The Wilderness Society

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FAX

To: 17758616745 **From:** Barbara Young
Re: **Date:** 02/13/2020

Please accept this timely protest of the above Oil and Gas Lease Sale being held by the Battle Mountain District. The protesting parties are The Wilderness Society and the Sierra Club Toiyabe Chapter. In this lease sale the BLM is proposing to offer 45 parcels covering approximately 73,591.22 acres of public land that are located in the Battle Mountain District of the BLM. This protest is filed pursuant to the provisions at 43 C.F.R. § 3120.1-3.

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February 17, 2020

Bureau of Land Management
Nevada State Office
1340 Financial Blvd.
Reno, Nevada 89502-7147

Via: Facsimile at **775-861-6745**

Protest of the BLM's March 2020 Oil and Gas Lease Sale in Nevada
(DOI-BLM-NV-B000-2020-0001-EA)

Dear Ms. Anderson,

Please accept this timely protest of the above Oil and Gas Lease Sale being held by the Battle Mountain District. The protesting parties are The Wilderness Society and the Sierra Club Toiyabe Chapter. In this lease sale the BLM is proposing to offer 45 parcels covering approximately 73,591.22 acres of public land that are located in the Battle Mountain District of the BLM. This protest is filed pursuant to the provisions at 43 C.F.R. § 3120.1-3.

I. Lease Parcels Protested

We protest the sale of all 45 parcels that are being offered in the Battle Mountain District. This protest is filed under the provisions at 43 C.F.R. § 3120.1-3. The parcel numbers and serial numbers that are protested are also shown in the Appendix to this protest.

II. Interests of the Protesting Parties

The Wilderness Society ("TWS") has a long-standing interest in the management of BLM lands in Nevada and engages frequently in the decision-making processes for land use planning and project proposals that could potentially affect wilderness-quality lands and other important natural resources managed by the BLM in Nevada. TWS has expended significant resources field inventorying public lands in Nevada for wilderness characteristics. TWS members and staff enjoy a myriad of recreation opportunities on BLM-managed public lands, including hiking, biking, nature-viewing, photography, and the quiet contemplation in the solitude offered by wild places. Founded in 1935, our mission is to protect wilderness and inspire Americans to care for our wild places.

The Sierra Club is a national nonprofit organization of approximately 784,000 members dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. The Toiyabe Chapter of the Sierra Club has approximately 6,600 members in Nevada and the Eastern Sierra, including members who live and recreate in the Battle Mountain District. Sierra Club members use the public lands in the Battle Mountain District, including lands and waters that would be affected by actions under

the lease sale, for quiet recreation, aesthetic pursuits, and spiritual renewal. These areas would be threatened by increased oil and gas development that could result from the proposed lease sale.

III. Authorization to File this Protest

As an attorney for The Wilderness Society, Bruce Pendery is authorized to file this protest on behalf of The Wilderness Society and its members and supporters. He has been given like authority to file this protest on behalf of the Sierra Club and Natural Resources Defense Council.

IV. Statement of Reasons

The protesting parties filed detailed comments on January 13, 2020 on the proposed lease parcels as described in the Environmental Assessment (EA) prepared by Battle Mountain District on December 19, 2019. The majority of our comments were not addressed or were inadequately address. Therefore, many elements of this protest remain unchanged from the issues we raised in the January comments and we ask the BLM to consider those concerns at this time. For that reason, our January 13, 2019 comments are incorporated into this protest by this reference and we ask that they be fully considered as part of it.

A. The Lease Sale EA for the Battle Mountain District Does not Adequately Consider or Provide for the Protection of Lands with Wilderness Characteristics.

1. BLM should defer parcels that overlap with inventoried lands with wilderness characteristics until management decisions are made for those lands in order to comply with the National Environmental Policy Act and Federal Land Policy and Management Act.

Lands with wilderness characteristics (LWC) are one of the resources of the public lands that must be inventoried and considered under the Federal Land Policy and Management Act (FLPMA). 43 U.S.C. § 1711(a); *see also Ore. Natural Desert Ass'n v. Bureau of Land Mgmt.*, 625 F.3d 1092, 1122 (9th Cir. 2008). Of the 45 lease parcels proposed for the March 2020 lease sale in the Battle Mountain District, 41 parcels overlap with 9 BLM-recognized LWC units covering 59,383 acres. See Exhibit 1. The BLM has not yet made management decisions in its land use plans for how these areas will be managed relative to wilderness characteristics. The Tonopah and Shoshone-Eureka Resource Management Plans (RMP) do not adequately address LWC management. LWC will be addressed in future RMP amendments. See EA at 52.

We appreciate BLM correcting the number of parcels overlapping with LWC inventory units. However, some mistakes still remain. The EA states that 41 lease sale parcels intersect LWC units. EA at 52. This contradicts the 42 distinct parcels listed on pages 28-30 of the March 2020 Competitive Oil and Gas Lease Sale EA (EASI). Parcel "NV-2020-03-6672", should not be included in Table 6 of the EASI parcels because it is not intersecting any LWC units. Additionally, in Section 10 of the EASI, BLM incorrectly lists LWC inventory unit "NV-060-374A" in Table 6. EASI at 28, Table 6. Additionally, BLM has failed to include "NV-060-059A" in its list of overlapping LWC Inventory Units, which overlaps with lease sale parcel "NV-2020-

03-5644". It is detrimental for BLM to not acknowledge this intersection. This needs to be corrected.

We greatly appreciate that BLM has completed an inventory of LWC in the Battle Mountain District consistent with FLPMA and agency policy. EA at 51. However, BLM must preserve its ability to decide whether and how to protectively manage those newly inventoried wilderness resources in a public planning process. Such decisions could be foreclosed by leasing those lands to the oil and gas industry at this time. Unfortunately, the BLM states in the EA that the Tonopah and Shoshone-Eureka RMPs do not address LWC, and this will be addressed in future RMP amendments, and therefore "[i]n the interim the District will manage lands with wilderness characteristics for multiple use." EA at 52. No decisions will be made until the project proposal stage.[1] That is, despite having completed an inventory finding these lands are LWC, the BLM has no current plans to recognize wilderness values and will manage the lands under a general multiple use mandate that may not recognize the wilderness values of these lands. BLM should defer all leases in inventoried LWC until the agency has the opportunity to make management decisions for those areas through a public planning process.

It is well within BLM's authority to defer nominated parcels from lease sales. Neither the Mineral Leasing Act (MLA), FLPMA, nor any other statutory mandate requires that BLM must offer public lands and minerals for oil and gas leasing solely because they are nominated for such use, even if those lands are allocated as available to leasing in the governing land use plan. The Tenth Circuit Court of Appeals confirmed this discretion in *New Mexico ex rel. Richardson*, when it stated, "[i]f the agency wishes to allow oil and gas leasing in the plan area it must undertake additional analysis…but it retains the option of ceasing such proceedings entirely". 565 F.3d 683, 698 (10th Cir. 2009).

BLM regularly exercises this discretion to defer parcels in inventoried LWC for which the agency has not yet made management decisions. For example, the Grand Junction Field Office deferred lease parcels from its December 2017 lease sale in areas that BLM recently inventoried and found to have wilderness characteristics. BLM stated: "Portions of the following parcels were deferred due to having lands with wilderness characteristics that require further evaluation." DOI-BLM-CO-N050-2017-0051-DNA, p. 1. The Grand Junction Field Office completed its RMP revision in 2015 but still determined that it is inappropriate to lease areas that have been inventoried and found to possess wilderness characteristics since the RMP was completed in order to allow the agency to consider management options for those wilderness resources.

BLM Nevada should similarly defer leasing in inventoried LWC for which management decisions have not been made in the Battle Mountain District. This approach is consistent with agency policy and authority and is critical to preserving BLM's ability to make management decisions for those wilderness resources through a public planning process.

[1] *See* EASI at 61, public comment responses. Stating, "BLM may choose to restrict land uses in inventory units found to have wilderness characteristics; however this would happen at the project proposal stage. Until that time, parcels that intersect lands with wilderness characteristics are managed for multiple use."

BLM has not evaluated a reasonable range of alternatives for protecting the wilderness characteristics of parcels in the Battle Mountain District, claiming in the EASI response to public comments that leasing has not direct resource effects. EASI at 61. In fact. BLM has stated that while LWC is present it will not be affected. EA at 20. Under the National Environmental Policy Act (NEPA), BLM must consider a broad range of alternatives to mitigate environmental impacts. 40 C.F.R. § 1502.14(a); *see also Theodore Roosevelt Conservation P'ship v. Salazar*, 661 F.3d 66, 72-73 (D.C. Cir. 2011) (requiring BLM to consider a reasonable range of alternatives for oil and gas activity). Additionally, under current policies, BLM must fully "consider" wilderness characteristics during planning actions and evaluate a range of measures to protect wilderness characteristics during the leasing process, including measures not contained in existing RMPs. *See* Instruction Memorandum (IM) 2011-154 at Att. 2; IM 2010-117 at III. E., F. 9. And leasing alternatives can definitely have environmental impacts. *See New Mexico ex rel. Richardson,* 565 F.3d at 708 and 710-11 (stating all environmental analysis under NEPA must be conducted at "the earliest possible time" and a no leasing alternative needed to be considered) (citation omitted).

A "rule of reason" is used to determine if an adequate range of alternatives have been considered; this rule is governed by two guideposts: (1) the agency's statutory mandates; and (2) the objectives for the project. *New Mexico ex rel. Richardson*, 565 F.3d at 709. Here, there is no doubt that BLM's legal mandates under FLPMA and NEPA require it to fully consider the protection of wilderness values. Additionally, under IM 2010-117, which was largely reinstated by the decision in *Western Watersheds Project v. Zinke*, 336 F. Supp. 3d 1204 (D. Idaho 2018) the agency must treat the protection of other important resources and values as an equally important objective to leasing.

Yet, in the Battle Mountain District EA, the BLM has failed to evaluate an adequate range of alternatives that would protect the wilderness characteristics of parcels in the Battle Mountain District from the impacts of the lease sale. Such alternatives include offering the parcels with no surface occupancy (NSO) stipulations or deferring the parcels. Because the BLM has not considered those alternatives or additional alternatives to protect the wilderness characteristics of the proposed parcels, it must defer the parcels from the lease sale.

B. BLM has failed to consider a reasonable range of alternatives.

NEPA generally requires the lead agency for a given project to "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(2)(E). For EISs, this requires the agency to "rigorously explore and objectively evaluate all reasonable alternatives" including those "reasonable alternatives not within the jurisdiction of the lead agency," so as to "provid[e] a clear basis for choice among the options." 40 C.F.R. § 1502.14 (referring to the alternatives analysis as the "heart" of an EIS"). NEPA "requires that alternatives . . . be given full and meaningful consideration" for EAs as well. *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1245 (9th Cir. 2005) (citing *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1229 (9th Cir. 1988)); *see also Davis v. Mineta*, 302 F.3d 1104, 1120 (10th Cir. 2002).

The range of alternatives is the heart of a NEPA document because "[w]ithout substantive, comparative environmental impact information regarding other possible courses of action, the ability of [a NEPA analysis] to inform agency deliberation and facilitate public involvement would be greatly degraded." *New Mexico ex rel. Richardson v. BLM,* 565 F.3d at 708. That analysis must cover a reasonable range of alternatives so that an agency can make an informed choice from the spectrum of reasonable options.

Here, BLM is evaluating only two options: the proposed action (leasing all of the nominated parcels) and a no action alternative. An EA offering a choice between leasing every proposed parcel, and leasing nothing at all, does not present a reasonable range of alternatives. *See TWS v. Wisely*, 524 F. Supp. 2d 1285, 1312 (D. Colo. 2007) (BLM violated NEPA by failing to consider "middle ground compromise between the absolutism of the outright leasing and no action alternatives"); *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 813 (9th Cir. 1999) (NEPA analysis failed to consider reasonable range of alternatives where it "considered only a no action alternative along with two virtually identical alternatives").

This issue is especially noteworthy relative to LWC and in low potential lands.

1. Lands with Wilderness Characteristics

In this lease sale the BLM is proposing to sell 41 parcels that overlap with 9 LWC inventory units that cover 59,383 acres. The BLM should consider not leasing or at least deferring leasing in these areas, or at a minimum, leasing the parcels with an NSO stipulation.

Even if lands at issue here are open for leasing under the governing RMP, it would be entirely reasonable and consistent with BLM's obligations under FLPMA and NEPA for BLM to consider deferring parcels that have important wilderness resources and/or other resources. Moreover, to the extent certain parcels have only low potential for development, the alternative of deferring them appears even more reasonable. These options have never been analyzed.

2. Parcels with Low to Very Low Potential

BLM should, at a minimum, evaluate an alternative that defers leasing the proposed parcels until BLM demonstrates that these are "lands…which are known or believed to contain oil or gas deposits…" 30 U.S.C. § 226(a). As discussed later in this protest, BLM provides no evidence that the proposed parcels contain oil or gas deposits, as required by the Mineral Leasing Act (MLA). *Ibid.*; *see also Vessels Coal Gas, Inc.*, 175 IBLA 8, 25 (2008) ("It is well-settled under the MLA that competitive leasing is to be based upon reasonable assurance of an existing mineral deposit."). Consistent with the MLA and BLM's multiple use mandate, BLM should not issue leases unless and until BLM has shown that the area is known to contain resources that have the potential to be developed.

Another alternative BLM should consider is one that defers leasing the proposed parcels until production in Nevada is on par with other western states. According to BLM data, at least 50%

of federal oil and gas leases are in production in Colorado, New Mexico, Utah and Wyoming. Nevada, by contrast, has 6% of leases in production.[2] BLM should evaluate an alternative to not issue new leases until 50% of federal oil and gas leases are in production in the state to ensure "reasonable diligence" requirements are being met under the MLA. 30 U.S.C. § 187. This would also be a fiscally responsible alternative because leases in low potential areas generate minimal to no revenue but can carry significant cost in terms of resource use conflicts.

Leases in low potential areas generate minimal to no revenue but can carry significant cost in terms of resource use conflicts. Leases in low potential areas are most likely to be sold at or near the minimum bid of $2/acre, or non-competitively, and they are least likely to actually produce oil or gas and generate royalties.[3] This has proved to be true in Nevada, where federal oil and gas lease sales have generated just $0.31 per acre offered in bonus bids over the past 3 years, compared to other western states which generate hundreds or even thousands of dollars per acre offered. BLM must consider alternatives that account for and reflect the development potential of proposed leases. *See Wilderness Workshop v. BLM*, 342 F. Supp. 3d 1145, 1165 (D. Colo. 2018) (requiring consideration of development potential when developing the range of alternatives for oil and gas decisions). Such alternatives include excluding leases with low potential that also overlap with LWCs, sage-grouse habitat, and other important resources.

Nevada[4]	**Acres**	**Bonus Bids**
Mar. 2015	25,882	$30,496
June 2015	256,875	$0
Dec. 2015	3,641	$0
Mar. 2016	50,416	$0
June 2016	74,661	$24,740
Mar 2017	115,970	$74,780
June 2017	195,614	$29,440
Sept. 2017	3,680	$33,120
Dec. 2017	388,967	$66,978
Mar. 2018	67,791	$121,146
June 2018	313,715	$139,896
Sept. 2018	295,174	$0
Dec. 2018	32,924	$7,866
July 2019	389,176	$132,679
Sept. 2019	32,342	$23,532
Oct. 2019	269,184	$19,054
Nov. 2019	111,420	$7,950

[2] https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/oil-and-gas-statistics.

[3] Center for Western Priorities, "A Fair Share" ("Oil Companies Can Obtain an Acre of Public Land for Less than the Price of a Big Mac. The minimum bid required to obtain public lands at oil and gas auctions stands at $2.00 per acre, an amount that has not been increased in decades. In 2014, oil companies obtained nearly 100,000 acres in Western states for only $2.00 per acre. . . Oil companies are sitting on nearly 22 million acres of American lands without producing oil and gas from them. It only costs $1.50 per year to keep public lands idle, which provides little incentive to generate oil and gas or avoid land speculation.").

[4] All data obtained from BLM (https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/regional-lease-sales/nevada) and EnergyNet (https://www.energynet.com/govt_listing.pl).

Dec. 2019	268,052	$150,443
Total	**2,895,484**	**$862,120 ($0.30/acre)**

Failing to consider alternatives that would protect other public lands resources from oil and gas development also violates FLPMA. Considering only one alternative in which BLM would offer all nominated oil and gas lease parcels for sale, as is proposed here, regardless of other values present on these public lands that could be harmed by oil and gas development, would indicate a preference for oil and gas leasing and development over other multiple uses. Such an approach violates the agency's multiple use and sustained yield mandate. *See* 43 U.S.C. § 1732(a).

C. Facilitating speculative leasing is inconsistent with the MLA and FLPMA.

The MLA is structured to facilitate the actual production of federal minerals, and thus its faithful application should discourage leasing of low potential lands. BLM's March 2020 lease sale would violate this core principle in three ways: (1) the sale continues a long-extant trend of leasing lands with little or no potential for productive mineral development; (2) as a result, the sale encourages speculative, noncompetitive leasing, which creates administrative waste, not oil and gas production; and (3) it would destroy important option values by hamstringing decisional flexibility in future management.

1. The March 2020 sale would violate the MLA's core purpose by offering land with low mineral potential.

The MLA directs BLM to hold periodic oil and gas lease sales for "lands…which are known or believed to contain oil or gas deposits…" 30 U.S.C. § 226(a). The Interior Department has, through its internal administrative review body, recognized this mandate. *See Vessels Coal Gas, Inc.*, 175 IBLA 8, 25 (2008) ("It is well-settled under the MLA that competitive leasing is to be based upon reasonable assurance of an existing mineral deposit."). Claims by BLM that "BLM is required by law under the Mineral Leasing Act of 1920, as amended, and under the regulations at 43 CFR 3100 to consider leasing areas that have been nominated for lease, if leasing is in conformance with the applicable land use plan(s)" have not merit EASI at 61. Leasing is clearly a discretionary action by the BLM, not mandatory (lands "may be leased", 30 U.S.C. § 226(a)).

Here, BLM has provided no evidence that the proposed parcels contain oil or gas deposits, as the MLA requires. *See* 30 U.S.C. § 226(a). Based on the pattern of lease sales in Nevada over the past three years, there is evidence to the contrary – that the lands encompassed by the parcels generally lack oil and gas resources. In fact, in the EA, BLM acknowledges that future drilling outside of limited areas not implicated by this sale "would be highly speculative..." EASI at 26.

The Reasonably Foreseeable Development Scenario (RFD) referenced in the EA substantiates this point:

> As of March 2019 there are 165 authorized oil and gas leases in Battle Mountain District. Since 1907, roughly 770 oil and gas wells had been drilled in Nevada, though there are just 96 active wells at the time of this EA.

> Shale Oil contains significant crude oil and may be used as a source of petroleum. The potential within the Analysis Area is low in the short term and probably low to moderate in the long term.

EA at 54. Furthermore, all 45 parcels are in areas with low to very low potential for development and in areas where little to no actual oil and gas development has occurred in the last decade or more. BLM has stated that "Parcels with low to very low potential are again assumed to have no production." EA at 30.

BLM Nevada is currently spending an excessive amount of time and resources evaluating oil and gas leases that industry is either not bidding on or will likely never develop. Over the past 3 years, BLM has sold less than 10% of the acres it has offered for sale in Nevada, compared with other western states, which are generally selling 70% or more.[5] Multiple lease sales have garnered zero competitive bids.

Sale	**Parcels (sold / offered)**	**Acres (sold / offered)**
Mar. 2015	13 / 24	15,244 / 25,882
June 2015	0 / 124	0 / 256,875
Dec. 2015	0 / 3	0 / 3,641
Mar. 2016	0 / 39	0 / 50,416
June 2016	4 / 42	3,765 / 74,661
Mar 2017	20 / 67	35,502 / 115,970
June 2017	3 / 106	5,760 / 195,614
Sept. 2017	3 / 3	3,680 / 3,680
Dec. 2017	17 / 208	33,483 / 388,697
Mar. 2018	11 / 40	19,432 / 69,691
June 2018	22 / 166	38,579 / 313,715
Sept. 2018	0 / 144	0 / 295,174
Dec. 2018	2 / 17	3,392 / 32,924
July 2019	11 / 200	22,352 / 389,176
Sept. 2019	6 / 28	9,164 / 32,342
Oct. 2019	10 / 141	19,052 / 269,184
Nov. 2019	2 / 48	3,974 / 111,420
Dec. 2019	6 / 156	13,217 / 268,052
Total	**130 / 1,556 (8.4%)**	**226,596 / 2,897,114 (7.8%)**

Recently, The Wilderness Society and the Center for Western Priorities developed a report, *America's Public Lands Giveaway*, documenting this trend.[6] and will be referred to as Exhibit 2 and is attached hereto and incorporated herein by this reference. As the first table in Exhibit 2

[5] All data obtained from BLM (https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/regional-lease-sales/nevada) and EnergyNet (https://www.energynet.com/govt_listing.pl).

[6] America's Public Lands Giveaway, https://westrnpriorities.maps.arcgis.com/apps/Cascade/index.html?appid=d2fa61b5690d4d0a8c1670b6bbc123b9 (last visited Jan 10, 2020).

shows, of the 827,651 acres that have been offered for lease in Nevada as of August 2019, only 114,339 acres were sold competitively for the minimum bid ($2.00 per acre) and 526,178 acres had to be leased noncompetitively with no bid, at the minimum rental rate of $1.50 per acre. This means 77% of the leases were leased for $2.00 per acre or less. And as the second table in Exhibit 2 shows, 803,454 acres out of the total of 827,651 acres leased, or 97 percent, are sitting idle with no activity on them. This pattern underscores just how inefficient and wasteful the oil and gas program in Nevada has become, and also demonstrates that BLM Nevada's oil and gas leasing program is inconsistent with the direction set forth in the MLA.

Additionally, BLM in its March 2020 EA violates NEPA because it failed to consider a reasonable range of alternatives by omitting any option that would meaningfully limit leasing and development. *Wilderness Workshop v. BLM*, 342 F. Supp. 3d 1145, 1167 (D. Colo. 2018). In that case, conservation group plaintiffs argued that BLM should have considered "an alternative eliminating oil and gas leasing in areas determined to have only moderate or low potential for oil and gas development." *Id.* at 1166. BLM declined to consider the alternative, claiming it had already considered and discarded a "no leasing" alternative. The court agreed with the plaintiffs, finding that BLM did not closely study an alternative that closed low and medium potential lands when it admits there is an exceedingly small chance of them being leased. This alternative would be "significantly distinguishable" because it would allow BLM to consider other uses for that land. *Id.* at 1167, *citing New Mexico ex rel. Richardson v. Bureau of Land Mgmt.*, 565 F.3d at 708-09. Considering such an alternative would permit BLM to consider the option value of delaying leasing on low potential lands, as will be discussed below. Thus, the court held that BLM's failure to consider reasonable alternatives violated NEPA. *Id.* at 1167.

BLM seems to believe that this EA does not need to evaluate the merits of leasing in low potential lands. EASI at 61. But a NEPA analysis must consider all significant environmental issues and its fundamental purpose is to ensure "important effects will not be overlooked or underestimated." *See e.g., Baltimore Gas & Elec. Co. v. Natural Resources Defense Council*, 462 U.S. 87, 107 (1983) (holding that all significant environmental impacts must be considered); R*obertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). And an EA must consider alternatives as required by NEPA section 102(2)(E). 40 C.F.R. § 1508.9(b).

2. The March 2020 lease sale would encourage noncompetitive, speculative leasing.

Besides being wasteful and contrary to the MLA's purpose, the ongoing leasing of lands with little or no development potential creates another related problem: it facilitates, and perhaps even encourages, below-market, speculative leasing by industry actors who don't actually intend to develop the public lands they lease. This problem creates more administrative waste and also fails to uphold the MLA's core purpose.

Going back to the MLA's language, lease sales are intended to foster responsible oil and gas development, which lessees must carry out with "reasonable diligence." 30 U.S.C. § 187; *see also* BLM Form 3100-11 § 4 ("Lessee must exercise reasonable diligence in developing and producing…leased resources.").

BLM Nevada's oil and gas leasing program is also facilitating a surge in noncompetitive lease sales, which is fiscally irresponsible management of publicly-owned lands and minerals. Because companies pay no bonus bids to purchase noncompetitive leases, taxpayers lose out in the noncompetitive leasing process. These sales do not enjoy the benefits of market forces and rarely result in productive development.

In states like Nevada that lack competition during lease sales, speculators can easily abuse the noncompetitive process to scoop up federal leases for undervalued rates, as shown in a recent report from the New York Times. *See* Exhibit 3. The New York Times article affirms that "In states like Nevada, noncompetitive sales frequently make up a majority of leases given out by the federal government." It provides examples of speculators, including in Nevada, intentionally using this process to nominate parcels for sale, then sitting on the sidelines during the competitive lease sales and instead purchasing the leases cheaper after the sale at noncompetitive sales. These speculators are then often unable to muster the financial resources to develop the lands they have leased, so they sit idle: "Two Grand Junction, Colo., business partners, for example — a geologist and a former Gulf Oil landman — now control 276,653 acres of federal parcels in northeastern Nevada. But they are still looking for the money they need to drill on the land, or even to pay for three-dimensional seismic surveys to determine whether there is enough oil there to try." *Id.* By failing to appropriately implement the MLA and ensure that parcels offered for sale have a "reasonable assurance" of containing mineral deposits, BLM is encouraging noncompetitive, speculative leasing, which deprives the public of bonus bids and royalties, and leaves taxpayers to foot the bill for industry speculation.

The speculative nature of noncompetitive leasing – and the administrative waste it creates – is evident from a common outcome in noncompetitive leasing: termination for non-payment of rent. A review of noncompetitive leases in Nevada shows that BLM frequently terminates these leases because the lessee stops paying rent.[7] The administrative waste this process creates is further exacerbated by the fact that there are no apparent consequences for companies engaging in this practice. Indeed, many of these companies continue to actively nominate and purchase oil and gas leases, despite the clear pattern of buying leases noncompetitively with little intent to develop and reneging on their contractual obligations shortly thereafter. This process cannot be characterized as anything other than wasteful, counterproductive, and contrary to the MLA.

Again, the stated national policy underlying oil and gas leasing is "the orderly and economic development of domestic mineral resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security and environmental needs." 30 U.S.C. § 21a. Noncompetitive, speculative leasing on low-potential land does not further this policy goal, and instead occupies BLM resource specialists' time that would be better spent on other public lands management activities – all while taxpayers pick up the tab. The BLM should not offer these low potential lands for lease.

[7] This research is documented in the Center for American Progress's recent report, *Backroom Deals: The Hidden World of Noncompetitive Oil and Gas Leasing*, along with other concerns regarding speculative leasing raised in these comments. Available at https://www.americanprogress.org/issues/green/reports/2019/05/23/470140/backroom-deals/.

3. *BLM must analyze the "option value" of offering parcels with low or non- existent development potential in order to avoid speculative leasing.*

In addition to the concerns above, leasing lands with low potential for oil and gas development gives preference to oil and gas development at the expense of other uses while handcuffing BLM's ability to make other management decisions down the road. This is because the presence of oil and gas leases can limit BLM's willingness to manage for other resources in the future.

For example, in the Colorado River Valley RMP, BLM decided against managing lands for protection of wilderness characteristics in the Grand Hogback lands with wilderness characteristics unit based specifically on the presence of oil and gas leases, even though the leases were non-producing:

> The Grand Hogback citizens' wilderness proposal unit contains 11,360 acres of BLM lands. All of the proposed area meets the overall criteria for wilderness character…There are six active oil and gas leases within the unit, totaling approximately 2,240 acres. None of these leases shows any active drilling or has previously drilled wells. The ability to manage for wilderness character would be difficult. If the current acres in the area continue to be leased and experience any development, protecting the unit's wilderness characteristics would be infeasible…

Proposed Colorado River Valley RMP (2015) at 3-135.

Similarly, in the Grand Junction Resource Management Plan, BLM expressly stated that undeveloped leases on low-potential lands had effectively prevented management to protect wilderness characteristics, stating:

> 133,900 acres of lands with wilderness characteristics have been classified as having low, very low, or no potential…While there is not potential for fluid mineral development in most of the lands with wilderness characteristics units, the majority of the areas, totaling 101,100 acres (59 percent), are already leased for oil and gas development.

Proposed Grand Junction Proposed RMP (2015) at 4-289 to 4-290. The presence of leases can also limit BLM's ability to manage for other important, non-wilderness values, like renewable energy projects. *See*, e.g., Proposed White River Resource Management Plan at 4-498 ("Areas closed to leasing…indirectly limit the potential for oil and gas developments to preclude other land use authorizations not related to oil and gas (e.g., renewable energy developments, transmission lines) in those areas.").

As stated in *America's Public Lands Giveaway*, Exhibit 2, "In September 2018 the Bureau of Land Management offered 295,000 acres of public land in Nevada for oil and gas development, many of them in prime sage-grouse habitat. Exactly zero of them sold at competitive auction, leaving all 144 parcels available for noncompetitive leasing. Within two months following the sale, 21 leases were scooped up noncompetitively for just $1.50 per acre." Similarly, here if

BLM does not consider the "option value" of the parcels it is proposing for oil and gas lease sale, it will rule the risk of precluding future management decisions to benefit other multiple use values.

In this context, BLM can and should apply the principles of option value or informational values, which permit the agency to look at the benefits of delaying irreversible decisions. *See* Jayni Foley Hein, *Harmonizing Preservation and Production 13* (June 2015) ("Option value derives from the ability to delay decisions until later when more information is available... In the leasing context, the value associated with the option to delay can be large, especially when there is a high degree of uncertainty about resource price, extraction costs, and/or the social and environmental costs of drilling.").[8]

It is well-established that the issuance of an oil and gas lease is an irreversible commitment of resources. As the U.S. Court of Appeals for the D.C. Circuit held in the context of considering the informational value of delaying leasing on the Outer Continental Shelf, "[t]here is therefore a tangible present economic benefit to delaying the decision to drill for fossil fuels to preserve the opportunity to see what new technologies develop and what new information comes to light." *Center for Sustainable Economy v. Jewell*, 779 F.3d 588, 610 (D.C. Cir. 2015).

Thus, in evaluating this lease sale, BLM should have evaluated "option value" – the economic benefits that could arise from delaying leasing and/or exploration and development based on improvements in technology, additional benefits that could come from managing these lands for other uses, and additional information on the impacts of climate change and ways to avoid or mitigate impacts on the environment. This is essential, in particular, for lands with low or non-existent development potential. BLM has the ability and obligation to undertake an analysis of the benefits of delaying leasing, which can be both qualitative and quantitative, considering both economic and environmental needs, as shown by a recent federal court decision. *See Wilderness Workshop v. BLM* (court finding that BLM failed to consider reasonable alternatives by omitting any option that would meaningfully limit leasing and development within the planning area.)

As applied here, this economic principle suggests that BLM Nevada would be well-served by deferring the March 2020 lease parcels and preparing a programmatic EIS that considers alternative approaches for managing the oil and gas program in Nevada. The point of deferring and planning would be to ensure that BLM does not commit to moving forward with oil and gas leasing when, based on Nevada's current leasing patterns described above, economic and other indicators suggest doing so right now does not best serve the public interest.

America's Public Lands Giveaway, Exhibit 2, provides a detailed discussion of problems that are caused by inactive leases, many leased noncompetitively, and provides recommendations for how to improve the leasing system. Leasing at minimum bids or noncompetitively leads to many leases sitting idle with a need to be terminated and not producing royalties since oil and gas is not produced, and other uses have been limited. *See* Exhibit 2. If BLM approached leasing based on an option value analysis, many of these problems could be avoided.

In this respect we remind you of the letter that Senator Cortez Masto sent to Kemba Anderson,

[8] *Available at* https://policyintegrity.org/files/publications/DOI_LeasingReport.pdf.

the BLM Branch Chief of Fluid Minerals, on November 5, 2019 regarding the November oil and gas lease sale. In that letter the Senator asked for the protection of water resources and sensitive lands near Great Basin National Park, Ruby Lakes National Wildlife Refuge, and the Ruby Mountains. As she said, "Our public lands serve as a unique and valuable resource that boost local economies across all corners of our state, while providing public spaces for hunting, fishing, and outdoor recreation. I request that you reconsider inclusion of these parcels that are near our treasured public spaces." The same is true of the March lease sale parcels, and if BLM employed a option value analysis it would see that many of these parcels should be deferred from leasing. And Representative Horsford in his November 26, 2019 letter to the BLM regarding the March 2019 lease sale made similar points and expressed similar concerns about a number of lease parcels.

D. Prioritizing oil and gas leasing is inconsistent with FLPMA's multiple-use mandate.

Prioritizing oil and gas leasing over all other resources and values violates FLPMA's multiple use mandate, and prioritizing leasing of lands with low potential for oil and gas development exacerbates this violation. Leasing in low potential areas gives preference to oil and gas development at the expense of other uses because the presence of leases can limit BLM's ability to manage for other resources, in violation of FLPMA's multiple use mandate. Under FLPMA, BLM is subject to a multiple-use and sustained yield mandate, which prohibits the Department of the Interior (DOI) from managing public lands primarily for energy development or in a manner that unduly or unnecessarily degrades other uses. *See* 43 U.S.C. § 1732(a) and (b). Instead, the multiple-use mandate directs DOI to achieve "a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations." 43 U.S.C. § 1702(c). Further, as co-equal, principal uses of public lands, outdoor recreation, fish and wildlife, grazing, and rights-of-way must receive the same consideration as energy development. 43 U.S.C. § 1702(l).

DOI appears to be pursuing an approach to oil and gas management that prioritizes this use above others in violation of the multiple use mandate established in FLPMA. For example, a March 28, 2017 Executive Order and ensuing March 29, 2017 Interior Secretarial Order #3349 seek to eliminate regulations and policies that ensure energy development is balanced with other multiple uses. None of the overarching legal mandates under which BLM operates – be it multiple-use or non-impairment – authorizes DOI to establish energy development as the dominant use of public lands. On our public lands, energy development is an allowable use that must be carefully balanced with other uses. Thus, any action that attempts to enshrine energy development as the dominant use of public lands is invalid on its face and inconsistent with the foundational statutes that govern the management of public lands.

