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working through science, law and creative media to secure a future for all species, great or small, hovering on the brink of extinction.

January 13, 2017

Kemba Anderson
Bureau of Land Management
Nevada State Office
1340 Financial Boulevard
Reno, NV 89502-7147

Via Telefax: (775) 861-67 11

RE: Scoping Comments for the February 2017 Competitive Oil and Gas Lease Sale, Tres Rios Field Office

Dear Ms. Anderson,

The Center for Biological Diversity ("Center") hereby files this Protest of the Bureau of Land Management's ("BLM") planned March 14, 2017 Competitive Oil and Gas Lease Sale and Environmental Assessment for oil and gas leasing in the Elko District Office (DOI-BLM-NV-E000-2016-0004-EA) ("EA"), pursuant to 43 C.F.R. § 3120.1-3. We formally protest the inclusion of each of the 67 parcels, covering 115,950.300 acres in the State of Nevada:

NV- 17-03- 001	**NV- 17-03- 018**	**NV- 17-03- 038**
NV- 17-03- 002	**NV- 17-03- 019**	**NV- 17-03- 039**
NV- 17-03- 003	**NV- 17-03- 020**	**NV- 17-03- 040**
NV- 17-03- 004	**NV- 17-03- 025**	**NV- 17-03- 041**
NV- 17-03- 005	**NV- 17-03- 026**	**NV- 17-03- 042**
NV- 17-03- 006	**NV- 17-03- 027**	**NV- 17-03- 043**
NV- 17-03- 007	**NV- 17-03- 028**	**NV- 17-03- 044**
NV- 17-03- 008	**NV- 17-03- 029**	**NV- 17-03- 045**
NV- 17-03- 009	**NV- 17-03- 030**	**NV- 17-03- 047**
NV- 17-03- 010	**NV- 17-03- 031**	**NV- 17-03- 048**
NV- 17-03- 011	**NV- 17-03- 032**	**NV- 17-03- 049**
NV- 17-03- 012	**NV- 17-03- 033**	**NV- 17-03- 050**
NV- 17-03- 013	**NV- 17-03- 034**	**NV- 17-03- 051**
NV- 17-03- 014	**NV- 17-03- 035**	**NV- 17-03- 052**
NV- 17-03- 015	**NV- 17-03- 036**	**NV- 17-03- 053**
NV- 17-03- 016	**NV- 17-03- 037**	**NV- 17-03- 054**

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NV- 17-03- 055	NV- 17-03- 062	NV- 17-03- 069
NV- 17-03- 056	NV- 17-03- 063	NV- 17-03- 070
NV- 17-03- 057	NV- 17-03- 064	NV- 17-03- 071
NV- 17-03- 058	NV- 17-03- 065	NV- 17-03- 073
NV- 17-03- 059	NV- 17-03- 066	NV- 17-03- 074
NV- 17-03- 060	NV- 17-03- 067	
NV- 17-03- 061	NV- 17-03- 068	

PROTEST

I. Protesting Party: Contact Information and Interests:

This Protest is filed on behalf of the Center by:

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The Center is a non-profit environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center also works to reduce greenhouse gas emissions to protect biological diversity, our environment, and public health. The Center has over one million members and activists, including those living in the state of Nevada who have visited these public lands in the Elko District Office ("EDO") for recreational, scientific, educational, and other pursuits and intend to continue to do so in the future, and are particularly interested in protecting the many native, imperiled, and sensitive species and their habitats that may be affected by the proposed oil and gas leasing.

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

BLM's proposed decision to lease the parcels listed above is substantively and procedurally flawed for the reasons discussed below:

A. BLM Violates the National Environmental Policy Act ("NEPA")

NEPA requires agencies to undertake thorough, site-specific environmental analysis at the earliest possible time and prior to any "irretrievable commitment of resources" so that the action can be shaped to account for environmental values. Pennaco Energy, Inc. v. United States DOI, 377 F.3d 1147, 1160 (10th Cir. 2004). Oil and gas leasing is an irretrievable commitment of resources. S. Utah Wilderness All. v. Norton, 457 F. Supp. 2d 1253, 1256 (D. Utah 2006). Thus, NEPA establishes "action-forcing" procedures that require agencies to take a "hard look," at "all foreseeable impacts of leasing" before leasing can proceed. Center for Biological Diversity v. United States DOI, 623 F.3d 633, 642 (9th Cir. 2010); N.M. ex rel. Richardson v.

BLM, 565 F.3d 683, 717 (10th Cir. 2009). Chief among these procedures is the preparation of an environmental impact statement ("EIS"). Id. BLM, however, did not prepare an EIS.

In order to determine whether a project's impacts may be "significant," an agency may first prepare an 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) (emphasis added). However, BLM's EA did not make any determination as to whether the act of opening up over 115,000 acres of land to oil and gas activities such as fracking will have any significant impact. BLM failed to provide any clear or "convincing statement of reasons" for a finding of no significant impact. Actually BLM did not issue a proposed Finding of No Significant Impact or even provide any explanation to the public as to why BLM chose not to prepare an EIS.

BLM failed both of NEPA's "twin aims": not only did BLM fail to ensure that the agency takes a "hard look" at the environmental consequences of its proposed action, it also failed to make information on the environmental consequences available to the public, which may then offer its insight to assist the agency's decision-making through the comment process. See, e.g., Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989). NEPA's procedural requirement is not merely a formality, but is there to allow the agencies and the public to understand the consequences of the proposed lease auction. Not only did BLM fail to provide an adequate environmental analysis of the foreseeable impacts of the proposed lease sale, but furthermore failed to provide the public adequate notice. For example, BLM did not provide the public with any working shapefiles or maps of the parcels proposed for leasing.

i. It is Unlawful to Proceed with the Lease Sale without Undertaking a Site-Specific Environmental Assessment.

BLM's deferral of site-specific analysis until the APD stage is unlawful under NEPA, its implementing regulations, and legal precedents. Courts have repeatedly rejected BLM's claim that it is not required to conduct any site-specific environmental review until after the parcels are leased and a proposal is submitted by industry. See, e.g., Center for Biological Diversity & Sierra Club v. BLM, 937 F. Supp. 2d 1140, 1158 (N.D. Cal. 2013) (". . . BLM asserts the now-familiar argument that there is no controversy because any degradation of the local environment from fracking should be discussed, if ever, when there is a site-specific proposal. But the Ninth Circuit has specifically disapproved of this as a reason for holding off on preparing an EIS."); and Conner v. Burford, 848 F.2d 1441, 1450 (9th Cir. 1988) ("The government's inability to fully ascertain the precise extent of the effects of mineral leasing ... is not, however, a justification for failing to estimate what those effects might be before irrevocably committing to the activity.").

BLM is required under NEPA to perform and disclose an analysis of environmental impacts of the 67 parcels offered for lease *before* there are any "irreversible and irretrievable commitments of resources." Center for Biological Diversity, 937 F. Supp. 2d at 1152 (citing

Conner v. Burford, 848 F.2d 1441, 1446 (9th Cir. 1988) ("Our circuit has held that an EIS must be prepared *before* any irreversible and irretrievable commitment of resources.") (emphasis added). "[N]on-NSO leases, even if subject to substantial government regulation, do constitute an 'irretrievable commitment of resources.' As a result, unless the lease reserves to the agencies an '*absolute right* to deny exploitation of those resources,' the sale of [] non-NSO leases ... constitutes the go or no-go point where NEPA analysis becomes necessary." Id at 1152. In other words, the specific environmental effects of oil and gas leasing in the project area must be analyzed and disclosed now, at the leasing stage.

Rather than perform the environmental review as required, BLM tiers to the environmental impact statements (EISs) for the 1987 Elko Resource Management Plan and the 1985 Wells Resource Management Plan (RMPs) and the Programmatic Environmental Assessment December 2005 Oil and Gas Lease Sale[1] and defers the site-specific analysis until after the parcels are leased.[2] This is unlawful. BLM is required to analyze all foreseeable human health and safety risks, and seismic risks, posed by unconventional extraction techniques before leasing. BLM's anlayses on these issues are outdated and/or cursory at best. In a case called Center for Biological Diversity & Sierra Club v. BLM, 937 F. Supp. 2d 1140, 1152 (N.D. Cal. 2013), BLM also attempted to defer NEPA analysis of hydraulic fracturing ("fracking") on the parcels at issue until it received a site-specific proposal, because the exact scope and extent of drilling that would involve fracking was unknown. The district court held BLM's "unreasonable lack of consideration of how fracking could impact development of the disputed parcels went on to unreasonably distort BLM's assessment," and explained:

> "[T]he basic thrust" of NEPA is to require that agencies consider the range of possible environmental effects before resources are committed and the effects are fully known. "Reasonable forecasting and speculation is thus implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry.'"

Center for Biological Diversity, 937 F. Supp. 2d at 1157 (citing City of Davis v. Coleman, 521 F.2d 661, 676 (9th Cir. 1975)).

NEPA requires that "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." N.M. ex rel. Richardson v. BLM, 565 F.3d 683, 717-18 (10th Cir. 2009) (citing 42 U.S.C. § 4332(2)(C)(v)); compare with Center for Biological Diversity, 937 F. Supp. 2d at 1152 (N.D. Cal. 2013) ("Agencies are required to conduct this review at the 'earliest possible time' to allow for proper consideration of environmental values. . . A review should be prepared at a time when the decisionmakers 'retain a maximum range of options.'"). In Richardson, BLM argued there also that it was not required to conduct any site-specific environmental reviews until the issuance of an APD. The court looked to the Ninth and D.C. Circuits in concluding that "NEPA requires BLM to conduct site-specific analysis before the leasing stage." Richardson, 565 F.3d at 688. Richardson then offered a two-part test to determine whether NEPA has been satisfied:

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[1] EA at 1.
[2] *Id.*

First we must ask whether the lease constitutes an "irretrievable commitment of resources." The Tenth Circuit, again citing to the Ninth and D.C. Circuits, concluded that issuing an oil and gas lease without an NSO stipulation constitutes such a commitment. Second, the agency must ask whether all "foreseeable impacts of leasing" have been taken into account before leasing can proceed. Id. Given the utter lack of any site-specific review of the present surface-occupancy-permitting parcels, for this lease sale, such impacts have not been taken into account.

BLM must take a hard look at the specific parcels that it is offering for oil and gas leasing, and the foreseeable impacts to the resources on these parcels. BLM insists, however, on postponing any such analysis until it has already signed over drilling rights and is unable to preclude all surface disturbing activities to prevent critical environmental impacts that may arise after a proper NEPA analysis. This is a violation of NEPA.

ii. BLM Failed to Issue a Finding of "No Significant Environmental Impact" or any Convincing Statement of Reasons as to why the Project's Impacts are Insignificant

As the time for NEPA analysis was triggered by the proposal for the sale of the lease, BLM had to analyze whether its decision to open up 115,000 acres of land to development activities such as fracking might have significant environmental impact. Center for Biological Diversity & Sierra Club v. BLM, 937 F. Supp. 2d 1140, 1153 (N.D. Cal. 2013). If BLM finds based on the EA that the proposed actions will not significantly affect the environment, BLM can issue a finding of No Significant Impact ("FONSI") in lieu of the EIS. Id. However, BLM's EA did not make any finding that the environmental effects of its major action are insignificant. Nor did BLM provide any explanation to the public as to why BLM chose not to prepare an EIS.

The FONSI must contain a "convincing statement of reasons" why the project's impacts are insignificant. Id. "The statement of reasons is crucial to determining whether the agency took a 'hard look' at the potential environmental impact of a project." Id. Standing together, the FONSI and EA must be "sufficient to establish the reasonableness of th[e] decision not to prepare an EIS." Id. However, BLM never issued a FONSI or any convincing statement of reasons as to why or how BLM's major action could be found to have no significant impact. BLM did not even clearly state in any part of the EA that the action does not presents any significant impacts. In a case called Center for Biological Diversity v. National Highway Traffic Safety Admin., 538 F.3d 1172 (9th Cir. 2008) the court took similar issues with the BLM's failure to explain why it chose not to prepare an EIS:

> Nowhere does the EA provide a 'statement of reasons' for a finding of no significant impact, much less a 'convincing statement of reasons.' For example, the EA discusses the amount of CO[2] emissions expected from the Rule, but does not discuss the potential impact of such emissions on climate change. In the "Affected Environment" section of the EA, NHTSA states that "[i]ncreasing concentrations of greenhouse gases are likely to accelerate the rate of climate change." The agency notes that "[t]he transportation sector is a significant source of greenhouse gas (GHG) emissions, accounting for approximately 28 percent of all greenhouse gas emissions in the United States." From this, NHTSA jumps to the conclusion that "[c]oupled with the effects resulting from the 2003 light

> truck rule, the effects resulting from the agency's current action are expected to lessen the GHG impacts discussed above."

Id. at 1223 (internal citations omitted).

Similar to the National Highway Traffic Safety Admin case, the EA at issue here does not provide any clear or convincing statement of reasons for a finding of no significant impact. The EA discusses generally and vaguely the amount of surface disturbance that may result from leasing, the number of wells that might be drilled, the types of pollutants that may be emitted during development and production; but it does not discuss the potential impacts of any of these on climate change or the human environment. BLM cannot simply jump to the conclusion that its stipulations and proposed mitigation measures will lessen the potential impacts to the level of insignificance.

In evaluating the significance of the impact of the proposed action, the agency must consider both the context of the action as well as the intensity. The several contexts in which the significance of an action must be analyzed includes: "society as a whole (human, national), the affected region, the affected interests, and the locality." 40 C.F.R. § 1508.27. For site-specific actions, significance usually depends on the impact of the action on the locale, id., but in light of the recent Paris Agreement, it also depends on the impact on the world as a whole. Thus, to determine the significance of the action, BLM needed to look at not only the environmental impacts on the area to be leased, but also the analysis of the cumulative effects of oil and gas leasing on climate change.

