

From: Nada Culver
To: [Greenberger, Sarah](#)
Subject: FW: comments on Continental Divide-Creston Final EIS
Date: Friday, May 20, 2016 12:29:55 PM
Attachments: [TWS et al. comments on CD-C FEIS - 5-16-16.pdf](#)
[TWS et al. comments on CD-C FEIS-Exhibit 1.pdf](#)
[TWS et al. comments on CD-C FEIS-Exhibit 1.pdf](#)
[TWS et al. comments on CD-C FEIS-Exhibit 2.pdf](#)

Hi Sarah – I thought these might be of interest to you.

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Subject: comments on Continental Divide-Creston Final EIS

Dear Ms. Fleuret – Attached please find comments from The Wilderness Society, Wyoming Outdoor Council and National Audubon Society on the Final EIS, along with the referenced attachments. Thank you for considering our comments.

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The Wilderness Society • Wyoming Outdoor Council • National Audubon Society

May 16, 2016

Bureau of Land Management
Continental Divide-Creston Project Final EIS
c/o Jennifer Fleuret
1300 North Third Street
Rawlins, WY 82301
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Re: Comments on the Final Environmental Impact Statement Continental Divide-Creston Natural Gas Development Project

Dear Ms. Fleuret:

Please accept these comments from the National Audubon Society, Wyoming Outdoor Council and The Wilderness society regarding the above referenced environmental impact statement that has been developed by the Bureau of Land Management (BLM). We appreciate the opportunity to comment on this final environmental impact statement, recognizing that BLM has discretion to seek comments at this stage of the process, and are submitting these comments because we believe the project approval can and should be improved.

The National Audubon Society's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity. Established in 1967, the Wyoming Outdoor Council is the state's oldest independent conservation organization. Our mission is to protect Wyoming's environment and quality of life for present and future generations. The mission of the Wilderness Society is to protect wilderness and inspire Americans to care for our wild places.

In these comments we will focus on issues related to Greater sage-grouse conservation, the need for openness and transparency in the implementation and mitigation of this project, air quality issues, and concerns about the proposed level of development the BLM is planning to permit. Henceforth we will refer to the final environmental impact statement (FEIS) that has been prepared for the Continental Divide-Creston (CD-C) Project Area and Project using those acronyms.

Overview of Key Recommendations:

1. Management of greater sage-grouse needs to be strengthened to limit surface disturbance, enhance mitigation requirements and incorporate noise protections based on best available science.

2. Both subsequent development approvals and implementation of mitigation must be transparent and provide meaningful opportunities for public engagement.
3. Air quality protection should include leak detection and repair requirements.
4. Proposed development levels must be reduced to reflect the BLM's obligations to protect other resources.

I. GREATER SAGE-GROUSE CONCERNS

Our groups have supported and continue to support the State of Wyoming and the BLM in the development and implementation of the sage-grouse core area strategy. This is a part of a first of its kind, landscape-level conservation effort that knits together local, state and federal perspectives, which many believe is the largest conservation effort in U.S. history, benefitting not only the greater sage-grouse, but also hundreds of other species and communities around the West. We support the strategy because we believe it can work to achieve the conservation of the sage-grouse in a way that allows continued human activity and uses on the landscape while protecting the habitat that is most important for the species. For the conservation strategy to work, however, it must be honored, respected, and faithfully implemented. Unfortunately, in our review of the CD-C FEIS, we see indications that the BLM may be backing away from some of the most fundamental elements of the strategy, and this concerns us.

Below we discuss relevant sections of the "9 Plan" that we expect to see incorporated into the Record of Decision (ROD) for the CD-C project and all subsequent site-specific approvals that are tiered to the FEIS and ROD. We encourage the BLM to pay careful attention to the implementation of these requirements, and ask it to do so in a manner that is open and transparent and that provides appropriate opportunities for public participation, consistent with the National Environmental Policy Act (NEPA) and the Department of the Interior's (DOI) landscape scale mitigation policy.