The mere fact an RMP makes lands *available* for leasing does not mean that actually leasing the lands meets BLMs' multiple use obligations. Given BLM's acknowledged discretion to engage in leasing, or not leasing, under the MLA, it is clear the leasing stage, as much as the planning stage, is when multiple use decisions should be made. Since land use plan decisions only set a basic framework for land management, and do not make project-specific decisions, it is clear the leasing stage is when decisions should be made about whether issuing a lease parcel would meet

BLM's multiple use responsibilities, and this must be reflected in the NEPA analysis at the leasing stage, which has not occurred here.

Federal courts have consistently rejected efforts to affirmatively elevate energy development over other uses of public lands. In the seminal case, *New Mexico ex rel. Richardson*, the Tenth Circuit put to rest the notion that BLM can manage chiefly for energy development, declaring that "[i]t is past doubt that the principle of multiple use does not require BLM to prioritize development over other uses." 565 F.3d at 710; *see also S. Utah Wilderness Alliance v. Norton*, 542 U.S. 52, 58 (2004) (defining "multiple use management" as "striking a balance among the many competing uses to which land can be put"). Other federal courts have agreed. *See, e.g., Colo. Envtl. Coalition v. Salazar*, 875 F. Supp. 2d 1233, 1249 (D. Colo. 2012) (rejecting oil and gas leasing plan that failed to adequately consider other uses of public lands). Thus, any action by BLM that seeks to prioritize oil and gas leasing and development as the dominant use of public lands, as this proposed sale of 45 parcels appears to do, would violate FLPMA. BLM must consider a reasonable range of alternatives for this lease sale that considers and balances the multiple uses of our public lands, consistent with NEPA and FLPMA.

E. BLM has inadequately analyzed and mitigated climate change impacts.

While we appreciate that BLM provided an analysis of GHG emissions associated with leasing in the EA, the analysis is inadequate. BLM has provided an assessment of the amount of GHGs likely to be emitted due to this leasing decision and an analysis of possible downstream GHG emissions. There is also an analysis of the cumulative impacts of climate change. Estimated GHG emissions from the 25 wells that might be drilled are 60,701 tons per year.[9] EA at 29. "The total projected increase in downstream GHG emissions from the proposed parcels could range from 0.0004 to 0.0119 MMT of CO2e per year . . ." *Id.* at 30. Total proposed action GHG emissions as a percent of total U.S. GHG emissions would be 0.002%. *Id.* at 59. But despite these analyses, BLM still concludes "[i]t is currently not feasible to predict the net impacts from the Proposed Action on climate, as leasing is an administrative action that has no direct effects." *Id.* at 31.

NEPA and its implementing regulations, promulgated by the Council on Environmental Quality ("CEQ"), 40 C.F.R. §§ 1500.1–1518.4, are our "basic national charter for the protection of the environment." 40 C.F.R. § 1500.1. Recognizing that "each person should enjoy a healthful environment," NEPA ensures that the federal government uses all practicable means to "assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings," and to "attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences," among other policies. 43 U.S.C. § 4331(b).

[9] The BLM should consider the recent decision by the Tenth Circuit Court of Appeals where it found that a reasonably foreseeable development scenario (RFDS) projection must be considered as the actual number of wells that will be drilled. NEPA therefore requires BLM to consider impacts of those wells in its lease sale NEPA analysis. *Diné Citizens Against Ruining Our Env't v. Bernhardt*, 923 F.3d 831, 853 (10th Cir. 2019). Thus, for purposes of NEPA, those reasonably foreseeable wells must be considered in the agency's cumulative impact analysis. *See id.* at 853.

NEPA regulations explain, in 40 C.F.R. §1500.1(c), that:

> Ultimately, of course, it is not better documents but better decisions that count. NEPA's purpose is not to generate paperwork – even excellent paperwork – but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.

Thus, while "NEPA itself does not mandate particular results, but simply prescribes the necessary process," *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989), agency adherence to NEPA's action-forcing statutory and regulatory mandates helps federal agencies ensure that they are adhering to NEPA's noble purpose and policies. *See* 42 U.S.C. §§ 4321, 4331.

Direct effects are "caused by the action and occur at the same time and place." 40 C.F.R. § 1508.8(a). Indirect effects are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." *Id.* § 1508.8(b). Cumulative impact "is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." *Id.* § 1508.7.

A large and growing body of scientific research demonstrates, with ever increasing confidence, that climate change is occurring and is caused by emissions of greenhouse gases (GHGs) from human activities, primarily the use of fossil fuels. The 2018 Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°C found that human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, and that warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate.[10] The 2018 United States Fourth National Climate Assessment (hereinafter, "NCA4") found, "that the evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans' physical, social, and economic well-being are rising."[11]

A 2018 analysis from the U.S. Geological Survey (USGS) found that, "[n]ationwide emissions from [fossil] fuels extracted from Federal lands in 2014 were 1,279.0 MMT CO_2 Eq. [million metric tons of carbon dioxide equivalent] for CO_2 [carbon dioxide], 47.6 MMT CO_2 Eq. for CH_4 [methane], and 5.5 MMT CO_2 Eq. for N_2O [nitrous oxide]. . . . On average, Federal lands fuels emissions . . . accounted for 23.7 percent of national CO_2 emissions, 7.3 percent for CH_4, and 1.5

[10] 2018 Intergovernmental Panel on Climate Change, *Summary for Policymakers*, *in* Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty 6 (Valérie Masson-Delmotte et al. eds., 2018), *available at*: https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf [hereinafter, *Summary of IPCC 1.5°C Report*].

[11] U.S. Global Change Research Program, *Fourth National Climate Assessment: Volume II Impacts, Risks, and Adaptation in the United States* 36 (David Reidmiller et al. eds. 2018), *available at*: https://nca2018.globalchange.gov/downloads/NCA4_2018_FullReport.pdf (emphasis omitted) [hereinafter, *NCA4*].

percent for N_2O" over the ten years included in this estimate.[12] Federal lands are also a critical carbon sink. The USGS found that in 2014, federal lands of the conterminous United States stored an estimated 83,600 MMT CO_2 Eq., in soils (63 percent), live vegetation (26 percent), and dead organic matter (10 percent).[13] In addition, the USGS estimated that Federal lands "sequestered an average of 195 MMT CO_2 Eq./yr between 2005 and 2014, offsetting approximately 15 percent of the CO_2 emissions resulting from the extraction of fossil fuels on Federal lands and their end-use combustion."[14]

It is well established that federal agencies must analyze climate change when conducting NEPA analyses, including in this lease sale analysis. In 2009, the Environmental Protection Agency (EPA) issued a finding that the changes in our climate caused by elevated concentrations of greenhouse gases in the atmosphere are reasonably anticipated to endanger the public health and welfare of current and future generations. EPA, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009). The D.C. Circuit Court of Appeals upheld this decision as supported by the vast body of scientific evidence on the subject. *See Coal. for Responsible Regulation, Inc. v. EPA.*, 684 F.3d 102, 120-22 (D.C. Cir. 2012).

Yet in the March 2020 Lease Sale EA, BLM unlawfully failed to take a hard look at direct, indirect, and cumulative impacts to a wide range of resource values including, but not limited to, GHGs and climate change.

BLM's failure to analyze and disclose to the public the impacts of its leasing decisions on GHG emissions and climate change violates NEPA. As more fully described above, lease issuance is the "point of no return" (*i.e.*, the point at which time BLM makes an irrevocable commitment of resources) for purposes of NEPA analysis. *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 66 (D.D.C. 2019). BLM itself identifies lease issuance as the point of irretrievable commitment of resources:

> The BLM has a statutory responsibility under NEPA to analyze and document the direct, indirect and cumulative impacts of past, present and reasonably foreseeable future actions resulting from Federally authorized fluid minerals activities. *By law, these impacts must be analyzed before the agency makes an irreversible commitment. In the fluid minerals program, this commitment occurs at the point of lease issuance.*[15]

It is at this point that BLM must analyze *all* direct, indirect, and cumulative impacts of its leasing decision. *See, e.g.*, *WildEarth Guardians*, 368 F. Supp. 3d at 65-66; *see also* 40 C.F.R. §§ 1508.7, 1507.8.

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[12] Matthew D. Merrill et al., *Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates for 2005-14: U.S. Geological Survey Scientific Investigations Report 2018-5131* 6 (2018), *available at*: https://pubs.usgs.gov/sir/2018/5131/sir20185131.pdf [hereinafter, *USGS 2018 Report*].

[13] *USGS 2018 Report* at 12-13.

[14] *Id.* at 1.

[15] Bureau of Land Mgmt., *H-1624-1 – Planning for Fluid Mineral Resources* § I.B.2, at I-2 (Feb. 20, 2018) (emphasis added), *available at*: https://www.blm.gov/sites/blm.gov/files/H-1624-1%20rel%201-1791.pdf [hereinafter, "BLM Handbook 1624"].

It is critical that BLM undertake a comprehensive NEPA analysis now, including GHG emissions and climate change, before deciding to offer, sell and issue the protested parcels. Subsequent approvals by BLM will not be able to completely eliminate potential environmental and climate change impacts.

BLM must complete a comprehensive cumulative impacts analysis that compares GHG emissions from the lease parcels to emissions from other BLM-managed projects in this region and across the country. *WildEarth Guardians*, 368 F.Supp.3d at 76. "To the extent other BLM actions in the region—such as other lease sales—are reasonably foreseeable when an EA is issued, BLM must discuss them as well." *Id.* at 77. Similarly, here, BLM must analyze and disclose to the public the cumulative GHGs from similar, collectively significant oil and gas lease sales within Nevada, as well as throughout the Interior West, and nationally. *Id.* at 77.

BLM also defers requiring the implementation of best management practices (BMPs) to reduce GHG emissions. Instead, BLM merely "encourages industry to incorporate and implement BMPs to reduce impacts to air quality by reducing emissions, surface disturbances, and dust. The BLM coordinates with the Environmental Protection Agency (EPA) and State agencies early in the exploration and development process to determine how best to model and mitigate for impacts to air quality."[16] However, lease stipulations and notices (and their accompanying mitigation measures) do not constitute NEPA analyses. Thus, even though BLM has attached them to the leases at issue,[17] this does not excuse the agency from its separate legal obligation to take a "hard look" at the potential impacts of its leasing decisions under NEPA. Stipulations and notices are required by FLPMA and the MLA, but are not a substitute for a NEPA analysis. *See, e.g.*, 43 C.F.R. § 3101.1-3; 43 U.S.C. § 1732(a). Further, voluntary efforts alone are not sufficient to reduce emissions. Therefore, BLM must analyze these emissions and include mandatory mitigation measures to address them.

1. The underlying RMPs are inadequate to support leasing without supplemental NEPA.

BLM did not adequately consider the potential climate impacts of making the proposed parcels available for leasing. The governing RMPs for the Battle Mountain District do not include climate change analysis appropriate to this discrete leasing decision, which requires greenhouse gas quantification and cumulative impact analysis among other elements; but rather discussed climate change at a general level relevant to the high-level NEPA analysis undertaken for field office-wide RMPs. Because BLM did not adequately analyze climate change impacts from oil and gas leasing in the governing RMPs, BLM should reevaluate its leasing allocation decisions prior to offering oil and gas leases for sale. The level of analysis required to rectify the failures of the underlying RMPs may require an EIS prior to leasing.

BLM has better climate change analysis tools at its disposal now and a court has required the agency to conduct additional climate analysis and make oil and gas leasing decisions that are based on that analysis. Here, the BLM has ample data to forecast a range of reasonably

[16] *Id.* at 16.
[17] *Id.* at Appendix D at 153-169.

foreseeable climate impacts from oil-and gas-development and must explain where there is uncertainty in order to meet its hard look obligation.

Courts have repeatedly invalidated oil and gas leasing decisions based on BLM's failure to adequately analyze potential climate impacts, including downstream impacts associated with leasing decisions. Most recently, the United States District Court for the District of Columbia ruled that BLM violated NEPA when evaluating a lease sale in Wyoming because the agency: (1) failed to quantify and forecast drilling-related GHG emissions; (2) failed to adequately consider GHG emissions from the downstream use of oil and gas produced on the leased parcels; and (3) failed to compare those GHG emissions to state, regional, and national GHG emissions forecasts, and other foreseeable regional and national BLM projects. *See Wild Earth Guardians v. Zinke,* 368 F. Supp. 3d 41, 76-77 (D.D.C. March 19, 2019). Numerous circuit court decisions have likewise confirmed that NEPA requires agencies to thoroughly analyze greenhouse gas emissions. *E.g., Ctr. For Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217, 1223-25 (9th Cir. 2008) ("The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct."). Furthermore, courts have repeatedly held that agencies must analyze and disclose to the public the GHG emissions resulting from the production, transportation, processing, and end-use of fossil fuels that will be produced or transported as a result of agency approvals.[18]

Whether BLM is able to quantify the full benefits of fossil fuel development or not, it is inappropriate to treat the value of climate harms as zero when the impact of climate change is certainly not zero. The Social Cost of Carbon (SCC) provides a methodology for that analysis that avoids zeroing out impacts. *High Country Conservation Advocates*, 52 F. Supp. 3d at 1192 ("[B]y deciding not to quantify the costs at all, the agencies effectively zeroed out the cost in its

[18] *See, e.g., Sierra Club v. FERC*, 867 F.3d 1357,1374 (D.C. Cir. 2017) (GHG emissions from the combustion of gas "are an indirect effect of authorizing this [pipeline] project, which [the agency] could reasonably foresee"); *Citizens for a Healthy Cmty. v. U.S. Bureau of Land Mgmt.,* No. 1:17-cv-02519-LTB-GPG, 2019 WL 1382785, at *8 (D. Colo. Mar. 27, 2019) ("Defendants acted in an arbitrary and capricious manner and violated NEPA by not taking a hard look at the foreseeable indirect effects resulting from the combustion of oil and gas."); *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 71 (D.D.C. 2019) ("BLM failed to take a hard look at the environmental impacts of leasing because it failed to quantify and forecast aggregate GHG emissions from oil and gas development."); *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549-50 (8th Cir. 2003); *San Juan Citizens All. v. U.S. Bureau of Land Mgmt.*, 326 F. Supp. 3d 1227, 1242-43 (D.N.M. 2018) (BLM's reasoning for not analyzing indirect GHG emissions was "contrary to the reasoning in several persuasive cases that have determined that combustion emissions are an indirect effect"); *W. Org. of Res. Councils*, 2018 WL 1475470, at *13 (D. Mont. Mar. 26, 2018) ("In light of the degree of foreseeability and specificity of information available to the agency while completing the EIS, NEPA requires BLM to consider in the EIS the environmental consequences of the downstream combustion of the coal, oil and gas resources potentially open to development under these RMPs."); *Mont. Envtl. Info. Ctr. v. U.S. Office of Surface Mining Reclamation and Enf't*, 274 F. Supp. 3d 1074, 1098-99 (D. Mont. 2017) (holding indirect effects from coal trains includes the 23.16 million metric tons of GHG emissions from the combustion of coal extracted from the mine); *Wilderness Workshop v. BLM*, 342 F. Supp. 3d 1145, 1156 (D. Colo. 2018) ("BLM acted in an arbitrary and capricious manner and violated NEPA by not taking a hard look at the indirect effects resulting from the combustion of oil and gas in the planning area under the RMP [Resource Management Plan]."); *Diné Citizens Against Ruining Our Env't v. U.S. Office of Surface Mining Reclamation and Enf't*, 82 F. Supp. 3d 1201, 1213 (D. Colo. 2015) ("[T]he coal combustion-related impacts of [the mine's] proposed expansion are an 'indirect effect' requiring NEPA analysis"), *vacated as moot*, 643 Fed. App'x 799 (2016); *High Country Conservation Advocates v. U.S. Forest Serv.*, 52 F. Supp. 3d. 1174, 1198 (D. Colo. 2014) ("[R]easonably foreseeable effect [of downstream combustion] must be analyzed, even if the precise extent of the effect is less certain.").

quantitative analysis"); *Center for Biological Diversity v. NHTSA*, 538 F.3d at 1200 (citing a range of values for the value of carbon emissions reductions, and noting that it "is certainly not zero"). BLM should use available tools, such as the SCC/SCM protocols, to ensure a full consideration of climate change issues

NEPA requires a more searching analysis of climate implications than merely disclosing the amount of pollution. Rather, BLM must examine the "ecological[,]... economic, [and] social" impacts of those emissions, including an assessment of their "significance." 40 C.F.R. §§ 1508.8(b), 1502.16(a)-(b). The U.S. Supreme Court has called the disclosure of impacts the "key requirement of NEPA," and held that agencies must "consider and disclose the *actual environmental effects*" of a proposed action in a way that "brings those effects to bear on [the agency's] decisions." *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council*, 462 U.S. 87, 96 (1983) (emphasis added). The tons of greenhouse gases emitted are not the "actual environmental effects" under NEPA. Rather, the actual environmental effects are the climate impacts caused by those emissions, such as property loss, changes in energy demand, impacts to agriculture, forestry, and fisheries, human health impacts, changes in fresh-water availability, ecosystem service impacts, impacts to outdoor recreation, and catastrophic impacts. These kinds of impacts are included in SCC calculations. BLM' should employ them to ensure full compliance with NEPA.

Under NEPA, BLM cannot hide behind a professed lack of high precision analytic tools to avoid a full analysis of climate change issues—NEPA allows reasonable assumptions to be made in order to achieve its hard look requirement. And besides quantifying GHG emissions due to the leasing decision, BLM must also consider emissions in the aggregate. Incremental emissions must be tied to the aggregate level of emissions. This is needed to avoid the "tyranny of small decisions" and ensure cumulative impacts are fully considered. *Kern v. BLM,* 284 F.3d 1062, 1078 (9th Cir. 2002). While small local emissions levels from individual sources may make only a small contribution to global climate change, collectively there is a large impact. Therefore, the analysis in the EA cannot be only of local level emissions and project area climate change impacts, the incremental contribution to cumulative global emissions must be considered; these local emissions will lead to worse climate change impacts globally *and* locally. The EA should consider the local resources (such as vegetation) and land uses (such as grazing) most susceptible to climate change and identify ways to protect them, including considering concerns about resiliency. This issue is addressed in the Utah State University report (Exhibit 4) that will be discussed in the section below, and which BLM should fully consider in it climate change analysis in the EA.

2. *BLM must consider climate mitigation measures, prevent unnecessary or undue degradation of the public lands, and comply with the multiple use mandate*

Given the severe impacts of climate change that are widely recognized in the scientific community, there are several issues that should be addressed in the EA for mitigating the impacts of climate change. The unnecessary and undue degradation (UUD) mandate in FLPMA requires BLM to consider net zero climate emissions that could be satisfied with mandatory mitigation measures. The lease sale EA fails to meet this obligation because it prioritizes energy development over other multiple uses. The plans in the EA will contribute to climate change in a

way that causes UUD. Furthermore, BLM has failed to consider—much less adopt—mitigation measures such as carbon offsets projects and other land protection measures.

The EA makes a number of provisions for mitigation of air quality impacts due to oil and gas development on the lease parcels, which we appreciate (although these provisions should be made lease stipulations and not just listed as possibilities for application at the APD stage in the EA). EA at 31. However, the analysis still neglects numerous potential other mitigation measures. These would include, for example, carbon offset projects such as tree plantings or other land protection measures. A climate mitigation fee could be assessed. While BLM may have limits in requiring compensatory mitigation at this time due to the provisions of IM 2019-018, the validity of that IM is in question. As required under the Idaho court decision regarding the sage-grouse plans, before BLM could eliminate the compensatory mitigation requirement it needed to prepare a supplemental EIS. *Western Watersheds Project v. Schneider,* 2019 U.S. Dist. LEXIX 181043, 28-29 (D. Idaho, Oct. 16, 2019).

And again, BLM should also ensure in the EA that it complies with the obligation to prevent unnecessary or undue degradation (UUD) of the public lands. 43 U.S.C. § 1732(b). This provision is more than wide enough to include climate change impacts. *See generally Theodore Roosevelt Conservation Partnership v. Salazar,* 661 F.3d 66 (D.C. Circuit 2011) (recognizing that environmental impacts can rise to the level of UUD if they result in "something more than the usual effects anticipated from *appropriately mitigated* development." (citation omitted) (emphasis added)). Other provisions of FLPMA also support the consideration and mitigation of climate change impacts. *See, e.g.,* 43 U.S.C. §§ 1701(a)(8) and (9) (establishing policies that the public lands be protected to ensure the quality of air and atmospheric resources, and that the U.S. must receive fair market value from the use of the public lands).

Moreover, the multiple use mandate established by FLPMA also allows the BLM to mitigate damages caused by climate change. 43 U.S.C. § 1732(a) (putting in place the multiple use mandate). Under this guidance BLM must consider present and future needs of the American people, consider the long-term needs of future generations, and provide for "harmonious and coordinated management . . . without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources . . . ." *Id.* § 1702(c). Mitigation of climate change impacts should be considered under these mandates.

3. *BLM violated NEPA by failing to analyze and disclose the potential emissions of Methane*

BLM failed to analyze and disclose the potential emissions of a particularly potent GHG, methane, in the EA. A global warming potential (GWP) is a measure of the amount of warming caused by the emission of one ton of a particular greenhouse gas relative to one ton of carbon dioxide. The methane GWP estimates how many tons of carbon dioxide would need to be emitted to produce the same amount of global warming as a single ton of methane. This is important because methane is a much more potent greenhouse gas than carbon dioxide. Thus, BLM must analyze and disclose the potential methane emissions from its leasing decisions. BLM must use the best available science by analyzing the global warming potential of methane

emissions using both the IPCC's current upper-end 100-year GWP for fossil methane of 36, and the IPCC's current upper-end 20-year GWP for fossil methane of 87. *W. Org. of Res. Councils v BLM,* 2018 U.S. Dist. LEXIS 49635, 53-55 (D. Mont. Mar. 26, 2018).

C. BLM must consider the climate change impact study done by Utah State University

Utah State University (USU) has done a study on the impact of climate change on BLM's multiple use mission and made recommendations for how to address this issue. Among other things the study, which reviewed 225 papers published between 2009 and 2018, finds that active uses on BLM lands, such as energy development, threaten passive uses such as conservation and ecosystem services. Many ecosystem processes will be affected by climate change, including an increased loss of wildlife habitat, the creation of conditions favorable for invasive species, and an increase in the size and severity of wildfires. The USU authors reviewed 44 BLM RMPs and found there was little consideration of climate change impacts to ecosystems and land uses and that adaptive responses to climate change were not considered. BLM has inadequate planning for climate change as needed to fulfill its conservation mandate, especially the need for prioritizing different uses. More effective incorporation of science is needed for effective natural resources management in the face of a climate- change-affected future. Passive uses are under-prioritized by BLM in favor of active uses. Energy extraction contributes the most to anthropogenic climate change of all the land uses BLM manages.

The BLM should consider the USU report as it develops the NEPA analysis for climate change for the March 2020 oil and gas lease sale in the Battle Mountain District. We have included the USU report here as Exhibit 4 and ask that it be fully considered in the climate change analysis. And we would note again, that since the RMPs for the Battle Mountain District do address climate change issues, it is even more important that BLM fully consider this issue at the leasing stage.

V. Conclusion

Based on the foregoing, BLM must complete additional analysis and fully comply with applicable law and guidance such as FLPMA and NEPA, prior to moving forward with this lease sale in the Battle Mountain District.

Sincerely,

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List of Exhibits

1. NV March 2020 Parcels Intersecting BLM LWC Map
2. *America's Public Lands Giveaway*. https://westernpriorities.org/2019/09/19/story-map-americas-public-lands-giveaway/
3. "Energy Speculators Jump on Chance to Lease Public Land at Bargain Rates", The New York Times, Nov. 27, 2018. https://www.nytimes.com/2018/11/27/business/energy-speculators-public-land-leases.html
4. Utah State University Climate Change Study
5. TWS et al, 2020 Q1 Oil and Gas Lease Comments

Appendix

Parcel Numbers and Serial Numbers of Protested Parcels

NVN 099509	NV-2020-03-6672
NVN 099510	NV-2020-03-5732
NVN 099511	NV-2020-03-5733
NVN 099512	NV-2020-03-5742
NVN 099513	NV-2020-03-5745
NVN 099514	NV-2020-03-5748
NVN 099515	NV-2020-03-5752
NVN 099516	NV-2020-03-5756
NVN 099517	NV-2020-03-5759
NVN 099518	NV-2020-03-5762
NVN 099519	NV-2020-03-5766
NVN 099520	NV-2020-03-5770
NVN 099521	NV-2020-03-5773
NVN 099522	NV-2020-03-5694
NVN 099523	NV-2020-03-5696
NVN 099524	NV-2020-03-5699
NVN 099525	NV-2020-03-5702
NVN 099526	NV-2020-03-5675
NVN 099527	NV-2020-03-5681
NVN 099528	NV-2020-03-5685
NVN 099529	NV-2020-03-5688
NVN 099530	NV-2020-03-5691
NVN 099531	NV-2020-03-5573
NVN 099532	NV-2020-03-5578
NVN 099533	NV-2020-03-5581
NVN 099534	NV-2020-03-5596
NVN 099535	NV-2020-03-5602
NVN 099536	NV-2020-03-5613
NVN 099537	NV-2020-03-5616
NVN 099538	NV-2020-03-5619
NVN 099539	NV-2020-03-5622
NVN 099540	NV-2020-03-5625
NVN 099541	NV-2020-03-5628
NVN 099542	NV-2020-03-5631
NVN 099543	NV-2020-03-5650
NVN 099544	NV-2020-03-5663
NVN 099545	NV-2020-03-5665
NVN 099546	NV-2020-03-5714
NVN 099547	NV-2020-03-5715

NVN 099548	NV-2020-03-5719
NVN 099549	NV-2020-03-5726
NVN 099550	NV-2020-03-5642
NVN 099551	NV-2020-03-5644
NVN 099552	NV-2020-03-5637
NVN 099553	NV-2020-03-5639

Exhibit 1

NV March 2020 Parcels Intersecting BLM LWC Map

NV March 2020 Parcels Intersecting BLM LWC

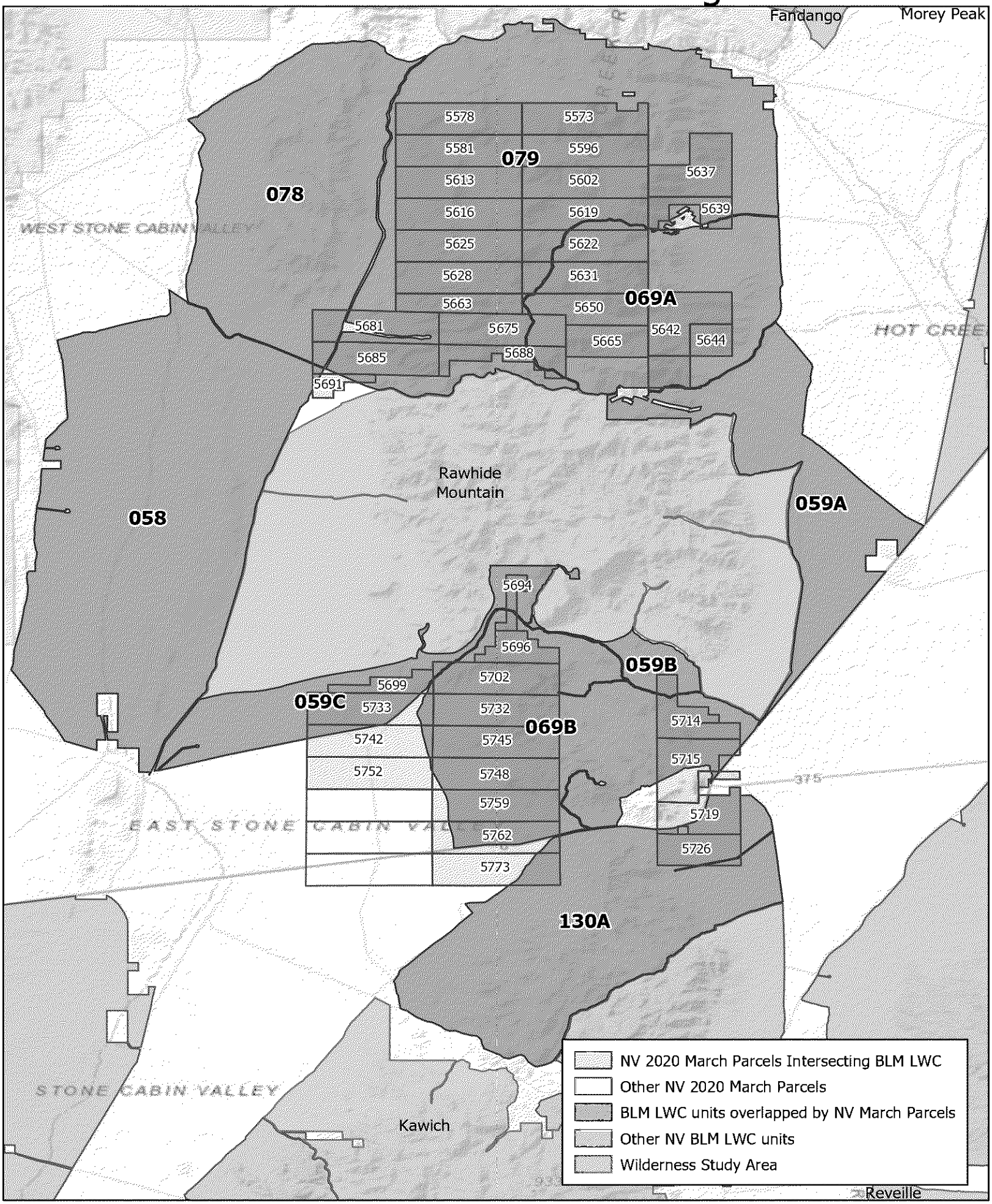


Exhibit 2

America's Public Lands Giveaway

Across the American West, millions of acres of public lands are currently leased for oil and gas drilling. For decades, private companies have taken advantage of an outdated system that is tilted in favor of the oil and gas industry and against taxpayers. These oil and gas companies drive the process to lease the public's land, pay extremely low bid rates, and leave millions of idle leased acres off limits to other uses.

While this is happening, the general public is often left in the dark. The federal government's system for tracking key oil and gas development information on public lands is inadequate and onerous. **The Wilderness Society and the Center for Western Priorities conducted a first-of-its-kind geospatial analysis to shine a light on the outdated leasing process. Using a newly developed tool, the analysis mapped all federal oil and gas leases, identifying instances where public lands leases were sold for bargain prices.**

Oil and gas leases currently lock up 17.7 million acres of public lands across ten Western states—Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, and Wyoming. These leases are often purchased at sweetheart prices as part of an outdated federal leasing process. **According to our analysis, 32 percent of all public lands and minerals actively leased for oil and gas were sold for just $2.00 per acre or less—totaling 5.7 million acres.**

Public lands leased for oil and gas development

As of August 2019, the oil and gas industry is leasing 17.7 million acres of national public lands in the West.