Intensity is determined by scrutinizing the ten factors described in 40 C.F.R. § 1508.27:

> (1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
>
> (2) The degree to which the proposed action affects public health or safety.
>
> (3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
>
> (4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.
>
> (5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
>
> (6) 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.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) 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.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

The presence of any *one* of these factors may be sufficient to require an EIS. Id. Several of these factors are implicated in this lease sale. The ones we highlight here in this protest are discussed in greater detail below. For one, there is a clear "controversy" regarding the nature of the drilling to occur on the leases and the potential impacts drilling would impose on air, water, soil, and wildlife resources among other things. A proposal is highly controversial when "substantial questions are raised as to whether a project... may cause significant degradation" of a resource. Northwest Envtl. Def. Ctr. v. Bonneville Power Admin., 117 F.3d 1520, 1536 (9th Cir. 1997). A substantial dispute may concern the "size, nature, or effect" of the action. Blue Mts. Biodiversity Project v. Blackwood, 161 F.3d 1208, 1212 (9th Cir. 1998).

We ask that BLM take a "hard look" at the potential impacts that leasing these parcels would have on water resources especially. The EA admits that "Hydraulic Fracturing is one of these methods that may be reasonably foreseeable for leases proposed for this sale"[3] and provides very general information on the controversial method, yet failed to provide any analysis of the impacts that the use of such methods in the areas to be leased would have on the water resources specific to that area. Subsequent development of a lease may result in long-and short term alterations to the hydrologic regime depending upon the location and intensity of development. Clearing, grading, and soil stockpiling activities associated with exploration and development actions could alter short term overland flow and natural groundwater recharge patterns.

Unconventional extraction methods such as hydraulic fracturing and horizontal drilling (hereinafter referred to as "fracking") requires the use of tremendous amounts of freshwater. Typically between 2 and 5.6 million gallons of water are required to frack each well.[4] These

[3] EA at 6.
[4] U.S. Government Accountability Office, Unconventional Oil and Gas Development – Key Environmental and Public Health Requirements at 17, GAO 12-874 (2012), http://www.gao.gov/products/GAO-12-874.

volumes far exceed the amounts used in conventional natural gas development.[5] Such high levels of water use are unsustainable. Nevada is the driest state in the Union, and water is often in short supply, which makes this a highly controversial matter. Water used in large quantities may lead to several kinds of critically harmful environmental impacts. The extraction of water for fracking can, for example, lower the water table, affect biodiversity, harm local ecosystems, and reduce water available to communities.[6]

However, BLM's generic analysis resulted in the arbitrary conclusion that although "potential exploration and development would likely result in additional water diversion" and "surface water quality could be affected by development," the "incremental increase in these impacts is small when compared to the level of impacts that already exist in the sub-basins as described above in the Affected Environment section. Based on conditions of approval and stipulations imposed on APD proposals these impacts would be minimized."[7]

The claim that "the incremental increase in these impacts is small when compared to the level of impacts that already exist in the sub-basins" is not a convincing basis for a finding of no significant impact. The argument that greater impacts already exist does not negate the potential impacts of leasing the parcels at issue.

Furthermore, BLM's estimates regarding surface disturbance is based on historic information from decades old RMPs which apparently do not take into account the recent sharp increase in leasing nominations and initial instances of fracking use in Nevada.[8] BLM should have considered in its EA the increased industry interest in Nevada oil and gas, and the potential for drilling levels to increase, should oil prices rise or well stimulation techniques change the production potential of Nevada hydrocarbon-bearing formations.

iii. BLM Violated its Statutory Duty to Prepare an Environmental Impact Statement ("EIS") under NEPA.

"[T]o prevail on a claim that the agency violated its statutory duty to prepare an EIS, a plaintiff need not show that significant effects will in fact occur. It is enough for the plaintiff to raise substantial questions whether a project may have a significant effect on the environment." Ctr. for Biological Diversity & Sierra Club v. BLM, 937 F. Supp. 2d 1140, 1154 (N.D. Cal. 2013). The significance of the impact of the proposed action depends on both the context of the action as well as the intensity. Id.

Numerous environmental harms may result from unconventional methods used by the industry to extract oil and gas, including hydraulic fracturing and horizontal drilling, as well as

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[5] *See* Clark, Corrie E. et al., Life Cycle Water Consumption for Shale Gas and Conventional Natural Gas, Environ. Sci. Technol., 2013, 47 (20), pp 11829–11836, abstract available at http://pubs.acs.org/doi/abs/10.1021/es4013855.

[6] International Energy Agency, Golden Rules for the Golden Age of Gas at 31-32 (2012).

[7] EA at 90.

[8] *See* BLM Nevada, 2015 and 2016 Expressions of Interest, *available at* http://www.blm.gov/nv/st/en/prog/minerals/leasable_minerals/oil__gas/oil_and_gas_leasing.html; Jeff DeLong, "Fracking Hits Home in Nevada," *Reno Gazette-Journal* (April 15, 2014)

concerns relating to climate change. BLM has asserted either that the issues went beyond the scope of the EA or that BLM was not required to look at these issues until it received an APD proposal from the industry. As we have already explained above, this is unlawful. The impact of fracking alone raises substantial questions on whether the proposed project may have significant effects on the environment. Additionally, we raised several highly controversial issues below. BLM therefore has a duty to prepare an EIS on the issues required by NEPA, including the issues we raised in scoping and in commenting on the EA.

B. BLM Failed to Take a Hard Look at the Foreseeable Impacts of Leasing

BLM has not provided any environmental review of the parcels at issue or any site-specific analysis of the potential environmental impacts from the proposed action. In particular, BLM failed to take a hard look at the potential impacts of the proposed action on water resources, air quality, climate change, human health and safety, seismicity, and sensitive species of plants and wildlife:

i. BLM does not Consider Potential Impacts to Greater Sage-Grouse Populations and Habitat in the EA

The greater sage-grouse is a BLM sensitive species. In September 2015, all BLM resource management plans for Nevada and Northeastern California, including Battle Mountain, were amended as part of an effort to secure adequate regulatory mechanisms to prevent the listing of the greater sage-grouse under the Endangered Species Act.[9] Because oil and gas development and associated infrastructure has numerous well-documented adverse effects on GRSG survival, breeding, and behavior, these plan amendments prescribe management measures for BLM-permitted activities, including oil and gas leasing, within various categories (Sagebrush Focal Areas ("SFAs"), Priority Habitat Management Areas ("PHMAs"), General Habitat Management Areas ("GHMAs") and Other Habitat Management Areas ("OHMAs")) of sage-grouse habitat,[10] and prescribed stipulations for all new fluid mineral leases within those designated habitats.[11]

Given the significance of the potential impacts that oil and gas development could have on the species, proper investigation here is crucial. BLM is required under NEPA to collect data particular to the region affected by the leases.[12] Summarizing general data about greater sage-grouse before dismissing the issue as insignificant does not provide the "hard look" that NEPA requires.[13] The EA contains only the most cursory mention of the presence of greater sage-grouse within the Elko District, but no discussion of the impacts of oil and gas development on the species, its behavior, survival, and persistence. The EA could have, and should have,

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[9] See BLM, Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment (Sept. 2015) ("NV/NE CA RMPA").
[10] NV/NE CA RMPA at 2-29 to 2-30.
[11] NV/NE CA RMPA Appendix G.
[12] See Center. for Biological Diversity, 937 F. Supp. 2d at 1159 (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.").
[13] Id. (Held BLM did not provide the "hard look" that NEPA requires because it "never collected any data particular to the region affected by the leases, instead opting to summarize general data.").

provided site-specific analysis based on information regarding the greater-sage population and habitat in or surrounding the area to be leased that may be affected by the oil and gas development on these parcels. It could also have disclosed the substantive science regarding effects of oil and gas development on greater sage-grouse, including discussion of the need for buffers around leks, nesting areas, and winter range. BLM's decision not to prepare an EIS and to go forward with the lease sale is based on the unreasonable lack of consideration of how fracking could impact the population and habitat of the GRSG on and surrounding the parcels that are being offered for lease sale, and is therefore arbitrary and capricious.

ii. BLM Failed to Adequately Address Potential Impacts to Threatened and Endangered Species, as Required by NEPA

BLM failed to adequately address in the EA the potential impacts from the proposed oil and gas leasing on special status species including those that are federally designated as threatened or endangered with extinction. Several of such species occur on the parcels for lease, including Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), which is listed as a Threatened species under the Endangered Species Act; Preble's shrew, which is known to inhabit portions of the EDO; Pygmy rabbits which also have been documented throughout the EDO; and numerous bat species such as the Townsend's big-eared bat which occupy yearlong or winter roost sites within the area of the proposed action. In determining whether NEPA requires an EIS for a proposed action, agencies must consider the degree to which the action may adversely affect threatened or endangered species, or their critical habitat. 40 C.F.R. § 1508.27(b)(9). In its EA, BLM failed to provide the required hard look at the potential impacts to listed species and their habitat.

The EA fails to provide any analysis of the foreseeable impacts to these populations or wildlife resources. Instead, BLM states that:

> Stipulations are in place to prevent or minimize adverse effects to special status species that must be complied with as a term of lease purchase. An inventory for special status species is required on leased parcels in known or potential habitat for threatened, endangered, or candidate species. If BLM determines an action "may affect" a listed threatened or endangered species Section 7 Consultation with the USFWS will be initiated.[14]

However, BLM does not provide any analysis of the effectiveness of these stipulations to minimize effects in the face of climate change, which we discuss in greater detail below. There is no indication that BLM has considered how leasing and drilling activities could fragment habitat or affect water depletions. BLM simply refers to a few mitigation measures with no analysis or any scientific data showing that these mitigation measures will prevent any significant effect on these endangered species. BLM may take into account any best management practices, standards of practice, or other mitigation measure in its analysis of foreseeable impacts, but cannot claim – without analysis and quantification of potential effects and of effectiveness of

[14] EA at 96.

these measures – that no significant impacts would result from BLM's action simply because there are any protective measures in place.

The expansion of oil and gas development activities will harm wildlife through habitat destruction and fragmentation, stress and displacement caused by development-related activities (e.g., construction and operation activities, truck traffic, noise and light pollution), surface water depletion leading to low stream flows, water and air contamination, introduction of invasive species, and climate change. These harms can result in negative health effects and population declines. Because the allowance of destructive oil and gas extraction runs contrary to BLM's policy of managing resources in a manner that will protect the quality of ecological values and provide habitat for wildlife, [15] a no-fracking alternative minimizing industrial development and its harmful effects on wildlife must be considered. At the very least, BLM must take a hard look at the imminent threats to the critically imperiled species in the area before allowing such an action to go through.

iii. BLM Failed to Take a Hard Look at Impacts to Water Resources

BLM failed to consider the impacts that oil and gas operations, including hydraulic fracturing and other unconventional stimulation methods, will have on the water resources in the areas to be leased. For example, BLM failed to consider the increased risk of spills and leaks that will result from new leasing within the planning area, which the EA describes as "semi-arid" in which surface water is limited.[16] Thus spills within the sub-basins, which according to the EA encompasses 1000 groundwater wells, could be particularly detrimental to the endangered fish and their critical habitat, as well as to municipalities, livestock, and wildlife that may use the water resources in the proposed action area.

The likelihood that the sale will result in fracking raises several issues that BLM failed to address:

- Where will the water come from and what are the impacts of extracting it?
- What chemicals will be used in the drilling and fracking process?
- How will BLM ensure the collection and disclosure of that information?
- What limitations will BLM place on the chemicals used in order to protect public health and the environment?
- What measures will BLM require to ensure adequate monitoring of water impacts, both during and after drilling?
- What baseline data is available to ensure that monitoring of impacts can be carried out effectively? How will BLM collect baseline data that is not currently available?
- Much of the fracking fluid return to the surface as toxic waste. Where will the discharge go?
- Is there the potential for subsurface migration of fracking fluids, or the potential for those fluids to escape into the groundwater by way of a faulty casing?

[15] 43 U.S. Code § 1701(a)(8).
[16] EA at 49.

- What kinds of treatment will be required?
- What is the potential footprint and impact of the necessary treatment facilities?

BLM's analysis of potential impacts to water must take account of all significant and "foreseeable" impacts to water that may arise from the sale, including the following issues.

a. Contamination

Across the U.S., in states where fracking or other types of unconventional oil and gas recovery has occurred, surface water and groundwater have been contaminated. Recent studies have concluded that water contamination attributed to unconventional oil and gas activity has occurred in several states, including Colorado,[17] Wyoming,[18] Texas,[19] Pennsylvania,[20] Ohio,[21] and West Virginia.[22] Surface waters can be contaminated in many ways from unconventional well stimulation. In addition to storm water runoff, surface water contamination may also occur from chemical and waste transport, chemical storage leaks, and breaches in pit liners.[23]

The potential for spills to move from tributaries into endangered fish critical habitat within main-stem rivers was shown by a 2014 spill into the Green River. On the night of May 20, 2014 an oil well operated by SW Energy on lands administered by BLM "blew out," leaking an estimated 100 barrels per hour of crude oil and production water into Salt Wash which leads to the Green River. SW Energy did not shut-in the well until 1:20 p.m. on May 22, at least 36 hours later. On May 24, flooding from a thunderstorm "overcame prevention measures" washing an unknown quantity of oil and produced water 1.5 miles from Salt Wash into the Green River and critical habitat for endangered fish.[24] The U.S. Fish and Wildlife Service's recent Biological

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[17] Trowbridge, A., *Colorado Floods Spur Fracking Concerns*, CBS News, Sept. 17, 2013, *available at* http://www.cbsnews.com/8301-201_162-57603336/colorado-floods-spur-fracking-concerns/ ("Trowbridge 2013") (accessed July 30, 2015).

