." *Id*.

In the instant lease sale, BLM cannot seriously dispute that offering the parcels is likely to result in oil and gas development and the production of oil and gas. The parcels are offered for the sole purpose of promoting oil and gas development. As discussed previously in II.B.1 and 2, BLM has made specific projections as to the number of wells and volume of gas that could be expected to be developed for this lease parcel sale. BLM can also project the type of development that would likely occur in the leased areas based on existing well types already within the area and the plays that are likely to be developed.

The issuance of a lease is an "irretrievable commitment of resources." *See id*.; *Sierra Club v. Peterson*, 717 F.2d 1409, 1414 (D.C. Cir. 1983); *Pennaco Energy, Inc. v. U.S. Dep't of Interior*, 377 F.3d 1147, 1160 (10th Cir. 2004). Under BLM's interpretation of its regulations, absent a no surface occupancy stipulation, a lessee cannot be prohibited entirely "from surface use of the leased parcel once its lease is final." *See Richardson*, 565 F.3d at 718 (citing 43 C.F.R. § 3101.1-2 ["A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease . . . [and other] reasonable measures . . . ."]); see also BLM Handbook H-1624-1 ("By law, these impacts [from oil and gas development] must be analyzed before the agency makes an irreversible commitment. In the fluid minerals program, this commitment occurs at the point of lease issuance.").

Accordingly, BLM Instruction Manual 2010-117 specifically directs BLM to conduct site-specific analysis of lease parcels in NEPA documentation.[74] *See, e.g.*, IM 2010-117 § III(E) ("The IPDR Team will complete site-specific NEPA compliance documentation for all BLM surface and split estate lease sale parcels..."); *id*. ("Most parcels that the field office determines should be available for lease will require site-specific NEPA analysis."). IM 2010-117 also calls upon BLM to consider a host of factors in deciding whether to propose parcels for lease, each of which calls for site-specific analysis. For example, BLM must consider whether "[c]onstruction and use of new access roads or upgrading existing access roads to an isolated parcel would have unacceptable impacts to important resource values." IM 2010-117 § III(C)(4), Another consideration is whether "[p]arcel configurations would lead to unacceptable impacts to resources on the parcels or on surrounding lands and cannot be remedied by reconfiguring." *Id*. Moreover, IM 2010-117 directs BLM to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." *Id*. § III(E). Such an evaluation would necessarily require a consideration of site-specific resource uses. *Id*. § III(E).

[74] U.S. Bureau of Land Management, Oil and Gas Leasing Reform - Land Use Planning and Lease Parcel Reviews, IM 2010-117 (2010).

Instead of disclosing reasonably foreseeable impacts, however, BLM improperly tiers the Leasing EA to a number of Wyoming RMP FEISs, in violation of NEPA. The EA and FEISs lack any analysis of the impacts of oil and gas development in the specific local areas at issue, and BLM unlawfully postpones disclosure of site-specific impacts when such analysis is possible now. The fact-specific holding in *Kern v. U.S. Bureau of Land Mgmt.* provides a clear precedent for improper NEPA tiering cases. 284 F.3d 1062, 1067 (9th Cir. 2002). In *Kern*, the 9th circuit invalidated an EA that tiered to a broader EIS and BLM Guideline document that was deficient under NEPA or where NEPA review was not conducted. *Id*. at 1074. The court held that while tiering to a broader NEPA document is permitted generally, site-specific impacts of the broader environmental impacts must be analyzed in an EA "as soon as it can reasonably be done." *Id*. at 1072.

4. <u>BLM should have conducted an EIS instead of an EA and FONSI for the Wyoming High Desert lease sale.</u>

NEPA requires that federal agencies take a hard look at the environmental consequences of a major federal action before taking that action. *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983). To that end, NEPA requires every federal agency to:

> [I]nclude in every recommendation … on … major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on (i) the environmental impact of the proposed action, (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented, (iii) alternatives to the proposed action, (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. 42 U.S.C. § 4332(2)(C).

NEPA demands that a federal agency prepare an EIS before taking a "'major [f]ederal action significantly affecting the quality' of the environment." *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1067 (9th Cir. 2002). In order to determine whether a project's impacts may be "significant," an agency may first prepare an Environmental Assessment ("EA"). 40 C.F.R. §§ 1501.4, 1508.9. If the EA reveals that "the agency's action may have a significant effect upon the . . . environment, an EIS must be prepared." *Nat'l Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 730 (9th Cir. 2001) (internal quotations omitted). If the agency determines that no significant impacts are possible, it must still adequately explain its decision by supplying a "convincing statement of reasons" why the action's effects are insignificant. *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1212 (9th Cir. 1998). Further, an agency must prepare all environmental analyses required by NEPA at "the earliest possible time." 40 C.F.R. § 1501.2. "NEPA is not designed to postpone analysis of an environmental consequence to the last possible moment," but is "designed to require such analysis as soon as it can reasonably be done." *Kern*, 284 F.3d at 1072.

To determine whether the impacts of an action are significant, Council on Environmental Quality (CEQ) regulations identify two factors: context and intensity. 40 C.F.R. § 1508.27(a)-(b). Context refers to an action's significance in several contexts such as society as a whole

(human, national), the affected region, the affected interests, and the locality, considering short- and long-term effects. *Id.* § 1508.27(a). Intensity refers to the severity of impact, based on a number of possible factors, including effects on public health or safety, cumulatively significant environmental impacts that are reasonable to anticipate, and the degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. *Id.* § 1508.27(b)(2), (6), (7).

BLM is therefore required under NEPA to prepare an EIS to support this proposed project. This is especially true in light of the likelihood that fracking would occur on the leases. *CBD*, 937 F. Supp. 2d at 1155-59 (holding that oil and gas leases were issued in violation of NEPA where BLM failed to prepare an EIS and failed to properly address the significance factors for context and intensity in 40 C.F.R. § 1508.27.

In considering whether the lease sale would have significant effects on the environment, NEPA's regulations require BLM to evaluate ten factors regarding the "intensity" of the impacts. 40 C.F.R. § 1508.27(b). The Ninth Circuit has held that the existence of any "one of these factors may be sufficient to require preparation of an EIS." *Ocean Advocates*, 402 F.3d at 865; *Nat'l Parks & Conservation Ass'n*, 241 F.3d at 731. Several of these "significance factors" are implicated in the lease sale and clearly warrant the preparation of an EIS:

> The degree to which the effects on the quality of the human environment are likely to be highly controversial.
>
> The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
>
> The degree to which the proposed action affects public health or safety.
>
> The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

40 C.F.R. § 1508.27(b)(4), (5), (2) & (9). *See CBD*, 937 F. Supp. 2d at 1158-59 (holding that BLM failed to properly address the significance factors regarding controversy and uncertainty that may have been resolved by further data collection (citing *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1240 (9th Cir. 2005)). Here, individually and considered as a whole, there is no doubt that significant effects may result from the lease sale; thus, NEPA requires that BLM should have prepared an EIS for the action.

a. <u>The effects on the human environment will be highly controversial.</u>

A proposal is highly controversial when "substantial questions are raised as to whether a project . . . may cause significant degradation" of a resource, *Nw. Envtl. Def. Ctr. v. Bonneville Power Admin.*, 117 F.3d 1520, 1536 (9th Cir. 1997), or when there is a "substantial dispute [about] the size, nature, or effect of the" action. *Blue Mtns. Biodiversity*, 161 F.3d at 1212. A

"substantial dispute exists when evidence, raised prior to the preparation of [a] . . . FONSI, casts serious doubt upon the reasonableness of an agency's conclusions." *Nat'l Parks & Conserv. Ass'n*, 241 F.3d at 736. When such a doubt is raised, "NEPA then places the burden on the agency to come forward with a 'well-reasoned explanation' demonstrating why those responses disputing the EA's conclusions 'do not . . . create a public controversy.'" *Id. See also CBD*, 937 F. Supp. 2d at 1158 .

Here, the controversy regarding the lease sale is fully evident. This protest provides abundant evidence that oil and gas operations can cause significant impacts to human health, water resources, air quality, imperiled species, and seismicity. The potential for these significant impacts to occur is particularly clear in light of the potential for fracking to result from the lease sale.

Fracking is among the top, if not the most controversial energy issue facing America today. The controversy spans the public arena, scientific discourse, local governments, and the halls of Congress. At the request of Congress, EPA is conducting a study into the effects of fracking on drinking and ground water.[75] Similarly, the New York DEC concluded that the health and environmental risks from fracking supports its ban in New York State. However, in addition to the presence of controversy, it is already evident, as discussed above, that fracking is harmful. Clearly, the level of controversy associated with fracking and its expansion in Montana in association with the lease sale is sufficient to trigger the need for an EIS. 40 C.F.R. § 1508.27(b)(4).

b. <u>The lease sale presents highly uncertain or unknown risks.</u>

An EIS must also be prepared when an action's effects are "highly uncertain or involve unique or unknown risks." 40 C.F.R. § 1508.27(b)(5). As the Ninth Circuit has held, "[p]reparation of an EIS is mandated where uncertainty may be resolved by further collection of data, or where the collection of such data may prevent speculation on potential . . . effects." *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1240 (9th Cir. 2005) (internal citations omitted); *Blue Mtns. Biodiversity*, 161 F.3d at 1213-1214 (finding "EA's cursory and inconsistent treatment of sedimentation issues . . . raises substantial questions about . . . the unknown risks to" fish populations). As one court recently explained regarding oil and gas leasing that may facilitate fracking, "BLM erroneously discounted the uncertainty from fracking that may be resolved by further data collection. 'Preparation [of an EIS] is mandated where uncertainty may be resolved by further collection of data, or where collection of such data may prevent speculation on potential effects.'" *CBD*, 937 F. Supp. 2d at 1159 (quoting *Native Ecosystems Council v. U.S. Forest Serv*., 428 F.3d 1233, 1240 (9th Cir. 2005)).

While it is clear that oil and gas activities can cause great harm, there remains much to be learned about the specific pathways through which harm may occur and the potential degree of harm that may result. Additional information is needed, for example, about possible rates of natural gas leakage, the potential for fluids to migrate through the ground in and around the

[75] U.S. Environmental Protection Agency, Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (November 2011).

parcels, the safety of various fracking chemicals, and the potential for drilling to affect local faults. NEPA clearly dictates that the way to address such uncertainties is through the preparation of an EIS.

c. The lease sale poses threats to public health and safety.

As discussed in great detail above, the oil and gas activities that may occur as a result of the lease sale could cause significant impacts to public health and safety. 40 C.F.R. § 1508.27(b)(2). Fracking would pose a grave threat to the region's water resources, harm air quality, pose seismic risks, negatively affect wildlife, and fuel climate change.