Federal oil and gas leases

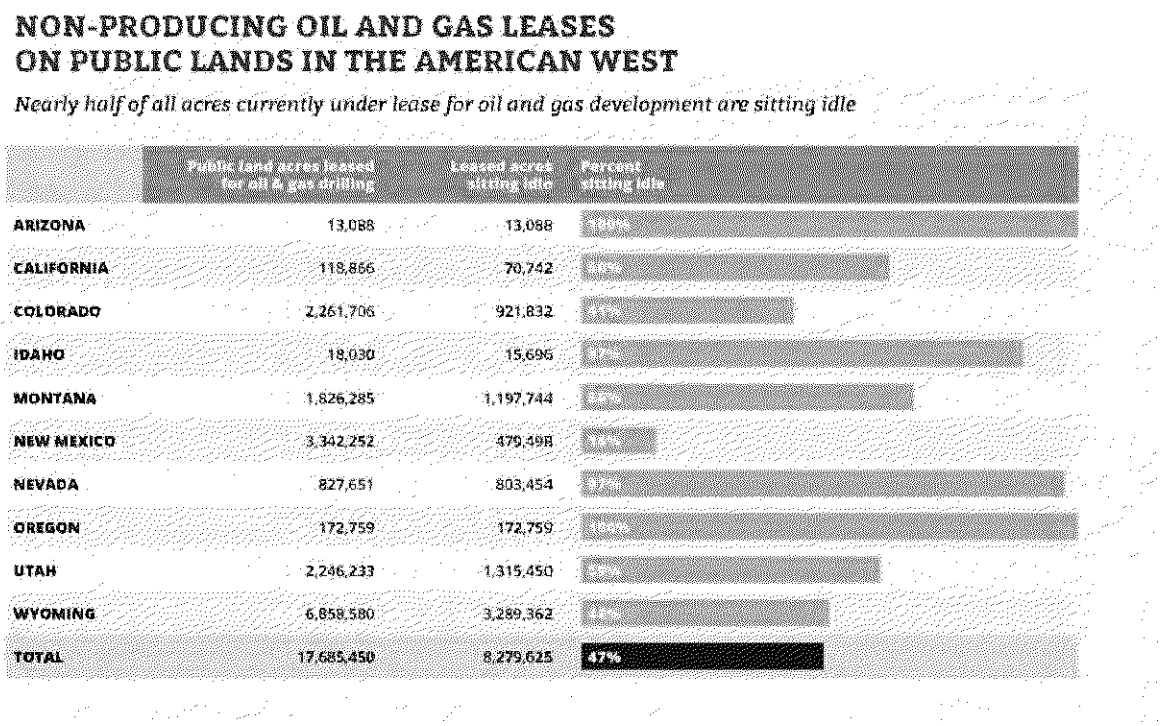
Such low cost leases shortchange taxpayers and incentivize speculation on public lands with little or no potential for oil and gas development. Compared to leases that sold for more than $2.00 per acre, low cost leases have significantly higher rates of termination. **Since 1987, when Congress** passed the last major amendment (link: https://www.congress.gov/bill/100th-congress/house-bill/2851) **to the Mineral Leasing Act, 60 percent of all acres leased—covering 42.1 million acres—have been leased for $2.00 or less. More than 90 percent of those leases are no longer active.**

LOW COST OIL AND GAS LEASING ON PUBLIC LANDS IN THE AMERICAN WEST

Leases sold for $2.00 per acres or less make up 32 percent of all lands currently under lease for oil and gas development

	Acres leased for oil & gas drilling	Acres leased for the minimum bid ($2.00/acre bid)	Acres leased noncompetitively (No bid, $1.50/acre rental)	Percent leased for $2.00 or less
ARIZONA	13,088	3,040	1,161	32%
CALIFORNIA	118,866	10,250	19,115	25%
COLORADO	2,261,706	263,757	459,118	32%
IDAHO	18,030	4,372	0	24%
MONTANA	1,826,258	112,996	933,110	57%
NEW MEXICO	3,342,252	27,824	931,884	37%
NEVADA	827,651	114,339	526,178	77%
OREGON	172,759	149,333	0	86%
UTAH	2,246,233	199,713	637,998	37%
WYOMING	6,858,580	468,619	823,588	19%
TOTAL	17,685,450	1,354,243	4,352,054	32%

Royalties from energy development are an important source of revenue for Western states and American taxpayers, but oil and gas companies frequently sit on undeveloped public land leases with little consequence. **According to the analysis, nearly half (47 percent) of all actively leased acres are currently sitting idle, generating only $1.50 per acre for taxpayers annually and preventing those lands from being actively managed (link: https://www.americanprogress.org/issues/green/reports/2019/05/23/470140/backroom-deals/) for conservation and recreation.**



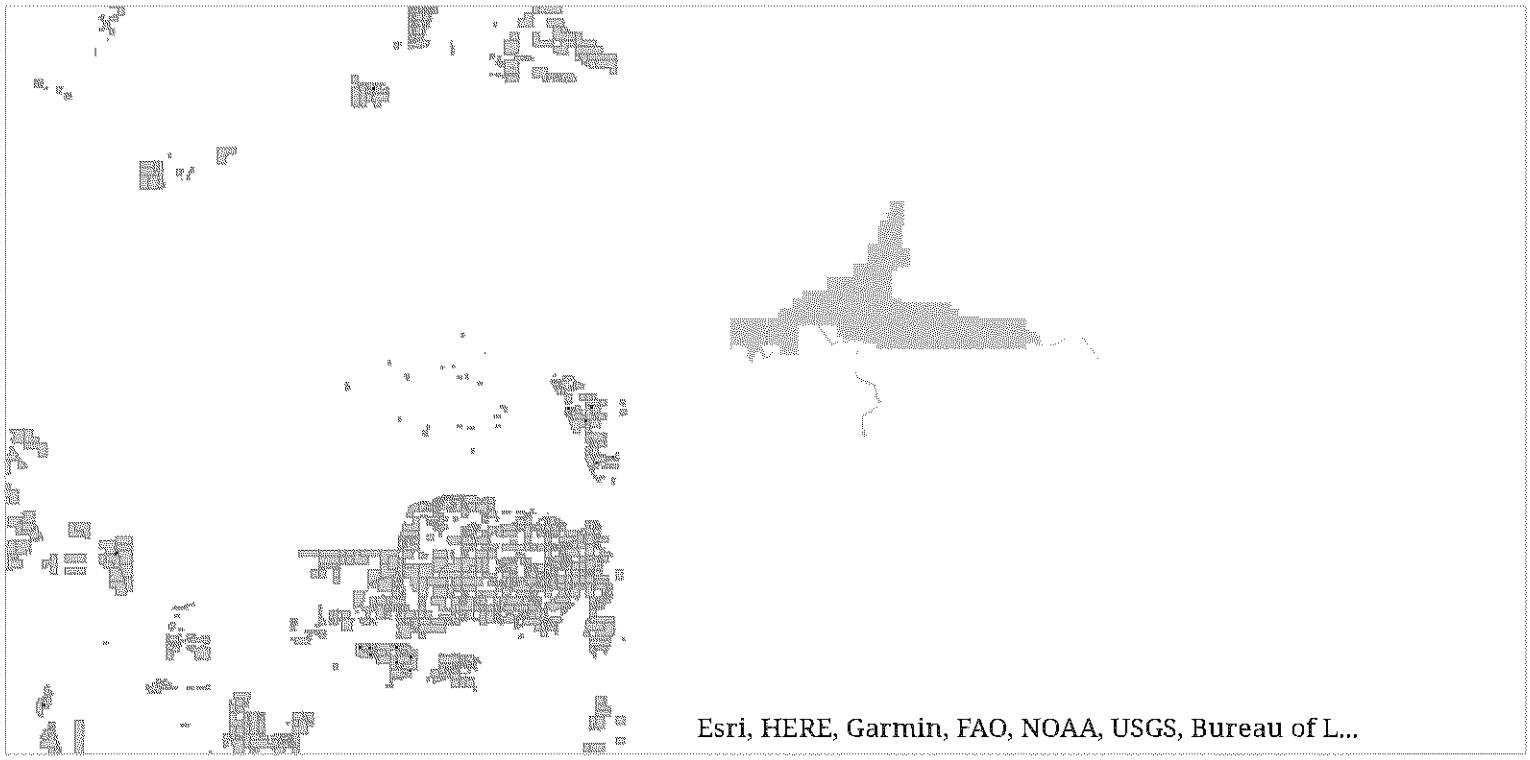
While 90 percent of public lands managed by the Bureau of Land Management (BLM) are available for oil and gas development (link: https://www.wilderness.org/articles/article/open-business-and-not-much-else-analysis-shows-oil-and-gas-leasing-out-whack-blm-lands) , only 10 percent are prioritized for other uses, like outdoor recreation, wildlife management, and conservation. Since 2017, the Trump administration has offered over 18.7 million acres (link: https://docs.google.com/spreadsheets/d/1WOA-Kr0nHE2KzsnCeI8SFNs9a0Rzz8GB9448lkjwkuE/edit#gid=344014728) nationwide to the oil and gas industry at auction. Simultaneously, this administration has eliminated protections for more than 13.5 million acres of public lands (link: https://www.americanprogress.org/issues/green/news/2019/03/20/467548/13-5-million-acre-lie/) once protected by mineral withdrawals or as national monuments.

The industry's footprint is excessive, locking up public lands and encroaching on national parks, imperiled wildlife habitat, and critical migration corridors.

The following series of maps takes a closer look at iconic landscapes under pressure from development, before taking a deeper dive into the current leasing system—a wildly outdated process that caters to the oil and gas industry at every step of the way.

Dinosaur National Monument

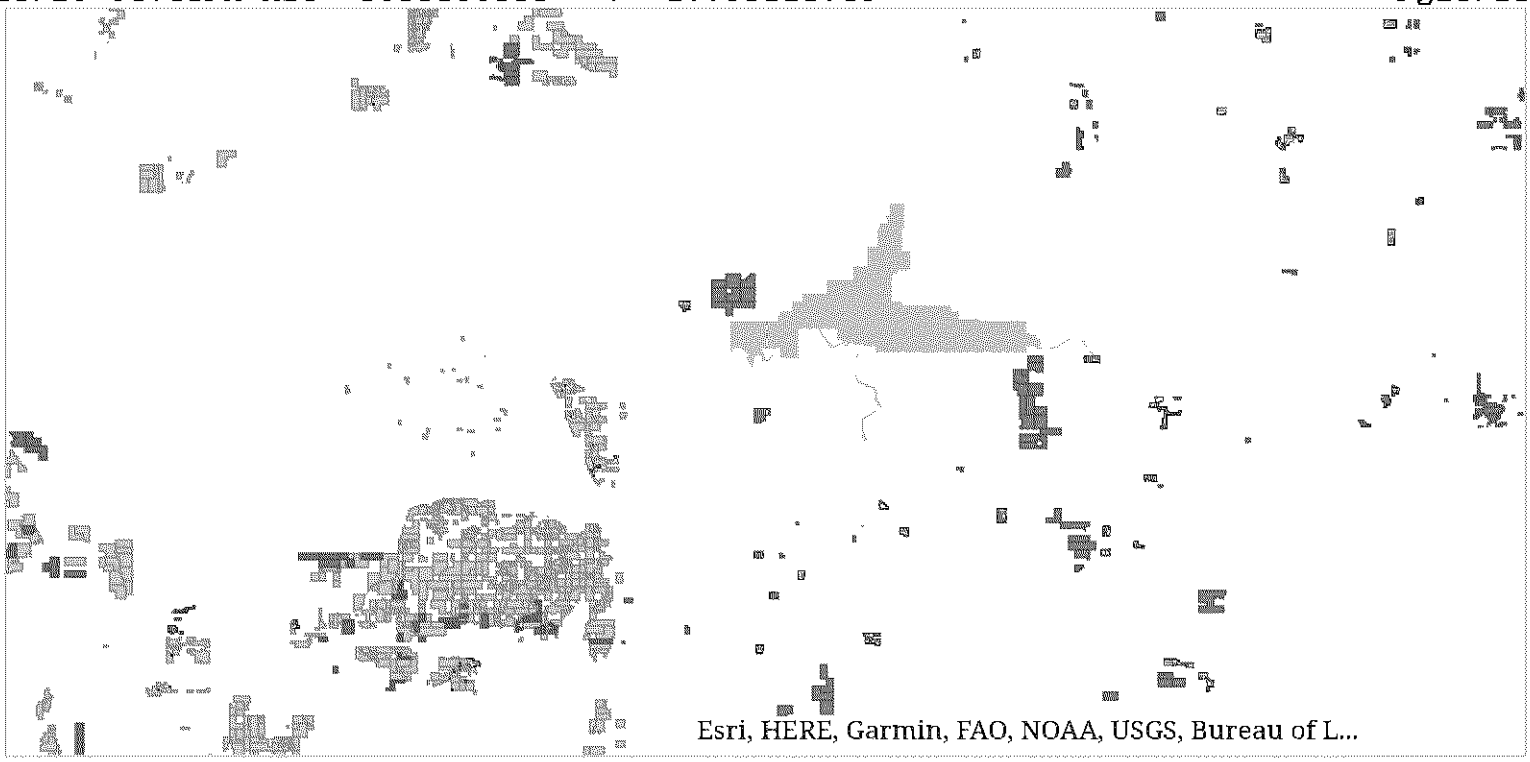
On the border between Colorado and Utah, oil and gas development directly abuts Dinosaur National Monument where incredible dinosaur fossils are still visible in the rocks.



A number of the leases in the park's vicinity were leased for the ***minimum bid*** of just **$2.00 per acre**.

Federal oil and gas leases

Federal oil and gas leases leased for minimum bid

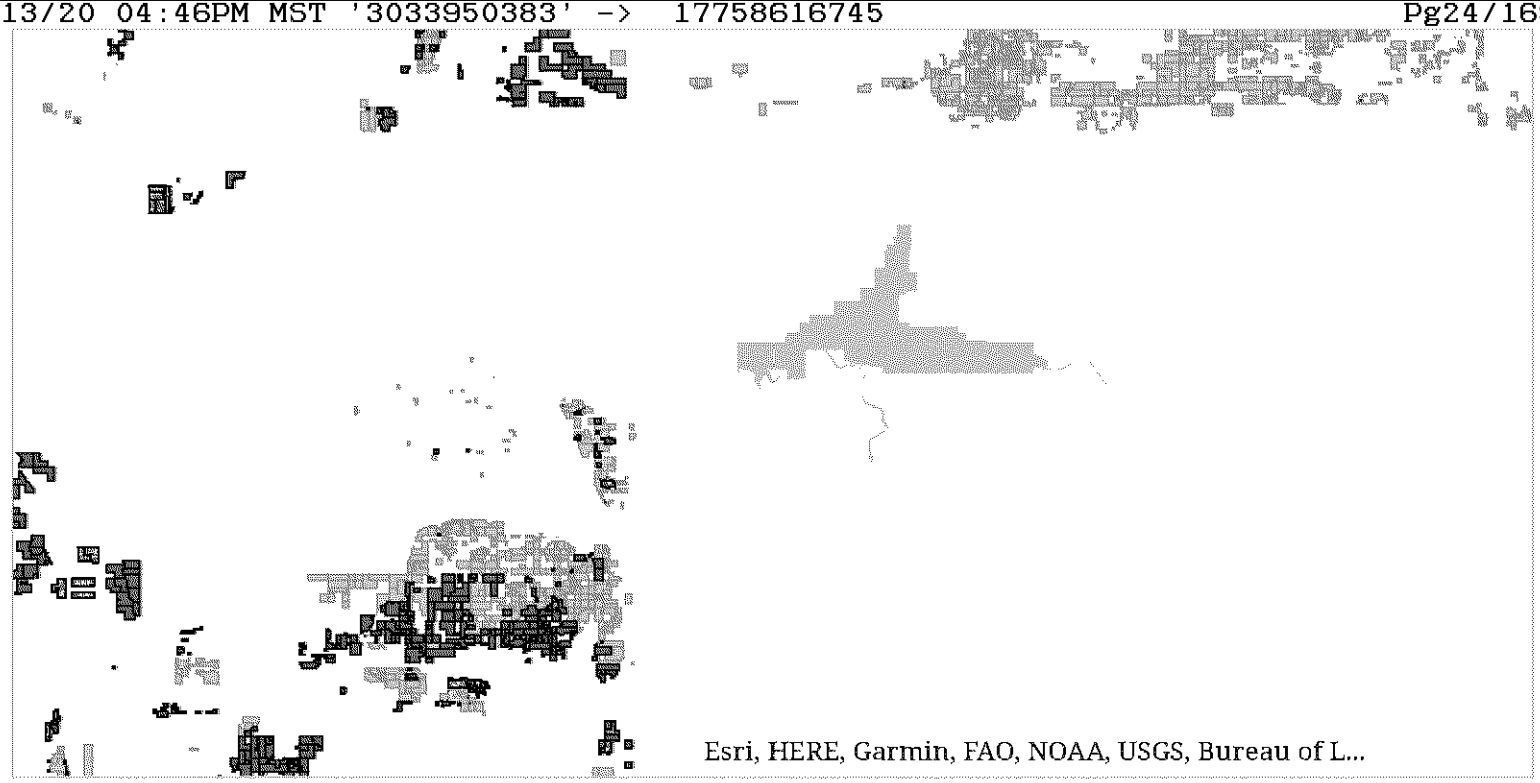


An even greater number of nearby leases were leased noncompetitively. If an oil and gas lease fails to sell at auction, it's available for sale for two years. Interested oil and gas companies only have to pay the first year's rental rate of **$1.50 per acre** and a small administrative fee.

Federal oil and gas leases

Federal oil and gas leases leased for minimum bid

Federal oil and gas leases leased noncompetitively



All of the leases directly adjacent to Dinosaur are currently sitting idle. Each year, oil and gas companies tie up public lands next door to the park, paying only a small rental fee—**$1.50 per acre**.

Dinosaur National Monument

Federal oil and gas leases

Federal oil and gas leases sitting idle

Sage-grouse habitat

Across the West, development is squeezing wildlife into smaller, more fragmented pockets of land and threatening populations of once-prolific species. The sage-grouse highlights this trend. The chicken-sized bird serves as an "indicator species," predicting the health of other plant and animal species across the Western sagebrush ecosystem.

Development, particularly during recent oil and gas drilling booms, has caused populations of the bird to plummet by an estimated 30 percent since 1985 (link: https://www.hcn.org/articles/birds-more-plans-less-protections-for-sage-grouse) . After years of hard-fought negotiations, the Obama administration, Western governors from both political parties, ranchers, and conservationists agreed on a series of landmark plans that would protect the sage-grouse while still allowing for new development.

A key component of those sage-grouse plans involved protecting critical habitat to allow populations to rebound. Within the plans, priority habitat management areas were one of the most critical designations, identified by high sage-grouse population densities and large expanses of undisturbed public land, ideal for preserving breeding habitat and landscape connectivity.

However, the Trump administration has since significantly weakened the sage-grouse conservation plans to allow more oil and gas development. In their overhaul of the Obama-era plans, the administration reduced

protections for nearly 9 million acres (link: https://www.nytimes.com/2018/12/06/climate/trump-sage-grouse-oil.html) and opened critical habitat to drilling.

Sage-Grouse Habitat

Today, the Interior Department is moving forward with oil and gas leasing in prime sage-grouse habitat across the West.

The 2015 sage-grouse plans established priority habitat management areas, large expanses of undisturbed public land, ideal for preserving critical breeding habitat.

Priority sage-grouse habitat

But the Trump administration weakened the landmark plans in an effort to allow more oil and gas drilling on public lands.

Federal oil and gas leases

Priority sage-grouse habitat

In September 2018, the Bureau of Land Management offered (link: https://thenevadaindependent.com/article/a-u-s-senator-a-top-oil-lobbyist-and-a-hard-line-environmentalist-question-blm-oil-and-gas-leasing) 295,000 acres of public land in Nevada for oil and gas development, many of them in prime sage-grouse habitat.

Exactly zero of them sold at competitive auction, leaving all 144 parcels available for noncompetitive leasing.

Within two months following the sale, 21 leases were scooped up noncompetitively for just $1.50 per acre. Here's a look at noncompetitive leases in Nevada's sage-grouse priority habitat management areas.

Federal oil and gas leases

Federal oil and gas leases leased noncompetitively

Priority sage-grouse habitat

Across Colorado, Idaho, Montana, Nevada, Oregon, Utah, and Wyoming, the six states with the greatest amount of sage-grouse habitat, 27 percent of oil and gas leases sold during the Trump administration (link: https://www.audubon.org/sites/default/files/greater_sage-grouse_habitat_reportfinal_20190725.pdf) are located in priority management areas.

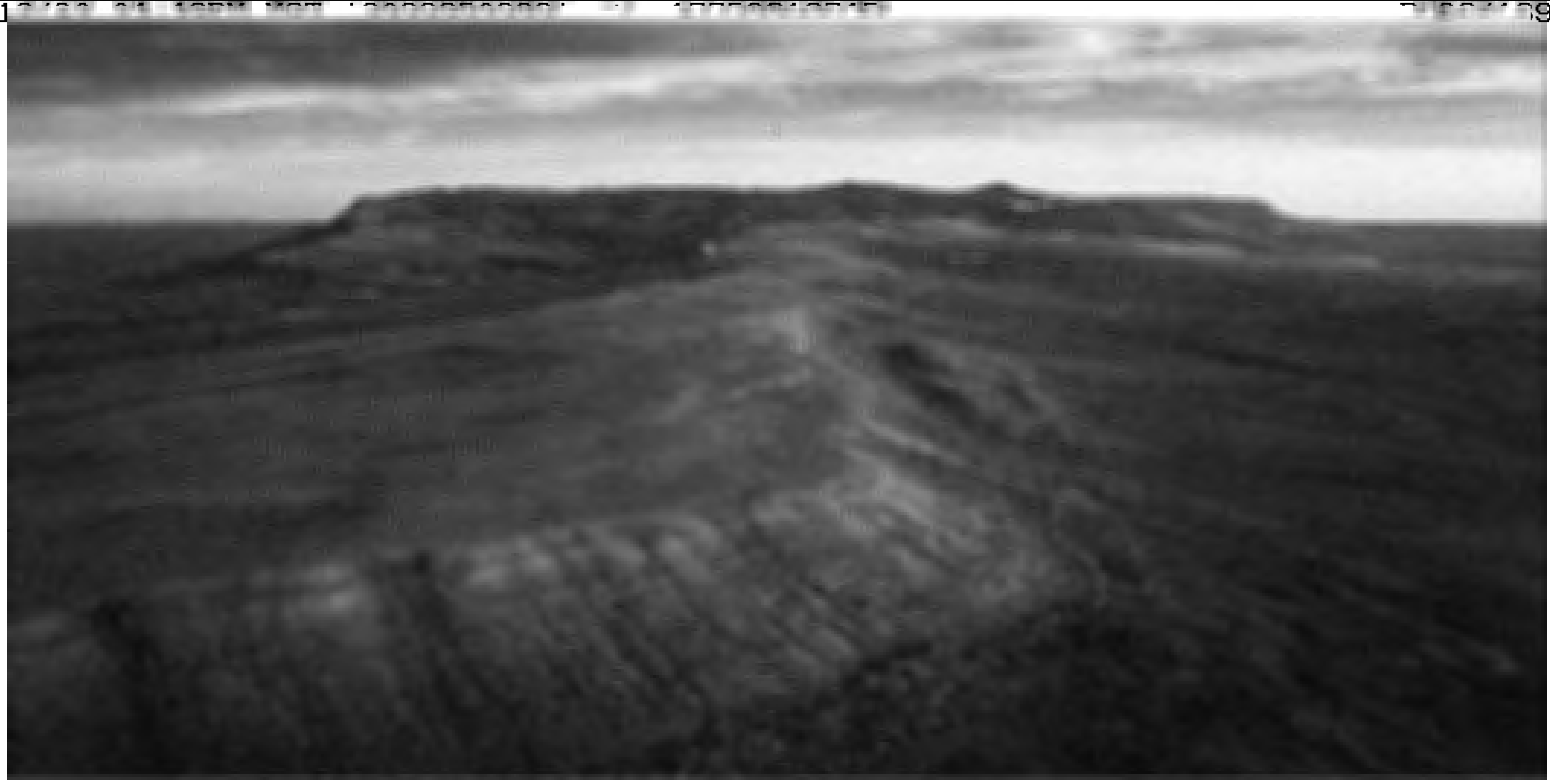
Red Desert-to-Hoback migration corridor

Big game species like elk, pronghorn, and mule deer traverse hundreds of miles between their summer and winter ranges each year, navigating by instinct and memory.

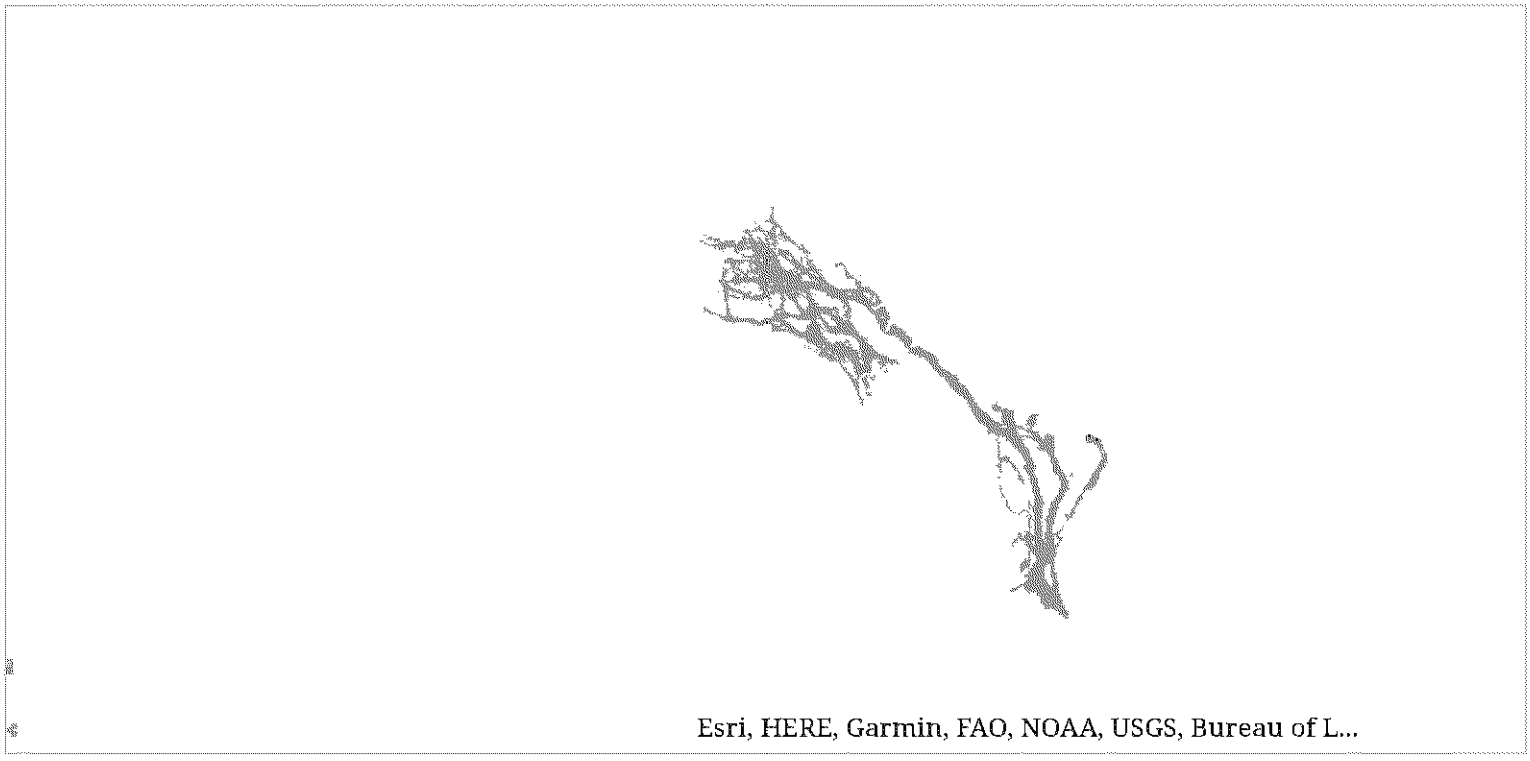
But energy development is creeping into critical breeding habitat. The oil and gas leasing process has failed to safeguard the West's wildlife. Nearly one-quarter (link: https://www.americanprogress.org/issues/green/news/2019/02/14/466218/trump-administration-selling-western-wildlife-corridors-oil-gas-industry/) of Western oil and gas leases offered since the start of the Trump administration lie in big game migration corridors or priority areas.

Red Desert-to-Hoback Migration Corridor

In southwestern Wyoming, leasing has encroached on the longest recorded mule deer migration.



Each year, mule deer complete a 150-mile journey (link: https://migrationinitiative.org/content/red-desert-hoback-migration-assessment) from their Red Desert winter range to the mountain slopes of the Hoback Basin, a route crisscrossed by highways, fences, and other obstacles.

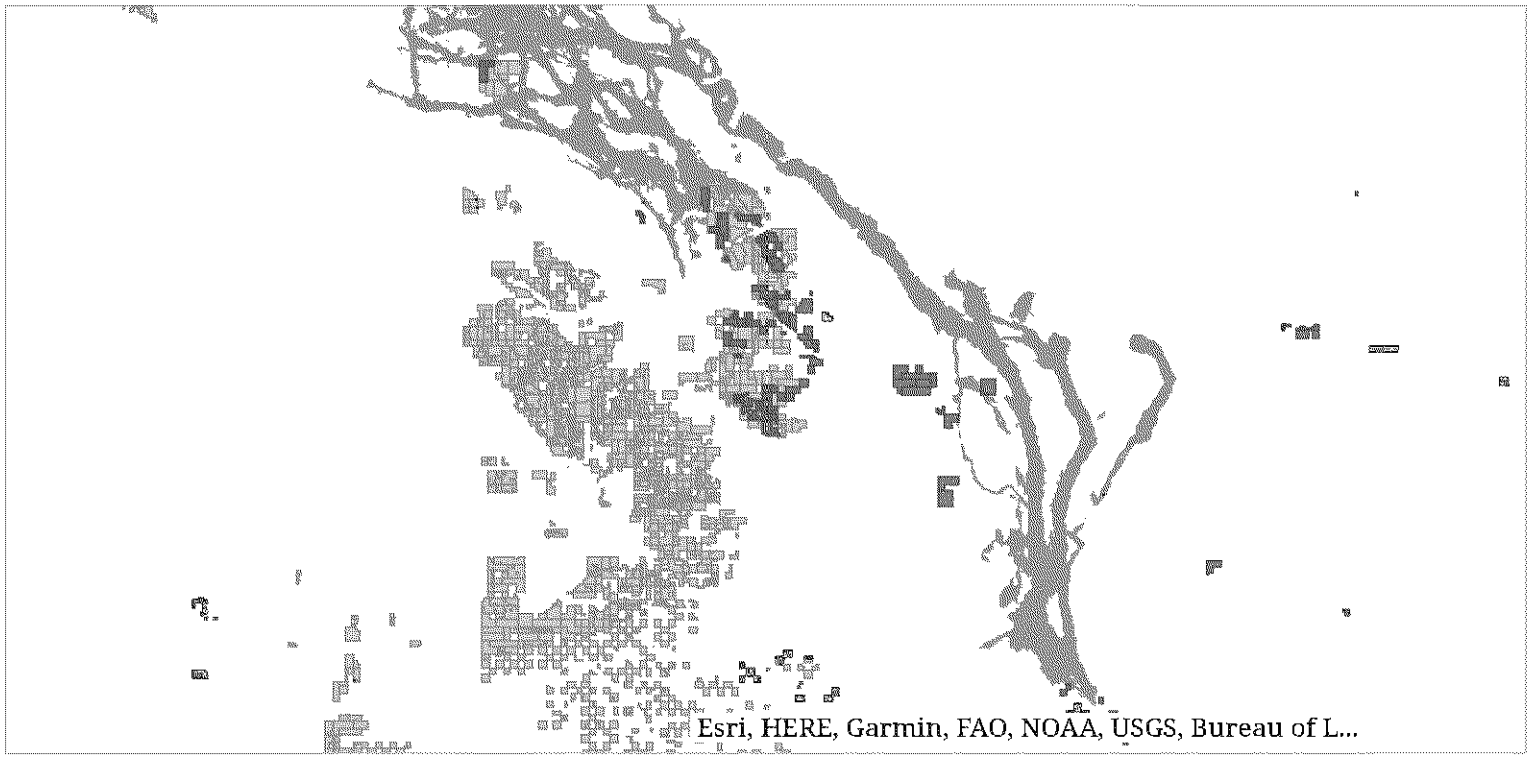


In 2018, the Trump administration proposed 700,000 acres (link: https://trib.com/business/energy/sportsmen-push-back-on-oil-and-gas-leasing-in-western/article_2191d5db-834b-5754-aafc-d75bf400c271.html) of oil and gas leases in the migration corridor.

While some of the proposed leases were withdrawn after outrage from hunting advocates, the administration has moved forward with oil and gas leasing within the Red Desert-to-Hoback route.

Federal oil and gas leases

Mule deer migration corridor



A number of oil and gas leases within the critical migration corridor were leased for pennies on the dollar—just $2.00 per acre for minimum bid leases and $1.50 per acre for noncompetitive leases.

Federal oil and gas leases

Federal oil and gas leases leased noncompetitively

Federal oil and gas leases leased for minimum bid

Mule deer migration corridor

The modern leasing process

In 1987, Congress passed legislation to modernize the federal government's oil and gas leasing system, which was first outlined nearly a century ago in the Mineral Leasing Act of 1920. This analysis shows that those changes were ultimately inadequate. The modern era of oil and gas leasing on public lands is characterized by a system tilted towards the oil and gas industry. Private companies drive the leasing process, pay extremely low rates to taxpayers, and are not held accountable for the long-term impacts of development. Let's break it down step-by-step.

Turning public lands into private oil and gas leases

1. Companies nominate public lands to be leased for drilling

More than 750 million acres of taxpayer-owned oil and gas mineral rights (link: https://www.taxpayer.net/energy-natural-resources/locked-out-the-cost-of-speculation-in-federal-oil-and-gas-leases/) —mostly lying under public lands—are overseen by the Bureau of Land Management. The process to lease those lands for oil and gas drilling is driven by private oil and gas companies who nominate parcels to be sold at auction, oftentimes anonymously. The BLM does not consider the likelihood of a lease entering production during the vetting process.

Federal oil and gas leases

2. Leases are sold competitively at auction starting at a minimum of $2.00 per acre

By law, the BLM offers all oil and gas leases through a competitive auction system. Public lands are sold for as low as $2.00 per acre, the minimum bid required. This amount has not been increased in decades. According to the analysis, 13.9 million acres of oil and gas leases have been sold for the minimum bid since 1987.

Federal oil and gas leases

Federal oil and gas leases leased for minimum bid

3. If leases fail to sell at auction, they're available for purchase noncompetitively for just $1.50 per acre

If public lands fail to sell at auction, they're still available to purchase noncompetitively starting the very next day (and for up to two years following). Unsold acres go for a nominal administrative fee and the first year's rent of just $1.50 per acre—the bid requirement is entirely waived. According to the analysis, over 28.2 million acres of public lands were purchased noncompetitively since 1987.

Federal oil and gas leases

Federal oil and gas leases leased noncompetitively

4. Companies can sit on leases for 10 years or longer before drilling, paying just $1.50 per acre annually to keep them idle

As of August 2019, over 17.7 million acres of public lands were leased by oil and gas companies in the West. Of those acres, 8.3 million, or approximately half, sit idle.