[18] U.S. Environmental Protection Agency, Draft Investigation of Ground Water Contamination near Pavillion, Wyoming (2011) ("USEPA Draft Pavillion Investigation"); See also DiGiulio, D. and Jackson, R., *Impact to Underground Sources of Drinking Water and Domestic Wells from Production Well Stimulation and Completion Practices in the Pavillion, Wyoming, Field.* Environ. Sci. Technol., Pp 4524-4536 (2016) ("DiGiulio, 2016").

[19] Fontenot, Brian et al., An evaluation of water quality in private drinking water wells near natural gas extraction sites in the Barnett Shale Formation, Environ. Sco. Technol., DOI: 10.1021/es4011724 (published online July 25, 2013) ("Fontenot 2013").

[20] Jackson, Robert et al., Increased Stray Gas Abundance in a Subset of Drinking Water Wells near Marcellus Shale Gas Extraction, Proc. Natl. Acad. of Sciences Early Edition, doi: 10.1073/pnas.1221635110/-/DCSupplemental (2013) ("Jackson 2013").

[21] Shulman, Seth, *Ohio Wake-Up Call On Fracking Disclosure Laws*, Union of Concerned Scientists, August 2014, *available at* http://www.ucsusa.org/publications/got-science/2014/got-science-august-2014.html#.V0NKhvkrK2w.

[22] Begos, K., *Four States Confirm Water Pollution*, Associated Press (January 5, 2014), *available at* http://www.usatoday.com/story/money/business/2014/01/05/some-states-confirm-water-pollution-from-drilling/4328859/ (accessed July 29, 2015); *see also* U.S. EPA, Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources, External Review Draft (June 2015) ("EPA 2015"), *available at* http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=523539 (accessed July 30, 2015).

[23] Vengosh, Avner et al., A Critical Review of the Risks to Water Resources from Unconventional Shale Gas Development and Hydraulic Fracturing in the United States, Environ. Sci. Technol., DOI: 10.1021/es405118y (2014) ("Vengosh 2014").

[24] BLM. 2014. Update Salt Wash Oil Spill, available at http://www.blm.gov/ut/st/en/fo/moab/SaltWashSpill.html.

Opinion for the Gasco Energy Inc. Field Development Project anticipates these events and the potential for more frequent spills given expanded drilling:

> There is a greater potential for impacts from pollutants, if a pipeline, well pit, or other source were to inadvertently release contaminated fluids into waterways at points near the Green and White Rivers. Through direct or indirect discharge, these pollutants could reach the Green River and negatively impact water quality to the point of affecting native fish populations. Direct impacts will result from a discharge from a pipeline or well pit reaching the Green River in its original form or within a single release event. Indirect effects occur when discharges are released to the ground and are later released to the river after being carried by an erosion event or carried by rain or snowmelt runoff. As more well and pipeline development occurs in the project area the chance of pollutants reaching the Green River increases, thus increasing the potential of harm to native fish populations.[25]

Like the above Green River incident, some spills or leaks are not detected until long after they have started.[26]

The spilling or leaking of fracking fluids, flowback, or produced water is a serious problem. Harmful chemicals present in these fluids can include volatile organic compounds ("VOCs"), such as benzene, toluene, xylenes, and acetone.[27] As much as 25 percent of fracking chemicals are carcinogens,[28] and flowback can even be radioactive.[29] As described below, contaminated surface water can result in many adverse effects to wildlife, agriculture, and human health and safety. It may make waters unsafe for drinking, fishing, swimming and other activities, and may be infeasible to restore the original water quality once surface water is contaminated. BLM should consider these impacts in the EIS.

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[25] Fish and Wildlife Service, Biological Opinion for the Gasco Energy Inc. Field Development Project ("Gasco BO"), Dec. 2011, p. 26, available at http://www.blm.gov/style/medialib/blm/ut/vernal_fo/planning/gasco_eis/gasco_rod.Par.56176.File.dat/Gasco%20ROD%20Attachment%205%20BO.pdf.

[26] *See* MacPherson, James, "ND wants answers on ruptured pipeline inspections," AP, Oct. 16, 2013, available at http://bigstory.ap.org/article/experts-question-north-dakota-oil-spill-estimates (spill released from quarter-inch pipeline hole contaminated wheat field the size of seven football fields); Vanderklippe, Nathan. "Spill sends 22,000 barrels of oil mix into Alberta muskeg," *The Globe and Mail*, May 30, 2012, available at http://www.theglobeandmail.com/globe-investor/spill-sends-22000-barrels-of-oil-mix-into-alberta-muskeg/article4219809/ (22,000-barrel wastewater pipeline spill not detected until after it had reached surface waters and was spotted by aircraft); Vanderklippe, "Toxic waste spill in northern Alberta biggest of recent disasters in North America," *The Globe and Mail*, June 12, 2013, available at http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/apache-pipeline-leaks-60000-barrels-of-salty-water-in-northwest-alberta/article12494371/ (9.5 million liter spill of produced water from pipeline suspected to be "longstanding" given the extent of damage over 42 hectares).

[27] U.S. Environmental Protection Agency, Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (Nov. 2011) ("EPA Plan to Study Fracking Impacts").

[28] Colborn 2011.

[29] EPA Plan to Study Fracking Impacts; White, Ivan E., Consideration of radiation in hazardous waste produced from horizontal hydrofracking, National Council on Radiation Protection (2012).

1) Groundwater Contamination

Contamination of groundwater is a significant concern that is important for BLM to analyze. Although BLM mentions the abundance of groundwater[30] and the presence of up to 1000 ground wells in the action area, BLM does not provide any analysis or explanation as to how potential impacts to these wells are insignificant. Contamination of groundwater of these drinking water sources is a real risk, as evidenced by recent studies showing that groundwater contamination in the Barnett Shale region is likely a result of unconventional well development activities.[31] One report showed that for decades, Texas oil and gas regulators ignored federal requirements governing injection of wastewater into underground sources of drinking water.[32] Another study detected "multiple volatile organic carbon compounds throughout the region, including various alcohols, the BTEX family of compounds, and several chlorinated compounds" in private and public drinking water well samples drawn from aquifers overlying the Barnett shale formation."[33] Another study found that "arsenic, selenium, strontium and total dissolved solids (TDS) exceeded the Environmental Protection Agency's Drinking Water Maximum Contaminant Limit (MCL) in some samples from private water wells located within 3 km of active natural gas wells," while lower levels of these contaminants were found at sites outside the Barnett Shale region, as well as sites within the Barnett Shale region located more than 3 km from active natural gas wells.[34] Many of the detected compounds were associated with unconventional oil and gas extraction.[35]

Once groundwater is contaminated, it is very difficult, if not impossible, to restore the original quality of the water. As a result, in communities that rely on groundwater drinking water supplies, groundwater contamination can deprive communities of usable drinking water. Such long-term contamination necessitates the costly importation of drinking water supplies. According to the EPA, "evidence of any fracturing-related fluid migration affecting drinking water resources...could take years to discover."[36] Another study based on modeling found that advective transport of fracking fluid from a fracked well to an aquifer could occur in less than 10 years.[37] Unfiltered drinking water supplies, such as drinking water wells, are especially at risk because they have no readily available means of removing contaminants from the water. Even water wells with filtration systems are not designed to handle the kind of contaminants that result from unconventional oil and gas extraction.[38] In some areas hydraulic fracturing may occur at

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[30] EA at 49.
[31] Hildenbrand, Zacariah, A Comprehensive Analysis of Groundwater Quality in The Barnett Shale Region, Environ. Sci. Technol. (June 16, 2015), available at http://pubs.acs.org/doi/abs/10.1021/acs.est.5b01526.
[32] Clean Water Action, Texas Aquifer Exemptions: Ignoring Federal Law to Fast Track Oil & Gas Drilling, August 2016.
[33] *Id.*
[34] Fontenot, Brian et al., An Evaluation of Water Quality in Private Drinking Water Wells Near Natural Gas Extraction Sites in the Barnett Shale Formation, Environ. Sci. Technol., 47 (17), 10032–10040 DOI: 10.1021/es4011724, available at http://pubs.acs.org/doi/abs/10.1021/es4011724 ("Fontenot 2013").
[35] *Id.*
[36] EPA 2015 at 6-56 – 6-57.
[37] Myers, Tom, Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers, Ground Water 50, no. 6, p. 1 (2012).
[38] Physicians, Scientist & Engineers for Healthy Energy, Letter from Robert Howarth Ph.D. and 58 other scientists to Andrew M. Cuomo, Governor of New York State re: municipal drinking water filtration systems and hydraulic

shallower depths or within the same formation as drinking water resources, resulting in direct aquifer contamination.[39] BLM failed in its EA to disclose where the potential for such drilling exists.

Groundwater contamination can occur in a number of ways, and the contamination may persist for many years,[40] including surface spills and leaks; methane and fracking fluid migration via abandoned wells, natural faults, or intentionally created fractures; failed or degraded casings; and improperly constructed wells. For example, fluids and hydrocarbons may contaminate groundwater by migrating through newly created or natural fractures.[41] Many unconventional techniques intentionally fracture the formation to increase the flow of gas or oil. New cracks and fissures can allow the additives or naturally occurring elements such as natural gas to migrate to groundwater. "[T]he increased deployment of hydraulic fracturing associated with oil and gas production activities, including techniques such as horizontal drilling and multi-well pads, may increase the likelihood that these pathways could develop," which, "in turn, could lead to increased opportunities for impacts on drinking water sources."[42] Fluids can also migrate through pre-existing and natural faults and fractures that may become pathways once the fracking or other method has been used. BLM acknowledged these risks briefly in its EA but failed to prepare an EIS based on these risks or provide any statement of convincing reasons as to why it finds these risks to be insignificant.

A well in which stimulation operations are being conducted may also "communicate" with nearby wells, which may lead to groundwater and surface contamination, particularly if the nearby wells are improperly constructed or abandoned.[43] In the last 150 years, as many as 12 million "holes" have been drilled across the United States in search of oil and gas, many of which are old and decaying, or are in unknown locations.[44] Fracking can contaminate water resources by intersecting one of those wells. For instance, one study found at least nineteen instances of fluid communication in British Columbia and Western Alberta.[45] Wells as far away as 1.8 miles away have provided pathways for surface contamination.[46] And given that a substantial portion of wells experience well barrier or integrity failure—6.3% in the Marcellus shale between 2005 and 2013—the threat of groundwater contamination is not at all

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fracturing fluid (Sept 15, 2011), *available at* http://www.psehealthyenergy.org/data/Cuomo_ScientistsLetter_15Sep20112.pdf (accessed July 29, 2015).

[39] EPA 2015 at ES-15.

[40] Myers, Tom, Potential Contamination Pathways from Hydraulically Fractured Shale to Aquifers, National Groundwater Association (2012).

[41] EPA Draft Pavillion Investigation; Warner, Nathaniel R., et al., Geochemical Evidence for Possible Natural Migration of Marcellus Formation Brine to Shallow Aquifers in Pennsylvania, PNAS Early Edition (2012).

[42] EPA 2015 at 6-55.

[43] *See* Detrow, Scott. (2012) *Perilous Pathways: How Drilling Near An Abandoned Well Produced a Methane Geyser*, StateImpact Pennsylvania, National Public Radio (October 9, 2012), *available at* https://stateimpact.npr.org/pennsylvania/2012/10/09/perilous-pathways-how-drilling-near-an-abandoned-well-produced-a-methane-geyser/ (accessed July 29, 2015); Alberta Energy Board, Directive 083: Hydraulic Fracturing – Subsurface Integrity, Alberta Energy Regulator (2013), *available at* http://www.aer.ca/documents/directives/Directive083.pdf.

[44] Kusnetz, Nicholas, *Deteriorating Oil and Gas Wells Threaten Drinking Water, Homes Across the Country*, ProPublica (April 4, 2011).

[45] BC Oil & Gas Commission, Safety Advisory 2010-03, Communication During Fracture Stimulation (2010).

[46] King, Pamela, *'Frack hits' provide pathways for methane migration study*, E&E News (Oct. 21, 2015).

hypothetical.[47] Dr. Ingraffea of Cornell has noted an 8.9 percent failure rate for wells in the Marcellus Shale.[48] Improper well construction and surface spills are cited as a confirmed or potential cause of groundwater contamination in numerous incidents at locations across the U.S. including but not limited to Colorado,[49] Wyoming,[50] Pennsylvania,[51] Ohio,[52] West Virginia,[53] and Texas.[54] Again, BLM failed to provide the public with a thorough analysis of the impacts of these spills. For unexplained reasons, BLM decided not to prepare any EIS despite the risks of contamination.

The Draft EPA Investigation of Ground Water Contamination near Pavillion, Wyoming, found that chemicals found in samples of groundwater were from fracked wells.[55] These results have been confirmed with follow-up analyses.[56] Another study based on modeling found that advective transport of fracking fluid from a fracked well to an aquifer could occur in less than 10 years.[57] The injection of fracking waste underground can also lead to leaks and spills.[58] Massive volumes of chemicals and wastewater are used or produced in oil and gas operations. Between 2,600 to 18,000 gallons of chemicals are injected per hydraulically fracked well depending on

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[47] Davies, Richard J. et al. Oil and gas wells and their integrity: Implications for shale and unconventional resource exploitation, Marine and Petroleum Geology 56 (2014) 239e254, available at http://ac.els-cdn.com/S0264817214000609/1-s2.0-S0264817214000609-main.pdf?_tid=7344676e-d5f1-11e5-9200-00000aab0f02&acdnat=1455767050_bdf90f64ecdb607187778614024039c4.

[48] Ingraffea, Anthony R., Some Scientific Failings within High Volume Hydraulic Fracturing Proposed Regulations 6 NYCRR Parts 550-556, 560, Comments and Recommendations Submitted to the NYS Dept. of Environmental Conservation (Jan 8, 2013).