As a congressional report noted, oil and gas companies have used fracking products containing at least 29 products that are known as possible carcinogens, regulated for their human health risk, or listed as hazardous air pollutants.[76] The public's exposure to these harmful pollutants alone would plainly constitute a significant impact. So do the many other public health risks associated with unconventional drilling as described in Part II of this protest. Furthermore and as previously discussed, information continues to emerge on the risk of earthquakes induced by wastewater injected into areas near faults. It is undeniable that these earthquakes pose risks to the residents of the area and points beyond.

The use of fracking fluid, which is likely to occur as a result of the lease sale, and other risks associated with unconventional drilling, pose a major threat to public health and safety and therefore constitute a significant impact. BLM therefore must evaluate such impacts in an EIS.

d. The lease sale action will adversely affect agency sensitive species and their habitat.

An EIS may also be required when an action "may adversely affect an endangered or threatened species or its habitat." 40 C.F.R. § 1508.27(b)(9). Although a finding that a project has "some negative effects does not mandate a finding of significant impact," an agency must nonetheless fully and closely evaluate the effects on listed species and issue an EIS if those impacts are significant. *Klamath-Siskiyou Wildlands Ctr. v. U.S. Forest Serv.*, 373 F. Supp. 2d 1069, 1081 (E.D. Cal. 2004) (finding agency's conclusion that action "may affect, is likely to adversely affect" species due to "disturbance and disruption of breeding" and "degradation" of habitat is "[a]t a minimum, . . . an important factor supporting the need for an EIS").

C. BLM has failed to consider site-specific impacts to sensitive species and other wildlife species of concern.

The EA reveals the presence of sensitive species and their habitat within the areas proposed for leasing, and fails to provide any meaningful information regarding potential effects to those species from future oil and gas development. For example, BLM failed to consider site-

[76] Waxman, Henry et al., United States House of Representatives, Committee on Energy and Commerce, Minority Staff, Chemicals Used in Hydraulic Fracturing (Apr. 2011) ("Waxman 2011")

specific impacts to Greater Sage-Grouse and to prioritize leasing outside of Priority and General Habitat Management Areas.

BLM Manual 6840 requires the agency "[t]o initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA."[77] Manual 6840 further states that it is the BLM's Policy to promote the "conservation and to minimize the likelihood and need for listing" Bureau sensitive species.[78] Piecemeal analyses of individual lease sales does not provide the appropriate perspective for examining and developing the proactive conservation measures necessary to reduce or eliminate threats from oil and gas leases.

Furthermore, pursuant to Manual 6840 it is the responsibility of State Directors to not only inventory BLM lands to determine the occurrence of BLM special status species, but also to determine "the condition of the populations and their habitats, and how discretionary BLM actions affect those species and their habitats."[79] The leasing of federal lands for oil and gas extraction is a discretionary BLM action that has the potential to adversely affect sensitive species including the Greater Sage-Grouse.

1. **Sage Grouse Habitat - WY-1611-001, WY-1611-002, WY-1611-003, WY-1611-004, WY-1611-005, WY-1611-006, WY-1611-007, WY-1611-008, WY-1611-009, WY-1611-010, WY-1611-011, WY-1611-012, WY-1611-013, WY-1611-014, WY-1611-015, WY-1611-016, WY-1611-017, WY-1611-018, WY-1611-019, WY-1611-020, WY-1611-021.**

All of the parcels are located within the current range of Greater Sage-Grouse, including 7 parcels covering 7,167.40134 acres in priority habitat management areas (PHMAs), and 19,929.04227 acres in general habitat management areas (GHMAs).[80] Indeed, 84% of the acres in this lease sale are sage grouse habitat.[81] Many of these areas also fall within four miles of leks, which provide important breeding and nesting grounds to Greater Sage-Grouse.[82]

Despite the fact that highly sensitive sage-grouse habitat would be threatened by new leasing, the EA fails in three major respects to disclose or analyze indirect and cumulative

---

[77] *Id.* at § .02 (emphasis added).
[78] *Id.* at § .06.

[79] *Id.* at § .04.
[80] *See* Exhibit B and C below (Exhibit B: Center for Biological Diversity, Sage Grouse Habitat map 1 (Parcels WY-1611-001, WY-1611-002, WY-1611-003, WY-1611-004, WY-1611-005, WY-1611-006, WY-1611-007, WY-1611-008, WY-1611-009, WY-1611-010, WY-1611-011, WY-1611-012, WY-1611-013, WY-1611-014, WY-1611-015) (2016); Exhibit C: Center for Biological Diversity, Sage Grouse Habitat map 2 (Parcels WY-1611-016, WY-1611-017, WY-1611-018, WY-1611-019, WY-1611-020, WY-1611-021) (2016))
[81] *Id.*
[82] *See* Rocky Mountain Wild Maps Game Map 4 (parcels 15, 16, 18); Game Map 5 (parcels 3, 4, 5, 10, 11, 13); Map 6 (parcels 20 and 21); Game Map 7 (parcels 115 and 108) (Rocky Mountain Wild, Map: Nov 2016 WY Lease Sale EA – Maps 3, 4, 5, 6, 7, 9 – Species and Places (May 3, 2015); Rocky Mountain Wild, Map: Nov 2016 WY Lease Sale EA – Maps 3, 4, 5, 6, 7, 9 – Big Game (May 3, 2016) ("Rocky Mountain Wild Maps"). Available at http://rockymountainwild.org/rocky-mountain-oil-gas-leasing.

impacts of leasing on greater sage-grouse. It tiers to and relies on RMP decisions for management of Wyoming greater sage-grouse habitat that fail to follow the best available science regarding measures necessary to ensure the survival and recovery of the species. The proposed leasing action, moreover, violates FLPMA by failing to conform to a key management prescription of those plans – the obligation to "prioritize the leasing and development of fluid mineral resources outside GRSG habitat." Furthermore, because the proposed leases are not in conformance with the 2015 RMP amendments and undermine significant assumptions of their accompanying FEISs (i.e., that new oil and gas development will tend to occur outside of greater sage-grouse habitat), the EA cannot tier to or rely on those EISs.

The 2015 Wyoming RMP Amendments, including those applicable to the areas of the Kemmerer, Rock Springs, Rawlins, and Pinedale Field Offices proposed for lease in this sale, do not conform to the best available science or the recommendations of BLM's own experts regarding necessary measures to protect sage grouse habitats and prevent population declines. Even under the BLM's own determinations, however, the proposed action is directly in conflict with a core provision of the 2015 sage-grouse RMP amendments. All the Rocky Mountain Region RMPs – significantly, including Wyoming – are subject to the following measure for both priority and general habitat management areas:

> *Prioritization Objective*—In addition to allocations that limit disturbance in PHMAs and GHMAs, the ARMPs and ARMPAs prioritize oil and gas leasing and development outside of identified PHMAs and GHMAs. This is to further limit future surface disturbance and encourage new development in areas that would not conflict with GRSG. This objective is intended to guide development to lower conflict areas and as such protect important habitat and reduce the time and cost associated with oil and gas leasing development by avoiding sensitive areas, reducing the complexity of environmental review and analysis of potential impacts on sensitive species, and decreasing the need for compensatory mitigation.[83]

The EA explicitly acknowledges that its greater sage-grouse conservation plans and strategy "direct the BLM to prioritize oil and gas leasing and development in a manner that minimizes resource conflicts in order to protect important habitat and reduce development time and costs." EA at 2. Indeed, the EA states, although without further explanation, that portions of 43 parcels containing 71,816.700 acres were deferred "through [State Director] discretion" pursuant to the Plans' prioritization requirement. EA at 2.

The BLM is subject to clear direction in the RMP amendments that its sage-grouse RMP plans and conservation strategy rely not only on stipulations within designated habitats (stipulations acknowledged as insufficient, in Wyoming, to result in a net conservation gain for general habitat, *see* 2015 RMPA ROD at 1-30 to 1-31), but also on a larger strategy of prioritizing development outside of all sage-grouse habitats.[84] Despite its acknowledgement of

[83] U.S. Bureau of Land Management, Record of Decision and Approved Resource Management Plan Amendments for the Rocky Mountain Region (September 2015).
[84] *See., e.g.,* U.S. Bureau of Land Management,, Casper, Kemmerer, Newcastle, Pinedale, Rawlins and Rock Springs Field Offices, Approved RMP Amendment for Greater Sage Grouse at 19.

the prioritization requirement by deferring over 71,800 acres, however, the BLM's proposed action would lease 21 parcels which all contain general and priority habitat.[85] It is simply impossible to understand how offering leases all within sage-grouse habitat is consistent with the RMP requirement to prioritize leasing outside such habitat, and the EA provides no rationale whatsoever for this decision. In particular, the EA fails to offer any explanation as to why approximately 71,800 acres are deferred as "consistent" with the prioritization requirement but the remaining parcels containing sage-grouse habitat are not.

In its response to Protestors' comments on the draft EA, BLM refers to its statement in the EA that "The parcels located in PHMA are proximate to existing production, do not exhibit GSG lek conflicts, are located in "checkerboard" land ownership areas, and are identified as having high or very high oil and gas reserves potential. These areas may provide nesting, wintering, and/or breeding habitat for Greater Sage-Grouse." EA at 44. The fact that the affected sage-grouse habitat is located in checkerboard, near existing production, and/or in "high potential" oil and gas areas does not, however, excuse BLM of its obligations to (a) comply with the RMP's direction to prioritize leasing outside of PHMA and GHMA, and (b) to assess the site-specific impacts to nesting, wintering, and/or breeding habitat prior to leasing.

An apparent BLM policy of leasing parcels all within sage-grouse habitat is not only inconsistent with the RMPs and FLPMA's consistency requirement, it also undermines a fundamental assumption of the RMP Amendment EISs – as well as the Fish and Wildlife Service's "not warranted" determination for the greater sage-grouse. That assumption is that the measures adopted in the RMP Amendments will tend to result in oil and gas development tending to occur outside of greater sage-grouse habitat.[86] Proposing a lease sale for 21 parcels containing sage-grouse habitat (including seven parcels that contain Priority Habitat Management Area) shortly following the finalization of the sage-grouse RMPs strongly undermines that assumption. It further undermines the assumption in the Fish and Wildlife Service's "Not Warranted" finding for the greater sage-grouse that federal and state implementation of the "Wyoming Plan" for fluid minerals will continue the 2012-15 of reduced drilling within core areas.[87] If BLM is not actually going to give meaningful content to its plan direction to prioritize leasing outside of sage-grouse habitats, it cannot rely on FEISs, such as the Wyoming Sage Grouse RMP FEIS, that assume the effectiveness of that plan direction.