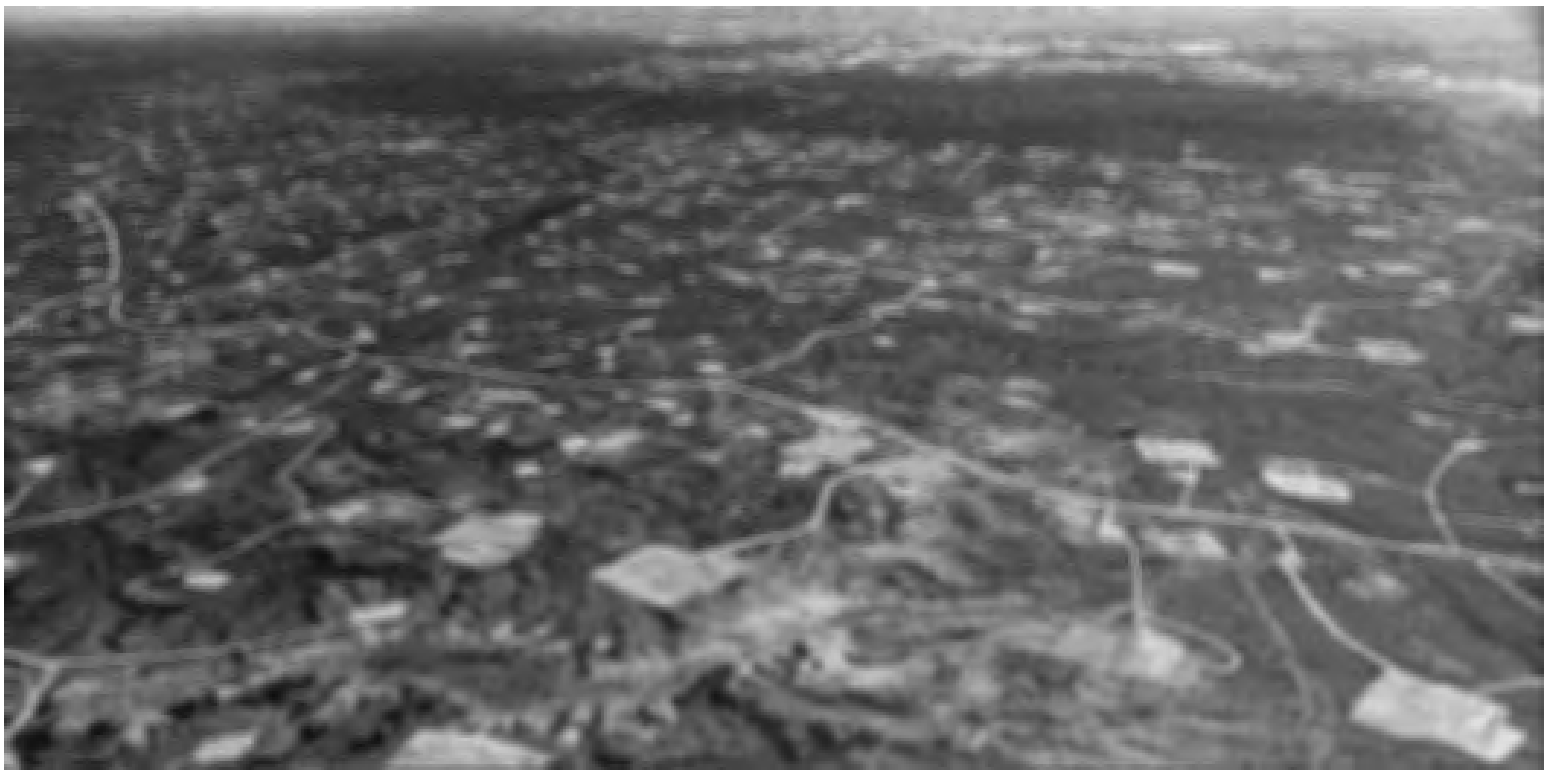
Federal oil and gas leases

Federal oil and gas leases sitting idle

Oil and gas companies frequently stockpile leases but fail to produce on them. It costs only $1.50 per acre annually (and $2.00 per acre annually after five years) to sit on public land leases, a small cost for not generating any oil and gas. The existence of these non-producing leases limits the BLM's ability to manage the land for other uses, such as conservation and recreation.

5. If a company fails to pay the annual fees, the lease is terminated

If oil and gas companies pay annual rental fees, they have up to 10 years to develop a lease before it expires. Even if the lease is still sitting idle at the end of the 10-year term, the Bureau of Land Management regularly grants lease extensions (link: https://www.gao.gov/products/GAO-18-411) which can last for decades. If companies don't pay the annual fees, the leases are simply terminated with no additional penalties.



6. Companies pay extremely low, outdated royalty rates on oil and gas produced

Oil and gas companies are required to pay royalties to taxpayers for oil and gas extracted from public lands. Federal royalty rates are set at 12.5 percent, a rate that was first established a century ago. In contrast, states across the West charge companies between 16.67 percent and 25 percent for the ability to produce oil and gas on state-owned lands.

7. Even with safeguards in place, companies can abandon oil and gas wells, leaving taxpayers with the reclamation bill

Companies are required to put up a bond—or insurance—to cover a portion of the cleanup costs of a well. Current bonding requirements are woefully inadequate to cover those costs, and because the U.S. government has not updated bonding levels in over 50 years, the problem is only getting worse.

When Congress established the modern leasing system in 1987, they set a nationwide minimum bid—a floor of $2.00 per acre paid at auction in addition to the first year's rent—and developed the current practice of first offering leases through a competitive auction, then offering unsold leases noncompetitively. (Previously, public lands were offered either competitively or noncompetitively depending on whether they were known to contain oil or gas.) The intent of this system was to harness market forces to dictate lease prices while still allowing for some amount of exploration on unproven land. The next section explores how these efforts opened the door for speculation and failed to generate a fair return for taxpayers.

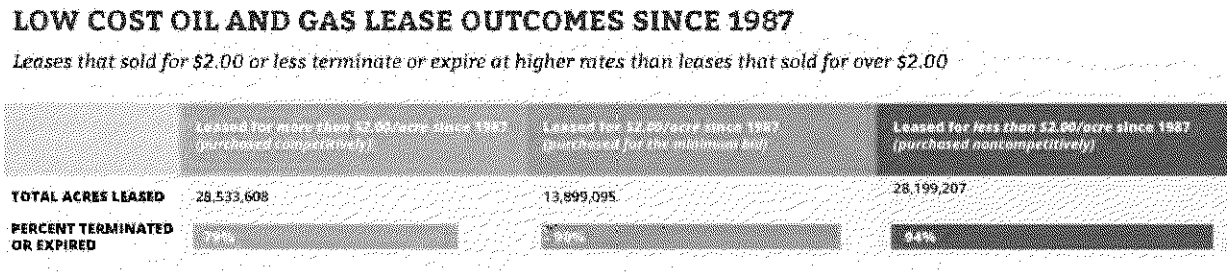
What happens to low cost leases?

There are major problems with the federal government's oil and gas leasing system. First, Congress has not updated the rates it set in 1987. The minimum bid and the annual rental rate no longer set an appropriate floor for the value of our public lands. Second, with the advancement of modern technology, few lands remain unexplored, eliminating the need to incentivize speculative exploration with low-cost leases. Yet the BLM continues the practice of leasing millions of acres of public lands for the minimum bid and noncompetitively. As a result, minimum bid leases and noncompetitive leases often sit idle and are ultimately terminated, tying up public lands that rarely produce royalty-generating oil and gas (link: https://www.americanprogress.org/issues/green/reports/2018/08/29/455226/oil-gas-companies-gain-stockpiling-americas-federal-land/) , shortchanging taxpayers, and limiting other uses like outdoor recreation and wildlife conservation.

In numerous instances, the BLM has declined to manage lands for other uses due to existing but undeveloped oil and gas leases. For example, in its land use plan (link: https://eplanning.blm.gov/epl-front-office/projects/lup/9506/58518/63310/BB_PRMP_FEIS.pdf) for Wyoming's greater Bighorn Basin region, the BLM opted not to protect numerous "Lands

with Wilderness Characteristics" due to existing but undeveloped oil and gas leases. Similarly, in the official planning decision (link: https://eplanning.blm.gov/epl-front-office/projects/lup/67041/83197/99802/Price_Final_Plan.pdf) for its Price field office in Utah, the agency evaluated an option to "emphasize protection of wildlife habitats, natural resources, ecosystems and landscapes," but opted against it out of concern that imposing restrictive protections "could severely and unnecessarily limit development of and access to existing oil and gas leases..."

Since 1987, more than 42.1 million acres have been leased at the minimum bid or noncompetitively. These leases expire or are terminated at a higher rate than leases purchased competitively, and many lapse without ever producing oil and gas (link: https://www.americanprogress.org/issues/green/reports/2018/08/29/455226/oil-gas-companies-gain-stockpiling-americas-federal-land/) .



The rate at which leases expire or terminate is a direct reflection of their potential to produce oil and gas. By law, a lease that is producing may be extended beyond its standard 10-year term. Conversely, non-producing leases typically may not be extended; and even before the end of their 10-year term, leases that are unlikely to produce are often terminated because the lessee simply stops paying rent.

Low-cost noncompetitive and minimum bid leases expire or terminate at higher rates than leases issued competitively for more than the minimum bid. Of all the above-minimum bid leases issued since 1987, about a fifth, or 21.3 percent, are still active. In contrast, 9.7 percent of minimum bid leases and just 5.6 percent of noncompetitive leases are active. These numbers show that noncompetitive leases are the least likely to produce oil and gas, minimum bid leases are the second least likely, and above-minimum bid leases are the most likely to enter production.

Because the BLM considers oil and gas leases, even if they are undeveloped, an impediment to managing for wildlife conservation, wilderness protection, or outdoor recreation, low-cost leases tie up public lands during the years they sit idle (link: https://www.wilderness.org/articles/blog/no-exit-how-our-public-lands-are-fated-oil-and-gas-development) .

What's at risk?

In the last two years, the Trump administration has offered 2.1 million acres that failed to sell at auction. Leases for each and every one of those acres are still available for purchase on an over-the-counter basis for just $1.50 per acre (the first year's rent) and a small administrative fee. Explore the map below to see which public lands are still on the table for oil and gas companies to lease for bargain prices.

Public lands still available to lease for $1.50 per acre

Esri, Garmin, FAO, NOAA, EPA

Across Western states, 2.1 million acres of public lands are currently on the table for oil and gas companies to lease noncompetitively.

— Federal oil and gas leases still available to buy noncompetitively

Conclusion

The federal government's oil and gas leasing system sits on a 100-year old foundation, hasn't been updated in 32 years, and is desperately in need of reform. Currently, the leasing system locks up huge amounts of the West's public lands, frequently at bargain prices. Of the 17.7 million acres currently leased, 8.3 million are sitting idle, generating only a $1.50 per acre annual return for taxpayers.

Congress must modernize the oil and gas leasing system to give taxpayers a fair share and ensure that we can conserve our natural heritage alongside development. Key updates to the current leasing system should include:

- *Identify lands suitable for oil and gas leasing through comprehensive and inclusive planning processes, including robust public participation, instead of through industry nominations*
- *End the practice of leasing lands with little to no oil and gas potential*
- *Raise the national minimum bid from $2.00 per acre to at least $10.00 per acre, and establish a process for periodic updates to account for inflation*
- *Eliminate noncompetitive leasing, instead allowing unsold parcels to be offered at a competitive auction in the future*

- *Raise the annual rental rate from $1.50 per acre to at least $3.00 per acre, and establish a process for periodic updates to account for inflation*
- *Raise the royalty rate for onshore oil and gas to match the federal offshore rate and leading Western states*
- *Shorten the duration of the standard lease term and raise the bar for companies to have terminated leases reinstated*
- *Before issuing a lease, require lessees to demonstrate a capacity of exploring and producing oil and gas*

Methodology & data definitions

To conduct this analysis, we collected publicly available data from the Bureau of Land Management's oil and gas leasing database, called the Legacy Rehost System or LR2000. Although LR2000 is outdated and opaque, we were able to gather detailed records for all oil and gas leases by querying the database for the following: when the lease was acquired, whether the lease was sold competitively or noncompetitively, the bid amount if it was sold competitively, and the lease production status.

LR2000 also provides information on lease developers, actions taken over the course of the lease, and a Public Land Survey System (PLSS) description. Because the lease PLSS information amounts to a description of the parcel's location as a subdivision of public lands into townships and sections, it is difficult to spatially map the data provided by LR2000. To address this, The Wilderness Society developed a tool—called the Federal Lands Use and Resource Transparency Tool, or FLURTT—to mine, parse, and translate LR2000 data into mappable GIS datasets. We relied on FLURTT for the entirety of this analysis.

LR2000 often contains outdated information, those inaccuracies were likely carried through into our analysis. However, despite its limitations, LR2000 is the only database of federal oil and gas leases available to the public. There are a number of additional caveats to consider:

Lease location: In some cases, the leases generated from FLURTT did not represent the actual lease boundaries and instead scaled up to entire map sections or townships (subdivisions of the Public Land Survey System). In these cases, we approximated the lease shape within the appropriate area. Thus, the maps are are approximations at fine scale. However, the actual lease acres involved in the analysis were reported by LR2000 and not calculated using FLURTT.

Minimum bid identification: Approximately 3 percent of the lease files pulled from LR2000 did not have bid amounts or could not be translated by FLURTT. Although these leases were included in the total acreage leased, they were excluded from all analyses involving minimum bids.

Idle lease identification: We considered leases producing if they were listed as "held in production" in LR2000. A number of leases were "held in production" due to their location within a producing well field, even if the lease itself didn't contain a producing well. Thus, the number of idle leases is, if anything, an underestimate.

For a detailed methodology and description of the analysis please click HERE (link: https://docs.google.com/document/d/1oSVm2sOBxllsRerXSSnlXtXFnWvnAZDqyRkAiSl42K4/edit?usp=sharing) .

The Wilderness Society | Center for Western Priorities

Additional Map Resources:

Bureau of Land Management records of oil and gas leases, as of May 2019 (link: https://wilderness.maps.arcgis.com/apps/webappviewer/index.html?id=fd1c2f382a6a4920b4bc56d5bc7982c7)

Upcoming Bureau of Land Management oil and gas lease sales, as of August 2019 (link: https://wilderness.maps.arcgis.com/apps/webappviewer/index.html?id=2eaa8f30a08f4e6497e78666b2b235d8)

Oil and gas industry expression of interest for lease sales, as of May 2019 (link: https://wilderness.maps.arcgis.com/apps/opsdashboard/index.html#/a7ce6c93a8ce43a19337692b3de7592e)

LR2000 GIS Web Services (link: https://gis.tws.org/arcgis/rest/services/LR2000)

This map is a collaboration between the The Wilderness Society (link: https://www.wilderness.org/) and the Center for Western Priorities (link: http://westernpriorities.org/) .

The Wilderness Society	Connor Bailey, Mackenzie Bosher, Kim Stevens
The Center for Western Priorities	Jesse Prentice-Dunn, Andre Miller, Lucy Livesay
Federal lease data	The Bureau of Land Management, Legacy Rehost System
Cover photo	The Wilderness Society, Mason Cummings
Dinosaur National Monument photo	National Park Service, Dinosaur National Monument
Sage-grouse photos	The Bureau of Land Management
Mule deer photo	U.S. Fish and Wildlife Service
Red Desert-to-Hoback migration corridor photo	The Wilderness Society, Mason Cummings
Oil pumpjack photo	The Wilderness Society, Mason Cummings
Aerial photo of oil field	EcoFlight
Natural gas rig photo	U.S. Fish and Wildlife Service

Oil pumpjack photo	Department of Energy
Twin oil pumpjacks photo	The Wilderness Society, Mason Cummings

Exhibit 3

Energy Speculators Jump on Chance to
Lease Public Land at Bargain Rates

The New York Times https://nyti.ms/2DKnl4a

Energy Speculators Jump on Chance to Lease Public Land at Bargain Rates

The Trump administration's policy of encouraging more oil and gas drilling combined with a loophole in federal rules has been a boon for investors with a taste for gambling — and has drawn criticism that it is a bad deal for taxpayers.

By Eric Lipton and Hiroko Tabuchi

Nov. 27, 2018

MILES CITY, Mont. — Robert B. Price, the chief executive of a London-based oil and gas company, came up with a creative tactic to grab bargain drilling rights to a sprawling piece of federal land here in eastern Montana — each acre for less than the price of a cup of coffee.

He first asked the Interior Department to auction off rights to as much as 200,000 acres in Montana through a process that allows energy companies to identify the public land they would like to develop. But when the auction took place last December, Mr. Price sat on the sidelines and waited for the clock to run out — betting no one else would bid.

His gamble worked. With no other bidders showing interest, the government allowed him to secure drilling rights on nearly 67,000 acres east of Miles City in a special noncompetitive sale the very next day. His cost: just $1.50 an acre a year in rent, compared with the more than $100-an-acre average paid by bidders, on top of rent, in competitive auctions in Montana in the final four years of the Obama administration.

"We're still interested in much more," said Mr. Price, reached by phone before he was scheduled to fly to London to meet with his investors.

Robert B. Price's gamble that no one else would bid on the land he was eyeing in Montana paid off. Eric Anderson/Highlands Natural Resources

The maneuver is one of many loopholes that energy speculators like Mr. Price are using as the Trump administration undertakes a burst of lease sales on federal lands in the West.

Major oil and gas companies like Chevron and Chesapeake Energy are frequent buyers of the leases. But the Trump administration has put so much land up for lease that it has also created an opening for super-low-price buyers like Mr. Price.

The plots of land the speculators bid on typically sell for such dirt-cheap prices because there is little evidence that much oil or gas is easily accessible. The buyers are hoping that the land will increase in value nonetheless, because of higher energy prices, new technologies that could make exploration and drilling more economical or the emergence of markets for other resources hidden beneath the surface.

In some cases they hope to resell access to deep-pocketed oil companies at a premium. In others they are hoping to raise money to search for oil or gas on their own. Either way, they are the latest in a long line of speculators willing to take a shot — sometimes a very long shot — at a big payoff in America's oil fields.

The percentage of leases being given away through noncompetitive sales, like the one that Mr. Price engineered, surged in the first year of the Trump administration to the highest levels in over a decade, according to an analysis of federal leasing data by Taxpayers for Common Sense, a nonpartisan group that highlights what it considers wasteful actions by federal government agencies.

In states like Nevada, noncompetitive sales frequently make up a majority of leases given out by the federal government, the group's database shows.

The growth of the amount of land put up for lease combined with the sharp increase in noncompetitive leasing has resulted in major drops in the price companies pay per acre in certain states, like Montana, where the average bid has fallen by 80 percent compared with the final years of the Obama administration.

Two Grand Junction, Colo., business partners, for example — a geologist and a former Gulf Oil landman — now control 276,653 acres of federal parcels in northeastern Nevada. But they are still looking for the money they need to drill on the land, or even to pay for three-dimensional seismic surveys to determine whether there is enough oil there to try.

In the case of Mr. Price, whose investors include Haliburton, the oil-services industry giant, he is convinced that there is an unusually high level of helium mixed in with natural gas that could be drilled in eastern Montana. Because helium sells at a much higher price than even oil, he is selling investors on the potential for lucrative returns. But the prospect of him delivering remains in doubt.

Rajan David Ahuja, vice president at R&R Royalty, a Texas-based company that has leases on land roughly equivalent to the size of Rhode Island, said that building landholdings like this was a crapshoot.

"We don't make money on 90 percent of the things we do," Mr. Ahuja said. "It is a really risky game."

The surge in noncompetitive transactions has intensified debate over how well the federal government handles the task of auctioning off access to taxpayer-owned lands. Taxpayers get 12.5 percent of revenues produced from any oil or gas extracted from leased public land — or nothing but trivial rent payments if speculators fail to develop the land successfully.

More than 11 million acres of land leased by the federal government lies idle — or about half of all the land out on lease — property that may or may not ever be drilled for oil and gas.

The speculation, critics say, allows companies to lock up millions of acres of federal land in leases, complicating efforts to set it aside for other uses, such as wildlife conservation areas or hunting and recreation zones.

"People come to Montana and stay in Montana not because of the best weather or highest wages or the best beaches," said John Todd, the conservation director at the Montana Wilderness Association. "They come here because we have access to ample public land, most of it that is in the same shape as it was when Lewis and Clark came here or before that."

Because the speculators can resell the leases, they could also reap the gains from any increase in the value of their landholdings, gains that otherwise would go to American taxpayers, said Ryan Alexander, president of Taxpayers for Common Sense.

"We should not be flooding the market so it is easy for companies to sit back and wait to get to leases at fire-sale prices," Ms. Alexander said. "The acceleration of leasing is doing just that. The industry is getting a great deal and taxpayers are not."

Ryan Zinke, the interior secretary, said this month that overall taxpayer revenue from energy production on federal lands jumped in 2018 as a result of rising production in states like Wyoming and New Mexico.

"President Trump's energy dominance strategy is paying off, and local communities across America are the beneficiaries," Mr. Zinke said in a statement.

The Speculators' Walmart

Inside the George R. Brown Convention Center in downtown Houston, thousands of energy industry executives converged in August for an event known as Summer NAPE, a giant gathering of hundreds of owners of potential oil and gas drilling sites. Most of them were there to raise money to turn their speculative gambles into real drilling plans.

"STRIKE WHILE THE DEALS ARE HOT," the banner at the entrance to the meeting hall said.

At Booth 2315, in front of a poster boasting about the more than 261,000 acres of federal leases they had secured in Nevada, stood Larry R. Moyer, a Colorado-based oil geologist, and his business partner, Stephen Smith, a former Gulf Oil landman, pitching their land to any prospective investor who walked up.

"You want to get in our deal — get your checkbook out," Mr. Smith said to one visitor.

Northern Nevada, Mr. Smith admits upfront, is a risky place to look for oil. Nevada has one of the highest percentages in the country of leased land that is sitting idle: Just 3 percent of the 715,441 acres of federal land in the state leased for oil and gas were actually producing energy as of late last year.

"There are a lot of people who have spent a lot of money drilling dry holes in the past," Mr. Smith said.

"We are working to overcome the conventional wisdom," Mr. Moyer added.

Mr. Moyer took to a small stage at the Houston conference for a "Shark Tank"-like presentation.

"What we are looking for — or we would ask someone — is about $10 million," Mr. Moyer said, money they would use for a seismic survey and to drill test wells.

"If you find a billion barrels, your finding cost is going to be a penny a barrel," he said before wrapping up his presentation by saying, "Think about taking a swing."

Waiting on the Sidelines

The bidding process typically begins when an oil and gas company asks the Interior Department to open up a new chunk of taxpayer-owned land to drilling.

Once the department agrees, it schedules an internet-based auction for registered bidders. Hot competition for the most sought-after land, where there are proven energy reserves, can drive these so-called bonus bids up close to $100,000 per acre, as happened in New Mexico in September. But to ensure that there is at least some upfront payment, the Interior Department requires a minimum per-acre bid of $2.

But there is a loophole. If no one bids, the land is then transferred into a program that allows anyone to approach the department within two years of the auction, without an upfront bid payment.

The only money that needs to be put down is the $1.50-per-acre annual lease payment for the first year of a 10-year lease, and a $75 filing fee. This is how Mr. Price managed to secure access to land in Custer County, east of Miles City, part of the 116,000 acres of federal leases his company, Highlands Montana, says it holds.

"We're a small company. We didn't want to get in a bidding process," said Mr. Price, whose company has raised at least $6 million from investors since 2016.

Mr. Moyer and Mr. Smith also secured a large share of their holdings in Nevada through these noncompetitive purchases, after sitting and watching the auctions play out without bidding.

But Neil Kornze, the former head of the Bureau of Land Management, the branch of the Interior Department that runs the leasing process, said this was a flawed policy.

"Someone should have to bid in the auction to get the land," said Mr. Kornze, who served as director in the final three years of the Obama administration.

The Trump administration made three times as much land available to bid on in the last fiscal year as the average for the last four years of the Obama administration. But only about 11 percent of the land attracted any bidders in 2018 — a total of 1.35 million acres. The rest of that land is now available for noncompetitive leases.

Highlands Montana has drilled a few test wells on adjacent state land it has leased here. But for now, most of Mr. Price's leased land remains undeveloped.

Large-scale development would be quite a shock in this part of Montana, where there is now very little oil and gas drilling.

From the back porch of the cattle ranch owned by Karen Aspevig Stevenson and her husband, the view stretches for miles, with ponderosa pines and juniper bushes swaying in a wind that blows so strong it sounds almost like ocean waves.

"This is our public lands. We all own this land," Ms. Stevenson said, as she walked through the rolling hills, her cattle-herding dog running ahead. "To come in here and just start drilling — that does not make sense."

Eric Lipton reported from Miles City and Houston, and Hiroko Tabuchi from New York. Rachel Shorey contributed research.

Exhibit 4

Utah State University – Impacts of climate change on the management of multiple uses of BLM land in the Intermountain West (USA)

Impacts of climate change on the management of multiple uses of BLM land in the Intermountain West (USA)

Elaine M. Brice[1,7], Brett Alan Miller[2,7], Hongchao Zhang[3,4,7], Kirsten Goldstein[3,7], Scott Zimmer[1,7], Guen Grosklos[6,7], Patrick Belmont[5,7], Courtney Flint[2,7], Jennifer Givens[2,7], Peter Adler[1,7], Mark Brunson[3,7], Jordan W. Smith[3,4,7]

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This report was submitted August 30, 2019 in partial fulfillment of a contract between The Wilderness Society and Utah State University. The contents were developed independently by the authors herein listed and do not necessarily represent the views or opinions of The Wilderness Society or Utah State University. This document has not been subject to peer-review, but a manuscript derived from this work has been submitted for peer-review for publication in an academic journal. We refer readers to the peer-reviewed publication as soon as it is available.

1. Executive Summary

The United States Bureau of Land Management (BLM) manages 248 million acres of public lands for multiple, often conflicting, uses. Climate change will affect the sustainability of these land uses and could increase conflicts among them. Although natural resource managers are concerned about climate change, many are unable to incorporate climate change into management plans. Due to institutional constraints and limited resources, managers are not always aware of, or do not always employ, current scientific knowledge. We summarize academic literature that discusses impacts of climate change on the multiple uses for which BLM manages in the Intermountain West, including a synthesis of projected vegetation changes and other foreseeable ecosystem changes. Further, we conducted a content analysis of BLM Resource Management Plans to determine how climate change is addressed by BLM mangers.

BLM land in the Intermountain West (IMW) has already experienced considerable climate change over the past century, including >0.9°C warming compared to the early 20th century and measurable decline in snowpack over the past few decades. All future scenarios predict accelerated warming and substantial changes in precipitation regimes, including:

- 3° C warming by 2050 and 5.3° C warming by 2085, relative to a 1970-2000 baselevel
- Further reductions in snowpack, reductions in the fraction of precipitation delivered as snow, reduction in the fraction of snowpack converted to streamflow, earlier snow melt
- Increased probability of multi-decadal, mega-drought
- Many other critical aspects of climate remain beyond the capability of climate models to predict, including changes in the frequency, timing, and spatial distribution of rainfall, changes in the formation and persistence of clouds, and changes in specific temperature and moisture regimes that serve as critical phenological cues for plants and animals.

We conducted an automated search of peer-reviewed literature and identified 225 papers published 2009-2018 that include the IMW, have been cited at least twice per year, and mention at least one BLM land use. BLM was only substantially discussed in 1% of the articles and explicit management recommendations were uncommon, both of which indicate that the scientific community could do a better job translating scientific insights into actionable information for BLM. We acknowledge that such knowledge transfer occurs in other forms, including meetings, workshops, conferences, and grey literature. Conservation and grazing were the most commonly studied land uses (138 and 85 articles, respectively). Recreation (55 articles), energy development (44), and logging and timber (41) were less frequently mentioned, and mining (24), cultural values (21), and wild horses and burros (5) were rarely discussed. Typically, the latter were often only briefly mentioned or discussed as a threat to conservation and ecosystem services. Most papers focused on one (39% of articles) or two (20%) land uses and avoided addressing the challenges of interacting and potentially conflicting land uses. When multiple uses were studied, the most prominent theme was that the more active uses (e.g., energy development, grazing, recreation) threaten passive uses (e.g., conservation, ecosystem services). We did not find any papers supporting the notion that climate change does not pose a major threat to BLM ecosystems and the services and products for which those lands are valued.

Augmenting our automated search with additional papers from the literature, we summarize the foreseeable impacts of climate change on BLM ecosystems. Looking specifically at vegetation

impacts, a quantitative meta-analysis shows a high degree of consistency in predicted future gains (+) and losses (-) for sagebrush (+ in some regions, - in others), pinyon-juniper (- throughout the IMW), and forage (+ throughout the IMW). Results for cheatgrass were less consistent. Our literature review indicates that climate change will to affect many other ecosystem processes, characteristics and services including:

- Degrading biological soil crusts
- Causing habitat loss, distributional shifts and declines in mammalian and fish populations
- Habitat loss and decreased recruitment, fecundity, and survival of numerous bird species
- Creating conditions favorable to invasive species
- Warmer and more variable conditions in aquatic ecosystems
- Decrease in ground- and surface-water availability
- Increased dust, which affects vegetation, water, nutrients and health of humans and animals
- Discordant shifts in phenology , especially for montane systems
- Increased occurrence, size, and severity of wildfire

We further summarize the impacts of climate change on uses for which BLM manages.

- Climate change poses some of the greatest threats to BLM's conservation mandate. Specifically, declines in big sagebrush will have significant negative impacts on a wide range of wildlife and plant species that depend on those communities. Some species may be able to shift upslope or northward, but some may not. Shifting species distributions may cause new and unpredictable species interactions. Soil conservation will be more challenging under future climate, as net primary production (NPP) is expected to decline in many parts of the IMW. Where NPP is predicted to increase, conservation gains may be offset by increased wildfire activity. Conservation of aquatic species is likely to be challenged by increased severity and duration of droughts as well as increased competition between human and ecosystem water demands.
- Livestock grazing is a complex issue with myriad factors influencing livestock and numerous impacts of livestock on the environment. Future climate will increase heat stress and diminish available water quantity and quality for livestock. Heat stress is likely to reduce reproduction, compromise metabolic and digestive functions, reduce weight gain, and increase mortality for livestock. Some of these effects may be offset by changing breeds. Climate change is also likely to alter the quantity, quality and location of forage, degrade air quality, increase transmission of diseases, and alter the spread of pests. Grazing may be impacted by national policy on carbon emissions as well as economic factors that reduce demand for livestock products.
- Recreation will be affected in numerous direct and indirect ways by climate change. Warmer temperatures are likely to increase participation in outdoor recreation, except in regions where daily high temperatures exceed 27-30° C. Hunting, fishing, and wildlife viewing opportunities on BLM land are particularly vulnerable to climate change via impacts on the species of interest.

- Other land uses are seldom discussed, but climate change is likely to have direct and indirect impacts on cultural and historical resources, horses and burros, and timber and logging.

A search of 44 Resource Management Plans (RMPs) developed by BLM field offices throughout the IMW, revealed very few mentions of climate change impacts on ecosystems and land uses. In general, references to climate change are vague in the plans, with very few specific predicted impacts or management considerations. Virtually none of the plans discuss BLM efforts to adapt to climate change impacts. While the RMPs are the legally binding documents that govern all BLM management actions, it is possible that BLM is attempting to address climate-related challenges to some extent using the existing management practices described in the plans, or other mechanisms, such as the Rapid Ecoregional Assessments. The time consuming and arduous task of developing and modifying RMPs calls into question whether the existing RMP framework is appropriate for adaptive management that will clearly be needed in the future.

2. Introduction

The United States (US) Bureau of Land Management (BLM) manages over 248 million acres of public land with a mandate to "sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations" (BLM Mission Statement n.d., Hardy Vincent, Hanson, and Argueta 2017). The multiple uses for which BLM manages these lands play a prominent role in the national economy and provide incalculable non-market value to society (Pederson et al. 2006, Kemp et al. 2015). However, multiple-use management of vast and diverse ecosystems is fraught with challenges, including conflicts amongst uses, an incomplete knowledge of complex and constantly evolving ecosystems, and discordant public, private, and political interests (Skillen 2009, Archie et al. 2014, Veblen et al. 2014, Butler et al. 2015, Wyborn et al. 2015). Exacerbating these challenges, anthropogenic climate change has long been understood to impact the resources and uses for which public lands are valued, and in some cases may cause non-linear and irreversible transitions in ecosystems (Baron et al. 2009, Joyce et al. 2009, West et al. 2009, Ellenwood et al. 2012, McNeeley et al. 2017, Halofsky et al. 2018). Yet, no comprehensive analysis has been conducted to articulate the myriad impacts of climate change on BLM land, uses, and ecosystems. Further, it remains unclear whether and how BLM has or is altering their 'on-the-ground' management practices in order to fulfill the agency's stated mission in the context of observed and future predicted climate change. Although specific BLM field offices are adapting to the localized consequences of climate change, it is unclear how extensive these adaptations are for BLM management (Kemp et al. 2015).

The BLM operates in a highly decentralized manner, with many field offices across the US working quasi-independently in order to provide flexibility to develop close partnerships

with state and local agencies, as well as landowners and stakeholders. But as a branch of the US Department of the Interior, local offices are also obligated to national policy and political pressures. In 2001, the Secretary of the Interior signed Secretarial Order 3226 requiring each Bureau and Office within the Department of Interior, including the BLM, to "consider and analyze potential climate change impacts" in planning and prioritization exercises (Ellenwood et al. 2012). This order was augmented with numerous Presidential Executive Orders, memoranda, reports and operational manuals developed between 2013 and 2016 (e.g., EO 13653 of November 1, 2013 "Preparing the United States for the Impacts of Climate Change", Presidential Memorandum of November 3, 2015, "Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment", Report of the Executive Office of the President of June 2013, "The President's Climate Action Plan", and Department of the Interior Departmental Manual Part 523, Chapter 1: Climate Change Policy, dated December 20, 2012). Furthermore, in 2014, the director of the BLM tasked the Advancing Science Integration Strategy Team to develop a plan to improve the creation and utilization of science to inform BLM's management of public land. In March of 2015, BLM released the plan, which asserted that "effective and consistent integration of the best available science in decision-making is becoming more and more essential for public land management in an era of changing climate… and diverse legal challenges" (Kitchell et al. 2015). However, these orders, reports and policies were rescinded in 2017 in order to eliminate "potential burdens" to US energy development (Secretarial Order 3360 "Rescinding Authorities Inconsistent with Secretary's Order 3349, 'American Energy Independence'"). Nevertheless, every management plan finalized and approved by the BLM between 2001 and 2017 was mandated to address climate change in its decision-making process.

This paper analyzes climate change research and BLM management plans in the Intermountain West (IMW), a highly sensitive region that contains 142 million acres of land managed by BLM (Fig. 1; Hardy Vincent, Hanson, and Argueta 2017). The IMW includes areas between the eastern edge of the Rocky Mountains and the eastern edge of the Sierra Nevada and Cascade Mountains, stretching between the borders with Mexico and Canada, and including land in the states of Washington, Oregon, California, Idaho, Nevada, Utah, Arizona, Montana, Wyoming, Colorado and New Mexico. This region includes some of the hottest and driest areas in North America and contains a wide variety of ecosystems, many of which are water-limited, exhibit low primary productivity, and contain fragile, erosion-prone, and low-fertility soils (Maestre et al. 2012).

Our research examines both peer-reviewed scientific literature pertaining to the IMW, as well as BLM Resource Management Plans from field offices in the IMW in order to answer the following research questions:

1) How is climate predicted to change for BLM lands in the Intermountain West?

2) Based on the peer-reviewed literature, what are the likely impacts of climate change on the multiple uses of BLM land? What impacts are predicted with sufficient confidence to inform management? Are there critical knowledge gaps?