[49] Gross, Sherilyn A. et al., Abstract: Analysis of BTEX groundwater concentrations from surface spills associated with hydraulic fracturing operations, 63 J. Air and Waste Mgmt. Assoc. 4, 424 doi: 10.1080/10962247.2012.759166 (2013).

[50] U.S. Environmental Protection Agency, Draft Investigation of Ground Water Contamination Near Pavillion, Wyoming (2011) ("EPA Draft Pavillion Investigation").

[51] Darrah, Thomas H. et al., Noble Gases Identify the Mechanisms of Fugitive Gas Contamination in Drinking-Water Wells Overlying the Marcellus and Barnett Shales, Proc. Natl. Acad. Of Sciences Early Edition, doi: 10.1073/pnas.1322107111 (2014) ("Darrah 2014").

[52] Begos, Kevin, *Some States Confirm Water Pollution from Oil, Gas Drilling*, Seattle Times, Jan. 6, 2014, http://www.seattletimes.com/business/some-states-confirm-water-pollution-from-oil-gas-drilling/ (accessed July 29, 2015) ("Begos, Seattle Times, Jan 6, 2014"); *see also* Ohio Department of Natural Resources, *Report on the Investigation of the Natural Gas Invasion of Aquifers in Bainbridge Township of Geauga County, Ohio* (Sep. 2008) ("ODNR 2008").

[53] Begos, Seattle Times, Jan 6. 2014.

[54] Darrah 2014.

[55] EPA Draft Pavillion Investigation.

[56] DiGiulio, 2016; Drajem, Mark, *Wyoming Water Tests in Line with EPA Finding on Fracking*, Bloomberg (Oct. 11, 2012); U.S. Environmental Protection Agency, Investigation of Ground Water Contamination near Pavillion, Wyoming Phase V Sampling Event - Summary of Methods and Results (September 2012); Myers, Tom, Review of DRAFT: Investigation of Ground Water Contamination near Pavillion Wyoming Prepared by the Environmental Protection Agency, Ada OK (Apr. 30, 2012).

[57] Myers, Tom, Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers, Ground Water 50, no. 6, p. 1 (2012).

[58] Kusnetz, Nicholas, North Dakota's Oil Boom Brings Damage Along with Prosperity at 4, ProPublica (June 7, 2012); Lustgarten, Abraham, Polluted Water Fuels a Battle for Answers, ProPublica (2012); Lustgarten, Abraham, Injection Wells: The Poison Beneath Us, ProPublica at 2 (2012); Lustgarten, Abraham, Whiff of Phenol Spells Trouble, ProPublica (2012).

the number of chemicals injected.[59] This waste can reach fresh water aquifers and drinking water.

BLM failed to analyze mitigation measures beyond "the standards of the State of Nevada,"[60] as existing requirements may not be adequate to protect groundwater from potential fracking fluid contamination. BLM's only attempt at a "convincing statement of reason" is that it does not "allow" unauthorized contamination of freshwater aquifers. That BLM does not allow such contamination to happen does not necessarily prevent all risks of contamination. BLM provides the public with no other reason to believe that these risks are insignificant.

2) Contamination from Chemical and Waste Transport

Produced waters that fracking operations force to the surface from deep underground can contain high levels of total dissolved solids, salts, metals, and naturally occurring radioactive materials.[61] If spilled, the effects of produced water or brine can be more severe and longer-lasting than oil spills, because salts do not biodegrade or break down over time.[62] The only way to deal with them is to remove them.[63] The accumulation of long-lived isotopes of radium has been observed in the sediments and soils of produced-water spill sites.[64] Due to its relatively long half-life, radium contamination could remain in the soil for thousands of years.[65] Flowback waters (i.e., fracturing fluids that return to the surface) may also contain similar constituents along with fracturing fluid additives such as surfactants and hydrocarbons.[66] Given the massive volumes of chemicals and wastewater produced, their potentially harmful constituents, and their persistence in the environment, the potential for environmental disaster is real.

Fluids must be transported to and/or from the well, which presents opportunities for spills.[67] Unconventional well stimulation relies on numerous trucks to transport chemicals to the site as well as collect and carry disposal fluid from the site to processing facilities. A U.S. Government Accountability Office (GAO) study found that up to 1,365 truck loads can be required just for the drilling and fracturing of a single well pad[68] while the New York Department of Conservation estimated the number of "heavy truck" trips to be about 3,950 per

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[59] EPA 2015 at ES-12.
[60] EA at 54.
[61] Brittingham, Margaret C. et al., Ecological Risks of Shale Oil and Gas Development to Wildlife, Aquatic Resources and their Habitats, Environ. Sci. Technol. 2014, 48, 11034-11047, p. 11039; Lauer, Nancy E. Brine Spills Associated with Unconventional Oil Development in North Dakota. Environmental Science & Technology Article ASAP, DOI: 10.1021/acs.est.5b06349 (April 27, 2016), available at http://pubs.acs.org/doi/abs/10.1021/acs.est.5b06349 (finding contaminants such as ammonium, selenium, and lead at produced-water spill sites in North Dakota, and contamination in violation of national water quality regulations
[62] *Id.* at G (observing contamination from produced water "is remarkably persistent in the environment" and "elevated levels of salts and trace elements...can be preserved in spill sites for at least months to years"); King, Pamela, *Limited study supports findings on bigger brine spill risks*, E&E News (Nov. 4, 2015) ("King 2015")
[63] *Id.*
[64] Lauer 2016 at G.
[65] *Id.*
[66] King 2015.
[67] Warco, Kathy, *Fracking truck runs off road; contents spill*, Observer Reporter (Oct 21, 2010).
[68] U.S. Government Accountability Office, Oil and Gas: Information on Shale Resources, Development, and Environmental and Public Health Risks, GAO 12-732 (2012) at 33.

horizontal well (including unloaded and loaded trucks).[69] Accidents during transit may cause leaks and spills that result in the transported chemicals and fluids reaching surface waters. Chemicals and waste transported by pipeline can also leak or spill. There are also multiple reports of truckers dumping waste uncontained into the environment.[70]

BLM did not take any look at how often accidents can be expected to occur, and the effect of chemical and fluid spills on present resources. Such analysis should have included identification of the particular harms faced by communities near oil and gas fields. BLM failed to include specific mitigation measures and alternatives based on a cumulative impacts assessment, and the particular vulnerabilities of environmental justice communities in both urban and rural settings.

3) Contamination from On-site Chemical Storage and Processing

Thousands of gallons of chemicals can be potentially stored on-site and used during hydraulic fracturing and other unconventional well stimulation activities.[71] These chemicals can be susceptible to accidental spills and leaks. Natural occurrences such as storms and earthquakes may cause accidents, as can negligent operator practices.

Some sites may also use on-site wastewater treatment facilities. Improper use or maintenance of the processing equipment used for these facilities may result in discharges of contaminants. Other causes of spills include equipment failure (most commonly, blowout preventer failure, corrosion and failed valves) and failure of container integrity.[72] Spills can result from accidents, negligence, or intentional dumping.

BLM failed to examine and quantify the risks to human health and the environment associated with on-site chemical and wastewater storage, including risks from natural events and negligent operator practices. Again, such analysis should have included an analysis of potential impacts faced by environmental justice communities in both rural and urban settings, which BLM failed to consider.

4) Disposal of Drilling and Fracking Wastes

BLM recognizes disposal of wastes from oil and gas operations can also lead to contamination of water resources but does not explain how its recommended practices will eliminate or minimize the impacts resulting from potential sources of contamination, which include:

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[69] NYDEC SGEIS at Ch. 6 Potential Environmental Impacts (2015) at 6-306 –*available at* http://www.dec.ny.gov/docs/materials_minerals_pdf/fsgeis2015.pdf.

[70] Kusnetz, Nicholas, *North Dakota's Oil Boom Brings Damage Along with Prosperity* at 4, ProPublica (June 7, 2012) ("Kusnetz North Dakota"); E&E News, *Ohio man pleads not guilty to brine dumping* (Feb. 15, 2013); Ohio Department of Natural Resources ("ODNR"), *Ohio Pursues Action Against Companies for Illegal Brine Dumping*, June 4, 2013, *available at* http://ohiodnr.gov/news/post/ohio-pursues-action-against-companies-for-illegal-brine-dumping.

[71] EPA 2015 at ES-10.

[72] EPA 2015 at ES-11.

- leaching from landfills that receive drilling and fracking solid wastes;
- spreading of drilling and fracking wastes over large areas of land;
- wastewaters discharged from treatment facilities without advanced "total dissolved solids" removal processes, or inadequate capacity to remove radioactive material removal; and
- breaches in underground injection disposal wells.[73]

BLM mentions that recovered fluids can be handled by underground injection,[74] but does not analyze the impacts of that method. For example, U.S. EPA has found that California's Class II underground injection well program to be insufficiently protective of groundwater resources.[75]

BLM only threw out several methods[76] for handling recovered fluid but did not evaluate the potential for contamination from each of these disposal methods.

5) Contamination from Storm Water Runoff

Oil and gas operations require land clearance for access roads, pipelines, well pads, drilling equipment, chemical storage, and waste disposal pits. As a result, new oil and gas development will cause short-term disturbance as well as long-term disturbance within the areas for lease. While undisturbed land can retain greater amounts of water through plants and pervious soil, land that has been disturbed or developed may be unable to retain as much water, thereby increasing the volume of runoff. The area of land that is able to retain water will be significantly decreased if unconventional oil and gas extraction methods are permitted to expand.

Water from precipitation and snowmelt can serve as an avenue through which contaminants travel from an operation site to sensitive areas, including population centers. Contaminated water runoff may seep into residential areas, polluting streets, sidewalks, soil, and vegetation in urban areas, adversely affecting human health. Thus, not only do these oil and gas activities create pollution, they create greater conduits for storm water runoff to carry those pollutants from the operation site, into areas in which significant harm can be caused.

Rapid runoff, even without contaminants, can harm the environment by changing water flow patterns and causing erosion, habitat loss, and flooding. Greater runoff volumes may also increase the amount of sediment that is carried to lakes and streams, affecting the turbidity and chemical content of surface waters. Because a National Pollutant Discharge Elimination System

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[73] EPA 2015, 8-20, 8-36, 8-48, 8-65, 8-70; U.S. Geologic Society, Indication of Unconventional Oil and Gas Wastewaters Found in Local Surface Waters, available at http://toxics.usgs.gov/highlights/2016-05-09-uog_wastes_in_streams.html.

[74] EA at 4.

[75] Walker, James, California Class II UIC Program Review, Report submitted to Ground Water Office USEPA Region 9 at 119 (Jun. 2011); U.S. Environmental Protection Agency Region IX, Letter from David Albright, Manager Ground Water, to Elena Miller, State Oil and Gas Supervisor Dept of Conservation re California Class II Underground Injection Control (UIC) Program Review final report (July 18, 2011).

[76] EA at 4.

permit is not required for oil and gas operations,[77] it is particularly important that the impact of runoff is considered as part of the NEPA process.

b. Water Depletion

BLM failed to analyze the impacts of its action on water depletion. Although BLM acknowledges that some unconventional extraction techniques, most notably fracking, require the use of tremendous amounts of freshwater, BLM failed to disclose the impacts of water used in large quantities, which may lead to several kinds of harmful environmental impacts. The extraction of water for fracking can, for example, lower the water table, affect biodiversity, harm local ecosystems, and reduce water available to communities.[78] The only impact BLM mentioned with respect to water depletion is that "areas of hydric soils may be negatively affected."[79]

Withdrawal of large quantities of freshwater from streams and other surface waters will undoubtedly have an impact on the environment beyond hydric soils.[80] Withdrawing water from streams will decrease the supply for downstream users, such as farmers or municipalities, compounding existing shortages, which will only worsen with climate change. A Bureau of Reclamation report looks at how climate change will affect water supplies in the West and finds that warming weather will increase the likelihood of shortages, particularly for farmers.[81] More "extreme variations" in climate will make it difficult for Reclamation to meet competing demands for water. Building on a 2011 report that analyzed eight river basins, the new version analyzes nine: the Klamath, Truckee, Sacramento, San Joaquin, Lower Colorado, Rio Grande, Colorado, Columbia and Missouri. The rivers supply Reclamation with 10 trillion gallons of water per year for cities, as well as water for 10 million acres of irrigated farmland that supply more than half of U.S. vegetable production and more than a quarter of fruit and nut production.[82] The Bureau of Reclamation notes that the basins have already warmed by about 2 degrees Fahrenheit since 1895, which is only slightly more than the nationwide average of 1.3 to 1.9 F.[83] The report finds that more of the West's precipitation will fall as rain rather than snow, and predicts reductions in runoff entering rivers in the South. All areas are expected to see big changes in the timing of snowmelt, which will shift peak river flows earlier and earlier.[84]

Runoff and demand for irrigation will rise. In addition to runoff changes, increased temperatures are expected to increase the demand for irrigation water and for Reclamation's hydroelectricity, as well as for water dedicated to maintaining habitat for fish and other river species.[85] Collectively, the impacts of climate change to water resources give rise to difficult

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[77] 33 U.S.C. § 1342(l)(2).
[78] International Energy Agency, Golden Rules for the Golden Age of Gas at 31-32 (2012).
[79] EA at 48.
[80] *See* Entrekin, Sally et al., *Rapid Expansion of Natural Gas Development Poses a Threat to Surface Waters*, 9 Front Ecol. Environ. 9, 503 (2011); EPA 2015 at 4-16.
[81] U.S. Department of the Interior Bureau of Reclamation. Secure Water Act Section 9503(c) – Reclamation Climate Change and Water, at 10-13, March 2016.
[82] Kahn, Debra. 'Climate change bodes ill for Western supplies.' E&E Reporter: The Politics and Business of Climate Change. March 2016.
[83] Id.
[84] Id.
[85] Id.

questions about how best to operate Reclamation facilities to address growing demands for water and hydropower now and how to upgrade and maintain infrastructure to optimize operations in the future.[86]

Rising demand from oil and gas operators has already led to increased competition for water between farmers and oil and gas operators. In some regions of Colorado, farmers have had to fallow fields due to astronomical water prices.[87] For example, in prior years, farmers in Colorado have paid at most $100 per acre-feet of water in auctions held by cities with excess supplies, but in 2013 energy companies paid $1200 to $2,900 per acre-feet.[88] Reductions in stream flows may also lead to downstream water quality problems by diminishing the water bodies' capacity for dilution and degradation.