Finally, because Wyoming contains the largest U.S. sage-grouse population and is an important source of sage-grouse in neighboring states, preservation of populations inhabiting the areas for lease is crucial to the sage-grouse's viability range-wide. A 2015 study modeling population trends shows that "most populations have continued to decline over the last 6 years reaching a low in 2013 below 50,000 males attending leks range-wide, an 8 fold decline from the late 1960s."[88] Some of the largest declines occurred in the Wyoming Basin.[89] "Overall

[85] EA at 42-44.
[86] *See., e.g.,* U.S. Bureau of Land Management,, Casper, Kemmerer, Newcastle, Pinedale, Rawlins and Rock Springs Field Offices, Approved RMP Amendment for Greater Sage Grouse at 19.
[87] *See* U.S. Fish and Wildlife Service, 12-Month Finding on a Petition to List Greater Sage-Grouse, 80 Fed. Reg. 59,858, 59,883 (Oct. 2, 2015).
[88] Garton, E. et al., Greater Sage-Grouse Population Dynamics and Probability of Persistence, Final Report to Pew Charitable Trusts, 18 March 2015, p. 23.

persistence of the species into the far distant future is not assured or even likely without maintenance of the essential connectivity amongst populations and without substantial changes in the current trajectories of the populations occupying this broad region."[90] The study confirms that existing management policies have not been effective in protecting sage-grouse.[91] The new policies established in the recent sage-grouse amendments also fall short.[92]

Stabilizing the Wyoming Basin population could be a major step forward for preserving "essential connectivity amongst populations" and reversing declining trends. Wyoming Basin populations perhaps have the best chance of recovery due to their larger size.[93] These populations may also be more resilient against the threats of drought and wildfire, which will only increase with climate change.[94] Recovering Wyoming Basin populations will maintain connectivity with Great Plains sage-grouse, helping to restore Great Plains populations and others. Failing to protect these populations risks far-reaching repercussions on the sage-grouse's survival throughout the west.

The "heart" of NEPA is an agency's obligation, in evaluating the environmental impacts of its actions, whether by EA or EIS, to consider all reasonable alternatives to those actions. *See Center. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008) (citing 40 C.F.R. § 1502.14(a)). The High Desert District November 2016 leasing EA fails to meet this core NEPA obligation by arbitrarily excluding from consideration any alternative that could meaningfully preserve BLM Wyoming offices' authority to adopt effective and scientifically credible conservation measures for greater sage-grouse.

The High Desert District November 2016 leasing EA considers only the no-action and proposed alternatives. EA at 6, 52. The EA does not even consider an alternative, regularly considered and adopted by other field offices, would defer all remaining parcels located within sage grouse "Priority Habitat Management Areas" and "General Habitat Management Areas," at least until such time as BLM completes a strategy for the implementation of the sage-grouse RMP amendments. Agencies may not reject an otherwise reasonable alternative out of hand simply because it shares some characteristics with the no-action alternative. *See Colorado Environmental Coalition v. Salazar*, 875 F. Supp.2d 1233, 1248-50 (D. Colo. 2012). Such an alternative would be consistent with BLM Instruction Memorandum IM WY-2012-019 at 8, which states:

> This policy does not preclude the development and immediate implementation of new, or innovative mitigation, or other conservation measures that would be expected to reduce activity/project impacts to sage-grouse and their habitats.

BLM refused to give consideration to such a habitat prioritization alternative, in violation of IM WY-2012-019 and FLPMA's required consistency with prescribed RMPs for protection of Greater Sage Grouse habitat.

---

[89] *Id*., pp.23-24, 27.
[90] *Id*., p. 28.
[91] *Id.*, p. 27.
[92] *Id*., pg. 27.
[93] *Id*., p. 23, 28,
[94] *See id*., p. 24, 26 (noting role of wildfire and drought in precipitous population declines).

2. **<u>Big Game Habitat and Migration Routes</u> - WY-1611-001, WY-1611-002, WY-1611-003, WY-1611-004, WY-1611-005, WY-1611-009, WY-1611-010, WY-1611-011, WY-1611-012, WY-1611-015, WY-1611-018, WY-1611-019, WY-1611-020, WY-1611-021.**

The above-listed parcels overlap with well-documented mule deer and pronghorn migration routes.[95] As the Wyoming Game and Fish Department has emphasized, recent research conclusively shows that oil and gas development in these areas is interfering with these important migration corridors and reduce overall habitat available to these species. Recent tracking collar research on the mule deer herd utilizing the Dad Winter Range (which is included in portions of proposed lease parcels WY-1611-004 and WY-1611-005) through the Dry Cow Creek development found that, "[i]n migration routes exposed to a larger, more concentrated development (i.e. Dry Cow Creek), mule deer use declined by 53% and movement rates nearly doubled."[96] Thus, as highlighted by the Sawyer et al. (2013) study, this population has already experienced impacts from development in migration corridors and winter range.

Another recent study shows that oil and gas development causes significant habitat loss in the Piceance Basin of Colorado:

> Energy development drove considerable alterations to deer habitat selection patterns, with the most substantial impacts manifested as avoidance of well pads with active drilling to a distance of at least 800 m. Deer displayed more nuanced responses to other infrastructure, avoiding pads with active production and roads to a greater degree during the day than night. In aggregate, these responses equate to alteration of behavior by human development in over 50% of the critical winter range in our study area during the day and over 25% at night.[97]

While the EA acknowledges the potential for habitat loss, it erroneously concludes that stipulations provided in the governing RMPs would be sufficient to offset these impacts. EA at 62-65. Other than No Surface Occupancy stipulations for a few parcels, the only protections are timing limitation stipulations, which prohibit surface disturbance during the winter months [unclear]. But this measure does nothing to offset the impacts of the substantial habitat loss that may occur with increased oil and gas infrastructure throughout the region which the mere

---

[95] *See* Exhibits D, E, F, G and H for Big Game migration routes and habitats. (Exhibit D: Center for Biological Diversity, Big Game Migration and Habitat map 1 (Parcels WY-1611-018, WY-1611-019, WY-1611-020, WY-1611-021) (2016); Exhibit E: Center for Biological Diversity, Big Game Migration and Habitat map 2 (Parcel WY-1161-015) (2016); Exhibit F: Center for Biological Diversity, Big Game Migration map 3 (Parcels WY-1611-009, WY-1611-010, WY-1611-011, WY-1611-012) (2016); Exhibit G: Center for Biological Diversity, Big Game Migration and Habitat map 4 (Parcels WY-1611-001, WY-1611-002, WY-1611-003) (2016); Exhibit H: Center for Biological Diversity, Big Game Migration and Habitat map 5 (Parcels WY-1611-004, WY-1611-005) (2016))

[96] Sawyer, Hall et al., A Framework for Understanding Semi-Permeable Barrier Effects on Migratory Ungulates, 50 J. Applied Ecol. 74 (2013), doi: 10.1111/1365-2664.12013.

[97] Northrup, J. M. et al. Quantifying spatial habitat loss from hydrocarbon development through assessing habitat selection patterns of mule deer, Global Change Biology (Aug. 2015), available at http://onlinelibrary.wiley.com/doi/10.1111/gcb.13037/epdf.

presence of new well pads and other infrastructure will inflict. BLM's proposed finding of "no significant impact" is baseless.

BLM also arbitrarily refuses to consider the Wyoming Game and Fish Department's request to refrain from leasing Parcels 004 and 005 (EA Parcels 10 and 11) until such time as WGFD and BLM can obtain more information and/or develop a mitigation strategy. As WGFD noted:

> There are 2 parcels (10, 11) that are of major concerns within the November 2016 Gas/Oil Preliminary Lease List. Our concern revolve around the fact that the parcels fall within big game crucial winter range, delineated migration routes and a combination of the previous 2 areas of concern that have recently shown impacts to mule deer in this area.
>
> We have major concerns with parcels 10 and 11 that fall within mule deer and pronghorn crucial winter range, mule deer migration routes and a combination of those two for mule deer in the Baggs Biologist District (Figure 1). Sawyer 2012 (Journal of Applied Ecology) found that high levels of development can alter migration behavior of mule deer which could have negative impacts to mule deer. In the area of parcels 9 and 10 we have seen high levels of development and mule deer migration routes impacted (Sawyer 2012). It has also been documented mule deer use in the Dad/Sandhills winter range complex has decreased since the development within the Catlina pod within the Atlantic Rim EIS (Table 1). Data from GPS collared doe mule deer from 2006-2010 suggest a high level of use by mule deer during the most critical period of winter (Jan- Mar, see Figure 1) in these areas.
>
> Based on the recent high level of development in the area of the Dad/Sandhills winter range and documented impacts to that portion of the Baggs mule deer herd we recommend removing these parcels from the November 2016 lease list until we can either develop a mitigation/development strategy or learn more about the impacts of energy activity to this portion of the Baggs mule deer herd.[98]

BLM, however, declines to consider this recommendation, pointing only to its general winter range/migration corridor stipulation – the same stipulation that has proven ineffective in preventing significant impairment to mule deer habitat use in the Dad Winter range and through the Dry Cow Creek Development.[99] Although BLM states "BLM is still willing to discuss any recommendations that the Baggs working group may formalize, and that the WGFD adopts,"[100] it arbitrarily declines to consider an alternative that would actually adopt WGFD's concrete recommendation – "removing these parcels from the November 2016 lease list until we can either develop a mitigation/development strategy or learn more about the impacts of energy activity to this portion of the Baggs mule deer herd."[101]

[98] Comments of Wyoming Game and Fish Department, EA App. E at 1 (Comment 1).
[99] EA App. E at 1.
[100] *Id.*
[101] *Id.*

3. Chain Lakes Wildlife Habitat Management Area-WY-1611-011.

Parcel WY-1611-011 falls within the Chain Lakes Wildlife Habitat Management Area ("Chain Lakes WHMA"), but other than mentioning this overlap, the EA provides no sense of the area's natural values and ecological functions and how wildlife dependent on this area would be affected by new drilling. According to the Wyoming Game and Fish Department, the Chain Lakes WHMA provides winter habitat for antelope and protects migration routes for pronghorn traveling between summer and winter ranges.[102] Further:

> Sagebrush grassland communities dominate most of the area, while greasewood grows along the basins around the "Chain of Lakes." The area is treeless and the lakes are natural drainage depressions without outlets. Some artesian flows drain into the surrounding wetlands.
>
> If you like to hunt, pronghorns, rabbits and sage grouse are what you will find. If you enjoy photography, there are more than 100 species of birds, mammals, amphibians and reptiles in this area to capture on film. The "Chain of Lakes" is an important resting area for migrating waterfowl and shorebirds. April is an excellent time to observe many unique migrating shorebirds. Plovers, sandpipers and yellowlegs, which nest in the arctic, might be seen just passing through the area.[103]
>
> A large population of feral (wild) horses lives on the Red Desert; these horses are a common sight at Chain Lakes. Two artesian wells provide a dependable and quality water source for pronghorn and horses as well as other wildlife…
>
> This management area is ideal for wildlife watching without much people pressure.