In its 2010 Endangered Species Act listing decision, the U.S. Fish and Wildlife Service (USFWS) determined that Factor A, the present or threatened destruction, modification, or curtailment of the habitat or range of the sage-grouse, and Factor D, the inadequacy of existing regulatory mechanisms, posed a significant threat to the sage-grouse now and in the foreseeable future. The USFWS identified the principal regulatory mechanisms for the BLM as conservation measures in resource management plans (RMP). A failure by the BLM to strictly adhere to the conservations measures outlined in its recently amended RMPs for sage-grouse conservation would cast doubt on the effectiveness of the "regulatory mechanisms" deemed essential to the conservation strategy, and would likely trigger a response from the USFWS that multiple stakeholders have worked hard to avoid.

A. Valid Existing Rights in Leased Areas Should Not Prevent Compliance with Density of Disturbance Limits.

The BLM appropriately notes the commitments made in connection with planning for conservation of the greater sage-grouse, stating: "[m]anagement of Greater sage-grouse within the CD-C project area **will conform** to the [Approved Resource Management Plan Amendments-ARMPA] and the ROD for the Greater Sage-Grouse." FEIS at 2-24 (emphasis added). A critical

provision of the ROD, and the companion Wyoming state policy, is that in priority habitat management areas (PHMA) or core areas, “the density of disturbance of an energy or mining facility will be limited to an average of one site per square mile (640 acres)” and the “proposed location and cumulative existing disturbances should not exceed 5 percent of suitable habitat.” FEIS at 2-25. The substantial diversion of the CD-C FEIS from these fundamental protections is a major concern, which can and should be addressed even in the context of existing leases.

The CD-C Plan makes clear that its directives are all “subject to valid existing rights.” It states that, “[a]cross all alternatives, valid existing rights would be honored” and appends this qualification to several specific resource protections. *See, e.g.*, FEIS at 2-18, 2-14 (“This alternative requires that all future natural gas wells on federal mineral estate be drilled from existing or new multi-well pads, which would require the employment of directional drilling technology, subject to valid existing rights.”), 2-25 (“Within PHMAs [Priority Habitat Management Areas]...the density of disturbance of an energy or mining facility would be limited...subject to valid existing rights.”).

Yet, the CD-C FEIS plan largely defers the analysis of how valid existing rights will be harmonized with the conservation goals and objectives of the Approved Resource Management Plan Amendment for Greater Sage-Grouse (Casper, Kemmerer, Newcastle, Pinedale, Rawlins, and Rock Springs Field Offices) (“9 Plan ARMPA”) until site-specific authorizations, like drilling permits, are proposed. This deferential, piecemeal approach to valid existing rights is inconsistent with key requirements and undermines the primary objective of the 9 Plan ARMPA: to manage and address threats to sage-grouse at the landscape-level. *See* 9 Plan ARMPA at 21 (“The plan provides consistent GRSG habitat management across the range, prioritizes development outside of GRSG habitat, and focuses on a landscape-scale approach to conserving GRSG habitat.”).

For instance, the 9 Plan ARMPA requires that the BLM “prioritize” oil and gas development “inside of non-habitat areas first and then in the least suitable habitat for GRSG.” 9 Plan ARMPA at 24. The fact that most or all of the CD-C Project Area is leased (encumbered by valid existing rights) does not relieve the BLM of this duty. In fact, the 9 Plan ARMPA specifically recognizes that the BLM “will work with project proponents holding valid existing leases that include less stringent lease stipulations . . . to ensure that measureable sage-grouse conservation objectives . . . are included in all project proposals.” *Id.* at 28. Yet beyond recognizing the general need to prioritize, the CD-C FEIS contains no detail on how that will be accomplished.

Under the 9 Plan ARMPA, the BLM must establish development priorities now, while evaluating impacts across a broad landscape, and in light of the specific habitat types and suitability found in the project area. The planning area contains a wide variety of sage-grouse habitat types—ranging from Sagebrush Focal Areas (SFA) to General Habitat Management Areas (GHMA) and PHMA—of varying suitability, at least based on the presence or absence of existing disturbance. FEIS at 2-5, 3-121-22. BLM cannot wait until the permitting stage to attempt to spell out how development will be prioritized across the broader landscape. It is too late, at that point, as industry and specific drilling proposals will determine priorities and not the landscape-level needs of sage-grouse, as envisioned by the 9 Plan ARMPA. This is just one specific

example of how the CD-C FEIS does not provide adequate guidance on how valid existing rights will be harmonized with the goals and objectives of the 9 Plan ARMPA.