Furthermore, withdrawing large quantities of water from subsurface waters to supply oil and gas production will likely deplete and harm aquifers. Removing water from surface water or directly from underground sources of water faster than the rate that aquifers can be replenished will lower the volume of water available for other uses. Depletion can also lead to compaction of the rock formation serving as an aquifer, after which the original level of water volume can never be restored.[89] Depleted aquifer water resources may also adversely affect agriculture, species habitat and ecosystems, and human health.

The freshwater in the planning areas therefore would be greatly affected by the increased demand for water if fracking and other unconventional oil and gas extraction are permitted. It is amazing that BLM did not even mention how these techniques would affect the endangered Lahontan cutthroat trout. BLM should have analyzed in an EIS where water will be sourced, how much, and the effects on water sources under different alternatives. All of these effects must be analyzed in the context of increasing water scarcity in the planning area due to climate change, drought, and increasing population growth.

c. *Harm to Aquatic Life and Habitat*

The areas at stake in this lease sale are known to support the endangered Lahontan cutthroat trout. When streams and other surface waters are depleted, the habitat for countless plants and animals will be harmed, and the depletion places tremendous pressure on species that depend on having a constant and ample stream of water. Oil and gas activities could also increase the risk of toxic spills and leaks, harming aquatic species that inhabit areas downstream from spill sites. A pair of studies that compared water quality downstream from a wastewater injection site in West Virginia to that of upstream areas found (1) downstream sites had elevated

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[86] U.S. Department of the Interior Bureau of Reclamation. Secure Water Act Section 9503(c) – Reclamation Climate Change and Water at 1-10.

[87] Healy, Jack. For Farmers in the West, Oil Wells are Thirsty Rivals, The New York Times (Sept. 5,2012), available at http://www.nytimes.com/2012/09/06/us/struggle-for-water-in-colorado-with-rise-in-fracking.html?_r=0 (accessed July 29, 2015); Burke, Garance. Fracking fuels water fights in nation's dry spots, Associated Press (June 17, 2013), available at http://news.yahoo.com/fracking-fuels-water-fights-nations-dry-spots-133742770.html.

[88] *Id.*

[89] Freyman, Monika and Ryan Salmon, Hydraulic Fracturing and Water Stress: Growing Competitive Pressures for Water, CERES, 9 (2013) ("Freyman 2013"), *available at* http://www.ceres.org/resources/reports/hydraulic-fracturing-water-stress-water-demand-by-the-numbers.

levels of endocrine-disrupting chemicals at levels known to adversely affect aquatic organisms; and (2) microbial communities in downstream sediments had lower diversity and shifts in community composition, altering microbial activity and potentially impacting nutrient cycling.[90] Such impacts must (a) be adequately analyzed in an EIS and (b) undergo full and up-to-date consultation with the Fish and Wildlife Service under Section 7 of the Endangered Species Act, using the best and most recent scientific data regarding Colorado River flows and the status of the four endangered fishes.

Physical habitats such as banks, pools, runs, and glides (low gradient river sections) are important yet susceptible to disturbance with changing stream flows.[91] Altering the volume of water can also change the water's temperature and oxygen content, harming some species that require a certain level of oxygenated water. Decreasing the volume of streamflow and stream channels by diverting water to fracking would have a negative impact on the environment.

BLM further failed to take into consideration the impacts of climate change on these water resources, such as the decline in stream flows. Numerous climate change models show anthropogenic climate change is profoundly impacting water resources such as the Colorado River in ways that are altering temperature[92], streamflow[93], and the hydrologic cycle.[94] Changes observed to date include rising temperatures, earlier snowmelt and streamflow, decreasing snowpack, and declining runoff and streamflow.[95] Modeling studies project that these changes will only worsen, including continued declines in streamflow and intensification of drought.[96]

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[90] Akob, D.M., et al., 2016, Wastewater disposal from unconventional oil and gas development degrades stream quality at a West Virginia injection facility: Environmental Science and Technology, doi:10.1021/acs.est.6b00428 (Advanced Web release); Kassotis, C.D., et al., 2016, Endocrine disrupting activities of surface water associated with a West Virginia oil and gas industry wastewater disposal site: Science of the Total Environment, v. 557–558, p. 901910, doi:10.1016/j.scitotenv.2016.03.113. The two studies are summarized at: http://toxics.usgs.gov/highlights/2016-05-09-uog_wastes_in_streams.html.

[91] Barnett, T. P., et al. 2008. Human-induced changes in the hydrology of the western United States. Science 319: 1080–1083 ("Barnett et al. 2008"); Woodhouse, C. A., et al. 2016. Increasing influence of air temperature on upper Colorado River streamflow. Geophys. Res. Lett. 43, doi:10.1002/2015GL067613 ("Woodhouse et al. 2016")

[92] Hoerling, M. P., et al. 2013. Evolving weather and climate conditions of the Southwest United States. Pages 74–100 in G. Garfin, A. Jardine, M. Black, R. Merideth, J. Overpeck, and A. Ray, editors. Assessment of climate change in the Southwest United States: a report prepared for the National Climate Assessment. Island Press, Washington, D.C., USA ("Hoerling, 2013")

[93] Hoerling, 2013; Hamlet, A., et al. 2005. Effects of temperature and precipitation variability on snowpack trends in the western United States. Journal of Climate 18: 4545-4561; Stewart, I. T., et al. 2004. Changes in snowmelt runoff timing in western North America under a 'Business as Usual' climate change scenario. Climatic Change 62: 217-232; Garfin, G., et al., 2014: Ch. 20: Southwest. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 462-486.

[94] *Id.*

[95] *Id.*

[96] Stewart, I. T., et al. 2004. Changes in snowmelt runoff timing in western North America under a 'Business as Usual' climate change scenario. Climatic Change 62: 217-232; Rauscher, S. A., et al. 2008. Future changes in snowmelt-driven runoff timing over the western US. Geophysical Research Letters 35: L16703, doi:10.1029/2008GL034424 ("Rauscher, 2008"); Dettinger, M., B. Udall, and A. Georgakakos. 2015. Western water and climate change. Ecological Applications 25: 2069-2093 ("Dettinger, 2015").

The physical equipment itself that is designed to intake and divert water may also pose a threat to certain wildlife. If not properly designed, such equipment and intake points may be a risk to wildlife.

d. Harm to Wetlands

BLM failed to look at how high volume removal of surface or groundwater can result in damage to wetlands, which rely on ample water supplies to maintain the fragile dynamics of a wetland habitat. Damage can also occur from spills of chemicals or wastewater, filling operations, and sediment runoff.[97] BLM in its environmental document must fully vet the impacts from every potential aspect of the proposed sale.

Many plant and animal species depend on wetland habitats, and even small changes can lead to significant impacts. Wetlands provide a variety of "eco-service" functions, including water purification, protection from floods, and functioning as carbon sinks.[98] The ecological importance of wetlands is unquestionable, and their full protection is paramount. The EIS must analyze these potential impacts to wetlands, and the related, potential indirect impacts that may stem from such impacts.

iv. BLM's Analyses of Air Quality and Greenhouse Gas Emissions are Deficient and Fail to Examine the Relevant Data

BLM's analysis of impacts to air quality was woefully inadequate.

a. The EA Failed to Provide Quantitative Analysis for Criteria Air Pollutants

Oil and gas operations—both conventional and unconventional—emit large amounts of air pollution, including multiple "criteria" air pollutants for which EPA has set National Ambient Air Quality Standards (NAAQS) due to their potential to cause primary and secondary health effects. Concentrations of these pollutants—ozone, particulate matter (PM), carbon monoxide, nitrogen oxides (NOx), sulfur dioxide (SO2) and lead—will likely increase in regions where unconventional oil and gas recovery techniques are permitted. The EA did not include any quantitative analysis of these criteria pollutants. For example, BLM failed to provide data or monitoring reports that reflect pollutant levels and whether they meet the NAAQs. The EA should have included monitoring data for the past 3-5 years for each criteria pollutant. BLM

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[97] U.S. Department of Justice, *Trans Energy Inc. to Restore Streams and Wetland Damaged by Natural Gas Extraction Activities in West Virginia* (Sep. 2, 2014), http://www.justice.gov/opa/pr/trans-energy-inc-restore-streams-and-wetland-damaged-natural-gas-extraction-activities-west (accessed July 29, 2015); *See also,* Pennsylvania Department of Environmental Protection, Commonwealth of Pennsylvania, DEP Fines Seneca Resources Corp. $40,000 for Violations at Marcellus Operation in Tioga County (Jul. 10, 2010), http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=14655&typeid=1 (accessed July 29, 2015).

[98] U.S. Environmental Protection Agency, Wetlands and People, http://water.epa.gov/type/wetlands/people.cfm (accessed July 29, 2015).

failed to adequately analyze direct, indirect, or cumulative impacts from increased ozone and other pollution in the area based on reasonably foreseeable development.

b. The EA Arbitrarily Underestimates the Impact of Methane and Nitrous Oxide Emissions

BLM's analysis of greenhouse gas emissions arbitrarily and capriciously uses a long-outdated estimate of the "global warming potential," or "GWP," of greenhouse gases other than carbon dioxide. GWP expresses warming caused by a greenhouse gas relative to the warming caused by an equivalent mass of carbon dioxide. GWP allows emissions of non-CO_2 pollutants to be expressed in terms of CO_2-equivalent. BLM uses a GWP for methane of 21 and for nitrous oxide of 310.[99] More recent report estimates, on the basis of more recent and thorough science, that methane from fossil sources has 36 times the global warming potential of carbon dioxide over a 100 year time frame and at least 87 times the global warming potential of carbon dioxide over a 20-year time frame.[100] Both the EPA and the Department of Energy have recognized that the newer estimates represent the best available science regarding the impact of non-CO2 GHGs. EPA does use the older IPCC values in one narrow regulatory context: compiling EPA's GHG Inventory pursuant to an international convention that specifically requires the old value.[101] But EPA has explicitly stated that it believes, on the basis of the new report, that the old values are scientifically unsupported and are too low.[102] The Department of Energy has similarly recognized that the Fifth Assessment Report values using climate feedbacks (*e.g.*, 36 and 87 for methane) reflect the current scientific consensus.[103]

In light of serious controversy and uncertainties regarding GHG pollution from oil and gas development, it is critical that BLM's quantitative assessment account for methane's long-term (100-year) global warming impact and, also, methane's short-term (20-year) warming impact using the latest peer-reviewed science to ensure that potentially significant impacts are not underestimated or ignored. See 40 C.F.R. § 1508.27(a) (requiring consideration of "[b]oth short- and long-term effects"). Use of the 20-year value is particularly appropriate because it corresponds with the 20-year planning and environmental review horizon used in the SIR and, typically, by BLM. See SIR at 4-1 thru 4-45 (discussing BLM-derived reasonably foreseeable development potential in each planning area). BLM has significantly underestimated the near-term benefits of keeping methane emissions out of the atmosphere. 40 C.F.R. §§ 1502.16(e), (f); id. at 1508.27. These estimates are important given the noted importance of near term action to ameliorate climate change – near term action that scientists say should focus, *inter alia*, on preventing the emission of short-lived but potent GHGs like methane while, at the same time, stemming the ongoing increase in the concentration of carbon dioxide.[104] These uncertainties –

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[99] EA at 40.
[100] *Id.*
[101] https://www3.epa.gov/climatechange/ghgemissions/gwps.html
[102] *Id.*
[103] Department of Energy, Opinion and Order 3357-C, DOE/FE Dkt. 11-161-LNG, at 30 (Dec. 4, 2015) ("We agree with Sierra Club that using 20- and 100-year methane GWPs of 87 and 36 is most appropriate for use today and that climate carbon feedbacks should be captured in the GWP values for methane."), *available at* www.fossil.energy.gov/programs/gasregulation/authorizations/2011_applications/ord3357c.pdf
[104] *See, e.g., Limiting Global Warming: Variety of Efforts Needed Ranging from 'Herculean' to the Readily*

which, here, the agency does not address – necessitate analysis in an EIS. 40 C.F.R. §§ 1508.27(a), (b)(4)-(5).

c. The EA Failed to Analyze The Significance and Severity of Greenhouse Gas Emissions

The EA estimates that development of the leases will cause, directly and indirectly, greenhouse gas emissions amounting between 63,280 tons and 294,560 tons of greenhouse gas emissions.[105] NEPA requires BLM to inform the public of direct and indirect effects the "significance" of these emissions, 40 C.F.R. § 1502.16(a)-(b); for example, BLM must "evaluate the[ir] severity." Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 352 (1989). To serve NEPA's "twin aims" of informing agency decisionmakers and the public, this evaluation must be in terms that will meaningfully inform these intended audiences of the magnitude and consequences of these effects. *Natural Res. Def. Council v. Nuclear Regulatory Comm'n*, 685 F.2d 459, 487 n.149 (D.C. Cir. 1982) *rev'd on other grounds sub nom. Balt. Gas & Elec. Co. v. Natural Res. Def. Council*, 462 U.S. 87, 106-107 (1983); *Columbia Basin Land Prot. Ass'n v. Schlesinger*, 643 F.2d 585, 594 (9th Cir. 1981).