The offered parcel covers substantial portions of this special management area, but the EA provides no sense of the potential for new development to fundamentally alter and degrade its important habitat values via habitat fragmentation, noise, light pollution, and contamination of wetlands and artesian wells from increased runoff, frack fluid migration, and toxic spills.

III. Conclusion

Oil and gas leasing is an irrevocable commitment to convey rights to use of federal land – a commitment with readily predictable environmental consequences that BLM is required to address. These include the specific geological formations, surface and ground water resources, seismic potential, or human, animal, and plant health and safety concerns present in the area to be leased. Unconventional oil and gas development not only fuel the climate crisis but entail

[102] Wyoming Game and Fish Department, Chain Lakes Wildlife Habitat Management Area, available at https://wgfd.wyo.gov/accessto/whmas/chainlakes.asp (accessed May 18, 2016)
[103] *Id.*

significant public health risks and harms to the environment. Accordingly, BLM should end all new leasing of federal minerals as detailed extensively in the Center for Biological Diversity, et al. comments on the Wyoming High Desert November 1, 2016 draft leasing EA, incorporated by reference in this protest.[104] Should BLM proceed with the proposed oil and gas leasing, it must thoroughly analyze the alternatives of no new leasing (or no action), and no fracking or other unconventional well stimulation methods in an EIS.

Thank you for your consideration of this protest. The proposed leasing's significant environmental impacts should compel BLM to withdraw the leasing proposal.

Sincerely,

Diana Dascalu-Joffe
Senior Attorney
Center for Biological Diversity

Shelley Silbert
Executive Director
Great Old Broads for Wilderness

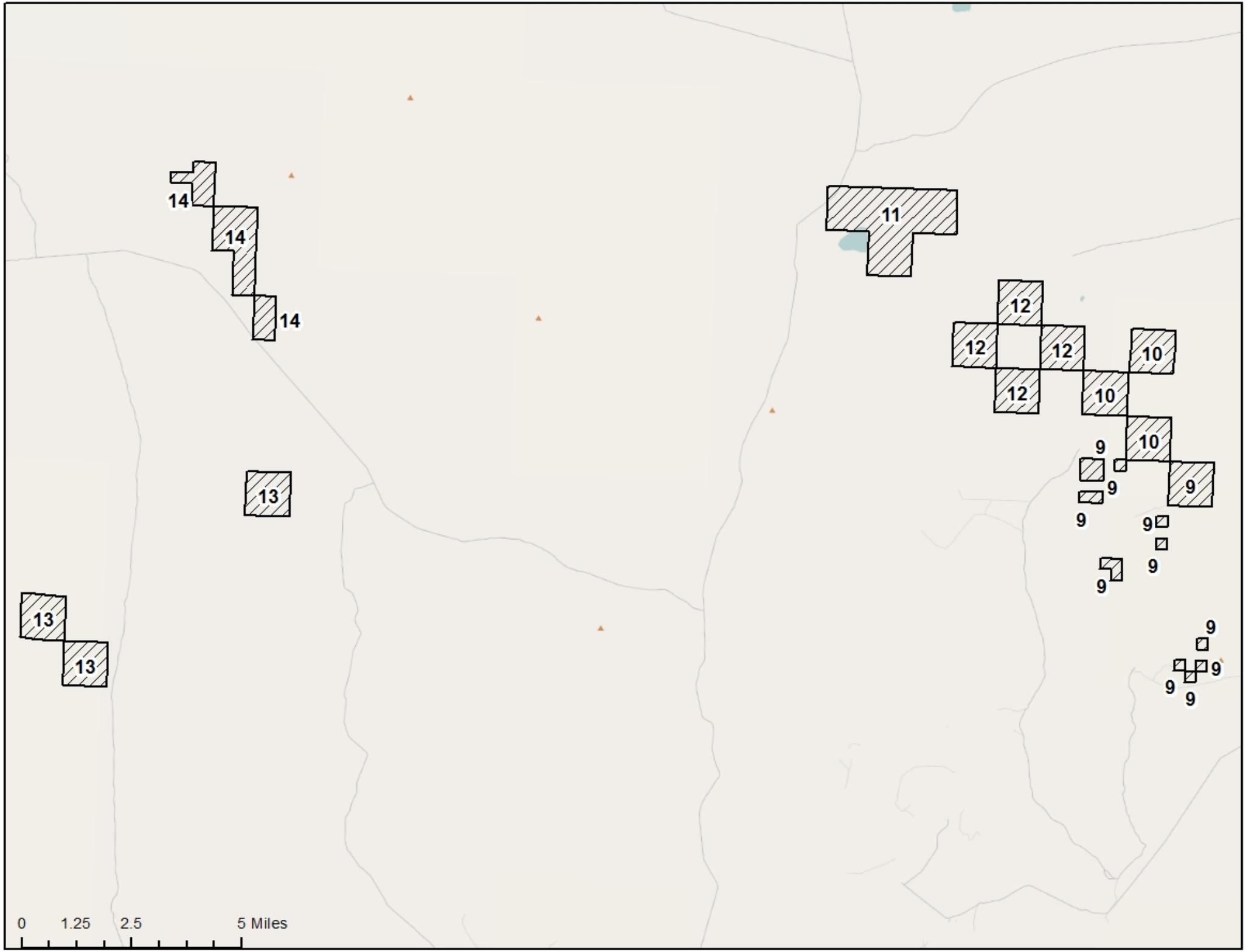
Katie Schaefer
Associate Attorney
Sierra Club

Encl:
Exhibits A-H
List of References

[104]The Center for Biological Diversity et al., Comments on High Desert District Lease Auction: November 2016 Lease Parcels (submitted May 19, 2016).

EXHIBIT A

Roads and Infrastructure Maps (All Parcels)


14
14
14
13
13
13
11
12
12
12
12
10
10
10
9
9
9
9
9
9
9
9
9
9
9
0
1.25
2.5
5 Miles

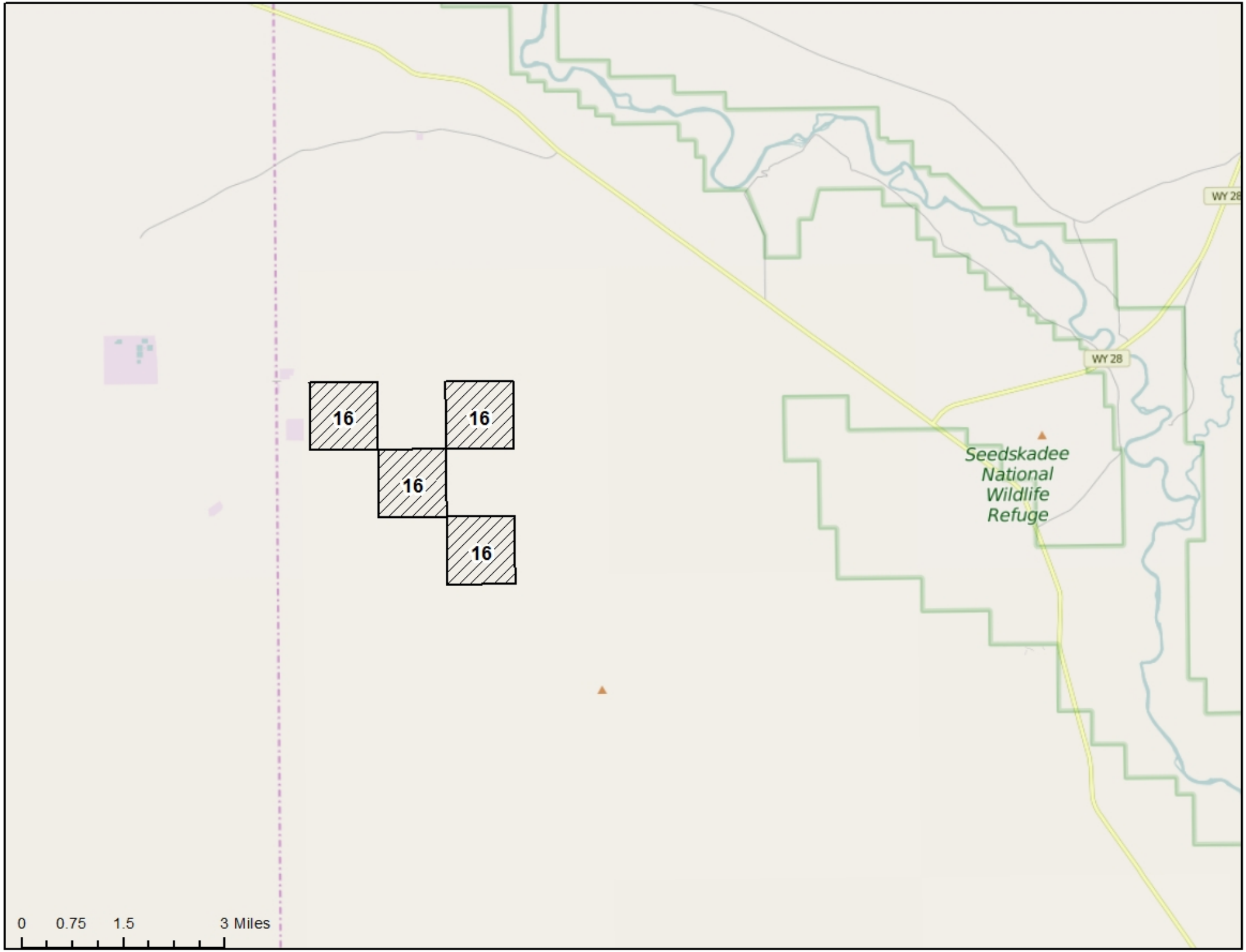

16
16
16
16
WY 28
WY 28
Seedskadee
National
Wildlife
Refuge
0
0.75
1.5
3 Miles

EXHIBIT B

Sage Grouse Habitat map 1 (Parcels WY-1611-001, WY-1611-002, WY-1611-003, WY-1611-004, WY-1611-005, WY-1611-006, WY-1611-007, WY-1611-008, WY-1611-009, WY-1611-010, WY-1611-011, WY-1611-012, WY-1611-013, WY-1611-014, WY-1611-015)