Instead, the BLM should determine how to achieve its resource protection goals for the protection of sage-grouse in light of valid existing rights now, at the planning stage, rather than piecemeal, with each site-specific authorization. To do so, the plan established in the FEIS should begin by identifying sources of authority by which the BLM can condition development on existing oil and gas leases in the planning area, in accordance with the 9 Plan ARMPA. Some of these sources of authority include:

- The current BLM standard lease form, Form 3100-11, which is issued “subject to applicable laws, the terms conditions, and attached stipulations of this lease, the Secretary of the Interior’s regulations and formal orders in effect as of lease issuance, and to regulations and formal orders hereafter promulgated...” The lease reserves numerous rights to condition future development under “Lease Terms,” especially pursuant to sections 4 and 6. Section 4 of the standard lease gives the BLM the right to specify the rates of development and production on a lease “in the public interest,” and section 6 requires lease operations to be conducted so as to minimize adverse impacts and allows the BLM to specify reasonable measures for the conduct of operations to achieve that goal.
- WY BLM Information Notice (March 27, 2008) providing official notice to prospective lease bidders that BLM may impose restrictions on oil and gas operations to protect the Greater sage-grouse.
- The pre-Federal Land Policy and Management Act (FLPMA) oil and gas lease form, which provides that “this lease shall be subject to control in the public interest by the Secretary of the Interior...” See *National Wildlife Federation*, 169 IBLA 146, 164 (2006) (“With respect to the 1948 lease, BLM argues that regulatory provisions at 43 CFR 3162.1(a) and 43 CFR 3101.1-2 and applicable onshore oil and gas orders vest it with adequate authority to protect wildlife values. We agree.”)
- BLM regulations, which provide that BLM may impose “reasonable measures...to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed.” 43 CFR § 3101.1-2. These reasonable measures, as well as the reasonable measures permitted under section 6 of the standard lease form, can include modifications to the siting or design of facilities, the timing of operations, and specification of reclamation measures. And both the Interior Board of Land Appeals (IBLA) and the BLM’s commentary in the Federal Register when this regulation was adopted have made it clear these reasonable measures are not limited to the “200-meter 60-day” limits mentioned in the regulation. See *Yates Petroleum Corp.*, 176 IBLA 144, 155-58 (2008); 53 Fed. Reg. 17,340, 17,341 (May 16, 1988) (finding that the ability to specify reasonable measures is expansive).

- FLPMA’s statutory mandate that “the Secretary shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands.” 43 U.S.C. § 1732(b).
- Wyoming Executive Order 2008-2, first issued on August 1, 2008, and all subsequent updates, which impose stipulations including limits on density and disturbance from oil and gas activities inside core population areas (PHMA) for the conservation of sage-grouse.

Further, beyond the best management practices (BMP) and Required Design Features (RDF) identified in Appendix C of the FEIS, the plan in the FEIS should identify specific ways that the BLM can condition future development on existing leases to meet its resource protection goals for sage-grouse, including:¹

- Well siting, relocation, and timing authorities. *See* 43 CFR § 3101.1-2 (“*At a minimum*, measures shall be deemed consistent with lease rights granted provided they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year.”) (emphasis added); *see also Yates Petroleum Corp.*, 176 IBLA 144, 156 (2008) (stating that § 3101.1-2 “describes what measures ‘at a minimum’ are deemed consistent with lease rights, and does not purport to prohibit as unreasonable *per se* measures that are more stringent.”);
- Mitigation requirements. *See, e.g., Colorado Environmental Coalition*, 165 IBLA 221, 227 (2005) (“[The unnecessary or undue degradation] standard allows the Secretary to impose reasonable mitigating measures to protect environmental values on activities necessary to the exercise of valid existing rights.”);
- Lease suspensions. *See* 43 CFR § 3103.4-4 (“A suspension of operations and production may be directed or consented to by the authorized officer only in the interest of conservation of natural resources.”); *see also Copper Valley Mach. Works, Inc.*, 653 F.2d 595, 600 (D.C. Cir. 1981) (“...suspending operations to avoid environmental harm is definitely a suspension in the interest of conservation in the ordinary sense of the word.”);
- Unitization. Form 3100-11, § 4 (“Lessor reserves right to specify rates of development and production in the public interest and to require lessee to subscribe to a cooperative or unit plan...”). *See also* 30 U.S.C. § 226(m) and 43 C.F.R. Part 3180 (authorizing unit agreements); and
- Deferring or postponing new authorizations. *See* 9 Plan ARMPA at 2-5 (“Consider the likelihood of developing not-yet-constructed surface-disturbing activities, as defined in Table 2 of the Monitoring Framework, under valid existing rights before authorizing new projects

¹ BLM could also seek Solicitor assistance in identifying other applicable development conditions. *See also generally* Bruce M. Pendery, *BLM’s Retained Rights: How Requiring Environmental Protection Fulfills Oil and Gas Lease Obligations*, 40 *Envtl. L.* 599 (2010).

in PHMAs.”)