3) How is climate change discussed and considered in BLM Resource Management Plans? Do BLM Resource Management Plans address climate change-related concerns described in the peer-reviewed literature?

3. Climate Change in the Intermountain Western US

The IMW has already experienced a considerable amount of warming over the past century. Comparing average temperatures throughout the IMW during the thirty-year period 1989-2018 to the period 1895-1924, the region has warmed nearly 0.9°C, with land managed by BLM having experienced warming approximately equivalent to the regional average (Fig. 1). On

more local scales, the highest amounts of warming (> 2°C) have historically occurred in areas managed by the BLM in western Colorado, eastern and southern Utah, southern Nevada, and eastern California. Notably, BLM also manages land in eastern Nevada indicated as having experienced slight cooling over the same timeframe, further highlighting the challenges faced in planning for changes in this large and diverse region.

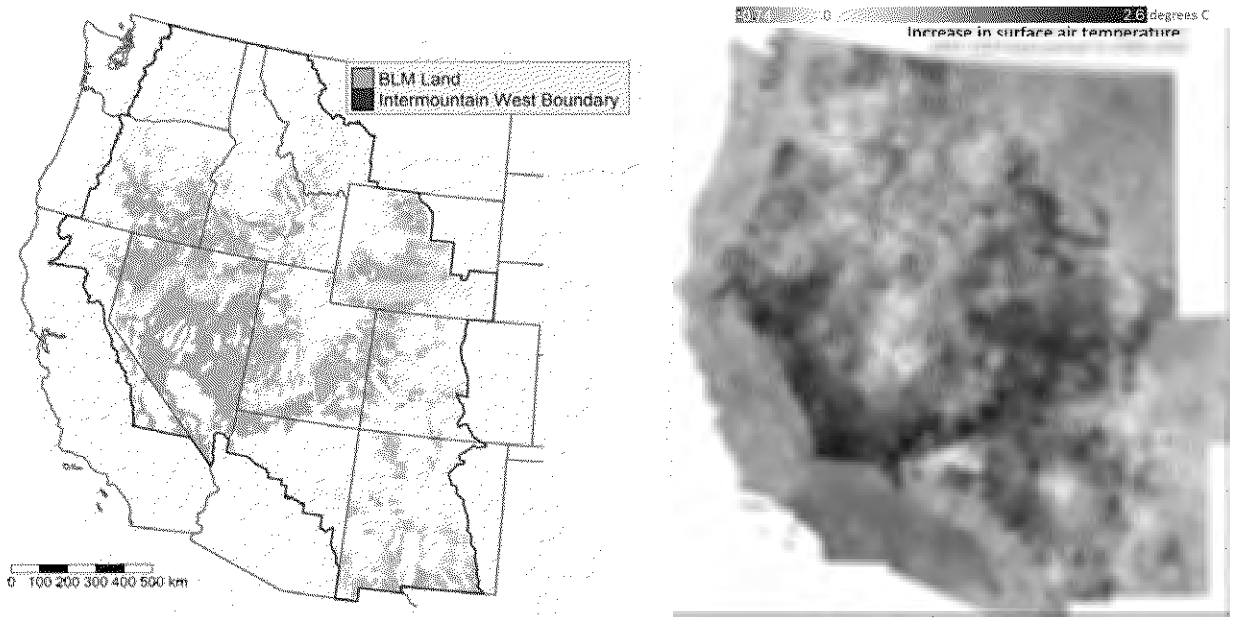

Figure 1. Our study area (left panel) includes the Intermountain Western US (IMW), outlined in blue, and specifically focuses on land managed by the US Bureau of Land Management, highlighted in orange. The right panel shows observed (interpolated) change in the average surface air temperature (2 m above surface) between two time periods, comparing 1895-1924 to 1989-2018. Temperature data was synthesized from PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu, Map created June 4, 2019.

Climate models are in close agreement that the IMW will experience additional warming under all foreseeable future scenarios (IPCC 2014, Frölicher et al. 2014, Palmquist et al. 2016, USGCRP 2017, Gonzalez et al. 2018, IPCC 2018, USGCRP 2018). Under the fossil fuel intensive (i.e., business-as-usual) Representative Concentration Pathway 8.5 scenario (RCP 8.5), average annual surface air temperature for land managed by BLM in the region is expected to

increase another 3.0°C by the 30-year period centered on 2050 and 5.3°C for the 30-year period centered on 2085, relative to the 1970-2000 baseline period (Fig. 2, Maurer et al. 2007).

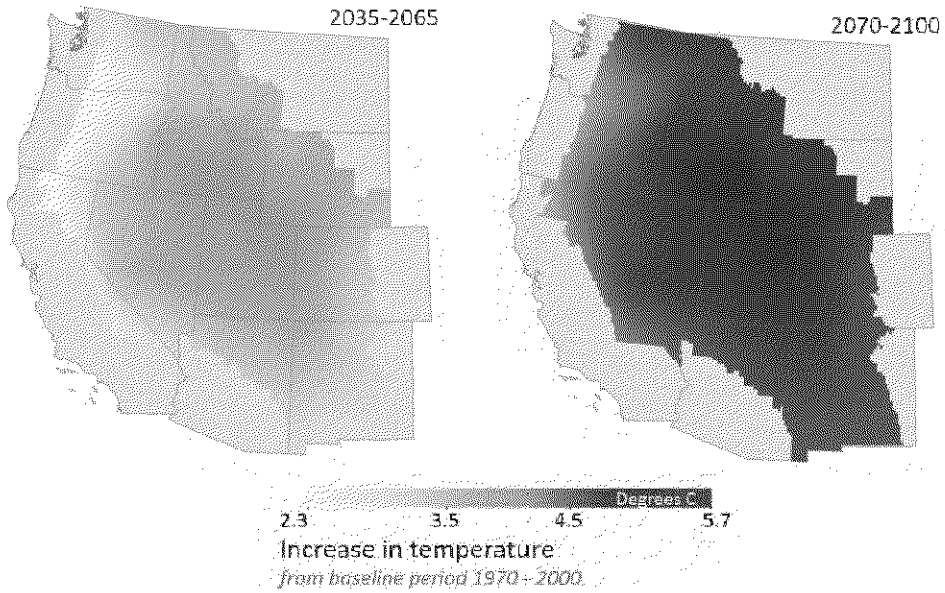

Figure 2. Future predicted change in mean annual temperature, relative to a 1970-2000 baseline. Data obtained from the World Climate Research Program's Working Group on Coupled Modelling CMIP5 multi-model ensemble (Maurer et al. 2007) available at: https://gdo-dcp.ucllnl.org/ downscaled_cmip_projections/dcpInterface.html.

Precipitation patterns in the region have also changed significantly in the past several decades. Seasonal snowpack provides the vast majority of water for the IMW (Strum et al. 2017, Julander and Clayton, 2018). Over the past 30 to 65 years, seasonal maximum snowpack and snowpack water content have both declined (Saley et al. in review, Pierce et al. 2008, Mote et al. 2016, 2018, Fyfe et al. 2017, Li et al. 2017, Chavarria and Gutzler, 2018). The fraction of precipitation falling as snow has decreased, the timing of snow melt has shifted to earlier in the season, and the fraction of snowpack that is converted to streamflow has decreased (Lute et al. 2015, Barnhart et al. 2016, Harpold et al. 2017, 2018, Solander et al. 2017). Future precipitation predictions are generally in agreement that the hotter temperatures expected under all future scenarios will further exacerbate the reductions in snowpack, reductions in the fraction of

precipitation delivered as snow, reductions in the fraction of snowpack that is converted to streamflow and timing of melt (Cook et al. 2014, Klos et al. 2014, Musselman et al. 2017, Rhoades et al. 2017).

The probability of decadal to multi-decadal mega-drought increases with hotter temperatures (Ault et al. 2014, 2016, Cook et al. 2016, Prein et al. 2016). Future climate predictions suggest 99% of the Colorado Plateau, which comprises a large portion of the IMW, will experience drying by 2075, with an average 17% increase in aridity across ecoregions in the Colorado Plateau (Copeland et al. 2017). Multi-decadal mega-droughts in the latter 21st century for moderate (RCP 4.5) and high (RCP 8.5) future emissions scenarios are predicted to significantly exceed any drought cycles observed in the past millennium throughout the American Southwest (Cook et al. 2015).

Ecosystems are affected by many more nuanced characteristics of the temperature and precipitation regime, some of which are not as well predicted by current climate models (Snyder et al. 2019, Bradley et al. 2016). Such phenomena include changes in the frequency, timing, and spatial distribution of rainfall, changes in the formation and persistence of clouds, and changes in specific temperature and moisture regimes that serve as critical phenological cues for plants and animals. Many of the more nuanced changes are likely to be correlated with the general trend (i.e., warming and increased variability).

4. Methods

We addressed our research questions with three approaches. First, we conducted a systematic review of academic, peer-reviewed literature pertaining to climate change in the IMW. We augment this systematic literature review with insights from papers that fell outside

the rigid constraints of our automated search in order to provide a more complete synthesis of implications of climate change on BLM lands and land uses. Second, we synthesized modelling results from numerous studies predicting vegetation change throughout the IMW. Third, we performed a content analysis of BLM Resource Management Plans throughout the IMW.

Systematic Literature Review

The systematic literature review was used as an objective means to identify recent articles that provide insights regarding climate change in the IMW, observed or expected impacts, and implications for land management. After systematically gathering all articles identified by climate change and IMW identifiers, we coded and read all articles pertaining to uses for which BLM manages.

We used Scopus to identify recent peer-reviewed literature relevant to climate change in the IMW. We searched Scopus in February and March 2019 for all articles that contained both a climate change identifier as well as a regional identifier (e.g., climat* AND "*mountain west"; see Table S1, Appendix I) within the title, abstract or key words. We exported all bibliographic data directly as a bibtex file.

Initial data cleaning was completed using the R *Bibliometrix* package (Aria and Cuccurullo 2017). First, we removed duplicate articles with the *duplicatedMatching* function. After deduplication, we scanned for, and removed, articles clearly outside the study area.

To determine how climate change will impact the BLM's management of multiple uses, we searched the abstracts of all articles for nine uses that are most relevant to BLM's mission ("About" 2016). These uses included: logging/timber, mining, grazing, energy [energy

extraction, development, and corridors], recreation, ecosystem services, conservation, historic/cultural values, and wild horse/burro management (Table 1).

Table 1. Operational definitions of the land uses analyzed for our systematic literature review.

Land use	Definition
Conservation	Protection of critical habitat, native wildlife and vegetation populations, natural resources, and natural landscapes
Ecosystem services	Direct and indirect contributions of ecosystems to human well-being, including water and air purification, carbon sequestration, and climate regulation
Cultural/historic value	Traditional, spiritual, cultural, and historic values that are tied to natural features or landscapes
Recreation	Outdoor participation on public lands, including camping, hunting, fishing, hiking, boating, cycling, and wildlife viewing
Wild horses & burros	Management and protection of wild horses and burros to ensure healthy populations
Grazing	Domestic livestock (mostly sheep and cattle) use of rangelands
Logging & timber	Harvest of timber for commercial purposes
Energy	Fossil fuel development, extraction, and corridors
Mining	Development and extraction of minerals, including gold, silver, copper, hard rock materials, coal, sand, and gravel

We narrowed the search to include only articles that referenced at least one land use in the abstract. We discarded all articles from 2019, as they only represented two months of publications (Jan/Feb), rather than all articles published that year, as well as articles published prior to 2009. While earlier literature could provide useful insights for BLM managers and to answer our research questions, limiting our systematic literature search to articles published

since 2009 helped ensure we were evaluating more recent papers that are likely to use more consistent and reliable climate forecasts as well as more recent analytical methods and models.

We further winnowed our search by keeping only articles that had a mean annual citation rate of 2 or more in order to discard articles that appear to have had very little impact. As articles from 2018 had only been published for a year or less at the time of analysis, we did not discard any articles published in 2018 based on the number of citations. The references for all of the articles gathered via this method are provided via Hydroshare.

Systematic Literature Review Coding

We developed a coding protocol to document the focus and relevance of the final set of papers identified in our search. Six different coders used a Qualtrics survey as a coding instrument (Appendix II) to determine, based on the body of the text, whether: (1) any part of the research took place in the IMW and where, (2) if it discussed climate change and its impacts, (3) if it discussed management, (4) if the BLM was mentioned, (5) if any BLM land uses were mentioned, and (6) if and how the paper was relevant to our research questions. In order to ensure reliability among all coders, we visually checked for consistency twice, adjusting the protocol based on the results. First, we tested reliability by having two coders code the same 50 articles, and then discussed inconsistencies as a group and revised our protocol to improve consistency. Next, all six coders coded the same 20 articles and we further revised our protocol before having each person code a distinct set of articles. Any questions that were not consistent between all six coders for all 20 articles were cut or revised, resulting in a final set of questions (Appendix II). Afterwards, the articles already coded were recoded for the revised questions. Data generated from our coding are available on Hydroshare.

Systematic Literature Review Content Analysis

The final phase of the systematic literature review involved a thematic analysis conducted by reading each article that included the IMW, mentioned climate change at least once within the body of the text, and mentioned at least one land use (n = 225). In reading each article, we determined the climate change impacts on the land uses the BLM manages, and further identified common themes throughout the literature.

Vegetation Change Analysis

As vegetation plays a central role in many BLM activities and concerns, we provide a novel and in-depth synthesis of recent studies that predict vegetation change throughout the IMW. Several peer-reviewed models predict climate change effects on important components of vegetation within the IMW, namely sagebrush (*Artemisia tridentata*), cheatgrass (*Bromus tectorum*), pinyon-juniper woodlands and forage production. Models used to make predictions of future changes in species distributions and/or abundances can be broadly categorized as process models or as correlational models, with correlations based on either spatial or temporal empirical relationships.

Process models employ theory based on underlying ecological mechanisms to predict species responses to future environmental conditions (Johnsen et al. 2001). Conversely, spatial correlations models correlate current species distributions or abundances to current climatic and environmental conditions, then predict future distribution and abundance based on predicted future climate (Elith and Leathwick 2009). Temporal correlations models correlate the effects of

current interannual climatic variation on interannual variation in species abundances or vital rates, and apply these relationships to future climate (Kleinhesselink and Adler 2018).

Models also incorporate a range of CO_2 emissions scenarios and model different indicators of species performance, which influence results. Given such disparate approaches and inputs, it would be no surprise if the models make inconsistent predictions. However, strong agreement among models regardless of methodological variation would increase confidence that their predictions should inform management decisions.

To evaluate consistency among predictions of vegetation change in the IMW, we identified all spatially explicit modeling studies since 2008. For each model, we noted the model type, indicator modeled, emissions scenario and latest time frame for which they projected results. In total, we identified 15 studies, containing 43 distinct projections. Of these 43 projections, 15 represented low emissions scenarios while 27 represented high emissions, and one projection represented an average of high and low emissions. The bulk of BLM land in the IMW falls within four ecoregions: the Northern Basin and Range, the Central Basin and Range, the Wyoming Basin, and the Colorado Plateau. As such, we focus primarily on results for those regions. Models addressed forage production by modeling grassland cover (Notaro et al. 2012, Hufkens et al. 2016), abundance of non-woody vegetation (Reeves et al. 2017), or primary productivity (Reeves et al. 2014, 2017, Hufkens et al. 2016). Primary productivity may not translate directly to forage production, but is interpreted as a proxy because primary productivity represents biomass available for grazers, and therefore forage quantity (Reeves et al. 2017).

To analyze vegetation change predictions, we downloaded the highest resolution image showing projected vegetation change from papers indicated in Table 2, imported them into ArcMap, and georeferenced them. We masked the data to include only data corresponding to

BLM land in the IMW, reclassified the pixels to indicate whether the vegetation type was predicted to increase, decrease or not change, and counted pixels within each of the 18 ecoregions within the IMW. This allowed us to calculate a mean change projected for each ecoregion in each dataset. Positive mean change denotes ecoregions with projected increases for a given species, and negative mean change denotes ecoregions with projected decreases.

Table 2. Studies used for the vegetation predictions.

Species	Study	Modeling method	Model type	Indicator	Emissions scenario	Time of projection	Fig.(s)
Cheatgrass	Boyte et al. (2016)	Regression tree	Statistics-based	Cover	RCP 4.5	2070	10
	Bradley (2009)	Mahalanobis distance	Statistics-based	Presence	A1B	2100	7, 8a, 8b, 9
	Brummer et al. (2016)	Boosted regression tree	Statistics-based	Cover	RCP 4.5	2080	5c
Forage	Hufkens et al. (2016)	PhenoGrass	Process-based	Cover; gross primary productivity	RCP 8.5	2100	2a (in text); 7k (in supplemental material)
	Notaro et al. (2012)	LPJ-GUESS DGVM	Process-based	Cover	A2FIXCO2, A2, B1	2100	4c,4i,4o
	Reeves et al. (2017)	Biome-BGC	Process-based	Net primary productivity	A1B, A2, B2	2100	2a,2b,2c (in supplementary material)
	Reeves et al. (2017)	MC2	Process-based	Cover	A1B, A2, B2	2100	3a,3b,3c (in supplementary material)
	Reeves et al. (2014)	Biome-BGC	Process-based	Net primary productivity	A1B, A2, B2	2100	4a
Pinyon-Juniper	Cole et al. (2008)	Multiple quadratic logistic regression	Statistics-based	Presence	Generic CO_2 doubling	2100	5
	Jiang et al. (2013)	CNDV	Process-based	Presence	A2	2100	5b
	McDowell et al. (2015)	CESM	Process-based	Cover	RCP 8.5	2090	4h
	Notaro et al. (2012)	LPJ-GUESS DGVM	Process-based	Cover	A2FIXCO2, A2, B1	2100	4d,4j,4p
	Rehfeldt et al. (2012)	Random forest	Statistics-based	Presence	A2, B1, B2	2090	3h,3i,3o,3p,3s,3t
Sagebrush	Renwick et al. (2018)*	Spatial correlations fit with random forest	Statistics-based	Cover	RCP 4.5, RCP 8.5	2100	N/A
	Renwick et al. (2018)*	Temporal correlations fit with mixed effects model	Statistics-based	Cover	RCP 4.5, RCP 8.5	2100	N/A
	Renwick et al. (2018)*	Seedling survival model	Process-based	Seedling survival	RCP 4.5, RCP 8.5	2100	N/A
	Renwick et al. (2018)*	LPJ-GUESS DGVM	Process-based	Cover	RCP 4.5, RCP 8.5	2100	N/A
	Schlaepfer et al. (2012)	Ensemble SDM fit to climate	Statistics-based	Presence	B1/A2	2090	3a,3b
	Schlaepfer et al. (2012)	Ensemble SDM fit to ecohydrology	Statistics-based	Presence	B1/A2	2090	3c,3d
	Still & Richardson (2015)	Random forest	Statistics-based	Presence	A1B	2050	1

Species - vegetation component modeled; Study – study containing model; Model type – broad model categorization; Modeling method – statistical method or specific model used; Indicator – measure of species performance modeled; Emissions scenario – CO2 emissions scenario or representative concentration pathway used to predict climatic changes; Time of projection – the latest time to which models were run; Fig. – which figure in original study showed results*Results from Renwick et al. (2018) are supplemental results obtained from authors.

BLM Resource Management Plans

Lastly, we systematically analyzed all 44 BLM Resource Management Plans within the IMW published between 2001 and 2017, to determine the extent to which these legally binding plans consider and provide adaptation strategies for climate change. We downloaded plans from BLM's website (https://eplanning.blm.gov/epl-front-office/eplanning/lup/lup_register.do, accessed in February 2019; Table S3).

We analyzed of BLM plans in two phases. First, we coded for keywords associated with climate change. To do so, we used NVivo to search each plan for the presence of the following keywords: "climate," "warming," "extreme," "weather," "greenhouse gas," "global," "IPCC" and GHG" (Table S2, Appendix I). Keywords were paired down from a longer phrase (e.g. "climate change," "global warming," "warming temperature," or "global extremes.") and left in the singular form so as not to exclude other variations of these words that refer to climate change. When a keyword was found, the whole paragraph to which it belonged was selected and coded as containing that keyword. If the word was found in a table, the whole table was selected, unless the table included paragraphs within it, in which case the relevant paragraph was selected and coded. This process was repeated for each keyword in each plan. Although the Record of Decision for Resource Management plans were occasionally provided with plans, we did not code these because such sections are not part of the legally binding plan that authorizes management actions.

In the second phase of coding, we used NVivo to read and analyze the relevant content of the saved sections. We read each of the selected sections, noted the context and essence of how climate change was discussed, and grouped statements by topic. We removed any sections that did not explicitly mention or discuss climate change. Finally, we compared our synthesis of the

literature with BLM management plans to determine whether the plans and literature address similar concerns regarding climate change impacts on multiple uses. All plans and NVivo files used for analysis can be found on Hydroshare.

5. Results of Systematic Literature Review

Our initial Scopus search resulted in 7,122 peer-reviewed articles. Of these, 841 contained at least one land use in the abstract (Fig. 3). From this subset we identified 280 articles published from 2009-2017 with annual citation rates of 2 or greater, and 74 articles published in 2018, for a total of 354 recent and cited land use articles (Fig. 3). Of these, 253 included study areas within the IMW, and 225 of this subset mentioned climate change in the body of the text. These 225 articles serve as the dataset for our systematic literature review.

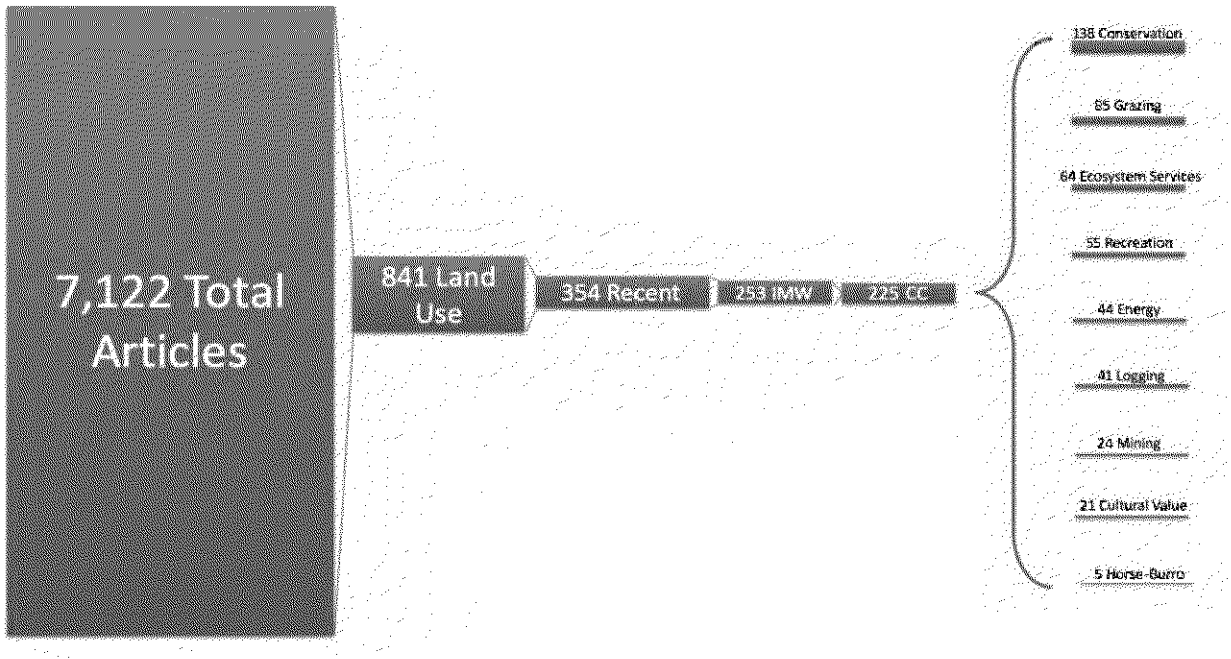

Figure 3. Flow chart of the article selection process. From left to right: all articles produced from the initial Scopus search; articles from the Scopus search with at least one land use in the abstract; articles published between 2009-2018 with at least two citations per year; articles within the IMW; articles that explicitly mention climate change in the body of the text; number of articles for which each land use appears in the body of the text.

BLM was mentioned in 18% of articles, but was only a substantial focus of 1% of the articles. When BLM was mentioned explicitly, it was typically as a data source, or was mentioned as the managing agency of the study area. Explicit management recommendations were also uncommon. While 80% of articles mentioned management of public lands, it was often only alluded to in a generic sense in a single sentence. For example, "These results will be useful to help direct management decisions and prioritize restoration activities for imperiled [Colorado River Cutthroat Trout] populations in the face of a changing climate" (Roberts et al. 2017, p. 1384). This lack of actionable recommendations in the academic literature reaffirms the oft-reported gap between academic research and on-the-ground land management activities (Archie et al. 2012, Davenport and Anderson 2005, de Groot et al. 2010, Leahy and Anderson 2010).

Our systematic literature search was targeted to identify recent and periodically cited articles directly relevant to our research questions. While it was not intended to be a complete, exhaustive search of every paper that could be relevant to land management in the IMW, several important insights emerged. First, the literature related to climate change and land management in the IMW is vast and diverse. Even within the relatively rigid constraints of our automated search, we encountered a tremendous number of relevant insights regarding observed or foreseeable impacts of climate change on uses for which BLM manages. A comprehensive list of these insights is available in supplementary information, and key findings are reported below.

Second, a few uses for which BLM manages are afforded considerably more attention than others in the academic literature. Of the 225 papers identified, conservation and grazing were the most frequently mentioned land uses (138 and 85 articles, respectively; Fig. 4). Recreation (55), energy development (44 articles), and logging and timber (41) were less frequently mentioned, and mining (24), cultural values (21), and wild horses and burros (5) were

rarely found within the article text. When discussed, they were often only briefly mentioned, or discussed as a threat to conservation and ecosystem services. Historic value was not found in any article.

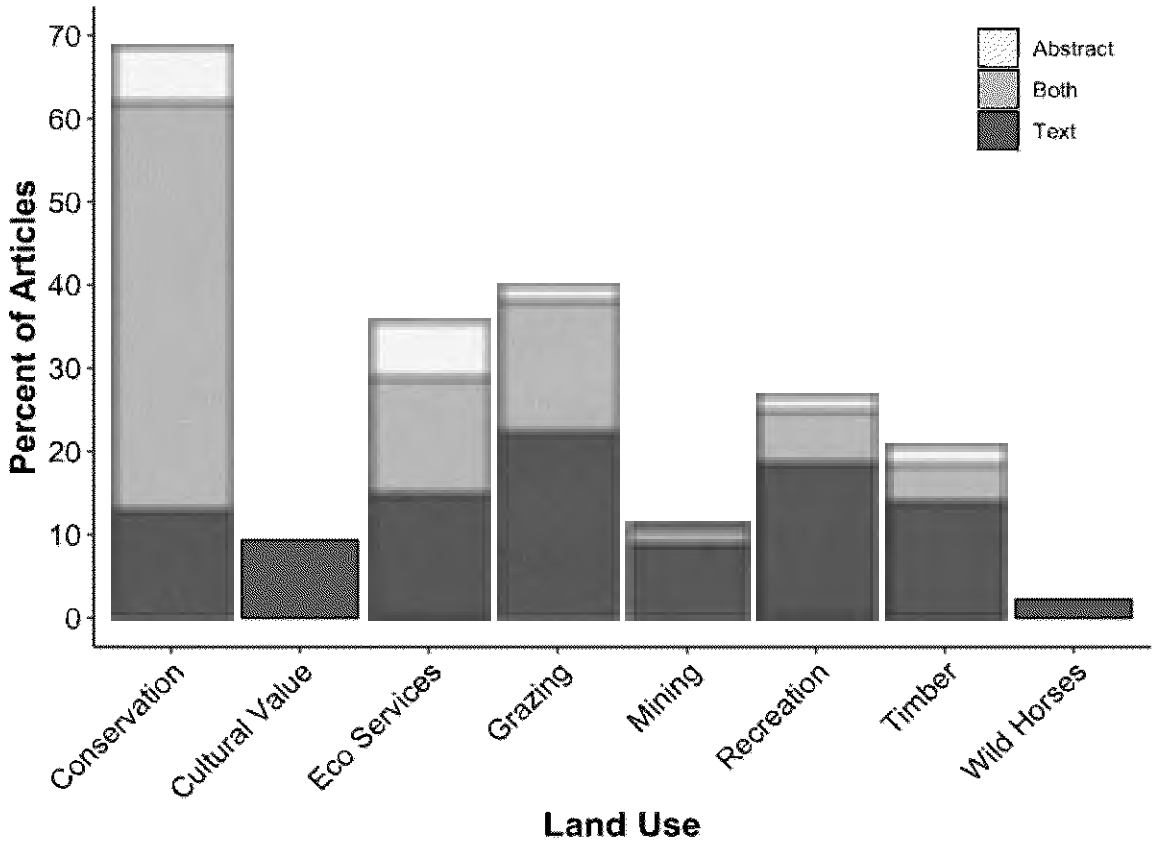

Figure 4. The percent of articles in which each land use was found. The lightest gray denotes that the land use was only found in the abstract of the paper, the darkest gray denotes that it was only found in the body of the text, and the middle gray means the land use was found in both the abstract and the body of the text.

The majority of papers focused on one (39% of articles) or two (20%) land uses and avoided addressing the challenges of interacting and potentially conflicting land uses. Of those studies that investigated interactions among multiple uses, the most prominent theme was that the more active and extractive uses (e.g., energy development, grazing, recreation) threaten the more passive uses (e.g., conservation, ecosystem services, cultural value). For instance, grazing can increase sediment runoff (Warziniack et al. 2018), degrade bird habitat (Friggens and Finch

2015), and promote pinyon-juniper expansion, which negatively impacts small mammal communities (Rowe et al. 2010). Additionally, energy development, large wildfires, exotic grass invasion, conifer expansion, conversion to cropland, and urban/exurban development all threaten sagebrush and the 350 species that rely on sagebrush ecosystems (USFWS 2013, Chambers 2017). These land use and ecosystem changes may exacerbate expected negative impacts (or offset positive impacts) of climate change on sagebrush. Similarly, combined effects of climate change and recreation have contributed to the decline of the snowy plover, a short-distance migratory bird (Thomas et al. 2012). Timber harvest has reduced habitat quality for redband trout, with 89% of this species' habitat at high risk of loss from land use (Muhlfeld et al. 2015). Livestock grazing, off-highway vehicles and energy development disturb soils and can increase dust loading 10- to 40-fold, which negatively impacts plant growth, causes numerous respiratory and cardiovascular disorders, and reduces the runoff efficiency of melting snowpack (Duniway et al. 2018).

Furthermore, the combined impacts of climate change and active land uses may have significant deleterious effects on ecosystem services and ecological function. Copeland et al. (2017) found, for example, that reduced abundance and diversity of native species in the Colorado Plateau was mostly due to the combined effects of climate change, population growth, recreation, oil and gas development, renewable energy, and agriculture. Roberts et al. (2017) found the effects of brown trout invasion combined with climate change imperiled more populations of cutthroat trout than climate change alone.

In contrast to land uses as threats, a second theme in the literature was that some land uses may actually help preserve others. For instance, grazing was mentioned as a tool to limit wildfire and invasive species, and ultimately preserve biodiversity and ecosystem function.

Davies et al. (2016) found grazing during winter can reduce fine fuels and, therefore, reduce wildfire likelihood, thus improving sage grouse habitat conservation. Similarly, Nafus and Davies (2014) determined low to moderate grazing, compared to no grazing, may increase the ability of a community to resist invasion from medusahead (a low forage value grass) following fire disturbance. However, it is difficult to support general conclusions about effects of grazing on ecosystem service because grazing effects are extremely variable at the local scale, reflecting variation in grazing intensity and seasonality and the biotic and edaphic context.

Our automated search did not find a single paper supporting the notion that climate change does not pose a major threat to BLM ecosystems and the services and products for which those lands are valued, although there were several inconclusive articles. This null finding supports earlier executive and secretarial orders for federal agencies to consider climate change in their planning and to reduce their own greenhouse gas emissions. Further, this null finding stands in contrast to the 2017 revocation of those former orders, which occurred without acknowledgement of the threats posed by anthropogenic climate change.

The vast majority of papers were published in journals that require a subscription or other charge for access. However, while we did not have information regarding copyright and sharing status of each article, the articles and abstracts could all be accessed using public search engines (e.g., Google Scholar) and could likely be obtained free of charge by personal communication with the corresponding author.

6. Foreseeable changes in BLM ecosystems

The vast majority of papers identified in our systematic literature review examined recently observed or foreseeable changes in BLM ecosystems. We highlight findings from many of those key papers in this section and augment those findings with additional papers that did not

meet our strict search criteria (e.g., because they did not explicitly mention a land use in the abstract or were not published between 2009-2018), but nevertheless provide useful insights regarding climate change impacts on the IMW ecosystems managed by BLM. We provide an in-depth analysis of predicted vegetation change because vegetation plays a central role in many of the uses for which BLM manages, and also provide a summary of foreseeable impacts to other components of BLM ecosystems in Table 3.

Climate change impacts on vegetation

Plant species composition and productivity determine the quantity of forage for livestock and wildlife and the quality of wildlife habitat, and influence other ecosystem services, including soil fertility and carbon storage, nutrient cycling, fire regimes, and recreation (Havstad et al. 2007). Predicting how climate change will alter vegetation, through alterations in temperature, precipitation and carbon dioxide (CO_2) concentrations, is critical for long-term land management planning.

Our quantitative review of predictions from vegetation models showed a high degree of consistency in the direction of predicted change for sagebrush, pinyon-juniper and forage production (Fig. 5). Models project significant ($p < 0.05$) increases in sagebrush distribution or abundance in the Northern Basin and Range and Wyoming Basin, significant ($p < 0.01$ or $p < 0.05$) decreases in pinyon-juniper in the Central Basin and Range, Colorado Plateau, and Northern Basin and Range, and significant ($p < 0.01$ or $p < 0.05$) increases in forage production in all ecoregions. These results do not address the magnitude of change in a region.