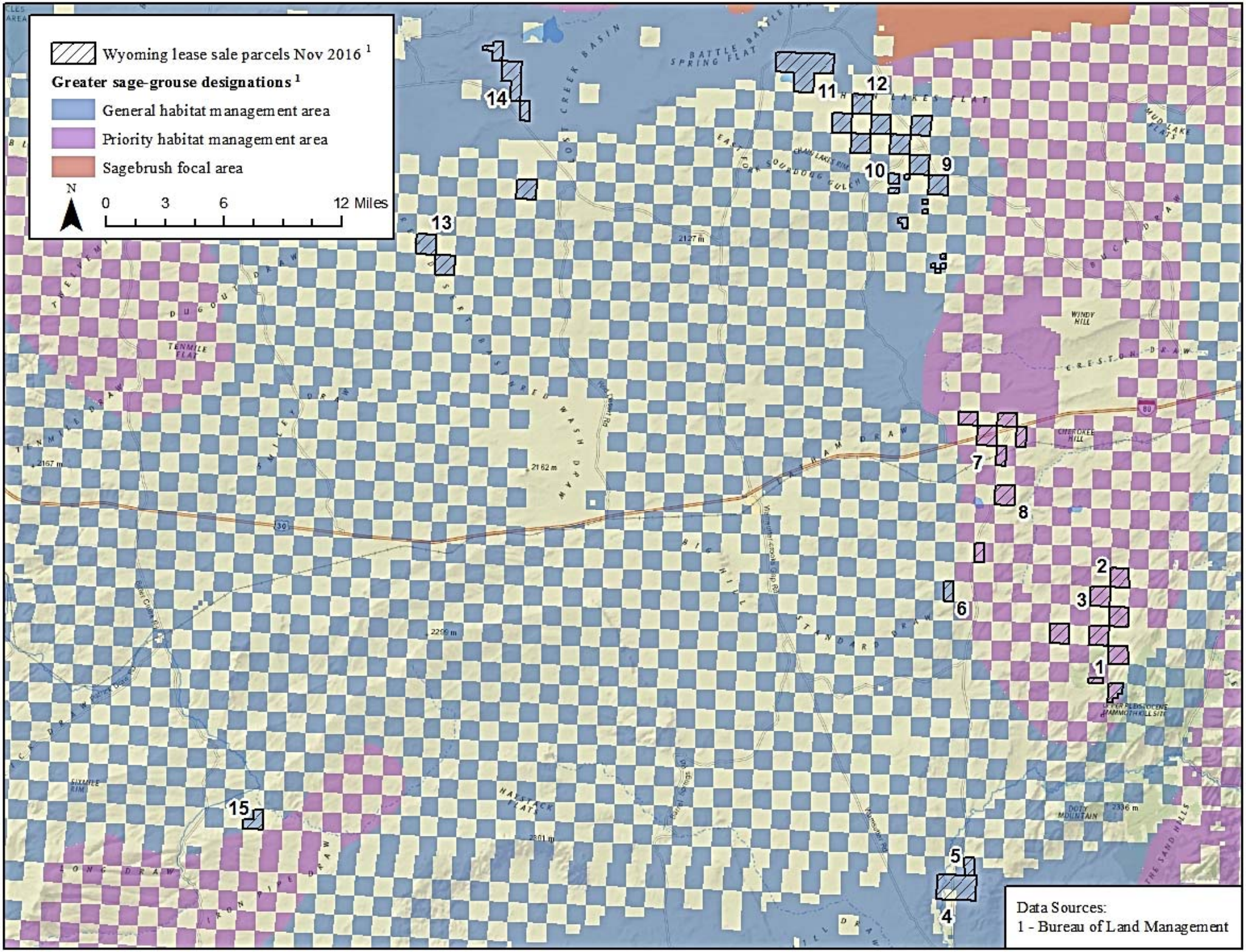

Wyoming lease sale parcels Nov 2016 [1]
Greater sage-grouse designations [1]
General habitat management area
Priority habitat management area
Sagebrush focal area
N
0 3 6 12 Miles
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Data Sources:
1 - Bureau of Land Management

EXHIBIT C

Sage Grouse Habitat map 2 (Parcels WY-1611-016, WY-1611-017, WY-1611-018, WY-1611-019, WY-1611-020, WY-1611-021)

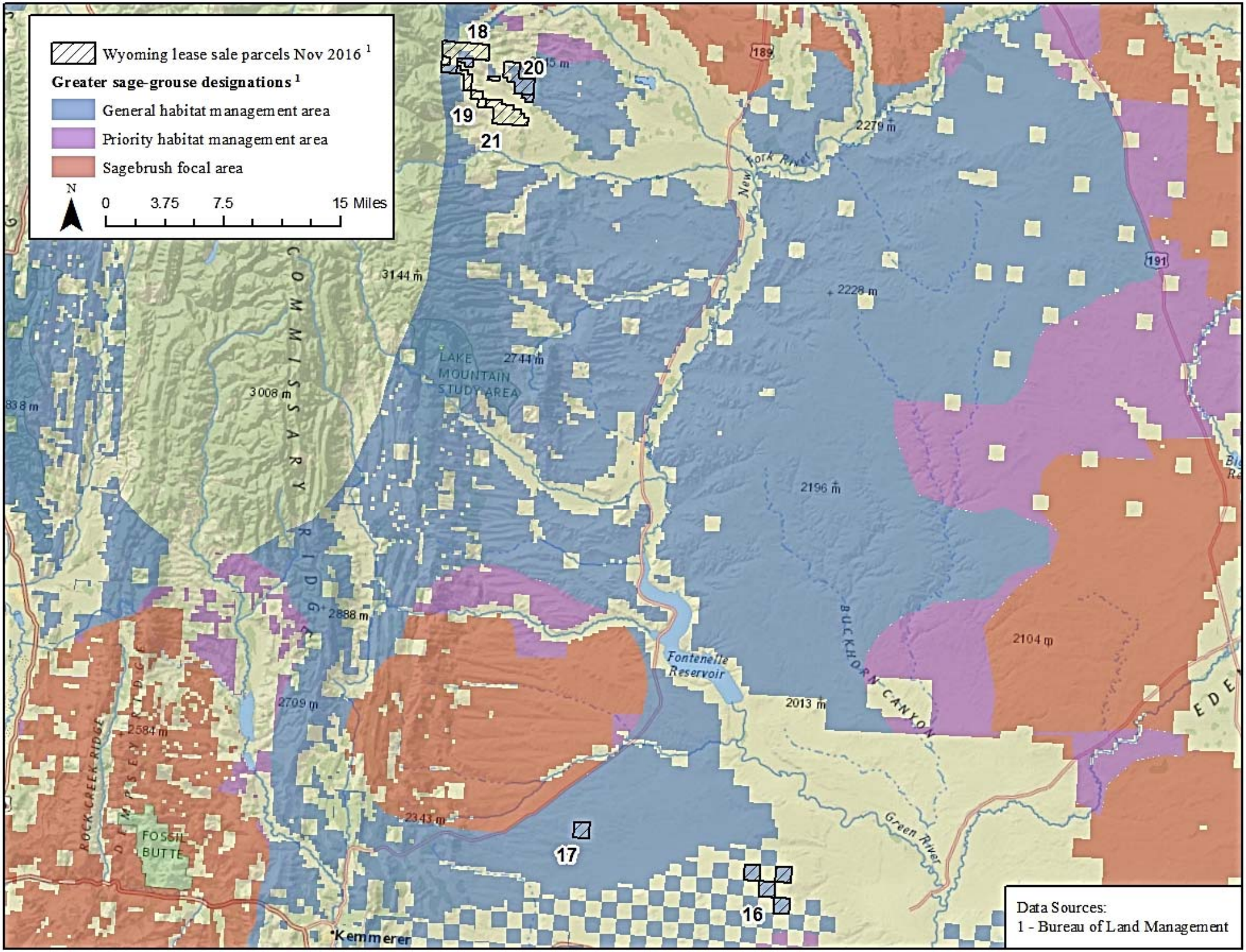

Wyoming lease sale parcels Nov 2016 [1]
Greater sage-grouse designations [1]
General habitat management area
Priority habitat management area
Sagebrush focal area
N
0 3.75 7.5 15 Miles
18
19
20
21
16
17
189
191
New Fork River
2279 m
2228 m
3144 m
2744 m
LAKE MOUNTAIN STUDY AREA
3008 m
838 m
COMMISSARY RIDGE
2888 m
2196 m
2104 m
Fontenelle Reservoir
BUCKHORN CANYON
2013 m
2709 m
2584 m
ROCK CREEK RIDGE
DEMPSEY RIDGE
2343 m
FOSSIL BUTTE
Green River
Kemmerer
Data Sources:
1 - Bureau of Land Management

EXHIBIT D

Big Game Migration and Habitat map 1 (Parcels WY-1611-018, WY-1611-019, WY-1611-020, WY-1611-021)