Here, the EA provides no analysis of the impact or severity of greenhouse gas emissions. One widely used approach to evaluating the impact of GHG emissions is to estimate the costs of those emissions to society. The federal Interagency Working Group on the Social Cost of Carbon has developed estimates of the present value of the future costs of carbon dioxide, methane, and nitrous oxide emissions as a proxy for the magnitude and severity of those impacts.[106] These tools are easy to use by agencies, easy to understand by the public, and supported by years of peer-reviewed scientific and economic research. The EPA and other federal agencies have used these social cost protocols to estimate the effects of rulemakings on climate, and certain BLM field offices have used these tools in project level NEPA analysis. These protocols estimate the global financial cost of each additional ton of GHG pollution emitted to the atmosphere, taking into account factors such as diminished agricultural productivity, droughts, wildfires, increased intensity and duration of storms, ocean acidification, and sea-level rise. The Council on Environmental Quality has explicitly endorsed these tools, explaining that they were "[d]eveloped through an interagency process committed to ensuring that [these] estimates reflect the best available science and methodologies and used to assess the social benefits of reducing carbon dioxide emissions across alternatives in rulemakings, [the social cost protocols] provide[] a harmonized,

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Actionable, Scientists Say, SCIENCE DAILY (May 4, 2010), available at: http://www.sciencedaily.com/releases/2010/05/100503161328.htm; *see also*, Ramanathan, et. al., *The Copenhagen Accord for Limiting Global Warming: Criteria, Constraints, and Available Avenues* (Feb. 2010).

[105] EA at 57.

[106] *See* Interagency Working Group on the Social Cost of Carbon, United States Government, *Technical Support Document: Technical Update on the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866* (May 2013) at 2 (hereinafter 2013 TSD); Interagency Working Group, Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide (August 2016), available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/august_2016_sc_ch4_sc_n2o_addendum_final_8_26_16.pdf (last visited October 30, 2016).

interagency metric that can give decision makers and the public useful information for their NEPA review."[107]

The EA improperly omitted any monetary estimate of the social cost of GHGs (SC GHG) in its NEPA analysis for this Proposed Action. However, analysis of the social cost of greenhouse gases plays an important—and otherwise unfilled—role regardless of whether BLM engages in a broader cost benefit analysis. Because BLM cannot identify the physical consequences of the greenhouse gas emissions caused by the leases, BLM must use "generally accepted" methods to discuss those impacts. 40 C.F.R. § 1502.22(b)(4). The social cost protocols, developed by a consortium of federal agencies specifically to address the impact of federal actions, are precisely such a generally accepted method. Given BLM's failure to adopt any other method for discussing these impacts, BLM's failure to use the social cost protocols was arbitrary and contrary to NEPA's requirements.

Although CEQ guidance gives BLM "discretion" in determining whether to monetize the impacts of greenhouse gas emissions,[108] the guidance does not and cannot relieve BLM of the regulatory obligation to use generally accepted methods to assess the impacts of greenhouse gas emissions. Insofar as BLM has discretion, it is discretion to choose between available methods to analyze the significance, severity, and impact of greenhouse gas emissions, but BLM does not have discretion to provide no such analysis whatsoever. Here, where BLM has not identified any alternative method, use of the social cost protocols was required. In 2014, the district court for the District of Colorado faulted the Forest Service for failing to calculate the social cost of carbon, refusing to accept the agency's explanation that such a calculation was not feasible. High Country Conservation Advocates v. U.S. Forest Service, 52 F.Supp.3d 1174 (D.Colo. 2014) (a decision the agency decided not to appeal, thus implicitly recognizing the importance of incorporating a social cost of carbon analysis into NEPA decisionmaking). In his decision, Judge Jackson identified the IWG's SCC protocol as a tool to "quantify a project's contribution to costs associated with global climate change." Id. at 1190.[109] To fulfill this mandate, they agency must disclose the "ecological[,] … economic, [and] social" impacts of the proposed action. 40 C.F.R. § 1508.8(b). Simple calculations applying the SCC to GHG emissions from this project offer a straightforward comparative basis for analyzing impacts, and identifying very significant costs.[110]

C. BLM Must End All New Fossil Fuel Leasing and Hydraulic Fracturing.

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[107] 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 at 33 n.86 (August 1, 2016), available at https://www.whitehouse.gov/sites/whitehouse.gov/files/documents/nepa_final_ghg_guidance.pdf

[108] EA at 94.

[109] *See also id.* at 18 (noting the EPA recommendation to "explore other means to characterize the impact of GHG emissions, including an estimate of the 'social cost of carbon' associated with potential increases in GHG emissions.") (citing Sarah E. Light, *NEPA's Footprint: Information Disclosure as a Quasi-Carbon Tax on Agencies*, 87 Tul. L. Rev. 511, 546 (Feb. 2013)).

[110] It is important to note that, although the 2010 IWG SCC protocol did not address methane impacts, the 2013 IWG Technical Update explicitly addresses methane impacts. Thus, it is appropriate to calculate a SCC outcome that takes into account the full CO_2e emissions associated with the proposed leasing.

BLM argues that it is required by law to "consider" leasing areas that have been nominated for leasing if leasing is in conformance with the BLM LUP. However, as BLM states and we agree, "[i]f there are known resource conflicts that cannot be addressed using a stipulation, then the parcel may be deferred until the known resource conflict is resolved." In this case, BLM has already demonstrated and exercised its authority to ban leasing by permanently removing from future lease sales several parcels due to resource conflicts. [111] In our comment letter we raised several more conflicts that require these parcels be deferred until such conflicts are resolved.

For one, and as we have already explained, climate change is a problem of global proportions resulting from the cumulative greenhouse gas emissions of countless individual sources. A comprehensive look at the impacts of fossil fuel extraction, and especially fracking, across all of the planning areas affected by the leases in updated RMPs is absolutely necessary. BLM has *never* thoroughly considered the cumulative climate change impacts of *all* potential fossil fuel extraction and fracking (1) within each of the planning areas, (2) across the state, and (3) across all public lands. Proceeding with new leasing proposals *ad hoc* in the absence of a comprehensive plan that addresses climate change and fracking is premature and risks irreversible damage before the agency and public have had the opportunity to weigh the full costs of oil and gas and other fossil fuel extraction and consider necessary limits on such activities. Therefore BLM must defer all new leasing at least until the issue is adequately analyzed in a programmatic review of all U.S. fossil fuel leasing, or at least within amended RMPs. BLM's argument, in response to our comments, that a permanent cessation of leasing would require RMP amendment beyond the scope of the leasing decision ignores the established principle that agencies are obligated to consider all reasonable alternatives. Considering a no-leasing alternative would allow the agency to preserve the status quo and avoid irretrievable commitment of resources until such time as it can consider the regional and national impacts of fossil fuel leasing and undertake appropriate land use plan amendments or other actions.

A. BLM Must Limit Greenhouse Gas Emissions By Keeping Federal Fossil Fuels In the Ground

Expansion of fossil fuel production will substantially increase the volume of greenhouse gases emitted into the atmosphere and jeopardize the environment and the health and well being of future generations. BLM's mandate to ensure "harmonious and coordinated management of the various resources *without permanent impairment of the productivity of the land and the quality of the environment*" requires BLM to limit the climate change effects of its actions.[112] Keeping all unleased fossil fuels in the ground and banning fracking and other unconventional well stimulation methods would lock away millions of tons of greenhouse gas pollution and limit the destructive effects of these practices.

A ban on new fossil fuel leasing and fracking is necessary to meet the U.S.'s greenhouse gas reduction commitments. On December 12, 2015, 197 nation-state and supra-national

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[111] EA at 14.

[112] *See* 43 U.S.C. §§ 1701(a)(7), 1702(c), 1712(c)(1), 1732(a) (emphasis added); *see also id.* § 1732(b) (directing Secretary to take any action to "prevent unnecessary or undue degradation" of the public lands).

organization parties meeting in Paris at the 2015 United Nations Framework Convention on Climate Change Conference of the Parties consented to an agreement (Paris Agreement) committing its parties to take action so as to avoid dangerous climate change.[113] As the Paris Agreement opens for signature in April 2016[114] and the United States is expected to sign the treaty[115] as a legally binding instrument through executive agreement,[116] the Paris Agreement commits the United States to critical goals—both binding and aspirational—that mandate bold action on the United States' domestic policy to rapidly reduce greenhouse gas emissions.[117]

The United States and other parties to the Paris Agreement recognized "the need for an effective and progressive response to the urgent threat of climate change on the basis of the best available scientific knowledge."[118] The Paris Agreement articulates the practical steps necessary to obtain its goals: parties including the United States have to "reach global peaking of greenhouse gas emissions *as soon as possible* . . . and to *undertake rapid reductions* thereafter in accordance *with best available science*,"[119] imperatively commanding that developed countries specifically "should continue taking the lead by undertaking economy-wide absolute emission reduction targets"[120] and that such actions reflect the "highest possible ambition."[121]

The Paris Agreement codifies the international consensus that climate change is an "urgent threat" of global concern,[122] and commits all signatories to achieving a set of global goals. Importantly, the Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature "to *well below 2°C* above pre-industrial levels and to *pursue efforts to limit the temperature increase to 1.5°C* above pre-industrial levels"[123] (emphasis added).

In light of the severe threats posed by even limited global warming, the Paris Agreement established the international goal of limiting global warming to 1.5°C above pre-industrial levels in order to "prevent dangerous anthropogenic interference with the climate system," as set forth in the UNFCCC, a treaty which the United States has ratified and to which it is bound.[124] The

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[113] U.N. Framework Convention on Climate Change, Paris Agreement ("Paris Agreement"), Art. 2.
[114] Paris Agreement, Art. 20(1).
[115] For purposes of this Petition, the term "treaty" refers to its international law definition, whereby a treaty is "an international law agreement concluded between states in written form and governed by international law" pursuant to article 2(a) of the Vienna Convention on the Law of Treaties, 1155 U.N.T.S. 331, 8 I.L.M. 679 (Jan. 27, 1980).
[116] *See* U.S. Department of State, Background Briefing on the Paris Climate Agreement, (Dec. 12, 2015), http://www. state.gov/ r/pa/prs/ps/2015/12/250592.htm.
[117] Although not every provision in the Paris Agreement is legally binding or enforceable, the U.S. and all parties are committed to perform the treaty commitments in good faith under the international legal principle of *pacta sunt servanda* ("agreements must be kept"). Vienna Convention on the Law of Treaties, Art. 26.
[118] *Id.*, Recitals.
[119] *Id.*, Art. 4(1).
[120] *Id.*, Art. 4(4).
[121] *Id.*, Art. 4(3).
[122] *Id.*, Recitals.
[123] *Id.*, Art. 2.
[124] *See* U.N. Framework Convention on Climate Change, Cancun Agreement. Available at http://cancun.unfccc.int/ (last visited Jan 7, 2015); United Nations Framework Convention on Climate Change, Copenhagen Accord. Available at http://unfccc.int/meetings/copenhagen_dec_2009/items/5262.php (last accessed Jan 7, 2015). The

Paris consensus on a 1.5°C warming goal reflects the findings of the IPCC and numerous scientific studies that indicate that 2°C warming would exceed thresholds for severe, extremely dangerous, and potentially irreversible impacts.[125] Those impacts include increased global food and water insecurity, the inundation of coastal regions and small island nations by sea level rise and increasing storm surge, complete loss of Arctic summer sea ice, irreversible melting of the Greenland ice sheet, increased extinction risk for at least 20-30% of species on Earth, dieback of the Amazon rainforest, and "rapid and terminal" declines of coral reefs worldwide.[126] As scientists noted, the impacts associated with 2°C temperature rise have been "revised upwards, sufficiently so that 2°C now more appropriately represents the threshold between 'dangerous' and 'extremely dangerous' climate change."[127] Consequently, a target of 1.5 °C or less temperature rise is now seen as essential to avoid dangerous climate change and has largely supplanted the 2°C target that had been the focus of most climate literature until recently.

Immediate and aggressive greenhouse gas emissions reductions are necessary to keep warming below a 1.5° or 2°C rise above pre-industrial levels. Put simply, there is only a finite amount of CO_2 that can be released into the atmosphere without rendering the goal of meeting the 1.5°C target virtually impossible. A slightly larger amount could be burned before meeting a 2°C became an impossibility. Globally, fossil fuel reserves, if all were extracted and burned, would release enough CO_2 to exceed this limit several times over.[128]

The question of what amount of fossil fuels can be extracted and burned without negating a realistic chance of meeting a 1.5 or 2°C target is relatively easy to answer, even if the answer is framed in probabilities and ranges. The IPCC Fifth Assessment Report and other expert assessments have established global carbon budgets, or the total amount of remaining carbon that can be burned while maintain some probability of staying below a given temperature target. According to the IPCC, total cumulative anthropogenic emissions of CO_2 must remain below about 1,000 gigatonnes ($GtCO_2$) from 2011 onward for a 66% probability of limiting warming to

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United States Senate ratified the UNFCC on October 7, 1992. *See* https://www.congress.gov/treaty-document/102nd-congress/38.

[125] *See* Paris Agreement, Art. 2(1)(a); U); U.N. Framework Convention on Climate Change, Subsidiary Body for Scientific and Technical Advice, Report on the structured expert dialogue on the 2013-15 review, No. FCCC/SB/2015/INF.1 at 15-16 (June 2015);IPCC AR5 Synthesis Report at 65 & Box 2.4.