Projected changes in cheatgrass were less consistent. On average, decreases were more common than increases, especially in the Northern Basin and Range (Fig. 5) but this trend was not clearly significant ($p = 0.09$). [SZ1]

We found only slight differences when comparing high emissions and low emissions scenario results (Fig. S1, Appendix I). In fact, we found more variability due to model type (Fig. S2, Appendix I) than emission scenario, indicating that uncertainty about ecological processes is larger than uncertainty about the impacts of varying magnitudes of climatic change.

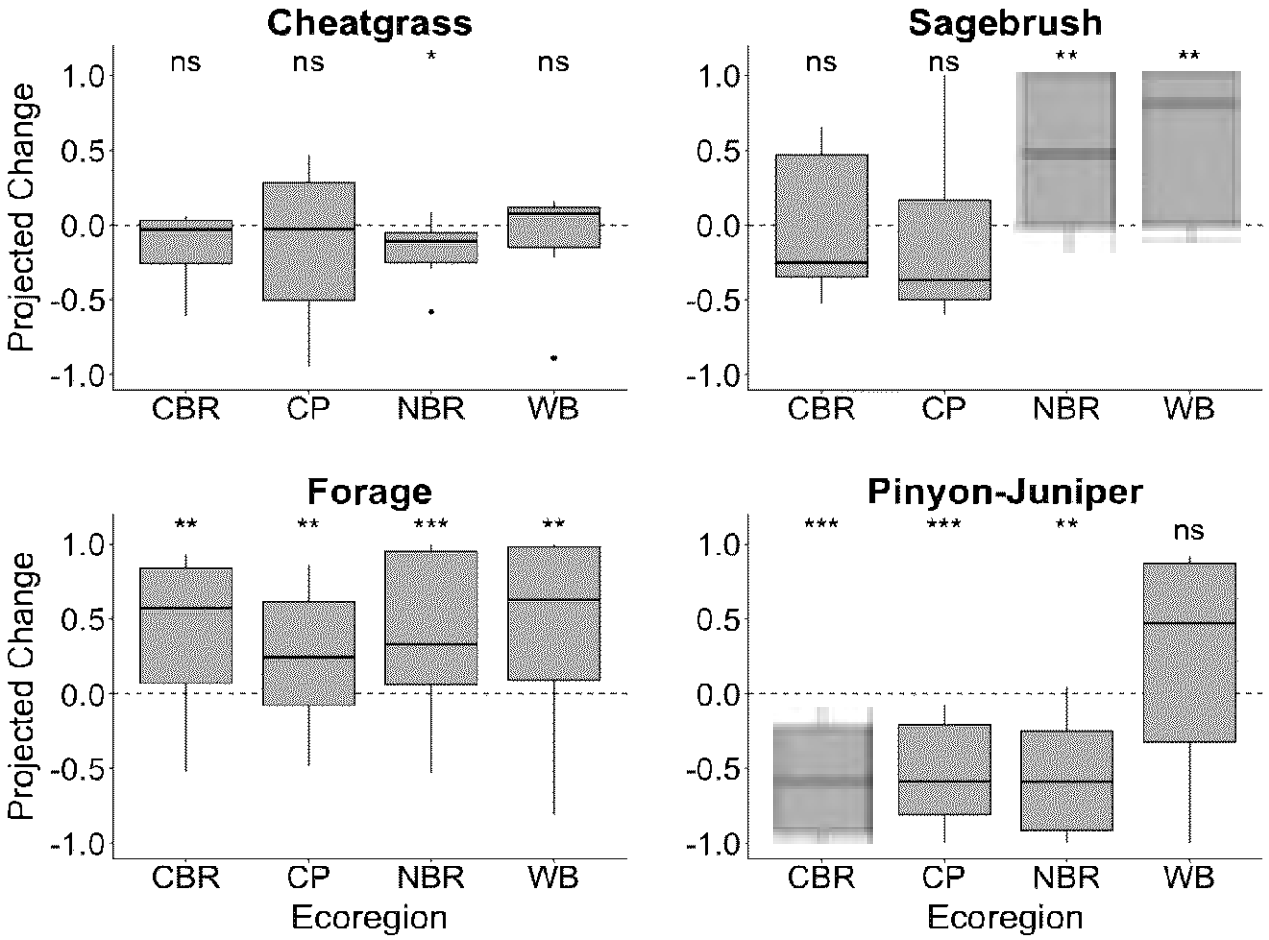

Figure 5. Projected changes within ecoregions important to BLM management, with results from all emissions scenarios and model types grouped. CBR=Central Basin and Range, CP=Colorado Plateau, NBR=Northern Basin and Range, WB=Wyoming Basin. Stars denote statistical significance: *** $p < 0.01$, ** $0.01 < p < 0.05$, * $0.05 < p < 0.20$, *ns* $p > 0.20$.

The high degree of consistency in the predicted impacts of climate change on vegetation means our results may be useful for land-management planning. For example, the BLM has devoted considerable resources to fighting increases in pinyon-juniper density and distribution

for decades (Redmond et al. 2013). Predicted declines in pinyon-juniper suggest BLM may be able to reduce costly pinyon-juniper management in the future. Predicted increases in forage production are also good news for land managers, implying greater capacity of BLM lands to support livestock and wildlife populations. Finally, the predicted sagebrush increases in the Northern Basin and Range and Wyoming Basin may provide opportunities for restoration and conservation. In contrast, predicted declines in sagebrush in southern regions suggest restoration strategies targeting no net loss of sagebrush in these regions may be infeasible, especially under high emissions future scenarios.

For cheatgrass, model predictions were less consistent. The lack of clear increases may be encouraging for land management agencies. However, cheatgrass predictions strongly depend on precipitation seasonality (Bradley 2009), which is notoriously difficult to predict with current climate models. Additionally, even if cheatgrass suitability declines in the future, other invasive annual grasses such as medusahead (*Taeniatherum caput-medusae*) and red brome (*Bromus madritensis ssp. rubens*) could potentially fill its niche (Snyder et al. 2019).

The most important caveat to our results is that most of the models we reviewed do not consider the effects of future changes in wildfire regimes. Climate change is expected to increase the size, frequency and severity of fires in the IMW (Liu et al. 2013, Barbero et al. 2015, Abatzoglou and Williams 2016, Murphy et al. 2018, Prudencio et al. 2018). The predicted increases in forage that we found may also increase wildfire risks. Increases in fire could cause greater declines in pinyon-juniper (Allen et al. 2015, McDowell et al. 2016) than the models predict, and could lead to decreases, rather than increases, in sagebrush (Reeves et al. 2018). Conversely, fire might cause greater increases in cheatgrass than shown in our results (Bradley et al. 2018, Larson et al. 2018).

Foreseeable impacts on other ecosystem processes

Climate change is predicted to affect many other ecosystem processes, characteristics and services. A comprehensive summary of those changes goes beyond what is feasible in this effort, and is highly dependent on greenhouse gas emissions over the next several decades. However, Table 3 summarizes some of the foreseeable impacts to critical characteristics, processes and services provided by BLM ecosystems.

Table 3. Commonly documented impacts of climate change across the Intermountain West

Category	Impacts	References
Biological Soil Crust	Change to community structure and function	Blay et al. (2017); Root et al. (2011); Washington-Allen et al. (2010)
	Warm/dry climates host late successional species and have more nitrogenase activity	Schwabedissen et al. (2017); Norton et al. (2011); Shaw et al. (2019)
Mammals	Distribution shifts poleward or upslope	Lynn et al. (2018); Rowe et al. (2010).
	Decline in some species abundance (e.g., bats, pika, small mammals)	Beever et al. (2016); Hayes & Adams (2017); Rowe & Terry (2014)
	Habitat loss	Malaney & Cook (2013); Mathewson et al. (2017); Beever et al. (2016)
	Chronic heat stress	Mathewson et al. (2017)
	Changes in food sources and animal activity	Butler (2012)
Birds	Decreased recruitment, fecundity, survival, range (e.g., spotted owl, sandhill crane, snowy plover, crossbill, sagegrouse)	Blomberg et al. (2014); Brown & Bachelet (2017); Gerber et al. (2015); Peery et al. (2012); Thomas et al. (2012).
	Loss of habitat (e.g., band-tailed pigeons, songbirds, sagegrouse)	Coxen et al. (2017); Friggens & Finch (2015); Homer et al. (2015); Schrag et al. (2011); Shirk et al. (2017).
Fish	Decline in coldwater species habitat	Isaak et al. (2015); Roberts et al. (2017); Young et al. (2016)
	Expansion of invasive species (e.g., brown trout)	Budy & Gaeta (2017)
	Hybridization	Young et al. (2016)
	Distribution shifts	Gresswell (2011)
Aquatic Ecosystems	Warmer and more variable thermal/hydrologic conditions	Al-Chokhachy et al. (2013); Isaak et al. (2012); Gresswell (2011); Leppi et al. (2012); Muhlfeld et al. (2015); Roberts et al. (2013); Strecker et al. (2011)

	Prone to larger, more frequent disturbances	Isaak et al. (2012); Fesenmyer et al. (2018); Rudolfsen et al. (2019)
	Increased wildfire further warms streams	Isaak et al. (2018)
Water Availability	Decrease in water availability due to increased evapotranspiration, altered precipitation patterns, reduced snowpack, and changes in timing of spring runoff	Perry & Praskievicz (2017); Sanderson et al. (2012); van Mantgem et al. (2009)
	Decreased ground- and surface water	Formica et al. (2014); Perry & Praskievicz (2017)
	Increased conflict over water	Sanderson et al. (2012)
Dust	Damage to vegetation, Reduced snowpack and water supply, increased nutrient loading to aquatic ecosystems, respiratory and cardiovascular impacts on humans and animals	Duniway et al. (2019)
Discordant shifts in phenology	Advanced cheatgrass phenology	Boyte et al. (2016)
	Accelerated flowering dates	Munson & Sher (2015)
	Montane systems may experience more rapid changes in phenology	Munson & Sher (2015)
Wildfire	Increased fire frequency	Embrey et al. (2012); Hansen & Phillips (2015); Hurteau et al. (2014); Palmquist et al. (2018)
	Fuel dries earlier in year, lengthening fire season	Hurteau et al. (2014); Rocca et al. (2014)
	More high severity fires and mega-fires	Davies et al. (2016); Hurteau et al. (2014)

7. Climate Change Impacts on Multiple Uses

Determining the impacts of climate change on specific uses for which BLM manages is particularly challenging because there are a variety of pathways by which climate change may evolve, those pathways may impact land uses in different and non-linear ways, and we do not know all of the thresholds and interactions within the ecosystems on BLM lands that climate change may affect. Generally, uncertainties regarding these thresholds and interactions are elevated under more fossil fuel-intensive pathways and are increasingly relevant for longer-term predictions. In this section, we dig deeper into foreseeable impacts of climate change on specific

uses for which BLM manages, drawing from literature that includes and extends beyond the papers identified in our systematic literature review. Table 4 summarizes climate change impacts on BLM land uses as well as interactions among land uses.

Table 4. Climate change impacts on and interactions between various land uses for which the BLM manages.

Land Use	Climate Change Impacts	Land Use Interactions
Conservation	• Distribution shifts upslope • Changes in abundance • Increased threat of invasive species • Habitat loss	• Grazing negatively impacts small mammal communities and causes habitat degradation • Energy development displaces wildlife • Timber, grazing, mining reduce habitat quality for fish
Ecosystem Services	• Decreased water availability in summer • Poor air quality due to wildfire and longer pollen seasons • Decreased ability of forests to sequester carbon	• Pressure on water from mining, grazing, and energy development • Grazing can cause loss of streamside vegetation and increased erosion • Oil and gas extraction can contaminate groundwater
Cultural Value	• Increased disturbances damage historic sites • Traditional practices and knowledge may erode	• Loss of natural characteristics of spiritual and cultural significance due to recreation, oil and gas, and grazing • Threatened by increased recreation (particularly motorized)
Recreation	• Overall increase in outdoor recreation participation • Lower elevations become unsuitable for snow-based recreation • Extreme summer temperatures dampen recreation • Sites with highly valued natural characteristics (e.g., glaciers) may have lowered visitation rates if threatened	• Managing for nonmotorized recreation may complement biodiversity and wildlife management, but conflict with timber and mining • Oil and gas extraction diminishes natural qualities valued by visitors • High potential of overlapping in area with oil and gas • Potential increases in motorized recreation may negatively impact other recreational, extractive, and conservation uses through increased dust and damage to biocrusts

Grazing	• Overall increased rangeland productivity due to increased temperatures and longer growing seasons • Low-elevation, low-moisture sites may have reduced productivity	• Grazing can reduce fire frequency/severity and invasive species • Negatively affect wildlife • Can damage riparian vegetation and stream quality • High potential of overlapping in area with oil and gas
Wild Horses & Burros	• No information in literature, likely same as for grazing	• No information in literature • May overlap with livestock grazing
Timber & Logging	• Minimal effects, but overall long-term decline in timber production • Primary sensitivity is to increased incidences of wildfire, insects, and disease associated with climate change • Accelerated root disease	• Can affect stream quality and wildlife habitat • Thinning can reduce wildfire risk, clearcutting can increase wildfire risk
Mining & Energy Development	• Increased mudslides and fires may threaten infrastructure • Will be most affected by policies aiming to reduce GHG emissions	• Can contaminate groundwater • Causes reduced abundance and diversity of native species • Contributes to loss of natural qualities associated with recreation • High potential of overlapping in area with recreation and grazing • Threatens nutrient cycling and sediment transport

Conservation

The Federal Land Management and Policy Act of 1976 (FLPMA), which established the nation's BLM public lands policy, declares "the public lands shall be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archeological values, that, where appropriate, will preserve

and protect certain public lands in their natural condition' [and] will provide food and habitat for fish and wildlife and domestic animals. …" (43 U.S.C. 1701, Sec. 102). Thus, the BLM's legal authority requires a variety of conservation activities that can protect a wide range of values. Doing so will depend to a large extent on the agency's capacity to retain key vegetative communities in a changing climate. This review has found numerous threats to vegetation and wildlife that may arise due to climate change, thereby posing significant challenges to BLM's ability to achieve its conservation mandate.

Predicted vegetation changes include shifts from shrub-dominated systems to invasive annual grassland where cheatgrass, medusahead and ventenata become established (Bradley, 2009, Ziska et al. 2005), from shrub-dominated to conifer woodland in other locations where there is pinyon-juniper encroachment (Balzotti et al. 2016), and from grassland to shrub-dominated in the Chihuahuan Desert grasslands of New Mexico (Caracciolo et al. 2016). All three circumstances have negative implications for maintenance of important plant communities and associated wildlife. In particular, climate-driven vegetation change threatens big sagebrush (*Artemisia tridentata*), the most widely distributed species within the study region and the dominant plant species throughout most of its range. Research suggests climate change is likely to have direct negative effects on big sagebrush survival and recruitment in the hottest part of its current range, but have only weak impacts, or perhaps even positive ones, in cooler parts of the IMW (Kleinhesselink and Adler 2018). Declines in the extent of big sagebrush communities is predicted to have significant negative impacts on a wide range of wildlife and plant species that depend on those communities for all or part of their life cycles (Coates et al. 2016, Davies et al. 2011).

An important factor in the conservation of vegetation communities at the landscape to regional scale is BLM's geographic position within the region. Generally speaking, BLM lands occupy lower-elevation landscapes while higher-elevation lands are managed by the USDA Forest Service. Except in eastern Washington, BLM land tends to be contiguous with or even surrounding national forests. Thus for some species, even if plant and/or animal communities disappear on BLM land due to changes in temperature and precipitation, upslope shifts in distribution may allow those communities to persist on Forest Service land. However, such shifts also are likely to lead to new interactions among species that shift upslope and those that persist in more montane areas. Without knowing which species are able to shift distributions and which will persist, it is not possible to predict how upslope movement from BLM to Forest Service lands may affect conservation of species and communities that experience range shifts due to climate change. In any event, it likely would constitute a FLPMA violation for the BLM to abandon efforts to conserve at-risk habitats simply because those habitats are encroaching on adjacent Forest Service land.

Conservation of rangeland soils is likely to become more difficult in a changing climate. Models suggest an increase in net primary productivity (NPP), and thereby the potential for soil carbon sequestration, in parts of the IMW but decreases in NPP elsewhere (Boone et al. 2018). Where NPP decreases as is predicted in southern and western parts of the region, carbon sequestration will likewise decrease. Further, increased bare soil leads to carbon losses due to erosion. Where NPP increases, the potential for improved soil carbon sequestration exists, however, gains may be offset by increased wildfire activity. For example, while some scientists and policy makers have suggested increasing pinyon-juniper woodland cover will lead to increased organic carbon storage, research suggests woodland expansion has limited potential for

below-ground organic carbon storage, and any benefits must be weighed against the increased risk of wildfire and subsequent annual grass invasion (Rau et al. 2011).

Protection of aquatic species on BLM lands in a changing climate is likely to depend on the reliability of water sources and streamflows. Although some climate projections suggest an increase in precipitation, droughts are predicted to be more frequent and last longer (Snyder et al. 2019), increasing the chance that seeps and springs will periodically go dry, with negative consequences for aquatic species. Increased wildfire events and subsequent erosional processes likewise have negative implications for aquatic species conservation.

Livestock and Grazing

BLM manages 115 million acres of rangeland, most of which is in the IMW (Warziniack et al. 2018), making grazing management an important component of BLM duties. Livestock grazing on public lands is a complex issue with myriad environmental factors influencing livestock and numerous impacts, both beneficial and detrimental, of livestock on the environment (Rojas-Downing et al. 2017, Henry et al. 2012).

Impacts of warmer temperatures are known with the highest certainty, and hence the direct impacts of warmer temperatures on livestock and forage are most predictable. Future increases in temperature and changes in precipitation regimes will have direct impacts on livestock in terms of heat stress and reductions in water quantity and quality. The vulnerability of livestock to heat stress depends on species and breed, life stage, and nutritional status, but generally heat stress has been shown to reduce reproduction (Nienaber and Hahn, 2007), compromise metabolic and digestive functions (Mader 2003, Bernabucci et al. 2006, King et al. 2006), reduce weight gain (Mitloehner et al. 2001), and increase mortality (Sirohi and Michaelowa, 2007). While changes in precipitation regimes are more difficult to predict, future

climate scenarios consistently predict a reduction in snowpack and runoff, as well as increased duration and severity of drought. These predicted trends imply a reduction in water availability for livestock grazing on BLM land, and less reliability of water from year to year. Further complicating the problem, livestock tend to require considerably more water under warmer conditions. Most cattle grazing on BLM public lands are of European-origin breeds within the species *Bos taurus,* which have been found to require 3, 8, and 14 kg of water per kg of dry matter consumed at ambient temperatures of 10, 30, and 35 °C, respectively (Thornton et al. 2009). Because tropical cattle breeds in the genus *Bos indicus* require less water (Thornton et al. 2009), as do certain *B. Taurus* breeds of Spanish and South American origin (Anderson et al. 2015), efforts are under way to identify and/or develop breeds that are better adapted to more arid landscapes. However, public-land livestock producers may find it difficult to switch to smaller, more water-efficient breeds in a beef supply chain geared toward a uniform product despite variations in forage conditions (Spiegal et al. 2018).

Climate change is also likely to impact livestock grazing on public lands indirectly in numerous ways, including changes in the quantity, quality and location of available forage, degraded air quality, increased transmission of diseases, and changes in the timing and distributions of pests. Generally, warmer temperatures, a lengthened growing season, and increased precipitation are expected to increase primary productivity of rangelands in the IMW, particularly in more northern latitudes (Halofsky et al. 2017, Warziniack et al. 2018). However, in some parts of the IMW primary productivity increases may accrue primarily to non-native annual grasses such as *Bromus tectorum* that lose palatability in summer and increase risks of catastrophic wildfire, which reduces local forage availability for several years (Blumenthal et al. 2016). Additionally, CO_2 increases may alter the relative abundance of grassland plant species

by increasing the production of a single species without affecting the biomass of others (Warziniack et al. 2018). Such changes, however, are more likely at higher elevations, with low-elevation, moisture-limited areas potentially facing reduced productivity (Halofsky et al. 2017).

Warmer temperatures, which stress cattle and reduce weight gains, and the potential for increased forage variability could make grazing management more challenging in the future, even if total forage quantities increase (Reeves, Bagne, and Tanaka 2017). Furthermore, increased inter-annual variability in forage requires more flexibility from range managers, but BLM grazing policies tend to constrain such flexibility. Climate change is also likely to affect pests, pathogens, hosts, vectors and epidemiological pathways that afflict livestock (Thornton et al. 2009, Tabachnick, 2010, Mills et al. 2010). However, these effects are difficult to predict due to the heterogeneous and non-linear nature of epidemiological phenomena, and especially when environmental conditions controlling pathogens and pests can change rapidly under altered environmental conditions, such as during a flood or drought.

Grazing may also be impacted by national policy on greenhouse gas emissions. While we are not aware of a comprehensive estimate of greenhouse gas emissions from livestock on public lands in the US, livestock have been estimated to be responsible for 10% of total greenhouse gas emissions in Australia (Henry et al. 2012) and 8-15% of global emissions. Some studies have estimated emissions associated with livestock to be considerably higher (Goodland and Anhang 2009, Gerber et al. 2013). Thus, policy or economic changes that reduce supply and demand for livestock may be an indirect feedback pathway that influences grazing on public lands in the near future.

Recreation

There is a clear disconnect between the scientific understanding of the impacts of climate change on lands managed by the BLM and the agency's awareness and use of that research. Research from social and economic sciences has identified several dominant pathways in which climate has, and will continue, to impact outdoor recreation participation and management (Hand et al. 2018). The first of these pathways, referred to as direct impacts, involves the effects of warming temperatures and more variable precipitation on the behaviors of outdoor recreationists themselves. The second pathway involves indirect effects in which outdoor recreationists' behaviors change in response to impacts to the biogeophysical characteristics of outdoor recreation settings.

For most outdoor recreation activities on BLM lands in the IMW, direct impacts involve rising temperatures, which will tend to make weather conditions more enjoyable; this is expected to lead to an increase in outdoor recreation participation. BLM lands facilitate over 65 million outdoor recreation visits per year (Cline and Crowley 2018) with most of those visits occurring in the warm summer months (U.S. Department of the Interior 2019). Numerous studies have shown visitation is positively correlated with warming temperatures (Fisichelli et al. 2015, Askew and Bowker 2018, Smith et al. 2019). Rising temperatures extend shoulder seasons earlier into the spring and later into the fall, resulting in more outdoor recreation destinations becoming accessible for longer portions of the year. The demand for warm-weather activities, which include hiking, camping, motorized recreation and mountain biking will likely increase on BLM lands in the future (Hand et al. 2018).

Given the warm temperate and already arid climates of BLM lands, some regions might experience reductions in outdoor recreation participation rates during mid-summer, when temperatures exceed comfortable thermal conditions. Previous research has documented the

relationship between outdoor recreation participation levels and temperatures switches from positive to negative when mean daily high temperatures exceed 27-30°C (Fisichelli et al. 2015, Hewer et al. 2016, Smith et al. 2018). Mid-summer temperature-driven declines in participation are likely to occur in the extreme southwestern portions of Utah and southeastern Nevada, as well as the lower-elevation regions of Arizona and New Mexico. However, these regions will still likely experience increasing annual participation as the shoulder seasons expand.

Indirect impacts of climate change on outdoor recreation participation are pervasive, affecting nearly every activity offered on BLM lands. Hunting, fishing and wildlife viewing opportunities provided by the agency are particularly vulnerable to these indirect impacts. Over half (4.2 million) of all wildlife associated recreation trips to BLM lands occur in the IMW (Southwick Associates 2018). As the availability and abundance of targeted species change in response to warming temperatures, it is highly likely participation in wildlife-related outdoor recreation will shift accordingly. Previous research suggests hunters and anglers are willing to substitute hunting/fishing sites and may even substitute other outdoor recreation activities if they are no longer able to target specific species (Hand et al. 2018). Previous analyses, however, suggest any reduced participation in hunting, angling and wildlife viewing attributable to target species being negatively impacted will be outweighed by the direct and positive effects of longer summer seasons (Askew and Bowker 2018).

Although existing research on the impacts of climate change on outdoor recreation opportunities on BLM lands is sparse, the existing literature suggests participation in outdoor recreation on BLM lands will continue to increase for the foreseeable future. With temperatures rising, more and more people are likely to seek out, and engage in, outdoor recreation opportunities on lands managed by the agency. Outdoor recreation opportunities on BLM lands

already make a notable contribution to the nation's economy; the Department of Interior estimates the direct economic contribution at over 3.33 billion USD (U.S. Department of the Interior, Office of Policy Analysis 2018). Between 2015 and 2017, the total economic contribution of outdoor recreation opportunities provided by BLM lands grew by 12%; by comparison the total economic contribution of oil, gas and coal over the same period grew by only 3% (U.S. Department of the Interior, Office of Policy Analysis 2016, 2018). While increased recreational pressures may exacerbate conflicts with other uses for which BLM manages, including conservation and cultural/historical preservation, increased revenues derived from recreation on BLM lands could potentially offset future declines in revenues from extraction of fossil fuels and minerals.

Other BLM land uses likely to be impacted by climate change

Climate change impacts on cultural and historical values of BLM resources are very seldom discussed in the literature. However, climate change poses a threat to cultural and historic values in two main ways, through damaging historic sites and altering traditional ways of life. First, increased disturbance due to climate change, such as floods and wildfire, have the potential to irreversibly damage historic sites. Second, the lifestyles and traditions of many Native American communities are likely to be threatened by climate change. For example, traditional foods may be affected by climate change through habitat alterations and changes in the abundance and distribution of species, which often results in the erosion of traditional practices and knowledge (Warziniack et al. 2018). Additionally, there may be accelerated loss of natural characteristics of cultural and spiritual significance. Furthermore, adaptive capacity is low, suggesting that such traditions and ways of life will be challenging to preserve.

Of the 225 articles coded in our systematic literature review, there was no mention of wild horses and burros in relation to climate change. Despite the lack of peer-reviewed literature on this topic, the effects of climate change on these species may be expected to be similar to that of livestock and grazing. That is, rangeland productivity may increase overall across the IMW, suggesting a potential benefit to wild horses and burros. As these species are largely considered to be nuisances with negative environmental impacts, a potential increase may exacerbate conflicts with other uses, including conservation and recreation.

Climate change is expected to profoundly influence the spatial and temporal patterns of drought, wildfire and invasive species distributions, all of which may impact forest health and, therefore, timber harvest operations. While the literature seldom discusses direct linkages between climate change and timber harvest, numerous papers document recent and future predicted shifts in tree species viability (Buma and Wessman 2013, Hansen and Phillips 2015, Iglesias et al. 2015, Yang et al. 2015, Shinneman et al. 2016, Stevens- Rumann et al. 2018), increased frequency and severity of wildfire (Wu et al. 2011, Macfarlane et al. 2013) and increased spread of invasive pests and diseases (Embrey et al. 2012, Weed et al. 2013, Shanahan et al. 2016, Halofsky et al. 2017, Warziniack et al. 2018). Increases in temperatures and CO_2 could result in increased forest productivity and biomass accumulation, resulting in greater timber productions at higher elevations (Halofksy et al. 2017). However, long-term decreases in moisture availability and increased disturbances will likely reduce forest growth and reproduction at low elevations, and potentially shift the ranges of important timber species (Halofksy et al. 2017, Parmenter et al. 2018). Warmer winters and a shift to more rain-dominated systems may increase forest road erosion and landslides, making winter harvest more expensive, and ultimately reducing the timer supply (Halofsky et al. 2017). These additional uncertainties,

limitations, and costs represent formidable challenges for the already diminished timber industry in the IMW.

8. How is BLM planning for climate and environmental change?

Of 44 total plans, only 17 mentioned climate change in any capacity (Table S3, Appendix I). In general, references to climate change are vague, with very few specific predicted impacts or management considerations. There are a few exceptions, such as plans developed by the Tres Rios, Dominguez-Escalante, Lakeview, Burns, John Day and Vale offices. Tres Rios, for instance, directly links climate change and extreme weather with increased outbreaks of insects and diseases threatening vegetation, habitat loss for wildlife, aspen decline, threats to riparian vegetation, drought, and biodiversity loss.

Furthermore, plans very rarely examine the impacts of GHGs, climate change, or poor air quality and focus instead on monitoring or minimizing fugitive emissions from BLM land. For example, the Tres Rios plan directly links GHGs with energy extraction stating, "greenhouse gases should not be vented from existing wells and should achieve at least 95% emission reduction." While other plans may mention GHGs, they do not typically link production of GHGs with specific land uses, nor do they offer specific rules or regulations. Similarly, the Socorro, New Mexico plan mentions GHGs but states: "It is not possible at this time to predict with any certainty the local or regional effects of this RMP's proposed actions on climate," (pg. 10). This statement is striking for two reasons: 1) it complies with the 2001 mandate "to consider" climate change but completely abstains from taking actionable responsibility and 2)

when the plans do mention climate change the emphasis is on mitigation rather than adapting to climate change. In any case, sections 5 and 6 describe myriad impacts of greenhouse gas emissions, with many other impacts predicted globally. Impacts that can be directly attributed to BLM lands could reasonably be estimated as the proportion of emissions from BLM-derived fossil fuels relative to total global emissions. While it is beyond the scope of this review to put a dollar value on those impacts, a large and growing literature is working to quantify the social cost of greenhouse gas emissions (Nordhaus 2017, Havranek et al. 2015, Yang et al. 2018).

Almost none of the plans actually discuss BLM efforts to adapt to climate change impacts. The John Day field office plan is one of the very few exceptions (Table 5) listing specific actions that could minimize the impact of climate change on sage grouse.

Of those that do consider the impact of climate change on BLM lands and uses, the most commonly discussed were wild horses/burros, domestic or wildlife grazing, and energy development and extraction. The Price, Utah plan, for instance, discusses grazing in relation to climate variation:

> "During times when extreme climatic conditions exist, the BLM will manage and adjust grazing practices to maintain and work toward meeting Standards for Rangeland Health for Public Lands in the PFO, see Appendix R-7" (pg. 99, emphasis added).

However, since extreme climatic conditions exist without anthropogenic climate change, this statement does not necessarily endorse the reality of climate change or the need for adaptation strategies.

We evaluated BLM RMPs because those are the legally binding documents that govern all BLM management actions under FLPMA. While we found very few mentions of climate change and adaptation strategies, it is possible that BLM is able to adapt to climate change to some extent using the management practices and philosophies described in the plans, while not

explicitly linking them to climate change. For example, field offices generally reserve the ability to increase or decrease grazing densities according to forage availability and conflicts with other uses, both of which may change under future climate regimes. In other cases, by excluding consideration of climate change in some plans BLM may be setting themselves up for failure. For example, several BLM plans establish a principle of no net loss of sage brush, which may not be feasible in some regions under future climates. It is also possible that BLM is attempting to adapt management for climate change using other mechanisms, such as the Rapid Ecoregional Assessments (https://landscape.blm.gov/geoportal/catalog/REAs/REAs.page). However, given that FLPMA requires management actions to be articulated in the RMPs, it is unclear if or how new or different management needs that emerge from the REAs could be implemented under existing RMPs. Lastly, we acknowledge the development and approval process for RMPs takes a considerable amount of time, often requiring 6 to 10 years. While the 17-year time period for which we analyzed plans should have been sufficiently long for most plans to have explicitly included consideration of climate change, some of the plans may have been too far along in the process to be modified when the 2001 mandate was issued. In any case, the time consuming and arduous task of developing and modifying RMPs calls into question whether the existing RMP framework is appropriate for adaptive management that will clearly be needed in the future.

Table 5. All references to climate change in BLM Resource Management Plans.

Plan	Year	Reference to Climate Change
Taos, NM	2012	Identify potential GHG sources and sinks
John Day Basin, OR	2012	Discusses impact of climate change on: changes in wintering elk; sage-grouse population and habitats (and possible listing of sage-grouse); rangeland vegetation. Discusses monitoring and adaptation for sage-grouse and rangeland vegetation
Carson City, NV	2001	Monitoring and adjusting livestock and wild horse numbers to adjust to "trends in… climatic data"
Winnemucca District, NV	2015	Monitor forest health/disease (whitebark pine) early warnings to respond to climate change
Socorro, NM	2010	Discusses GHGs and vulnerability of federal land to "wide range of effects from climate change, some of which are already occurring" but doesn't specify and claims it's impossible to predict "RMP's proposed actions on climate"
Price, UT	2008	Adjust grazing practices due to "extreme climatic conditions"
Vernal, UT	2008	Found in references but not plan
Canyons of The Ancients, CO	2010	Require use of green mobile well completion equipment for oil and gas wells to "prevent venting of saleable gas and other air pollutants"; Also in references
Colorado River Valley, CO	2015	Reduce GHG emissions associated with construction and industrial activities
Grand Junction, CO	2015	"Minimize emissions, within the scope of BLM's authority; protect watershed health impacts from "climate variability"
Tres Rios, CO	2015	Associates climate change with extreme weather, insects/diseases, habitat loss, aspen decline, threats to riparian vegetation, drought, and biodiversity loss; Links GHGs with energy extraction specifies required reductions
Dominguez-Escalante National Conservation Area	2017	Discusses climate trends as impetus for new RMP; require oil and gas activities to submit comprehensive inventory of anticipated direct and indirect GHG emissions
Lakeview, OR	2003	Mentions "climate-driven stresses" in management objectives of "Late-Successional Reserve," specifically mentioning wildfires and spotted owl recovery
Burns District Office, OR	2005	Climate change has negative effect on soil crusts, also discusses climate change contributing to increasing wildfire severity that threatens riparian vegetation resilient to climate variation
Vale Field Office, OR	2002	Mentions "climatic data" in regards to wild horses and domestic grazing [ten mile seeding project], and vegetation management
Cody, WY	2015	Discusses paleoclimate change; mentions "both natural and anthropogenic" GHGs

9. Implications of climate change for multiple use management of BLM land

Although natural resource managers are concerned about climate change, many are unable to adequately plan for it (Daniels and Walker 2012, Murphy et al. 2015, Wyborn et al. 2015). Challenges for multiple use public land management in a changing climate include disconnects between managers and academic researchers (Lane 2001), 'siloing' of disciplinary scientific knowledge (Flint 2007, Howarth and Monasterolo 2017), lack of awareness or inability to implement management changes based on current scientific knowledge (van Riper et al. 2012, Cheng and Randall-Parker 2017), lack of clarity over different management mandates (Hardy Vincent, Hanson, and Argueta 2017), conflicts inherent in the management of multiple uses of public land (Cuba et al. 2014, Fleming et al. 2015, Oppio et al. 2015, Rudestam 2014, Wulfhorst et al. 2006, Wilson 1997), and the general uncertainty of climate change at spatial and temporal scales relevant to management (Wyborn et al. 2015). Furthermore, the lack of social drivers and/or social change into modeling efforts and general lack of consideration of social outcomes of management decision making constrains management (Beckage et al. 2018, Givens et al. 2018).