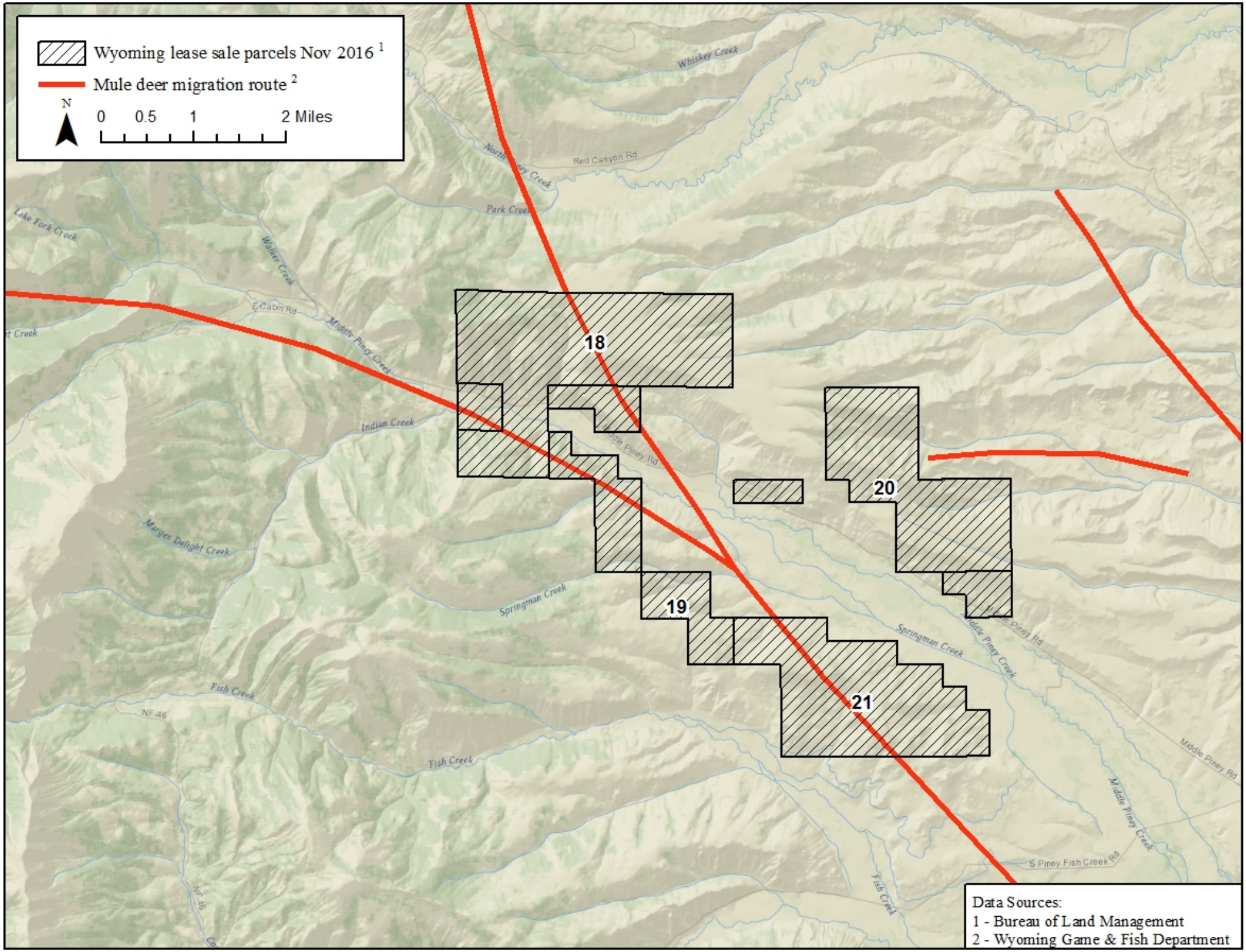

Wyoming lease sale parcels Nov 2016 [1]
Mule deer migration route [2]
N
0 0.5 1 2 Miles
18
19
20
21
Whiskey Creek
Red Canyon Rd
Park Creek
Lake Fork Creek
Walker Creek
E Cabin Rd
Middle Piney Creek
Indian Creek
Middle Piney Rd
Marges Delight Creek
Springman Creek
Fish Creek
NF 46
S Piney Fish Creek Rd
Data Sources:
1 - Bureau of Land Management
2 - Wyoming Game & Fish Department

EXHIBIT E

Big Game Migration and Habitat map 2 (Parcel WY-1611-015)

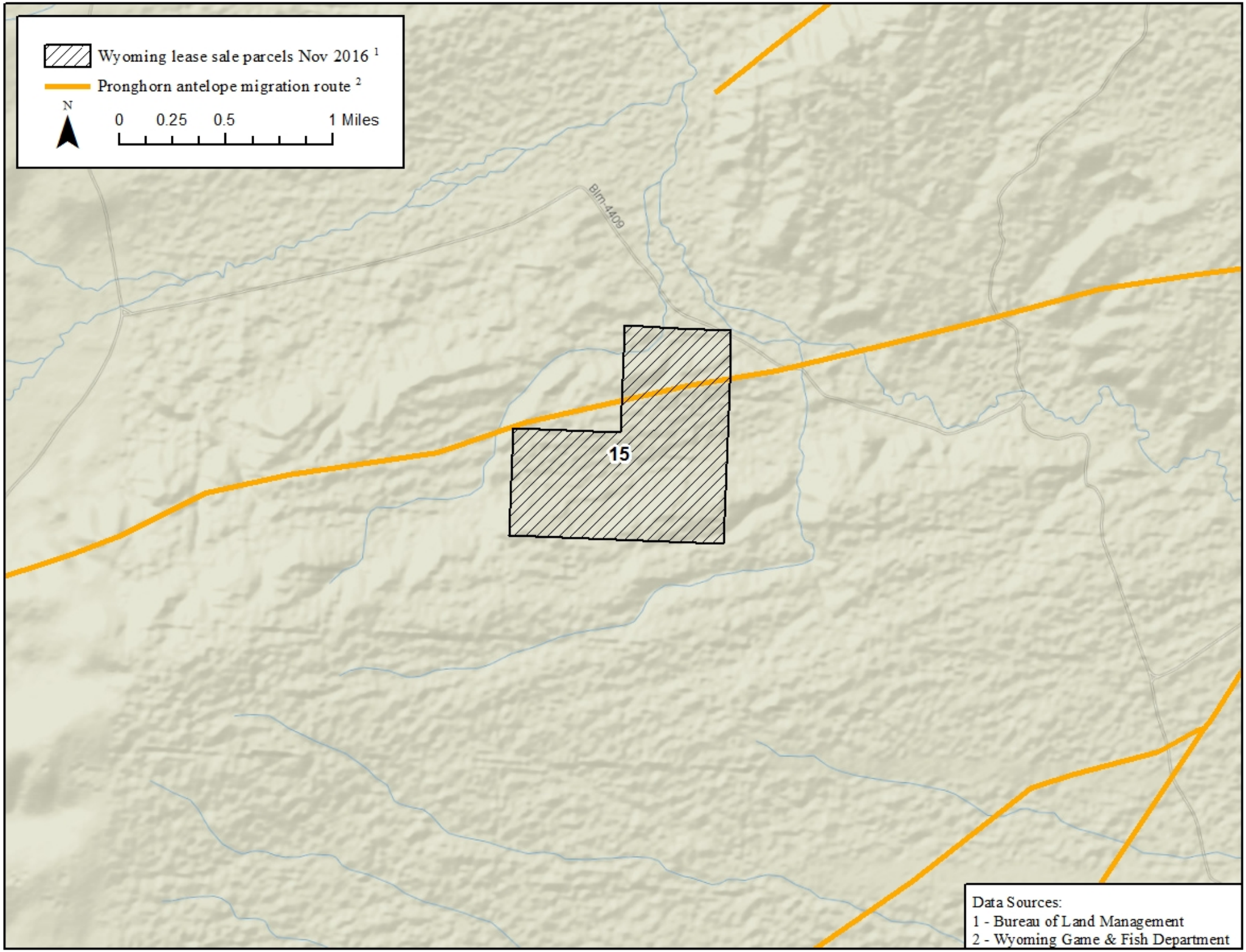

Wyoming lease sale parcels Nov 2016 [1]
Pronghorn antelope migration route [2]
N
0 0.25 0.5 1 Miles
Blm 4409
15
Data Sources:
1 - Bureau of Land Management
2 - Wyoming Game & Fish Department

EXHIBIT F

Big Game Migration map 3 (Parcels WY-1611-009, WY-1611-010, WY-1611-011, WY-1611-012)

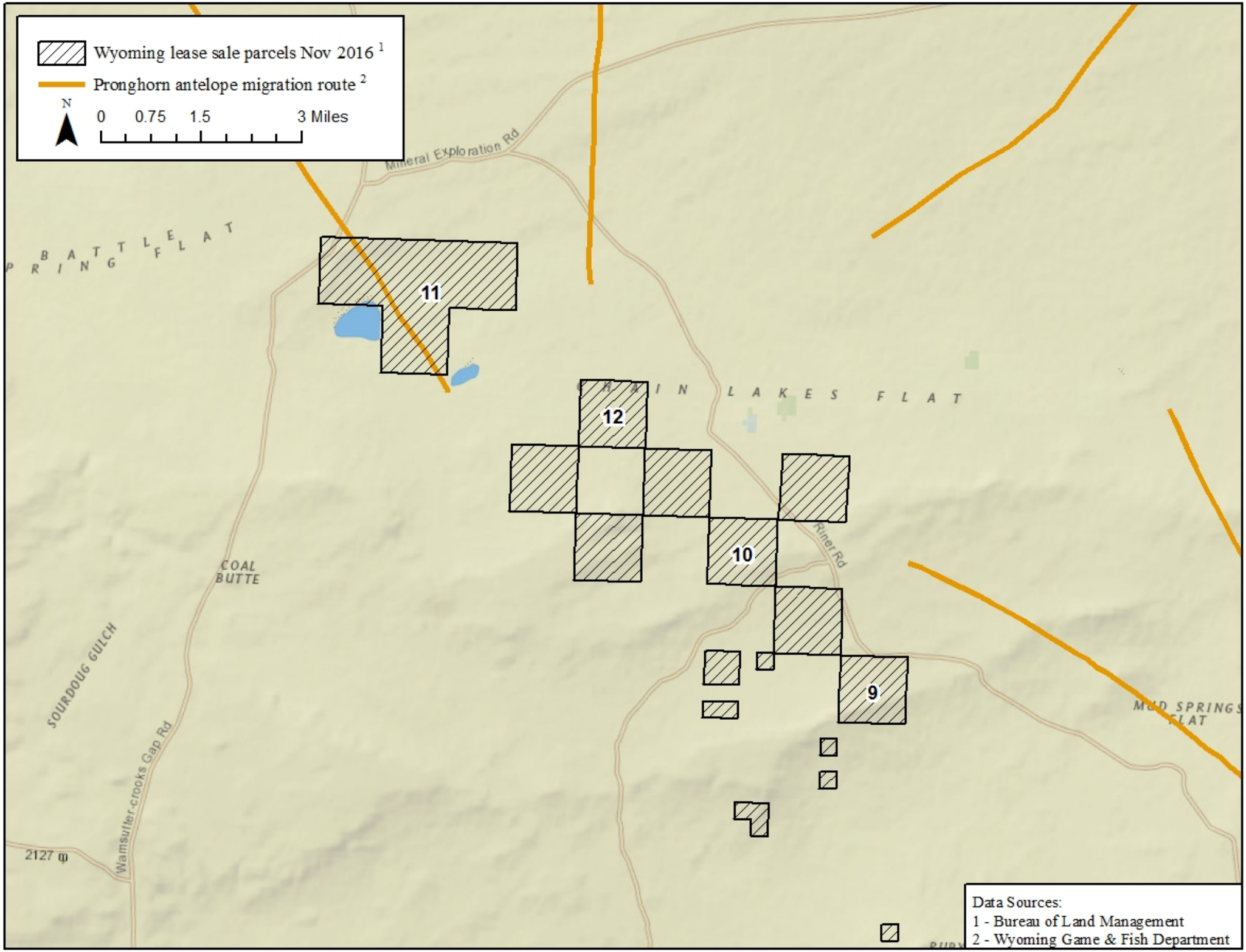

Wyoming lease sale parcels Nov 2016 [1]
Pronghorn antelope migration route [2]
N
0 0.75 1.5 3 Miles
Mineral Exploration Rd
PRATT FLAT
11
12
10
9
Riner Rd
COAL BUTTE
SOURDOUG GULCH
Wamsutter-crooks Gap Rd
2127 m
Data Sources:
1 - Bureau of Land Management
2 - Wyoming Game & Fish Department