[126] *See* Jones, C. et al, Committed Terrestrial Ecosystem Changes due to Climate Change, 2 Nature Geoscience 484, 484–487 (2009); Smith, J. B. *et al.*, Assessing Dangerous Climate Change Through an Update of the Intergovernmental Panel on Climate Change (IPCC) 'Reasons for Concern', 106 Proceedings of the National Academy of Sciences of the United States of America 4133, 4133–37 (2009); Veron, J. E. N. *et al.*, The Coral Reef Crisis: The Critical Importance of <350 ppm CO2, 58 Marine Pollution Bulletin 1428, 1428–36, (2009); Warren, R. J. *et al.*, Increasing Impacts of Climate Change Upon Ecosystems with Increasing Global Mean Temperature Rise, 106 Climatic Change 141–77 (2011); Hare, W. W. *et al.*, Climate Hotspots: Key Vulnerable Regions, Climate Change and Limits to Warming, 11 Regional Environmental Change 1, 1–13 (2011); Frieler, K. M. *et al.*, Limiting Global Warming to 2°C is Unlikely to Save Most Coral Reefs, Nature Climate Change, Published Online (2013) doi: 10.1038/NCLIMATE1674; M. Schaeffer *et al.*, Adequacy and Feasibility of the 1.5°C Long-Term Global Limit, Climate Analytics (2013).

[127] Anderson, K. and A. Bows, Beyond 'Dangerous' Climate Change: Emission Scenarios for a New World, 369 Philosophical Transactions, Series A, Mathematical, Physical, and Engineering Sciences 20, 20–44 (2011).

[128] Cimons, M., Keep It In the Ground 6 (Sierra Club *et al.*, Jan. 25, 2016).

2°C above pre-industrial levels.[129] Given more than 100 $GtCO_2$ have been emitted since 2011,[130] the remaining portion of the budget under this scenario is well below 900 $GtCO_2$. To have an 80% probability of staying below the 2°C target, the budget from 2000 is 890 $GtCO_2$, with less than 430 $GtCO_2$ remaining.[131]

To have even a 50% probability of achieving the Paris Agreement goal of limiting warming to 1.5°C above pre-industrial levels equates to a carbon budget of 550-600 $GtCO_2$ from 2011 onward,[132] of which more than 100 $GtCO_2$ has already been emitted. To achieve a 66% probability of limiting warming to 1.5°C requires adherence to a more stringent carbon budget of only 400 $GtCO_2$ from 2011 onward,[133] of which less than 300 $GtCO_2$ remained at the start of 2015. An 80% probability budget for 1.5°C would have far less that 300 $GtCO_2$ remaining. Given that global CO_2 emissions in 2014 alone totaled 36 $GtCO_2$,[134] humanity is rapidly consuming the remaining burnable carbon budget needed to have even a 50/50 chance of meeting the 1.5°C temperature goal.[135]

According to a recent report by EcoShift Consulting commissioned by the Center and Friends of the Earth, unleased (and thus unburnable) federal fossil fuels represent a significant source of potential greenhouse gas emissions:

- Potential GHG emissions of federal fossil fuels (leased and unleased) if developed would release up to 492 gigatons (Gt) (one gigaton equals 1 billion tons) of carbon dioxide equivalent pollution (CO2e); representing 46 percent to 50 percent of potential emissions from all remaining U.S. fossil fuels.

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[129] IPCC, 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change; Summary for Policymakers at 27; IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change at 64 & Table 2.2 [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)] at 63-64 & Table 2.2 ("IPCC AR5 Synthesis Report").

[130] From 2012-2014, 107 GtCO2 was emitted (*see* Annual Global Carbon Emissions at http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html).

[131] Carbon Tracker Initiative, Unburnable Carbon – Are the world's financial markets carrying a carbon bubble? available at http://www.carbontracker.org/wp-content/uploads/2014/09/Unburnable-Carbon-Full-rev2-1.pdf; Meinshausen, M. *et al.*, Greenhouse gas emission targets for limiting global warming to 2 degrees Celsius, 458 Nature 1158, 1159 (2009).

[132] Intergovernmental Panel on Climate Change, Climate Change 2014: Synthesis Report, Summary for Policy Makers IPCC Fifth Assessment Synthesis Report, 18 (2014), available at http://ar5-syr.ipcc.ch/ipcc/ipcc/resources/pdf/IPCC_SynthesisReport.pdf.

[133] *Id.*

[134] *See* Global Carbon Emissions, http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html

[135] In addition to limits on the *amount* of fossil fuels that can be utilized, emissions pathways compatible with a 1.5 or 2°C target also have a significant temporal element. Leading studies make clear that to reach a reasonable likelihood of stopping warming at 1.5° or even 2°C, global CO2 emissions must be phased out by mid-century and likely as early as 2040-2045. *See, e.g.* Joeri Rogelj *et al.*, Energy system transformations for limiting end-of-century warming to below 1.5°C, 5 Nature Climate Change 519, 522 (2015). United States focused studies indicate that we must phase out fossil fuel CO2 emissions even earlier—between 2025 and 2040—for a reasonable chance of staying below 2°C. *See, e.g.* Climate Action Tracker, http://climateactiontracker.org/countries/usa. Issuing new legal entitlements to explore for and extract federal fossil fuels for decades to come is wholly incompatible with such a transition.

- Of that amount, up to 450 Gt CO2e have not yet been leased to private industry for extraction;
- Releasing those 450 Gt CO2e (the equivalent annual pollution of more than 118,000 coal-fired power plants) would be greater than any proposed U.S. share of global carbon limits that would keep emissions below scientifically advised levels.

Fracking has also opened up vast reserves that otherwise would not be available, increasing the potential greenhouse gas emissions that can be released into the atmosphere. BLM must consider a ban on this dangerous practice and a ban on new leasing to prevent the worst effects of climate change.

Based on our review and analysis of the BLM's proposed lease sale parcels, recoverable oil and gas volumes in BLM's EPCA Phase III inventory, and life-cycle greenhouse gas emissions models developed by EcoShift consulting, the proposed lease sale would make available for extraction and combustion the equivalent of approximately 419,983 tons CO_2.[136] Despite the availability of this BLM data, the EA makes no effort whatsoever to calculate the full climate impacts of leasing[137] – impacts that must include not just on-site emissions from development, but the full life-cycle emissions of processing, transporting, and ultimately burning the oil. Over a ten-year lease term, the emissions of full development of the recoverable reserves proposed for lease would greatly exceed the EPA and CEQ significance threshold of 25,000 tons/year CO_2e. requiring quantitative analysis.[138] Because the lease sale is the final decision-making point at which BLM can avoid irretrievably conveying a right to extract oil and gas, it is impermissible to consider only the effects of 20 exploratory wells. Instead, BLM must consider and quantify now, prior to lease issuance, the full GHG impacts of irretrievable commitment to lease issuance.

B. BLM Must Consider A Ban on New Oil and Gas Leasing and Fracking in a Programmatic Review and Halt All New Leasing and Fracking in the Meantime.

Development of unleased oil and gas resources will fuel climate disruption and undercut the needed transition to a clean energy economy. As BLM has not yet had a chance to consider no leasing and no-fracking alternatives as part of any of its RMP planning processes or a comprehensive review of its federal oil and gas leasing program, BLM should suspend new leasing until it properly considers this alternative in updated RMPs or a programmatic EIS for the entire leasing program. BLM demonstrably has tools available to consider the climate

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[136] Oil and gas volume estimates were generated in a geographic information system by clipping technically recoverable oil and gas volumes in the Bureau of Land Management's EPCA Phase III spatial data with lease parcel boundaries provided by Bureau of Land Management. Potential lifecycle greenhouse gas emissions for resultant oil and gas volumes were generated using a carbon calculator and lifecycle greenhouse gas emissions models developed by EcoShift consulting. Methods for those models are described in the report. *See* EcoShift Consulting et al., The Potential Greenhouse Gas Emissions of U.S. Federal Fossil Fuels (Aug. 2015), available at http://www.ecoshiftconsulting.com/wp-content/uploads/Potential-Greenhouse-Gas-Emissions-U-S-Federal-Fossil-Fuels.pdf.

[137] *See* EA at 36-37.

[138] *See* Council on Environmental Quality, Draft Guidance on Consideration of Greenhouse Gas Emissions 18 (Dec. 2014).

consequences of its leasing programs, and alternatives available to mitigate those consequences, at either a regional or national scale.[139]

BLM would be remiss to continue leasing when it has never stepped back and taken a hard look at this problem at the programmatic scale. Before allowing more oil and gas extraction in the planning area, BLM must: (1) comprehensively analyze the total greenhouse gas emissions which result from past, present, and potential future fossil fuel leasing and all other activities across all BLM lands and within the various planning areas at issue here, (2) consider their cumulative significance in the context of global climate change, carbon budgets, and other greenhouse gas pollution sources outside BLM lands and the planning area, and (3) formulate measures that avoid or limit their climate change effects. By continuing leasing and allowing new fracking in the absence of any overall plan addressing climate change BLM is effectively burying its head in the sand.

A programmatic review and moratorium on new leasing would be consistent with the Secretary of Interior's recent order to conduct a comprehensive, programmatic EIS (PEIS) on its coal leasing program, in light of the need to take into account the program's impacts on climate change, among other issues, and "the lack of any recent analysis of the Federal coal program as a whole." *See* Secretary of Interior, Order No. 3338, § 4 (Jan. 15, 2016). Specifically, the Secretary directed that the PEIS "should examine how best to assess the climate impacts of continued Federal coal production and combustion and how to address those impacts in the management of the program to meet both the Nation's energy needs and its climate goals, as well as how best to protect the public lands from climate change impacts." Id. § 4(c).

The Secretary also ordered a moratorium on new coal leasing while such a review is being conducted. The Secretary reasoned:

> Lease sales and lease modifications result in lease terms of 20 years and for so long thereafter as coal is produced in commercial quantities. Continuing to conduct lease sales or approve lease modifications during this programmatic review risks locking in for decades the future development of large quantities of coal under current rates and terms that the PEIS may ultimately determine to be less than optimal. This risk is why, during the previous two programmatic reviews, the Department halted most lease sales with limited exceptions.... Considering these factors and given the extensive recoverable reserves of Federal coal currently under lease, I have decided that a similar policy is warranted here. A pause on leasing, with limited exceptions, will allow future leasing decisions to benefit from the recommendations that result from the PEIS while minimizing any economic hardship during that review.

Id. § 5.

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[139] *See, e.g.*, BLM Montana, North Dakota and South Dakota, Climate Change Supplementary Information Report (updated Oct. 2010) (conducting GHG inventory for BLM leasing in Montana, North Dakota and South Dakota); BLM, Proposed Rule: Waste Prevention, Production Subject to Royalties, and Resource Conservation, 81 Fed. Reg. 6615 (Feb. 8, 2016) (proposing BLM-wide rule for prevention of methane waste).

The Secretary's reasoning is also apt here. A programmatic review assessing the climate change effects of public fossil fuels is long overdue. And there is no shortage of oil and gas that would preclude a moratorium while such a review is conducted, as evidenced by very low natural oil and gas prices. More importantly, BLM should not "risk[] locking in for decades the future development of large quantities of [fossil fuels] under current...terms that a [programmatic review] may ultimately determine to be less than optimal." Id. BLM should cancel the sale and halt all new leasing and fracking until a programmatic review is completed.

BLM claims that in order to halt all leasing, it would have to amend the "current" RMPs through a public process which is beyond the scope of the EA. The Shoshone-Eureka RMP is 30 years old – it should have expired and been replaced with an amended RMP many years ago. The 1997 Tonopah RMP, which states that it "will guide management for the next 10-20 years," is similarly due for a replacement. Nevertheless, BLM is only required to "consider" leasing of areas that have been nominated for lease. As BLM explained in its EA, "[i]f there are known resource conflicts that cannot be addressed using a stipulation, then the parcel may be deferred until the known resource conflict is resolved."

v. BLM Violated its Mandate to Manage the Public Lands "Without Permanent Impairment of the Productivity of the Land and the Quality of the Environment."

The exploration and development of these parcels likely involves highly controversial and severely harmful extraction methods, including horizontal drilling and hydraulic fracturing (or "fracking"). The extraction and burning of fossil fuels worsens the climate crisis; endangers water, air, wildlife, public health, and local communities; and further undermines the protection of our public lands. Because new fossil fuel leasing within the planning area will contribute to worsening the climate crisis, the vast majority of all *proven* fossil fuels must be kept in the ground to preserve any chance of averting catastrophic climate disruption. Opening up new areas to oil and gas exploration and unlocking new sources of greenhouse gas pollution would only fuel greater warming and contravenes BLM's mandate to manage the public lands "without permanent impairment of the productivity of the land and the quality of the environment."[140] Full compliance with the spirit and objectives of NEPA and other federal environmental laws and regulations requires BLM to avoid these dangers by ending all new leasing in the planning area and all other areas that it manages in order to limit the climate change effects of its actions; at a minimum, it should defer any such leasing until such time as it can conduct a comprehensive review of the climate consequences of its leasing activities, at the national and regional scale.

Despite NEPA's requirement that agencies undertake environmental analysis at the earliest possible time and prior to irretrievable commitment of resources, BLM has chosen to move forward with the Oil and Gas Lease Sale EA because BLM believes "the combination of stipulations consistent with current RMPs and parcels proposed for deferral afford sufficient protection to important wildlife and water resources."[141] With the exception of last year's

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[140] *See* 43 U.S.C. §§ 1701(a)(7), 1702(c), 1712(c)(1), 1732(a) (emphasis added), *see also id.* § 1732(b) (directing Secretary to take any action to "prevent unnecessary or undue degradation" of the public lands).
[141] EA, Appendix H, at 253.

amendments for greater sage-grouse management, however, these "current" RMPs, with which these stipulations are in accordance, date from 1986 and 1997 respectively.