The BLM's mandate is "to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations" ("About," 2016). Although the BLM is effectively the nation's largest landlord (Skillen 2009), this mandate has proven to be difficult to enforce as there is no guidance on how to prioritize different uses when the uses either conflict with one another or threaten the health, diversity or productivity of the public lands (Hardy Vincent, Hanson, and Argueta 2017). Furthermore, BLM field offices have to consider all secretarial orders, congressional mandates and executive orders that apply to federal lands managed by the BLM, as well as work with state and county officials (Ross 2006). This results in the BLM struggling to comply with many different mandates, which opens the BLM to

lawsuits and litigation. For instance, in the past year the BLM has been sued in Wyoming, Colorado and Utah for failing to incorporate climate change into its oil and gas leasing process (Kohler 2019, Passut 2019, Randall 2019).

Although the BLM has historically resisted action that would detract from its "flexibility" in decision-making (Glicksman and Coggins 2001), in 2014 the agency recognized the need for more science in their planning due in part to climate change, and attempted to implement that change among others in 2016. Although the BLM Implementation Strategy asserts there are "numerous examples [of specific project and field offices]… in which the BLM is effectively embracing science-land management integration," these authors assert more consistent practice throughout the BLM is needed in order to be more consistently effective as an organization in the future (Schadegg 2017). Towards this effort, the BLM finalized an attempt to reform their planning processes, the Resource Management Planning Rule, in 2016. This rule was intended to increase the amount of science incorporated into BLM management.

However, in 2017, the US Congress utilized the oversight authority granted to them via the 1996 Congressional Review Act to repeal the BLM's attempt to improve their own planning process (McEnany 2017). On March 27th, 2017 when President Trump signed the joint resolution overturning the Resource Management Planning Rule, former Interior Secretary Zinke issued a memo to the BLM indicating the BLM should instead increase the flexibility of the agency to operate at state or local scales in order to reduce litigation and actually reduce "duplicative and disproportionate [scientific] analyses" (Zinke 2017). Contrary to those findings, our results suggest that, at least in the context of climate change, more explicit incorporation of science is indeed necessary for effective natural resource management in a climate change-affected future.

The science-management gap identified in our study is problematic, as our results support previous findings that climate change will likely increase land use conflicts (Johnson and Becker 2015) and that most human land uses and/or values are fundamentally threatened by climate change (Chambers and Wisdom 2009). In particular, passive uses are under-prioritized by the BLM due to an institutional focus on active and anthropocentric uses (Loomis 2002). Several studies indicate these passive uses need greater consideration (Beschta et al. 2013, Koontz and Bodine 2008).

10. Management Recommendations

While the US government has thus far failed to develop a comprehensive policy on climate mitigation or adaptation, public land management agencies acknowledge the imperative. In a survey of BLM and US Forest Service (USFS) managers, the vast majority of respondents thought climate change science was useful for their work (90%), for future planning efforts (97%), and for specific management projects (80%), and a large majority (80%) agreed strongly that using climate change science is within their job description or responsibilities (Kemp et al. 2015). In 2008, the USFS, which also manages public lands for multiple uses, asserted that "without fully integrating consideration of climate change impacts into planning and actions, the Forest Service can no longer fulfill its mission" (Dillard et al. 2008). Although both the BLM Resource Management Plans and academic literature emphasize the uncertainty of climate change and the need for more research, the literature offers some explicit management recommendations that may benefit BLM.

Climate Refugia

Many articles, particularly those regarding wildlife, suggested protecting climate refugia as a way to manage conservation under climate change. Climate refugia are areas that are buffered from the effects of climate change, and are thus valued as habitat for many threatened species. Such areas include locations with cold-air pooling, valley bottoms, gorges, north-facing aspects and riparian corridors (Beever et al. 2016, Curtis et al. 2014). Beever et al. (2016) identified Craters of the Moon National Monument in Idaho as a potential refugia for pika, for example. Similarly, Isaak et al. (2015) identified cold-water habitat in Idaho that is projected to remain so in 2080 as potential refugia for salmonids. Additionally, Friggens and Finch (2015) determined that the land around Elephant Butte and Caballo reservoirs in New Mexico, much of which is BLM land, are important climate refugia for several bird species. BLM may consider placing higher protective status on areas that serve as climate refugia.

Adaptive Grazing and Restoration

Specific management recommendations regarding grazing were focused on limiting the effects of grazing on other land uses, rather than adapting to climate change. Such recommendations include shorter grazing periods, long post-grazing recovery and rest periods, as well as enclosures to keep livestock out of sensitive areas (Halofsky et al. 2017). To adapt to increasing wildfire potential, a common recommendation was to use prescribed burns and mechanical thinning to decrease the fuel load (Halofsky et al. 2017), which would both protect ecosystem services provided by forests and grasslands, as well as timber and logging activities.

There are several recommendations for managing vegetation under climate change. First, to restore and revegetate landscapes, one recommendation is to plant drought-tolerant species (Halofsky et al. 2017). Another recommendation is to use climate forecasts to determine when and where planting is most likely to result in successful seedling establishment (Copeland et al.

2017). A more novel approach is to increase species and genetic diversity through plantings, which could increase resilience to climate change (Halofsky et al. 2017).

Protecting Cultural Values

Warziniack et al. (2018) provides suggestions for maintaining cultural values under climate change. First, they recommend increasing resources for law enforcement and preservation of cultural sites to mitigate expected damage. They also suggest using traditional ecological knowledge, which has helped tribes adapt to ecological change in the past. Additionally, Warziniack et al. recommend the use of vegetation management near high-risk cultural and historic sites to combat fire, floods, erosion and the establishment of non-native species.

11. Improving communications in the science-management-policy nexus

Our research demonstrates a wealth of literature regarding climate change impacts in the IMW. Yet, the stark disparity between the literature and management plans highlights a disconnect between academics, managers and policymakers. To bridge this gap, scientists need to make their research more accessible and could make greater efforts to include more explicit and thorough management recommendations. At the same time, managers and policymakers need to make stronger efforts to access and more fully incorporate information from the scientific community. Here, we have provided a synthesis of the science from over 200 articles, which can be used as a starting point for managers to incorporate climate change science into their land management planning. Furthermore, the data collected for this project provides a list of DOIs for all the literature outlined here (available on Hydroshare), which can facilitate the incorporation of such science into management practices and plans. But fundamentally

improving communication within the science-management-policy nexus will require realignment of incentives in academia, management agencies and funding agencies to acknowledge the value of more meaningful interactions.

12. Permitting extraction of fossil fuels on BLM land

Of all the potential management implications of this research, the obvious, paradoxical problem is the continued extraction of fossils fuels on land managed by the BLM. Based on Secretarial Order 3226 (2001), the BLM needed to consider contributing to climate change in their land management plans, although this requirement was revoked in 2017. As noted in our analysis of BLM land management plans, some field offices did restrict extraction of fossil fuels, as these activities inevitably contribute to anthropogenic climate change. However, due to the way FLPMA was written, the BLM also has to manage for legacy land uses, including energy extraction (Ellenwood et al. 2012). Thus, in the context of anthropogenic climate change, energy extraction on BLM land represents a fundamental management conundrum.

Under current rules, the BLM will continue to permit energy extractions, and yet, of all the land uses the BLM manages for, energy extraction contributes the most directly to anthropogenic climate change. Our results highlight some of the major implications of climate change for multiple use management of BLM land, and our recommendations reflect those implications. However, the most direct way the BLM can reduce their contribution to climate change is by reducing permits for energy extraction on BLM land. This reality is reflected by several lawsuits brought against the BLM recently for allowing energy extraction without considering how such actions could contribute to climate change (e.g., Kohler 2019, Passut 2019, Randall 2019). Dealing with these lawsuits is challenging for the BLM, but due to current

management guidelines, the BLM may also face lawsuits from oil and gas companies if they restrict energy extraction. Thus, without major rule changes such as those prosed by the BLM's "Planning 2.0," which congress repealed in 2017, the BLM appears to lack the ability to rectify this issue (McEnaney 2017).

13. Conclusions

Through a systematic review of peer-reviewed literature and analysis of BLM management plans, we have found climate change is likely to negatively impact conservation, ecosystem services, cultural values, timber and logging, energy development, and mining on BLM land. Conversely, recreation and grazing will likely be unaffected or may in some respects be positively affected. The most common theme in the literature was the finding that more active uses of BLM land threaten more passive uses, and climate change is expected to exacerbate these threats in numerous ways. Management should aim to consider the interactions of these land uses in the context of climate change. The BLM will also need to consider both how climate change will affect public land, as well as how the management of public land potentially contributes to climate change. These findings are consistent with the BLM's own findings (Kitchell et al. 2015). However, our research demonstrates there is a lack of: 1) explicit climate change management in BLM plans, 2) a clear directive of land uses and priorities in land use plans, and 3) science on climate change impacts on land uses. This absence may be due in part to our finding that truly interdisciplinary research on climate change is lacking, which may be impeding managers' ability to effectively manage multiple land uses under climate change.

Our study bridges the gap between public land managers and the academic community by identifying what has been identified in the academic literature regarding climate change and comparing it to BLM management plans. Our results detail the existing gaps in the current

literature regarding impacts of climate change on multiple uses of BLM lands in the IMW, as well as a lack of consideration of climate change in BLM management plans. Based on these findings, our research provides actionable management implications for public land agencies to adapt to future environments shaped by climate change.

We also recommend researchers studying the effects of climate change make a more robust effort to understand the reality of public land management in order to communicate their findings effectively. To this end we hope that editors and reviewers strongly encourage a more robust description of 'management implications' when accepting articles regarding climate change that pertain to public land managers. Towards this end we have attempted to disclose some of the challenges currently faced by the BLM in managing for climate change. Currently, the rules and guidelines that dictate how the BLM manages public land do not provide adequate direction on how to manage for climate change. Thus, these results support the BLM Advancing Science Integration Strategy Team's recommendations of "incorporating best available science" and the agency's recent efforts to modernize their own planning guidelines.

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16. Appendix I: Supplementary Tables and Figures

Table S1. Terms used in Scopus searches to identify articles that contained *both* a climate change and IMW identifier in the title, abstract, or keywords.

Climate Change	Intermountain West		
Climat*	Great Basin	*Mountain West	Oregon
Global Warming	Colorado Plateau	Arizona	Washington
Temperature Change	Rocky Mountains	Colorado	Wyoming
Environmental Change	Sagebrush Steppe	Idaho	Utah
Extreme event	Greater Yellowstone	Montana	western US
	Bureau of Land Management	Nevada	western United States
	BLM	New Mexico	

Table S2. Terms used to identify climate change in the BLM resource management plans.

Climate Change Identifiers
Climate
Warming
Greenhouse gas
Weather
Extreme
Global
IPCC
GHG

Table S3. The 44 BLM Resource Management Plans analyzed for climate change references.

Plan ID	Region	Field Office	Year
NMF01000	Arizona/New Mexico Plateau	Farmington	2003
NMF02000	Arizona/New Mexico Plateau	Taos	2012
ORP06000	Blue Mountains	Prineville Deschutes	2005
ORP04000	Blue Mountains	John Day Basin	2012
NVC01000	Central Basin and Range	Stillwater	2001
NVW03000	Central Basin and Range	Black Rock	2005
CAN05000	Central Basin and Range	Eagle Lake	2008
NVL00000	Central Basin and Range	Ely	2008
UTC02000	Central Basin and Range	Richfield	2008
NVW00000	Central Basin and Range	Winnemucca	2015
NMA02000	Chihuahuan Deserts	Socorro	2010
IDC02000	Columbia Plateau	Cottonwood	2009
UTC04000	Colorado Plateaus	Kanab	2008
UTY01000	Colorado Plateaus	Moab	2008
UTY02000	Colorado Plateaus	Monticello	2008
UTG02000	Colorado Plateaus	Price	2008
UTG01000	Colorado Plateaus	Vernal	2008
COS07000	Colorado Plateaus	Canyons of the Ancients Visitor Center	2010
CON04000	Colorado Plateaus	Colorado River Valley	2015
COS08000	Colorado Plateaus	Grand Junction	2015
COS01000	Colorado Plateaus	Tres Rios	2015
COS09000	Colorado Plateaus	Dominguez-Escalante (NCA)	2017
ORL05000	Eastern Cascades Slopes and Foothills	Lakeview	2003
CAN02000	Eastern Cascades Slopes and Foothills	Alturas	2008

ORL04000	Eastern Cascades Slopes and Foothills	Lakeview Klamath Falls	2016
NVS02000	Mojave Basin and Range	Red Rock/Sloan Canyon NCA Field Office	2005
AZA00000	Mojave Basin and Range	Arizona Strip	2008
AZA03000	Mojave Basin and Range	Grand Canyon/Parashant National Monument	2008
AZA02000	Mojave Basin and Range	Vermilion Cliffs National Monument	2008
MTB05000	Middle Rockies	Dillon	2006
MTB07000	Middle Rockies	Butte	2009
ORB06000	Northern Basin and Range	Burns Andrews	2005
CAN02000	Northern Basin and Range	Surprise	2008
IDI02000	Northern Basin and Range	Pocatello	2012
IDC01000	Northern Rockies	Coeur D'alene	2007
WYP06000	Northwestern Great Plains	Casper	2007
ORV04000	Snake River Plain	Vale Malheur	2002
IDT01000	Snake River Plain	Jarbidge	2015
CON02000	Southern Rockies	Kremmling	2016
WYD09000	Wyoming Basin	Kemmerer	2003
WYD01000	Wyoming Basin	Pinedale	2008
WYD03000	Wyoming Basin	Rawlins	2008
WYR02000	Wyoming Basin	Cody	2015
CON01000	Wyoming Basin	Little Snake	2016

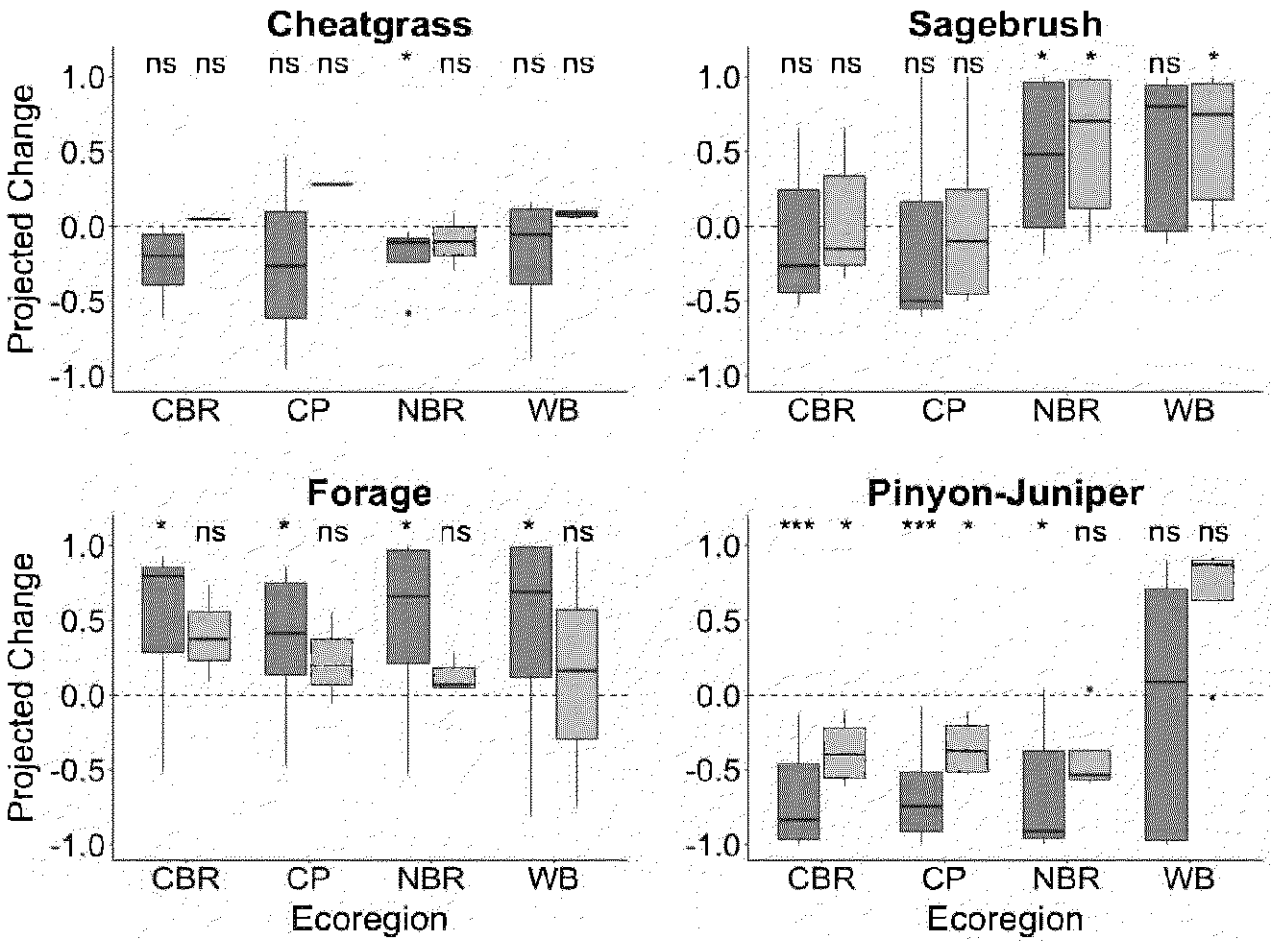

Fig. S1. Projected changes from high (red) and low emissions scenarios (blue) within ecoregions important to BLM management, with results from all model types grouped. CBR=Central Basin and Range, CP=Colorado Plateau, NBR=Northern Basin and Range, WB=Wyoming Basin. Stars denote statistical significance: *** $p < 0.01$, ** $0.01 < p < 0.05$, * $0.05 < p < 0.20$, *ns* $p > 0.20$.

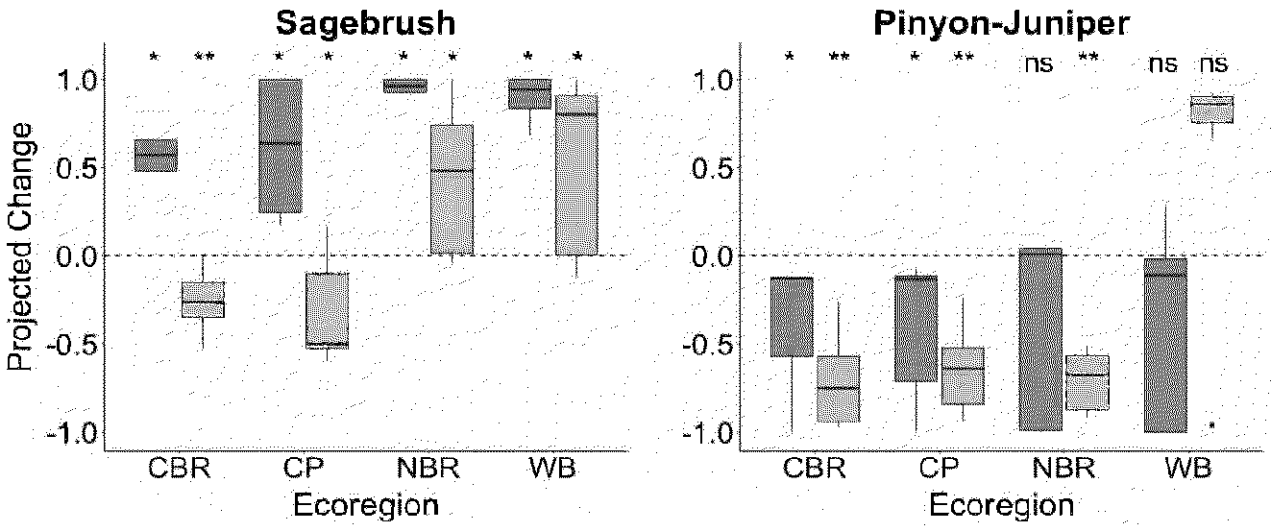

Fig. S2. Projected changes from correlations-based (blue) and process-based models (red) within ecoregions important to BLM management, with results from all emissions scenarios grouped. CBR=Central Basin and Range, CP=Colorado Plateau, NBR=Northern Basin and Range, WB=Wyoming Basin. Stars denote statistical significance: *** $p < 0.01$, ** $0.01 < p < 0.05$, * $0.05 < p < 0.20$, *ns* $p > 0.20$.

17. Appendix II: Qualtrics Coding Survey

For the following questions, please skim through the body of the text, i.e. the text starting at the introduction and going through to the conclusion (including footnotes).

DO NOT INCLUDE ABSTRACT, KEYWORDS, or REFERENCES.

Is the Intermountain West a major focus of the paper based on this map?

This could be the study area or a major area of focus

When in doubt code "yes"

Note:

- Sierra Nevada: exclude if clearly only western slope
- The Cascade Mountains are out. The IMW region begins at the eastern base of the Cascades.
- Great Plains are out, but if a location in the IMW is in the map, then code it as in the IMW (e.g. Cheyenne)
- The Rocky Mountains are in; The IMW region ends at the eastern base of the Rocky Mountains.
- For AZ, the Mogollon Rim is in the IMW. This is the border on the map.

In general, You may need to use Google Maps to clarify.

○ No (0)

○ Yes - If yes, type in the article's geography in this text box

Climate Change Instructions

Search for "climat" and look for EXPLICIT reference to climate change. This may include "climate variation," "a warming climate," "climate impacts," etc., but it must be in reference to climate change.

If nothing returns then search "warming"

Look for explicit references to a changing climate (not just climatic factors or interannual variation)

Do the authors mention *"climate change" or other climate change identifiers* anywhere in the body of the text?

- ○ No (0)
- ○ Yes (1)

Is there a significant focus on the **impacts of climate change?**

Any consequence of a changing climate, (even if vague) should be coded yes. This information can be anywhere in the body of the text, including the introduction (i.e., doesn't have to be original findings)

Fill in the text box for the climate change impacts discussed. A quote is fine.

- ○ No (0)
- ○ Yes (1) _____

FLAG climate for review!

If any of the climate questions are unclear, click this

- ☐ FLAG CLIMATE (1)

Describe flagged climate issue

Does the paper discuss **management of public lands or land uses?**

Search for the word "manage" and see if they are talking about implications for management or management efforts. Even if there is only a single phrase regarding management, code "yes" (e.g., "these results have implications for management").

If nothing on management, code no even if you think it might have implications for management

NOTE: This is not about whether or not you think the paper is relevant for managers.

Use the text box to briefly describe the management aspects of the article. A quote is fine.

○ No (0)

○ Yes (1) _____

Is the phrase "Bureau of Land Management" (or "BLM") found in the body of the text?

Search for “BLM” and “Bureau” and then read to see if it is Bureau of Land Management

This is only for the body of the text. Not the acknowledgments. If you see that BLM is mentioned in the acknowledgments in a significant way, you can write that in the notes box

○ No (0)

○ Yes (1)

Notes on BLM

_____

FLAG management/BLM for review!

If any of the management/BLM questions are unclear, click this and describe

☐ MANAGEMENT or BLM FLAG (1)

Describe flagged management or BLM issue

Are any of the following land uses found in the body of the text?
Note: LEAVE BLANK if not mentioned at all. If the land use is found only in the title of an organization/group (e.g., "Conservation Lands Foundation"*), leave blank.*

	Yes
Conservation	
Ecosystem Services	
Energy	
Grazing	
Cultural/Historical Value	
Logging/Timber	
Mining	
Recreation	
Wild and/or feral Horse/Burro	
Other	
NONE MENTIONED	

Notes on uses

Are any of the following vegetation types found in the body of the text?

	Yes
Sagebrush	
Cheatgrass	
Grasses/Forage/Grassland	
Pinyon and/or Juniper	
Forests	
Other	
NONE MENTIONED	

As briefly as possible (e.g. 1, 2 or 3 words), what is the topic of the article?

_____

How relevant is the paper to the research question:

What are the implications of climate change on the management of multiple uses on BLM land?

Use this box to describe if and how the paper is relevant to the research question:

_____

Flag for review?

Select this if you were not sure about anything in the coding or if there is something unique or problematic about the article that needs to be resolved. and you HAVEN"T flagged the article already.

Explain the reason for flagging the article:

FLAG! _____

Any other comments on this article?

_____

Exhibit 5

TWS et al, 2020 Q1 Oil and Gas Lease Comments

January 13, 2020

Bureau of Land Management
Battle Mountain District Tonopah Field Office
Attn: Melissa Jennings
1553 South Main Street; P.O. Box 911
Tonopah, NV 89049

Via: BLM's Comment Submission Form on ePlanning (https://eplanning.blm.gov/epl-front-office/eplanning/comments/commentSubmission.do?commentPeriodId=8000893)

Re: Comments on the March 2020 Oil and Gas Lease Sale Environmental Assessment (DOI-BLM-NV-B000-2020-0001-EA)

Dear Ms. Jennings,

Please accept and fully consider these comments on the parcels under consideration for inclusion in BLM Nevada's March 2020 Competitive Oil and Gas Lease Sale in the Battle Mountain District, submitted on behalf of The Wilderness Society, the Sierra Club Toiyabe Chapter and the Natural Resources Defense Council. These comments are filed in accordance with the notice BLM posted at https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=200006213 to ensure compliance with the National Environmental Policy Act (NEPA) and a related court decision. We have significant concerns with the proposed lease sale, including potential impacts to wilderness-quality lands, the leasing of federal lands unlikely to produce oil or gas, and climate impacts. Our comments detail these concerns below.

Statement of Concerns

I. The Lease Sale EA for the Battle Mountain District Does not Adequately Consider or Provide for the Protection of Lands with Wilderness Characteristics.

A. BLM should defer parcels that overlap with inventoried lands with wilderness characteristics until management decisions are made for those lands in order to comply with NEPA and FLMPA.

Lands with wilderness characteristics (LWC) are one of the resources of the public lands that must be inventoried and considered under the Federal Land Policy and Management Act (FLPMA). 43 U.S.C. § 1711(a); *see also Ore. Natural Desert Ass'n v. Bureau of Land Mgmt.*, 625 F.3d 1092, 1122 (9th Cir. 2008). Of the 45 lease parcels proposed for the March 2020 lease sale in the Battle Mountain District, 41 parcels overlap with 9 BLM-recognized LWC units covering 59,383 acres. See Exhibit 1. The BLM has not yet made management decisions in its land use plans for how these areas will be managed relative to wilderness characteristics. The Tonopah and Shoshone-Eureka Resource Management Plans (RMP) do not address lands with wilderness characteristics. LWC will be addressed in future RMP amendments. See EA at 52.

The BLM needs to check its LWC data to ensure what is presented in the EA is accurate. The Battle Mountain District LWC layer we have reviewed shows an overlap of 41 parcels, not 40 or 42. Furthermore, inconsistencies exist between the EA and EASI. The EA states that "of the 45 proposed lease parcels, 40 parcels intersect these 6 inventory units." EA at 52. Yet the EASI lists seven distinct LWC units that intersect lease cell parcels. EASI at 28-30. Another inconsistency between the two documents is the number of overlapping parcels. The EA states that 40 lease sale parcels intersect LWC units. EA at 52. This contradicts the 42 distinct parcels listed on pages 28-30 of the EASI. This needs to be clarified and corrected.

We greatly appreciate that BLM has completed an inventory of LWC in the Battle Mountain District consistent with FLPMA and agency policy. EA at 51. However, BLM must preserve its ability to decide whether and how to protectively manage those newly inventoried wilderness resources in a public planning process. Such decisions could be foreclosed by leasing those lands to the oil and gas industry at this time. Unfortunately, the BLM states in the EA that the Tonopah and Shoshone-Eureka RMPs do not address LWC, and this will be addressed in future RMP amendments, and therefore "[i]n the interim the District will manage lands with wilderness characteristics for multiple use." EA at 52. That is, despite having completed an inventory finding these lands are LWC, the BLM has no current plans to recognize wilderness values and will manage the lands under a general multiple use mandate that may not recognize the wilderness values of these lands. BLM should defer all leases in inventoried LWC until the agency has the opportunity to make management decisions for those areas through a public planning process.

It is well within BLM's authority to defer nominated parcels from lease sales. Neither the Mineral Leasing Act (MLA), FLPMA, nor any other statutory mandate requires that BLM must offer public lands and minerals for oil and gas leasing solely because they are nominated for such use, even if those lands are allocated as available to leasing in the governing land use plan. The Tenth Circuit Court of Appeals confirmed this discretion in *New Mexico ex rel. Richardson*, when it stated, "[i]f the agency wishes to allow oil and gas leasing in the plan area it must undertake additional analysis…but it retains the option of ceasing such proceedings entirely". 565 F.3d 683, 698 (10th Cir. 2009).

BLM regularly exercises this discretion to defer parcels in inventoried LWC for which the agency has not yet made management decisions. For example, the Grand Junction Field Office deferred lease parcels from its December 2017 lease sale in areas that BLM recently inventoried and found to have wilderness characteristics. BLM stated: "Portions of the following parcels were deferred due to having lands with wilderness characteristics that require further evaluation." DOI-BLM-CO-N050-2017-0051-DNA, p. 1. The Grand Junction Field Office completed its RMP revision in 2015 but still determined that it is inappropriate to lease areas that have been inventoried and found to possess wilderness characteristics since the RMP was completed in order to allow the agency to consider management options for those wilderness resources.

BLM Nevada should similarly defer leasing in inventoried LWC for which management decisions have not been made in the Battle Mountain District. This approach is consistent with agency policy and authority and is critical to preserving BLM's ability to make management decisions for those wilderness resources through a public planning process.

BLM has not evaluated a reasonable range of alternatives for protecting the wilderness characteristics of parcels in the Battle Mountain District. In fact. BLM has stated that while LWC is present it will not be affected. EA at 20. Under NEPA, BLM must consider a broad range of alternatives to mitigate environmental impacts. 40 C.F.R. § 1502.14(a); *see also Theodore Roosevelt Conservation P'ship v. Salazar*, 661 F.3d 66, 72-73 (D.C. Cir. 2011) (requiring BLM to consider a reasonable range of alternatives for oil and gas activity). Additionally, under current policies, BLM must fully "consider" wilderness characteristics during planning actions and evaluate a range of measures to protect wilderness characteristics during the leasing process, including measures not contained in existing RMPs. *See* Instruction Memorandum (IM) 2011-154 at Att. 2; IM 2010-117 at III. E., F. 9.

A "rule of reason" is used to determine if an adequate range of alternatives have been considered; this rule is governed by two guideposts: (1) the agency's statutory mandates; and (2) the objectives for the project. *New Mexico ex rel. Richardson*, 565 F.3d at 709. Here, there is no doubt that BLM's legal mandates under FLPMA and NEPA require it to fully consider the protection of wilderness values. Additionally, under IM 2010-117, which was largely reinstated by the decision in *Western Watersheds Project v. Zinke*, 336 F. Supp. 3d 1204 (D. Idaho 2018) the agency must treat the protection of other important resources and values as an equally important objective to leasing.

Yet, in the Battle Mountain District EA, the BLM has failed to evaluate an adequate range of alternatives that would protect the wilderness characteristics of parcels in the Battle Mountain District from the impacts of the lease sale. Such alternatives include offering the parcels with no surface occupancy (NSO) stipulations or deferring the parcels. Because the BLM has not considered those alternatives or additional alternatives to protect the wilderness characteristics of the proposed parcels, it must defer the parcels from the lease sale.

II. BLM has failed to consider a reasonable range of alternatives.

NEPA generally requires the lead agency for a given project to "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(2)(E). For EISs, this requires the agency to "rigorously explore and objectively evaluate all reasonable alternatives" including those "reasonable alternatives not within the jurisdiction of the lead agency," so as to "provid[e] a clear basis for choice among the options." 40 C.F.R. § 1502.14 (referring to the alternatives analysis as the "heart" of an EIS"). NEPA "requires that alternatives . . . be given full and meaningful consideration" for EAs as well. *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1245 (9th Cir. 2005) (citing *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1229 (9th Cir. 1988)); *see also Davis v. Mineta*, 302 F.3d 1104, 1120 (10th Cir. 2002).

The range of alternatives is the heart of a NEPA document because "[w]ithout substantive, comparative environmental impact information regarding other possible courses of action, the ability of [a NEPA analysis] to inform agency deliberation and facilitate public involvement would be greatly degraded." *New Mexico ex rel. Richardson v. BLM,* 565 F.3d at 708. That

analysis must cover a reasonable range of alternatives so that an agency can make an informed choice from the spectrum of reasonable options. Here, BLM is evaluating only two options: the proposed action (leasing all of the nominated parcels) and a no action alternative. An EA offering a choice between leasing every proposed parcel, and leasing nothing at all, does not present a reasonable range of alternatives. *See TWS v. Wisely*, 524 F. Supp. 2d 1285, 1312 (D. Colo. 2007) (BLM violated NEPA by failing to consider "middle ground compromise between the absolutism of the outright leasing and no action alternatives"); *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 813 (9th Cir. 1999) (NEPA analysis failed to consider reasonable range of alternatives where it "considered only a no action alternative along with two virtually identical alternatives").

A. Lands with Wilderness Characteristics

In this lease sale the BLM is proposing to sell 41 parcels that overlap with 9 Lands With Wilderness Characteristics (LWC) units that cover 59,383 acres. The BLM should consider not leasing or at least deferring leasing in these areas, or at a minimum, leasing the parcels with an NSO stipulation.