EXHIBIT G

Big Game Migration and Habitat map 4 (Parcels WY-1611-001, WY-1611-002, WY-1611-003)

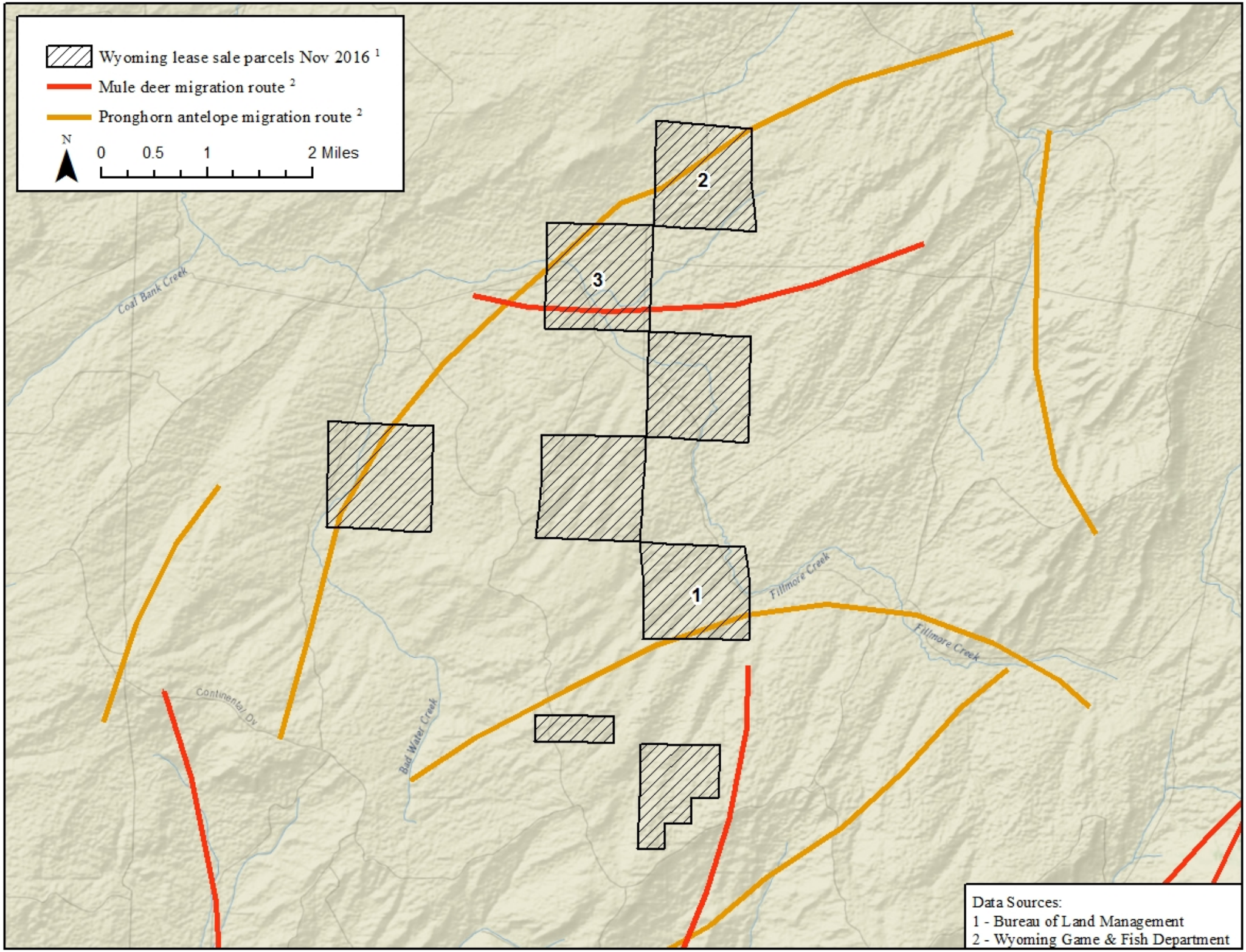
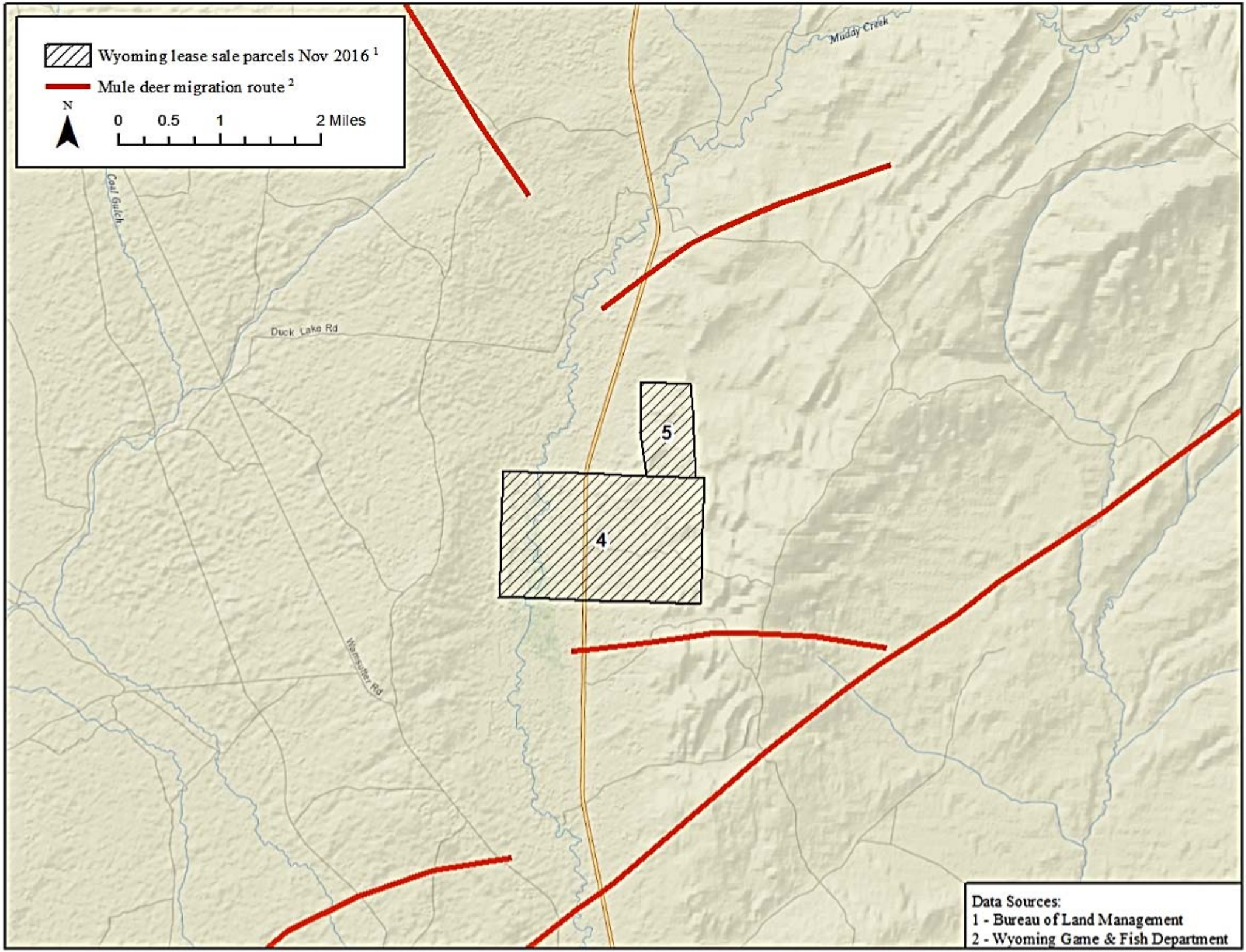

Wyoming lease sale parcels Nov 2016 [1]
Mule deer migration route [2]
Pronghorn antelope migration route [2]
N
0
0.5
1
2 Miles
2
3
1
Coal Bank Creek
Fillmore Creek
Fillmore Creek
Continental Div
Bad Water Creek
Data Sources:
1 - Bureau of Land Management
2 - Wyoming Game & Fish Department

EXHIBIT H

Big Game Migration and Habitat map 5 (Parcels WY-1611-004, WY-1611-005)


Wyoming lease sale parcels Nov 2016 [1]
Mule deer migration route [2]
N
0
0.5
1
2 Miles
Muddy Creek
Coal Gulch
Duck Lake Rd
Wamsutter Rd
5
4
Data Sources:
1 - Bureau of Land Management
2 - Wyoming Game & Fish Department

List of References

Allen, David et al., Measurements of methane emissions at natural gas production sites in the United States, PNAS Early Edition, doi:10.1073/pnas.1304880110 (2013)

Alvarez, Ramon, Greater focus needed on methane leakage from natural gas infrastructure, PNAS Early Edition, doi: 10.1073/pnas.1202407109 (2013)

Armendariz, Al, Emissions for Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements (2009)

Bar-Ilan, Amnon et al., A Comprehensive Emissions Inventory of Upstream Oil and Gas Activities in the Rocky Mountain States, ENVIRON International Corporation (2010)

Bay Area Air Quality Management District, Particulate Matter Overview, Particulate Matter and Human Health (2012)

Brown, Heather, Memorandum to Bruce Moore, USEPA/OAQPS/SPPD re Composition of Natural Gas for Use in the Oil and Natural Gas Sector Rulemaking (July 28, 2011)

Brune, Michael, Statement of Sierra Club Executive Director Michael Brune Before the Committee on Oversight & Government Reform (May 31, 2012)

Center for Biological Diversity et al. comments on High Desert District Lease Auction: November 2016 Lease Parcels (May 19, 2016).