In addition to climate change effects, oil and gas leasing and fracking entail significant public health risks that should compel BLM to consider a ban on these practices in a programmatic review and in the current leasing proposal. The EA fails to study these public health risks, precluding meaningful review of the proposed action

Ample scientific evidence indicates that well development and well stimulation activities have been linked to an array of adverse human health effects, including carcinogenic, developmental, reproductive, and endocrine disruption effects. The EA does not consider how close development could potentially take place to schools, residences, and businesses under BLM's proposed leasing decision. Just as troubling, is how much is *unknown* about the chemicals used in well stimulation activities.[142] The potential human health dangers and the precautionary principle should further compel BLM to consider not allowing further development of oil and gas minerals in the areas for lease. In comparing the no-leasing and no-fracking alternatives to leasing and continued unconventional well development scenarios, BLM should include a health impact assessment, or equivalent, of the aggregate impact that unconventional extraction techniques, including fracking, will have on human health and nearby communities.

Due to the heavy and frequent use of chemicals, proximity to fracked wells is associated with higher rates of cancer, birth defects, poor infant health, and acute health effects for nearby residents who must endure long-term exposure:

- In one study, residents living within one-half mile of a fracked well were significantly more likely to develop cancer than those who live more than one-half mile away, with exposure to benzene being the most significant risk.[143]

- Another study found that pregnant women living within 10 miles of a fracked well were more likely to bear children with congenital heart defects and possibly neural tube defects.[144] A separate study independently found the same pattern; infants born near fracked gas wells had more health problems than infants born near sites that had not yet conducted fracking.[145, 146]

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[142] *See, e.g.* U.S. Environmental Protection Agency, Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources, External Review Draft at 5-73, 10-7 (June 2015) available at http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=523539 ("EPA 2015").

[143] 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) ("McKenzie 2012").

[144] McKenzie, L. et al., Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado, Advance Publication Environmental Health Perspectives (Jan. 28, 2014), http://dx.doi.org/10.1289/ehp.1306722 ("McKenzie 2014").

[145] Hill, Elaine L., Unconventional Natural Gas Development and Infant Health: Evidence from Pennsylvania, Cornell University (2012).

[146] Whitehouse, Mark, *Study Shows Fracking is Bad for Babies*, Bloomberg View, Jan. 4, 2014, *available at* http://www.bloombergview.com/articles/2014-01-04/study-shows-fracking-is-bad-for-babies.

- A study analyzed Pennsylvania birth records from 2004 to 2011 to assess the health of infants born within a 2.5-kilometer radius of natural-gas fracking sites. They found that proximity to fracking increased the likelihood of low birth weight by more than half, from about 5.6 percent to more than 9 percent.[147] The chances of a low Apgar score, a summary measure of the health of newborn children, roughly doubled, to more than 5 percent.[148] Another recent Pennsylvania study found a correlation between proximity to unconventional gas drilling and higher incidence of lower birth weight and small-for-gestational-age babies.[149]

- A recent study found increased rates of cardiology-patient hospitalizations in zip codes with greater number of unconventional oil and gas wells and higher well density in Pennsylvania.[150] The results suggested that if a zip code went from having zero wells to well density greater than 0.79 wells/km^2, the number of cardiology-patient hospitalizations per 100 people (or "cardiology inpatient prevalence rate") in that zip code would increase by 27%. If a zip code went from having zero wells to a well density of 0.17 to 0.79 wells/km^2, a 14% increase in cardiology inpatient prevalence rates would be expected. Further, higher rates of neurology-patient hospitalizations were correlated with zip codes with higher well density.

- Recently published reports indicate that people living in proximity to fracked gas wells commonly report skin rashes and irritation, nausea or vomiting, headache, dizziness, eye irritation and throat irritation.[151]

- In Texas, a jury awarded nearly $3 million to a family who lived near a well that was hydraulically fractured.[152] The family complained that they experienced migraines, rashes, dizziness, nausea and chronic nosebleeds. Medical tests showed one of the plaintiffs had more than 20 toxic chemicals in her bloodstream.[153] Air samples around their home also showed the presence of BTEX — benzene, toluene, ethylbenzene and xylene —colorless but toxic chemicals typically found in petroleum products.[154]

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[147] *Id.*, citing Janet Currie of Princeton University, Katherine Meckel of Columbia University, and John Deutch and Michael Greenstone of the Massachusetts Institute of Technology.
[148] *Id.*
[149] Stacy, Shaina L. et al. (2015) Perinatal Outcomes and Unconventional Natural Gas Operations in Southwest Pennsylvania. PLoS ONE 10(6): e0126425. doi:10.1371/journal.pone.0126425, *available at* http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0126425.
[150] Jemielital, T. et al. Unconventional Gas and Oil Drilling Is Associated with Increased Hospital Utilization Rates. PLoS ONE 10(7): e0131093, *available at* http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0131093.
[151] Rabinowitz, P.M. et al., Proximity to Natural Gas Wells and Reported Health Status: Results of a Household Survey in Washington County, Pennsylvania. Environmental Health Perspectives Advance Publication (2014); Bamberger, Michelle and R.E. Oswald, Impacts of Gas Drilling on Human and Animal Health, 22 New Solutions 51 (2012); Steinzor, N. et al., Gas Patch Roulette: How Shale Development Risks Public Health in Pennsylvania, Earthworks Gas & Oil Accountability Project (2012).
[152] *Parr v. Aruba Petroleum, Inc.*, Case No. 11-01650-E (Dallas Cty., filed Sept.13, 2013).
[153] Deam, Jenny, *Jury Awards Texas family Nearly $3 million in Fracking Case*, Los Angeles Times (Apr. 3, 2014) http://www.latimes.com/nation/la-na-fracking-lawsuit-20140424-story.html.
[154] *Id.*

Chemicals used for fracking also put nearby residents at risk of endocrine disruption effects. A study that sampled water near active wells and known spill sites in Garfield County Colorado found alarming levels of estrogenic, antiestrogenic, androgenic, and antiandrogenic activities, indicating that endocrine system disrupting chemicals (EDC) threaten to contaminate surface and groundwater sources for nearby residents.[155] The study concluded:

> [M]ost water samples from sites with known drilling-related incidents in a drilling-dense region of Colorado exhibited more estrogenic, antiestrogenic, and/or antiandrogenic activities than the water samples collected from reference sites[,] and 12 chemicals used in drilling operations exhibited similar activities. Taken together, the following support an association between natural gas drilling operations and EDC activity in surface and ground water: [1] hormonal activities in Garfield County spill sites and the Colorado River are higher than those in reference sites in Garfield County and in Missouri, [2] selected drilling chemicals displayed activities similar to those measured in water samples collected from a drilling-dense region, [3] several of these chemicals and similar compounds were detected by other researchers at our sample collection sites, and [4] known spills of natural gas fluids occurred at these spill sites.

The study also noted a linkage between EDCs and "negative health outcomes in laboratory animals, wildlife, and humans":

> Despite an understanding of adverse health outcomes associated with exposure to EDCs, research on the potential health implications of exposure to chemicals used in hydraulic fracturing is lacking. Bamberger and Oswald (26) analyzed the health consequences associated with exposure to chemicals used in natural gas operations and found respiratory, gastrointestinal, dermatologic, neurologic, immunologic, endocrine, reproductive, and other negative health outcomes in humans, pets, livestock, and wildlife species.
>
> Of note, site 4 in the current study was used as a small-scale ranch before the produced water spill in 2004. This use had to be discontinued because the animals no longer produced live offspring, perhaps because of the high antiestrogenic activity observed at this site. There is evidence that hydraulic fracturing fluids are associated with negative health outcomes, and there is a critical need to quickly and thoroughly evaluate the overall human and environmental health impact of this process. It should be noted that although this study focused on only estrogen and androgen receptors, there is a need for evaluation of other hormone receptor activities to provide a more complete endocrine-disrupting profile associated with natural gas drilling.[156]

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[155] Kassotis, Christopher D. et al., Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and Ground Water in a Drilling-Dense Region. Endocrinology, March 2014, 155(3):897–907, pp. 905-906, *available at* http://press.endocrine.org/doi/full/10.1210/en.2013-1697.

[156] *Id.*, p. 905.

Operational accidents also pose a significant threat to public health. For example in August 2008, Newsweek reported that an employee of an energy-services company got caught in a fracking fluid spill and was taken to the emergency room, complaining of nausea and headaches.[157] The fracking fluid was so toxic that it ended up harming not only the worker, but also the emergency room nurse who treated him. Several days later, after she began vomiting and retaining fluid, her skin turned yellow and she was diagnosed with chemical poisoning.[158]

Harmful chemicals are also found in the flowback fluid after well stimulation events. Flowback fluid is a key component of oil-industry wastewater from stimulated wells. A survey of chemical analyses of flowback fluid dating back to April 2014 in California revealed that concentrations of benzene, a known carcinogen, were detected at levels over 1,500 times the federal limits for drinking water.[159] Of the 329 available tests that measured for benzene, the chemical was detected at levels in excess of federal limits in 320 tests (97 percent).[160] On average, benzene levels were around 700 times the federal limit for drinking water.[161] Among other carcinogenic or otherwise dangerous chemicals found in flowback fluid from fracked wells are toluene and chromium-6.[162] These hazardous substances were detected in excess of federal limits for drinking water in over one hundred tests. This dangerous fluid is commonly disposed of in injection wells, which often feed into aquifers, including some that could be used for drinking water and irrigation.

Acidizing presents similarly alarming risks to public health and safety. In acidizing operations, large volumes of hydrochloric and hydrofluoric acid are transported to the site and injected underground. These chemicals are highly dangerous due to their corrosive properties and ability to trigger tissue corrosion and damage to sensory organs through contact.

While many risks are known, much more is unknown about the hundreds of chemicals used in fracking. The identity and effects of many of these additives is unknown, due to operators' claims of confidential business information. But, as the EPA recognizes, chemical identities are "necessary to understand their chemical, physical, and toxicological properties, which determine how they might move through the environment to drinking water resources and any resulting effects."[163] Compounds in mixtures can have synergistic or antagonistic effects, but

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[157] Wiserman, Hannah, Untested Waters: the Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation, Fordham Envtl. Law Rev. 115 (2009),138-39.
[158] *Id.*
[159] California Department of Conservation Division of Oil, Gas, & Geothermal Resources, California Well Stimulation Public Disclosure Report, *available at* http://www.conservation.ca.gov/dog/Pages/WellStimulationTreatmentDisclosure.aspx. The highest concentration was 7,700 parts per billion (ppb) for a well with API number 03052587. The US EPA's maximum contaminant level for benzene is 5 ppb.
[160] *Id.*
[161] *Id.*, *see also* Cart, J., High Levels of Benzene Found in Fracking Wastewater, Los Angeles Times, Feb. 11, 2015, http://www.latimes.com/local/california/la-me-fracking-20150211-story.html#page=1.
[162] *Id.*; *see also* Center for Biological Diversity, Cancer-causing Chemicals Found in Fracking Flowback from California Oil Wells (2015) Feb. 11, 2015, *available at* http://www.biologicaldiversity.org/news/press_releases/2015/fracking-02-11-2015.html.
[163] EPA 2015 at 10-18.

again, it is impossible to know these effects without full disclosure.[164] The lack of this information also precludes effective remediation: "Knowing their identities would also help inform what chemicals to test for in the event of suspected drinking water impacts and, in the case of wastewater, may help predict whether current treatment systems are effective at removing them."[165]

Even where chemical identities are known, chemical safety data may be limited. In EPA's study of the hazards of fracking chemicals to drinking water, EPA found that "[o]ral reference values and oral slope factors meeting the criteria used in this assessment were not available for the majority of chemicals used in hydraulic fracturing fluids [87%], representing a significant data gap for hazard identification."[166] Without this data, EPA could not adequately assess potential impacts on drinking water resources and human health.[167] Further, of 1,076 hydraulic fracturing fluid chemicals identified by the EPA, 623 did not have estimated physiochemical properties reported in EPA's toxics database, although this information is "essential to predicting how and where it will travel in the environment."[168] The data gaps are actually much larger, because EPA excluded 35% of fracking chemicals reported to FracFocus from its analysis because it could not assign them standardized chemical names.[169]

The EA fails to incorporate a literature review of the harmful effects of each of the chemicals known to be used in fracking and other unconventional oil and gas extraction methods. Without knowing the effects of each chemical, the EA cannot accurately project the true impact of unconventional oil and gas extraction.

The EA also fails to study the human health and safety impacts of noise pollution, light pollution, and traffic accidents resulting from oil and gas development. A recent study found that automobile and truck accident rates in counties in Pennsylvania with heavy unconventional oil and gas extraction activity were between 15 and 65 percent higher than accident rates in counties without unconventional oil and gas extraction activities.[170] Rates of traffic fatalities and major injuries may be higher in areas with heavy drilling activity than areas without.[171]

Conclusion

Unconventional oil and gas development not only fuels the climate crisis but entails significant public health risks and harms to the environment. Accordingly, BLM should prepare an EIS that thoroughly analyzes the effects of the proposed lease auction, as compared to the alternative of no new fossil fuel leasing and no fracking or other unconventional well stimulation

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[164] Souther, Sara et al. Biotic Impacts of Energy Development from Shale: Research Priorities and Knowledge Gaps, Front Ecol Environ 2014; 12(6): p. 334.
[165] EPA 2015 at 10-18.
[166] *Id.* at 10-7, 9-7.
[167] *Id.* at 9-37-38.
[168] *Id.* at 5-73.
[169] *Id.* at 9-38.
[170] Graham, J., Irving et al., Increased Traffic Accident Rates Associated with Shale Gas Drilling in Pennsylvania. 74 Accident Analysis and Prevention 203 (2015).
[171] *Id.*

methods within the Elko District planning area. We strongly urge BLM to defer the proposed lease sale, prepare a legally adequate EIS for this proposed oil and gas leasing action, and consult under Section 7 of the ESA on the endangered Lahontan cutthroat trout, prior to allowing the proposed action to move forward. Thank you for your consideration of these comments.

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