Even if lands at issue here are open for leasing under the governing RMP, it would be entirely reasonable and consistent with its obligations under FLPMA and NEPA for BLM to consider deferring parcels that have important wilderness resources and/or other resources. Moreover, to the extent certain parcels have only low potential for development, the alternative of deferring them appears even more reasonable. These options have never been analyzed.

B. Parcels with Low to Very Low Potential

Leases in low potential areas generate minimal to no revenue but can carry significant cost in terms of resource use conflicts. Leases in low potential areas are most likely to be sold at or near the minimum bid of $2/acre, or non-competitively, and they are least likely to actually produce oil or gas and generate royalties.[1] This has proved to be true in Nevada, where federal oil and gas lease sales have generated just $0.31 per acre offered in bonus bids over the past 3 years, compared to other western states which generate hundreds or even thousands of dollars per acre offered. BLM must consider alternatives that account for and reflect the development potential of proposed leases. *See Wilderness Workshop v. BLM*, 342 F. Supp. 3d 1145, 1165 (D. Colo. 2018) (requiring consideration of development potential when developing the range of alternatives for oil and gas decisions). Such alternatives include excluding leases with low potential that also overlap with LWCs, sage-grouse habitat, and other important resources.

Nevada[2]	Acres	Bonus Bids

[1] Center for Western Priorities, "A Fair Share" ("Oil Companies Can Obtain an Acre of Public Land for Less than the Price of a Big Mac. The minimum bid required to obtain public lands at oil and gas auctions stands at $2.00 per acre, an amount that has not been increased in decades. In 2014, oil companies obtained nearly 100,000 acres in Western states for only $2.00 per acre. . . Oil companies are sitting on nearly 22 million acres of American lands without producing oil and gas from them. It only costs $1.50 per year to keep public lands idle, which provides little incentive to generate oil and gas or avoid land speculation.").

[2] All data obtained from BLM (https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/regional-lease-sales/nevada) and EnergyNet (https://www.energynet.com/govt_listing.pl).

Mar. 2015	25,882	$30,496
June 2015	256,875	$0
Dec. 2015	3,641	$0
Mar. 2016	50,416	$0
June 2016	74,661	$24,740
Mar 2017	115,970	$74,780
June 2017	195,614	$29,440
Sept. 2017	3,680	$33,120
Dec. 2017	388,967	$66,978
Mar. 2018	67,791	$121,146
June 2018	313,715	$139,896
Sept. 2018	295,174	$0
Dec. 2018	32,924	$7,866
July 2019	389,176	$132,679
Sept. 2019	32,342	$23,532
Oct. 2019	269,184	$19,054
Nov. 2019	111,420	$7,950
Dec. 2019	268,052	$150,443
Total	**2,895,484**	**$862,120 ($0.30/acre)**

Failing to consider alternatives that would protect other public lands resources from oil and gas development also violates FLPMA. Considering only one alternative in which BLM would offer all nominated oil and gas lease parcels for sale, as is proposed here, regardless of other values present on these public lands that could be harmed by oil and gas development, would indicate a preference for oil and gas leasing and development over other multiple uses. Such an approach violates the agency's multiple use and sustained yield mandate. *See* 43 U.S.C. § 1732(a).

III. Facilitating speculative leasing is inconsistent with the MLA and FLPMA.

The MLA is structured to facilitate the actual production of federal minerals, and thus its faithful application should discourage leasing of low potential lands. BLM's March 2020 lease sale would violate this core principle in three ways: (1) the sale continues a long-extant trend of leasing lands with little or no potential for productive mineral development; (2) as a result, the sale encourages speculative, noncompetitive leasing, which creates administrative waste, not oil and gas production; and (3) it would destroy important option values by hamstringing decisional flexibility in future management.

A. The March 2020 sale would violate the MLA's core purpose by offering land with low mineral potential.

The MLA directs BLM to hold periodic oil and gas lease sales for "lands…which are known or believed to contain oil or gas deposits…" 30 U.S.C. § 226(a). The Interior Department has, through its internal administrative review body, recognized this mandate. *See Vessels Coal Gas, Inc.*, 175 IBLA 8, 25 (2008) ("It is well-settled under the MLA that competitive leasing is to be based upon reasonable assurance of an existing mineral deposit.") Here, BLM has provided no

evidence that the proposed parcels contain oil or gas deposits, as the MLA requires. *See* 30 U.S.C. § 226(a). Based on the pattern of lease sales in Nevada over the past three years, there is evidence to the contrary – that the lands encompassed by the parcels generally lack oil and gas resources. In fact, in the EA, BLM acknowledges that future drilling outside of limited areas not implicated by this sale "would be highly speculative..." EASI at 26.

The Reasonably Foreseeable Development Scenario (RFD) referenced in the EA substantiates this point.

> As of March 2019 there are 165 authorized oil and gas leases in Battle Mountain District. Since 1907, roughly 770 oil and gas wells had been drilled in Nevada, though there are just 96 active wells at the time of this EA.
>
> Shale Oil contains significant crude oil and may be used as a source of petroleum. The potential within the Analysis Area is low in the short term and probably low to moderate in the long term.

EA at 54. Furthermore, all 45 parcels are in areas with low to very low potential for development and in areas where little to no actual oil and gas development has occurred in the last decade or more. BLM has stated that "Parcels with low to very low potential are again assumed to have no production." EA at 30.

BLM Nevada is currently spending an excessive amount of time and resources evaluating oil and gas leases that industry is either not bidding on or will likely never develop. Over the past 3 years, BLM has sold less than 10% of the acres it has offered for sale in Nevada, compared with other western states, which are generally selling 70% or more.[3] Multiple lease sales have garnered zero competitive bids.

Sale	Parcels (sold / offered)	Acres (sold / offered)
Mar. 2015	13 / 24	15,244 / 25,882
June 2015	0 / 124	0 / 256,875
Dec. 2015	0 / 3	0 / 3,641
Mar. 2016	0 / 39	0 / 50,416
June 2016	4 / 42	3,765 / 74,661
Mar 2017	20 / 67	35,502 / 115,970
June 2017	3 / 106	5,760 / 195,614
Sept. 2017	3 / 3	3,680 / 3,680
Dec. 2017	17 / 208	33,483 / 388,697
Mar. 2018	11 / 40	19,432 / 69,691
June 2018	22 / 166	38,579 / 313,715
Sept. 2018	0 / 144	0 / 295,174
Dec. 2018	2 / 17	3,392 / 32,924
July 2019	11 / 200	22,352 / 389,176

[3] All data obtained from BLM (https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/regional-lease-sales/nevada) and EnergyNet (https://www.energynet.com/govt_listing.pl).

Sept. 2019	6 / 28	9,164 / 32,342
Oct. 2019	10 / 141	19,052 / 269,184
Nov. 2019	2 / 48	3,974 / 111,420
Dec. 2019	6 / 156	13,217 / 268,052
Total	**130 / 1,556 (8.4%)**	**226,596 / 2,897,114 (7.8%)**

Recently, The Wilderness Society and the Center for Western Priorities developed a report, *America's Public Lands Giveaway*, documenting this trend. That report can be found at https://westernpriorities.org/2019/09/19/story-map-americas-public-lands-giveaway/a and will be referred to as Exhibit 2 and is attached hereto and incorporated herein by this reference. As the first table in Exhibit 2 shows, of the 827,651 acres that have been offered for lease in Nevada as of August 2019, only 114,339 acres were sold competitively for the minimum bid ($2.00 per acre) and 526,178 acres had to be leased noncompetitively with no bid, at the minimum rental rate of $1.50 per acre. This means 77% of the leases were leased for $2.00 per acre or less. And as the second table in Exhibit 2 shows, 803,454 acres out of the total of 827,651 acres leased, or 97 percent, are sitting idle with no activity on them. This pattern underscores just how inefficient and wasteful the oil and gas program in Nevada has become, and also demonstrates that BLM Nevada's oil and gas leasing program is inconsistent with the direction set forth in the MLA.

Additionally, BLM in its March 2020 EA violates NEPA because it failed to consider a reasonable range of alternatives by omitting any option that would meaningfully limit leasing and development. *Wilderness Workshop v. U.S. Bureau of Land Mgmt*, 342 F. Supp. 3d 1145, 1167 (D. Colo. 2018). In that case, conservation group plaintiffs argued that BLM should have considered "an alternative eliminating oil and gas leasing in areas determined to have only moderate or low potential for oil and gas development." *Id.* at 1166. The court agreed, finding that BLM did not closely study an alternative that closes low and medium potential lands when it admits there is an exceedingly small chance of them being leased. This alternative would be "significantly distinguishable" because it would allow BLM to consider other uses for that land. *Id.* at 1167, *citing New Mexico ex rel. Richardson v. Bureau of Land Mgmt.*, 565 F.3d at 708-09. Thus, the court held that BLM's failure to consider reasonable alternatives violated NEPA. *Id.* at 1167.

B. The March 2020 lease sale would encourage noncompetitive, speculative leasing.

Besides being wasteful and contrary to the MLA's purpose, the ongoing leasing of lands with little or no development potential creates another related problem: it facilitates, and perhaps even encourages, below-market, speculative leasing by industry actors who don't actually intend to develop the public lands they lease. This problem creates more administrative waste and also fails to uphold the MLA's core purpose.

Going back to the MLA's language, lease sales are intended to foster responsible oil and gas development, which lessees must carry out with "reasonable diligence." 30 U.S.C. § 187; *see also* BLM Form 3100-11 § 4 ("Lessee must exercise reasonable diligence in developing and producing…leased resources.").

BLM Nevada's oil and gas leasing program is also facilitating a surge in noncompetitive lease sales, which is fiscally irresponsible management of publicly-owned lands and minerals. Because companies pay no bonus bids to purchase noncompetitive leases, taxpayers lose out in the noncompetitive leasing process. These sales do not enjoy the benefits of market forces and rarely result in productive development.

In states like Nevada that lack competition during lease sales, speculators can easily abuse the noncompetitive process to scoop up federal leases for undervalued rates, as shown in a recent report from the New York Times. *See* Exhibit 3. The New York Times article affirms that "In states like Nevada, noncompetitive sales frequently make up a majority of leases given out by the federal government." It provides examples of speculators, including in Nevada, intentionally using this process to nominate parcels for sale, then sitting on the sidelines during the competitive lease sales and instead purchasing the leases cheaper after the sale at noncompetitive sales. These speculators are then often unable to muster the financial resources to develop the lands they have leased, so they sit idle: "Two Grand Junction, Colo., business partners, for example — a geologist and a former Gulf Oil landman — now control 276,653 acres of federal parcels in northeastern Nevada. But they are still looking for the money they need to drill on the land, or even to pay for three-dimensional seismic surveys to determine whether there is enough oil there to try." *Id.* By failing to appropriately implement the MLA and ensure that parcels offered for sale have a "reasonable assurance" of containing mineral deposits, BLM is encouraging noncompetitive, speculative leasing, which deprives the public of bonus bids and royalties, and leaves taxpayers to foot the bill for industry speculation.

The speculative nature of noncompetitive leasing – and the administrative waste it creates – is evident from a common outcome in noncompetitive leasing: termination for non-payment of rent. A review of noncompetitive leases in Nevada shows that BLM frequently terminates these leases because the lessee stops paying rent.[4] The administrative waste this process creates is further exacerbated by the fact that there are no apparent consequences for companies engaging in this practice. Indeed, many of these companies continue to actively nominate and purchase oil and gas leases, despite the clear pattern of buying leases noncompetitively with little intent to develop and reneging on their contractual obligations shortly thereafter. This process cannot be characterized as anything other than wasteful, counterproductive, and contrary to the MLA.

Again, the stated national policy underlying oil and gas leasing is "the orderly and economic development of domestic mineral resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security and environmental needs." 30 U.S.C. § 21a. Noncompetitive, speculative leasing on low-potential land does not further this policy goal, and instead occupies BLM resource specialists' time that would be better spent on other public lands management activities – all while taxpayers pick up the tab.

C. BLM must analyze the "option value" of offering parcels with low or non-existent development potential in order to avoid speculative leasing.

[4] This research is documented in the Center for American Progress's recent report, *Backroom Deals: The Hidden World of Noncompetitive Oil and Gas Leasing*, along with other concerns regarding speculative leasing raised in these comments. Available at https://www.americanprogress.org/issues/green/reports/2019/05/23/470140/backroom-deals/.

In addition to the concerns above, leasing lands with low potential for oil and gas development gives preference to oil and gas development at the expense of other uses while handcuffing BLM's ability to make other management decisions down the road. This is because the presence of oil and gas leases can limit BLM's willingness to manage for other resources in the future.

For example, in the Colorado River Valley RMP, BLM decided against managing lands for protection of wilderness characteristics in the Grand Hogback lands with wilderness characteristics unit based specifically on the presence of oil and gas leases, even though the leases were non-producing:

> The Grand Hogback citizens' wilderness proposal unit contains 11,360 acres of BLM lands. All of the proposed area meets the overall criteria for wilderness character…There are six active oil and gas leases within the unit, totaling approximately 2,240 acres. None of these leases shows any active drilling or has previously drilled wells. The ability to manage for wilderness character would be difficult. If the current acres in the area continue to be leased and experience any development, protecting the unit's wilderness characteristics would be infeasible…

Proposed Colorado River Valley RMP (2015) at 3-135. Similarly, in the Grand Junction Resource Management Plan, BLM expressly stated that undeveloped leases on low-potential lands had effectively prevented management to protect wilderness characteristics, stating:

> 133,900 acres of lands with wilderness characteristics have been classified as having low, very low, or no potential…While there is not potential for fluid mineral development in most of the lands with wilderness characteristics units, the majority of the areas, totaling 101,100 acres (59 percent), are already leased for oil and gas development.

Proposed Grand Junction Proposed RMP (2015) at 4-289 to 4-290. The presence of leases can also limit BLM's ability to manage for other important, non-wilderness values, like renewable energy projects. *See*, e.g., Proposed White River Resource Management Plan at 4-498 ("Areas closed to leasing…indirectly limit the potential for oil and gas developments to preclude other land use authorizations not related to oil and gas (e.g., renewable energy developments, transmission lines) in those areas.").

As stated in *America's Public Lands Giveaway*, Exhibit 2, "In September 2018 the Bureau of Land Management offered 295,000 acres of public land in Nevada for oil and gas development, many of them in prime sage-grouse habitat. Exactly zero of them sold at competitive auction, leaving all 144 parcels available for noncompetitive leasing. Within two months following the sale, 21 leases were scooped up noncompetitively for just $1.50 per acre." Similarly, here if BLM does not consider the "option value" of the parcels it is proposing for oil and gas lease sale, it will rule the risk of precluding future management decisions to benefit other multiple use values.

The presence of leases can also limit the BLM's ability to manage for other important, non-wilderness values, like renewable-energy projects. *See, e.g.,* Proposed White River Res. Mgmt. Plan, at 4-498 (acknowledging "the potential for oil and gas developments to preclude other land use authorizations not related to oil and gas (e.g., renewable energy developments, transmission lines)"). In offering the parcels involved in this sale, the BLM runs a similar risk of precluding future management decisions for other resources and uses such as wilderness, recreation, and renewable-energy development.

In this context, BLM can and should apply the principles of option value or informational values, which permit the agency to look at the benefits of delaying irreversible decisions. *See* Jayni Foley Hein, *Harmonizing Preservation and Production 13* (June 2015) ("Option value derives from the ability to delay decisions until later when more information is available... In the leasing context, the value associated with the option to delay can be large, especially when there is a high degree of uncertainty about resource price, extraction costs, and/or the social and environmental costs of drilling.").[5]

It is well-established that the issuance of an oil and gas lease is an irreversible commitment of resources. As the U.S. Court of Appeals for the D.C. Circuit held in the context of considering the informational value of delaying leasing on the Outer Continental Shelf, "[t]here is therefore a tangible present economic benefit to delaying the decision to drill for fossil fuels to preserve the opportunity to see what new technologies develop and what new information comes to light." *Center for Sustainable Economy v. Jewell*, 779 F.3d 588, 610 (D.C. Cir. 2015). Thus, in evaluating this lease sale, BLM should have evaluated "option value" – the economic benefits that could arise from delaying leasing and/or exploration and development based on improvements in technology, additional benefits that could come from managing these lands for other uses, and additional information on the impacts of climate change and ways to avoid or mitigate impacts on the environment. This is essential, in particular, for lands with low or non-existent development potential. BLM has the ability and obligation to undertake an analysis of the benefits of delaying leasing, which can be both qualitative and quantitative, considering both economic and environmental needs, as shown by a recent federal court decision.

As previously mentioned, in *Wilderness Workshop v. Bureau of Land Mgmt.*, the conservation group plaintiffs proposed a land use planning alternative where low and medium potential lands would be closed for leasing. BLM declined to consider the alternative, claiming it had already considered and discarded a "no leasing" alternative. The court found: "This alternative would be 'significantly distinguishable' because it would allow BLM to consider other uses for that land." 342 F. Supp. 3d 1145, 1167 (D. Colo. 2018). Considering such an alternative would permit BLM to consider the option value of delaying leasing on low potential lands.

As applied here, this economic principle suggests that BLM Nevada would be well-served by deferring the March 2020 lease parcels and preparing a programmatic EIS that considers alternative approaches for managing the oil and gas program in Nevada. The point of deferring and planning would be to ensure that BLM does not commit to moving forward with oil and gas leasing when, based on Nevada's current leasing patterns described above, economic and other indicators suggest doing so right now does not best serve the public interest.

[5] *Available at* https://policyintegrity.org/files/publications/DOI_LeasingReport.pdf.

America's Public Lands Giveaway, Exhibit 2, provides a detailed discussion of problems that are caused by inactive leases, many leased noncompetitively, and provides recommendations for how to improve the leasing system. Leasing at minimum bids or noncompetitively leads to many leases sitting idle with a need to be terminated and not producing royalties since oil and gas is not produced, and other uses have been limited. *See* Exhibit 2. If BLM approached leasing based on an option value analysis, many of these problems could be avoided.

IV. Prioritizing oil and gas leasing is inconsistent with FLPMA's multiple-use mandate.

Prioritizing oil and gas leasing over all other resources and values violates FLPMA's multiple use mandate, and prioritizing leasing of lands with low potential for oil and gas development exacerbates this violation. Leasing in low potential areas gives preference to oil and gas development at the expense of other uses because the presence of leases can limit BLM's ability to manage for other resources, in violation of FLPMA's multiple use mandate. Under FLPMA, BLM is subject to a multiple-use and sustained yield mandate, which prohibits the Department of the Interior (DOI) from managing public lands primarily for energy development or in a manner that unduly or unnecessarily degrades other uses. *See* 43 U.S.C. § 1732(a) and (b). Instead, the multiple-use mandate directs DOI to achieve "a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations." 43 U.S.C. § 1702(c). Further, as co-equal, principal uses of public lands, outdoor recreation, fish and wildlife, grazing, and rights-of-way must receive the same consideration as energy development. 43 U.S.C. § 1702(l).

DOI appears to be pursuing an approach to oil and gas management that prioritizes this use above others in violation of the multiple use mandate established in FLPMA. For example, a March 28, 2017 Executive Order and ensuing March 29, 2017 Interior Secretarial Order #3349 seek to eliminate regulations and policies that ensure energy development is balanced with other multiple uses. None of the overarching legal mandates under which BLM operates – be it multiple-use or non-impairment – authorizes DOI to establish energy development as the dominant use of public lands. On our public lands, energy development is an allowable use that must be carefully balanced with other uses. Thus, any action that attempts to enshrine energy development as the dominant use of public lands is invalid on its face and inconsistent with the foundational statutes that govern the management of public lands.

The mere fact an RMP makes lands *available* for leasing does not mean that actually leasing the lands meets BLMs' multiple use obligations. Given BLM's acknowledged discretion to engage in leasing, or not leasing, under the Mineral Leasing Act, it is clear the leasing stage, as much as the planning stage, is when multiple use decisions should be made. Since land use plan decisions only set a basic framework for land management, and do not make project-specific decisions, it is clear the leasing stage is when decisions should be made about whether issuing a lease parcel would meet BLM's multiple use responsibilities, and this must be reflected in the NEPA analysis at the leasing stage, which has not occurred here.

None of the overarching legal mandates under which BLM operates – be it multiple-use or non-impairment – authorize the DOI to establish energy development as the dominant use of public

lands. On our public lands, energy development is an allowable use that must be carefully balanced with other uses. Thus, any action that attempts to enshrine energy development as the dominant use of public lands is invalid on its face and inconsistent with the foundational statutes that govern the management of public lands. As discussed above in the Prioritization section, the courts have held unequivocally that BLM must meet its statutory obligations prior to erecting any administrative walls to meeting the statutory mandate.

Federal courts have consistently rejected efforts to affirmatively elevate energy development over other uses of public lands. In the seminal case, *New Mexico ex rel. Richardson*, the Tenth Circuit put to rest the notion that BLM can manage chiefly for energy development, declaring that "[i]t is past doubt that the principle of multiple use does not require BLM to prioritize development over other uses." 565 F.3d at 710; *see also S. Utah Wilderness Alliance v. Norton*, 542 U.S. 52, 58 (2004) (defining "multiple use management" as "striking a balance among the many competing uses to which land can be put"). Other federal courts have agreed. *See, e.g., Colo. Envtl. Coalition v. Salazar*, 875 F. Supp. 2d 1233, 1249 (D. Colo. 2012) (rejecting oil and gas leasing plan that failed to adequately consider other uses of public lands). Thus, any action by BLM that seeks to prioritize oil and gas leasing and development as the dominant use of public lands, as this proposed sale of 45 parcels appears to do, would violate FLPMA. BLM must consider a reasonable range of alternatives for this lease sale that considers and balances the multiple uses of our public lands, consistent with NEPA and FLPMA.

V. BLM has inadequately analyzed and mitigated climate change impacts.

It is well established that federal agencies must analyze climate change when conducting NEPA analyses, including in this lease sale analysis. In 2009, the Environmental Protection Agency (EPA) issued a finding that the changes in our climate caused by elevated concentrations of greenhouse gases in the atmosphere are reasonably anticipated to endanger the public health and welfare of current and future generations. EPA, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009). The D.C. Circuit Court of Appeals upheld this decision as supported by the vast body of scientific evidence on the subject. *See Coal. for Responsible Regulation, Inc. v. EPA.*, 684 F.3d 102, 120-22 (D.C. Cir. 2012). The Intergovernmental Panel on Climate Change (IPCC) in the Special Report on Global Warming of 1.5 °C and the United States Fourth National Climate Assessment (NCA4) have both shown the threats of climate change in their reports and presented many climate change impacts that can be anticipated and impacts to ecosystems and communities.[6]

A. The underlying RMPs are inadequate to support leasing without supplemental NEPA.

BLM did not adequately consider the potential climate impacts of making the proposed parcels available for leasing. The governing RMPs for the Battle Mountain District do not include climate change analysis appropriate to this discrete leasing decision, which requires greenhouse gas quantification and cumulative impact analysis among other elements; but rather discussed

[6] https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf and https://nca2018.globalchange.gov/downloads/NCA4_2018_FullReport.pdf.

climate change at a general level relevant to the high-level NEPA analysis undertaken for field office-wide RMPs. Because BLM did not adequately analyze climate change impacts from oil and gas leasing in the governing RMPs for all of the affected field offices, BLM should reevaluate its leasing allocation decisions prior to offering oil and gas leases for sale. The level of analysis required to rectify the failures of the underlying RMPs may require an EIS prior to leasing.

BLM has better climate change analysis tools at its disposal now and a court has required the agency to conduct additional climate analysis and make oil and gas leasing decisions that are based on that analysis. This need was highlighted in *Wilderness Workshop v. U.S. Bureau of Land Mgmt*, 342 F. Supp. 3d 1145, (D. Colo. 2018). In that case the conservation group plaintiffs proposed a land use planning alternative where low and medium potential lands would be closed for leasing. BLM declined to consider the alternative, claiming it had already considered and discarded a "no leasing" alternative. The court found: "This alternative would be 'significantly distinguishable' because it would allow BLM to consider other uses for that land." 342 F. Supp. 3d 1145, 1167 (D. Colo. 2018). Considering such an alternative would permit BLM to consider the option value of delaying leasing on low potential lands. Here, as in that case, the BLM has ample data to forecast a range of reasonably foreseeable climate impacts from oil-and gas-development and must explain where there is uncertainty in order to meet its hard look obligation

Courts have repeatedly invalidated oil and gas leasing decisions based on BLM's failure to adequately analyze potential climate impacts, including downstream impacts associated with leasing decisions. Most recently, the United States District Court for the District of Columbia ruled that BLM violated NEPA when evaluating a lease sale in Wyoming because the agency: (1) failed to quantify and forecast drilling-related GHG emissions; (2) failed to adequately consider GHG emissions from the downstream use of oil and gas produced on the leased parcels; and (3) failed to compare those GHG emissions to state, regional, and national GHG emissions forecasts, and other foreseeable regional and national BLM projects. *See Wild Earth Guardians v.*
Zinke, Case No. 1:16-cv-01724-RC (Doc. 99) (D.D.C. March 19, 2019). Numerous circuit court decisions have likewise confirmed that NEPA requires agencies to thoroughly analyze greenhouse gas emissions. *E.g., Ctr. For Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217, 1223-25 (9th Cir. 2008) ("The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct.").

While we appreciate that BLM provided an analysis of GHG emissions associated with leasing in the EA, the analysis is inadequate. BLM has provided an assessment of the amount of GHGs likely to be emitted due to this leasing decision and an analysis of possible downstream GHG emissions. There is also an analysis of the cumulative impacts of climate change. Estimated GHG emissions from the 25 wells that might be drilled are 60,701 tons per year.[7] EA at 29. "The

[7] The BLM should consider the recent decision by the Tenth Circuit Court of Appeals where it found that a reasonably foreseeable development scenario (RFDS) projection must be considered as the actual number of wells that will be drilled. NEPA therefore requires BLM to consider impacts of those wells in its lease sale NEPA analysis. *Diné Citizens Against Ruining Our Env't v. Bernhardt*, 923 F.3d 831, 853 (10th Cir. 2019). Thus, for

total projected increase in downstream GHG emissions from the proposed parcels could range from 0.0004 to 0.0119 MMT of CO2e per year . . ." *Id.* at 30. Total proposed action GHG emissions as a percent of total U.S. GHG emissions would be 0.002%. *Id.* at 59. But despite these analyses, BLM still concludes "[i]t is currently not feasible to predict the net impacts from the Proposed Action on climate, as leasing is an administrative action that has no direct effects." *Id.* at 31. The BLM needs to reconsider this claim in light of further analyses that are widely recognized as effective and available such as estimating the Social Cost of Carbon (SCC) or developing a carbon budget. In addition, BLM needs to consider the potential UUD impacts of leasing and impacts on multiple use needs, and it must not treat the impacts of climate change as inconsequential. A lease-specific analysis that considers SCC and a carbon budget could help overcome the deficiencies in the EA analysis.

Whether BLM is able to quantify the full benefits of fossil fuel development or not, it is inappropriate to treat the value of climate harms as zero when the impact of climate change is certainly not zero. The SCC provides a methodology for that analysis that avoids zeroing out impacts. *High Country Conservation Advocates*, 52 F. Supp. 3d at 1192 ("[B]y deciding not to quantify the costs at all, the agencies effectively zeroed out the cost in its quantitative analysis"); *Center for Biological Diversity v. NHTSA*, 538 F.3d at 1200 (citing a range of values for the value of carbon emissions reductions, and noting that it "is certainly not zero"). BLM should use available tools, such as the SCC/SCM protocols, to ensure a full consideration of climate change issues

NEPA requires a more searching analysis of climate implications than merely disclosing the amount of pollution. Rather, BLM must examine the "ecological[,]... economic, [and] social" impacts of those emissions, including an assessment of their "significance." 40 C.F.R. §§ 1508.8(b), 1502.16(a)-(b). The U.S. Supreme Court has called the disclosure of impacts the "key requirement of NEPA," and held that agencies must "consider and disclose the *actual environmental effects*" of a proposed action in a way that "brings those effects to bear on [the agency's] decisions." *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council*, 462 U.S. 87, 96 (1983) (emphasis added). The tons of greenhouse gases emitted by the proposed actions are not the "actual environmental effects" under NEPA. Rather, the actual environmental effects are the climate impacts caused by those emissions, such as property loss, changes in energy demand, impacts to agriculture, forestry, and fisheries, human health impacts, changes in fresh-water availability, ecosystem service impacts, impacts to outdoor recreation, and catastrophic impacts. These kinds of impacts are included in SCC calculations. BLM' should employ them to ensure full compliance with NEPA.

Under NEPA, BLM cannot hide behind a professed lack of high precision analytic tools to avoid a full analysis of climate change issues—NEPA allows reasonable assumptions to be made in order to achieve its hard look requirement. And besides quantifying GHG emissions due to the leasing decision, BLM must also consider emissions in the aggregate. Incremental emissions must be tied to the aggregate level of emissions. This is needed to avoid the "tyranny of small decisions" and ensure cumulative impacts are fully considered. *Kern v. BLM,* 284 F.3d 1062, 1078 (9th Cir. 2002). While small local emissions levels from individual sources may make only

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purposes of NEPA, those reasonably foreseeable wells must be considered in the agency's cumulative impact analysis. *See id.* at 853.

a small contribution to global climate change, collectively there is a large impact. Therefore, the analysis in the EA cannot be only of project level emissions and project area climate change impacts, the incremental contribution to cumulative global emissions must be considered; these local emissions will lead to worse climate change impacts globally *and* locally. The EA should consider the local resources (such as vegetation) and land uses (such as grazing) most susceptible to climate change and identify ways to protect them, including considering concerns about resiliency. This issue is addressed in the Utah State University report (Exhibit 4) that will be discussed in the section below, and which BLM should fully consider in it climate change analysis in the EA.

B. BLM must consider climate mitigation measures, prevent unnecessary or undue degradation of the public lands, and comply with the multiple use mandate

Given the severe impacts of climate change that are widely recognized in the scientific community, there are several issues that should be addressed in the EA for mitigating the impacts of climate change. The unnecessary and undue degradation (UUD) mandate in FLPMA requires BLM to consider net zero climate emissions that could be satisfied with mandatory mitigation measures. The lease sale EA fails to meet this obligation because it prioritizes energy development over other multiple uses. The plans in the EA will contribute to climate change in a way that causes UUD. Furthermore, BLM has failed to consider—much less adopt—mitigation measures such as carbon offsets projects and other land protection measures.

The EA makes a number of provisions for mitigation of air quality impacts due to oil and gas development on the lease parcels, which we appreciate (although these provisions should be made lease stipulations and not just listed as possibilities for application at the APD stage in the EA). EA at 31. However, the analysis still neglects numerous potential other mitigation measures. These would include, for example, carbon offset projects such as tree plantings or other land protection measures. A climate mitigation fee could be assessed. While BLM may have limits in requiring compensatory mitigation at this time due to the provisions of IM 2019-018, the validity of that IM is in question. As required under the Idaho court decision regarding the sage-grouse plans, before BLM could eliminate the compensatory mitigation requirement it needed to prepare a supplemental EIS. *Western Watersheds Project v. Schneider,* Case No. 1:16-CV-83-BLW at 24-25 (D. Idaho, Oct. 16, 2019).

And again, BLM should also ensure in the EA that it complies with the obligation to prevent unnecessary or undue degradation (UUD) of the public lands. 43 U.S.C. § 1732(b). This provision is more than wide enough to include climate change impacts. *See generally Theodore Roosevelt Conservation Partnership v. Salazar,* 661 F.3d 66 (D.C. Circuit 2011) (recognizing that environmental impacts can rise to the level of UUD if they result in "something more than the usual effects anticipated from *appropriately mitigated* development." (citation omitted) (emphasis added)). Other provisions of FLPMA also support the consideration and mitigation of climate change impacts. *See, e.g.,* 43 U.S.C. §§ 1701(a)(8) and (9) (establishing policies that the public lands be protected to ensure the quality of air and atmospheric resources, and that the U.S. must receive fair market value from the use of the public lands).

Moreover, the multiple use mandate established by FLPMA also allows the BLM to mitigate damages caused by climate change. 43 U.S.C. § 1732(a) (putting in place the multiple use mandate). Under this guidance BLM must consider present and future needs of the American people, consider the long-term needs of future generations, and provide for "harmonious and coordinated management . . . without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources . . . ." *Id.* § 1702(c). Mitigation of climate change impacts should be considered under these mandates.

C. BLM Must Consider the Climate change impact study done by Utah State University

Utah State University (USU) has done a study on the impact of climate change on BLM's multiple use mission and made recommendations for how to address this issue. Among other things the study, which reviewed 225 papers published between 2009 and 2018, finds that active uses on BLM lands, such as energy development, threaten passive uses such as conservation and ecosystem services. Many ecosystem processes will be affected by climate change, including an increased loss of wildlife habitat, the creation of conditions favorable for invasive species, and an increase in the size and severity of wildfires. The USU authors reviewed 44 BLM RMPs and found there was little consideration of climate change impacts to ecosystems and land uses and that adaptive responses to climate change were not considered. BLM has inadequate planning for climate change as needed to fulfill its conservation mandate, especially the need for prioritizing different uses. More effective incorporation of science is needed for effective natural resources management in the face of a climate- change-affected future. Passive uses are under-prioritized by BLM in favor of active uses. Energy extraction contributes the most to anthropogenic climate change of all the land uses BLM manages.

The BLM should consider the USU report as it develops the NEPA analysis for climate change for the March 2020 oil and gas lease sale in the Battle Mountain District. We have included the USU report here as Exhibit 4 and ask that it be fully considered in the climate change analysis. And we would note again, that since the RMP for the Battle Mountain District does address climate change issues, it is even more important that BLM fully consider this issue at the leasing stage.

Conclusion

Thank you for considering these comments. We hope to see BLM complete needed analysis and fully comply with applicable law and guidance prior to moving forward with this lease sale.

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List of Exhibits

1. NV March 2020 Parcels Intersecting BLM LWC Map
2. *America's Public Lands Giveaway.* https://westernpriorities.org/2019/09/19/story-map-americas-public-lands-giveaway/
3. "Energy Speculators Jump on Chance to Lease Public Land at Bargain Rates", The New York Times, Nov. 27, 2018. https://www.nytimes.com/2018/11/27/business/energy-speculators-public-land-leases.html
4. Utah State University Climate Change Study