Center for Biological Diversity, Air Toxics One-Year Report: Oil companies used millions of pounds of air-polluting chemicals in Los Angeles Basin neighborhoods (2014)

Center for Biological Diversity, Dirty Dozen: The 12 most commonly used air toxics in unconventional oil development in the Los Angeles Basin (2013)

Colborn et al., An Exploratory Study of Air Quality Near Natural Gas Operations, 20 Human and Ecological Risk Assessment: An International Journal 1 (2014)

Colborn, Theo et al., Natural Gas Operations from a Public Health Perspective, 17 Human and Ecological Risk Assessment 1039 (2011)

Colborn, Theo, et al., An Exploratory Study of Air Quality near Natural Gas Operations, 20 Human and Ecological Risk Assessment: An International Journal 1 (2012), DOI:10.1080/10807039.2012.749447

Colorado Department of Public Health, Colorado Conservation Commission, Colorado Weekly & Monthly Oil & Gas Statistics (July 6, 2012)

Council on Environmental Quality, Final Guidance for Federal Departments and Agencies

on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews, 81 Fed. Reg. 51,866 at 14 (Aug. 5, 2016)

Council on Environmental Quality, Revised draft guidance for greenhouse gas emissions and climate change impacts (2014)

Craft, Elena, Environmental Defense Fund, Do Shale Gas Activities Play a Role in Rising Ozone Levels? (2012)

Earthworks, Sources of Oil and Gas Pollution (2011)

Ecoshift Consulting, The potential Greenhouse Gas Emissions of U.S. Federal Fossil Fuels, Center for Biological Diversity and Friends of the Earth (2015)

Fiore, Arlene et al., Linking ozone pollution and climate change: The case for controlling methane, 29 Geophys. Res Letters 19 (2002)

Food and Water Watch, The Case for a Ban on gas Fracking (June 2011)

Garton, E. et al., Greater Sage-Grouse Population Dynamics and Probability of Persistence, Final Report to Pew Charitable Trusts (2015)

Gilman, J.B. et al., Source signature of volatile organic compounds from oil and natural gas operations in Northeastern Colorado, Environment. Science. & Technology (2013)

Harriss, Robert et al., Using multi-scale measurements to improve methane emission estimates from oil and gas operations in the Barnett Shale Region, Texas, 49 Environ. Sci. Technol 7524 (2015), doi: 10.1021/acs.est.5b02305

Hou, Deyi et al., Shale gas can be a double-edged sword for climate change, 2 Nature Climate Change 385 (June 2012)

Howarth, Robert, et al., Methane and the greenhouse-gas footprint of natural gas from shale formations,Climactic Change (Mar. 31, 2011)

Howarth, Robert, et al., Venting and leaking of methane from shale gas development: response to Cathles et al., Climatic Change DOI 10.1007/s10584-012-0401-0 (2012)

Koch, Wendy, Wyoming's Smog Exceeds Los Angeles' Due to Gas Drilling, USA Today (May 9, 2011)

Lester, Liza, Sagebrush Ecosystem Recovery Hobbled By Loss Of Soil Complexity At Development Sites, Ecological Society of America (Jan. 26, 2015), http://www.esa.org/esa/sagebrush-ecosystem-recovery-hobbled-by-loss-of-soil-complexity-at-development-sites/

Lyman, Seth and Howard Shorthill, Final Report: 2012 Uintah Basin Winter Ozone & Air Quality Study, Utah Dept of Environmental Quality (2013)

Macey, G.P. et al., Air Concentrations of Volatile Compounds Near Oil and Gas Production: A Community-Based Exploratory Study, 13 Environmental Health 82 (2014)

Martin, Randal et al., Final Report: Uinta Basin Winter Ozone and Air Quality Study Dec 2010 - March 2011 (2011)

McCawley, M., Air, Noise, and Light Monitoring Plan for Assessing Environmental Impacts of Horizontal Gas Well Drilling Operations (ETD-10 Project), West Virginia University School of Public Health, Morgantown, WV (2013)

McKenzie, L. et al., Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources, 424 Science of the Total Environment 79 (2012)

Minnick, Tamara J., Plant–soil feedbacks and the partial recovery of soil spatial patterns on abandoned well pads in a sagebrush shrubland, 25 Ecological Applications 1 (2015)

Northrup, J. M. et al. Quantifying spatial habitat loss from hydrocarbon development through assessing habitat selection patterns of mule deer, Global Change Biology (Aug. 2015)

Ostro, Bart et al., Long-term Exposure to Constituents of Fine Particulate Air Pollution and Mortality: Results from the California Teachers Study, 118 Environmental Health Perspectives 3 (2010)

Petron, Gabrielle, et al., Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study, 117 Journal of Geophysical Research (2012)

Rocky Mountain Wild, Map: Nov 2016 WY Lease Sale EA – Maps 3, 4, 5, 6, 7, 9 – Big Game (May 3, 2016)

Rocky Mountain Wild, Map: Nov 2016 WY Lease Sale EA – Maps 3, 4, 5, 6, 7, 9 – Species and Places (May 3, 2016)

Russell, James, et al., An Emission Inventory of Non-point Oil and Gas Emissions Sources in the Western Region, ENVIRON International Corporation (2006)

Sawyer, Hall et al., A Framework for Understanding Semi-Permeable Barrier Effects on Migratory Ungulates, 50 J. Applied Ecol. 74 (2013), doi: 10.1111/1365-2664.12013.

Sierra Club et al. comments on New Source Performance Standards: Oil and Natural Gas Sector; Review and Proposed Rule for Subpart OOOO (Nov. 30, 2011)

South Coast Air Quality Management District, Draft Staff Report on Proposed Rule 1148.2 - Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers (January 2013)

South Coast Air Quality Management District, Response to Questions re Air Quality Risks of Hydraulic Fracturing in California, Submission to Joint Senate Hearing (2013)

South Coast Air Quality Management District, Revised Draft Staff Report on Proposed Amended Rule 1148.2 - Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers (June 2015)

Tollefson, Jeff, Methane leaks erode green credentials of natural gas, Nature News (Jan 2, 2013)

U.S. Army Corps of Engineers, Final Environmental Impact Statement: Alaska Stand Alone Gas Pipeline, Volume 2 Sec. 5.20-70–71 (Oct. 2012)

U.S. Bureau of Land Management, Casper, Kemmerer, Newcastle, Pinedale, Rawlins and Rock Springs Field Offices, Approved RMP Amendment for Greater Sage Grouse, https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=renderDefaultPlanOrProjectSite&projectId=9153&dctmId=0b0003e8801367ca (last updated 9/21/15)

U.S. Bureau of Land Management, Environmental Assessment for West Desert District, Fillmore Field Office, August 2015 Oil and Gas Lease Sale, pp. 57-58 (Dec. 2015)

U.S. Bureau of Land Management, Final Supplemental Environmental Impact Statement for the Leasing and Underground Mining of the Greens Hollow Federal Coal Lease Tract, UTU-84102 (Feb 2015)

U.S. Bureau of Land Management, Oil and Gas Leasing Reform - Land Use Planning and Lease Parcel Reviews, IM 2010-117 (2010)

U.S. Bureau of Land Management, Record of Decision and Approved Resource Management Plan Amendments for the Rocky Mountain Region (September 2015)

U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Analysis: Natural Gas Combined Cycle (NGCC) Power Plant, Pub No DOE/NETL-403-110509 (Sep 10, 2012)

U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Greenhouse Gas Inventory of Natural Gas Extraction, Delivery and Electricity Production, Pub No. DOE/NETL-2011/1522 (Oct 24, 2011)

U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States, DOE/NETL-2014/1649 (May 29, 2014)

U.S. Department of Energy National Energy Technology Laboratory, Role of Alternative Energy Sources: Natural Gas Technology Assessment Pub No. DOE/NETL-2012/1539 (NETL, 2012)

U.S. Department of State, Final Supplemental Environmental Impact Statement for the Keystone XL Project, Appendix U (Jan. 2014)

U.S. Environmental Protection Agency Region X, Letter from Dennis McLerran, Regional Administrator, to Randel Perry, U.S. Army Corps of Engineers Seattle District, re Gateway Pacific Projects (Jan 22, 2013)

U.S. Environmental Protection Agency, Carbon Monoxide, http://www.epa.gov/airquality/carbonmonoxide/health.html (last accessed Aug 17, 2016)

U.S. Environmental Protection Agency, Ground Level Ozone, http://www.epa.gov/airquality/ozonepollution/health.html (last accessed Aug 17, 2016)

U.S. Environmental Protection Agency, Hazardous Air Pollutants, http://www.epa.gov/haps (last accessed Aug 17, 2016)

U.S. Environmental Protection Agency, Integrated Science Assessment (ISA) for Ozone (O3) and Related Photochemical Oxidants (2013)

U.S. Environmental Protection Agency, National Ambient Air Quality Standards for Particulate Matter Proposed Rule, 77 Fed. Reg. 38,890, 38,893 (June 29, 2012)

U.S. Environmental Protection Agency, National Gas STAR Program, Basic Information, Major Methane Emission Sources and Opportunities to Reduce Methane Emissions, http://www.epa.gov/gasstar/basic-information/index.html#sources (last updat May 24, 2012)

U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Report to Congress on Hydrogen Sulfide Air Emissions Associated with the Extraction of Oil and Natural Gas (EPA-453/R-93-045) (Oct. 1993)

U.S. Environmental Protection Agency, Oil and Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews Proposed Rule, 76 Fed. Reg 52,738 (Aug 23, 2011).

U.S. Environmental Protection Agency, Oil and Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution: Background Technical Support Document for Proposed Standards (July 2011)

U.S. Environmental Protection Agency, Particulate Matter, (PM) http://www.epa.gov/airquality/particlepollution/health.html (accessed Oct 1, 2013)

U.S. Environmental Protection Agency, Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (November 2011)

U.S. Environmental Protection Agency, Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Particulate Matter (June 2012)

U.S. Environmental Protection Agency, Sulfur Dioxide http://www.epa.gov/airquality/sulfurdioxide/health.html (accessed Oct 1, 2013)

U.S. Environmental Protection Agency, The Clean Air Act Amendments of 1990 List of Hazardous Air Pollutants, Technology Transfer Network Air Toxics Web Site, http://www.epa.gov/ttnatw01/orig189.html (accessed Apr 4, 2014)

U.S. Fish and Wildlife Service, 12-Month Finding on a Petition to List Greater Sage-Grouse, 80 Fed. Reg. 59,858 (Oct. 2, 2015).

U.S. Forest Service, Record of Decision and Final Environmental Impact Statement, Oil and Gas Leasing Analysis, Fishlake National Forest (Aug 2013)

United States Department of Agriculture, United States Department of Energy, United States Department of the Interior, Inventory of Onshore Federal Oil and Natural Gas Resurces and Restrictions to Their Development ("EPCA Phase III Inventory") (2008)

Wang, Jinsheng, et al., Reducing the Greenhouse Gas Footprint of Shale, 39 Energy Policy 8196 (2011)

Waxman, Henry et al., United States House of Representatives, Committee on Energy and Commerce, Minority Staff, Chemicals Used in Hydraulic Fracturing (Apr. 2011)

Williams, Megan & Cindy Copeland, Earthjustice, Methane Controls for the Oil and Gas Production Sector (2010)

Wyoming Game and Fish Department, Chain Lakes Wildlife Habitat Management Area, https://wgfd.wyo.gov/accessto/whmas/chainlakes.asp (accessed May 18, 2016)