The plan in the FEIS should identify how these protective measures can be applied to valid existing rights to meet critical resource protection goals, especially for sage-grouse. For example, the Plan recognizes that valid existing rights could compromise its density and disturbance caps in sage-grouse PHMA. FEIS at 4-126 (“...the CD-C project area already has existing disturbances within delineated PHMAs...As CD-C Operators propose projects within this area, the DDCT analysis tool may demonstrate exceedances of the disturbance and disruption limitations because of existing disturbance.”). Yet, to prepare for these exceedances, the FEIS plan only generally provides that:

[T]he preferred options when dealing with threshold exceedance in a PHMA are to defer actions until the disturbance has been reduced below the threshold, to redesign the project so it does not result in any additional surface disturbance (collocation), or to redesign the project to move it outside of PHMA. If the proposal is based on a valid existing right, the BLM would work with the project proponents to avoid, reduce and mitigate adverse impacts to the extent compatible with lessees’ rights to drill and produce fluid mineral resources.

FEIS at p. 4-126.

Instead, the Plan should identify specific conditions of approval by which BLM can meet the density and disturbance caps for sage-grouse, consistent with, and tailored to, the valid existing rights in PHMA. To “defer actions until the disturbance has been reduced below the threshold,” for example, the Plan should suggest that BLM defer drilling permits and/or authorize oil and gas lease suspensions. *See* 43 CFR § 3103.4-4 (allowing lease suspensions to be directed). Likewise, “to redesign the project so it does not result in additional surface disturbance (collocation),” the Plan should suggest that BLM require unitization for leases accessing common reservoirs. *See* BLM Form 3100-11, § 4 (reserving the right to the BLM to “require” lessees to subscribe to a cooperative or unit plan). Or, “to redesign the project to move it outside of PHMA,” the Plan should suggest that BLM apply its well siting and relocation authorities. *See* 43 CFR § 3101.1-2 (allowing for reasonable measures to be specified). These are just some specific options BLM could employ, consistent with valid existing rights, to meet this critical resource protection need for sage-grouse, and which the BLM should identify in the CD-C FEIS plan.²

Moreover, while we believe BLM has ample authority to impose these conditions, should BLM take the position that a valid existing right on a lease will prevent it from meeting the 9 Plan ARMPA density of disturbance limits, then the agency should provide its justification for public comment prior to making a final decision. As we indicated in the introduction to this section, we believe the 9 Plan ARMPA should be faithfully implemented.

²The BLM is also required to consider “the potential for developing valid existing rights when authorizing new projects in PHMA.” ROD and ARMPA/ARMPs for the Rocky Mountain Region (September 2015) at 1-18, 2-5 (“Consider the likelihood of developing not-yet-constructed surface-disturbing activities...under valid existing rights before authorizing new projects in PHMAs.”). Like the protective measures that BLM should apply to valid existing rights to meet its resource protection goals, this requirement should also be explicit in the CD-C FEIS plan.

One reason for the need for increased specificity about managing development where there are valid existing lease rights is that BLM's preferred alternative specified in the CD-C FEIS, Alternative F, would allow 8 well pads to be developed in *every* BLM-owned section of land in the CD-C project area – a major exceedance from the provisions in the 9-Plan ARMPA limiting disturbance to one facility per square mile and five percent of suitable habitat. This means that up to 7,840 well pads could be developed on the 980 sections of BLM-owned land in the CD-C Project area, many of which are in sage-grouse PHMA. And in fact, the BLM's preferred alternative allows for exceptions that would permit even more than 8 well pads to be developed per section. Allowing 8 well pads in a section that falls in a sage-grouse PHMA is a significant failure to comply with the density of disturbance limits specified in the ARMPA. But as we have discussed, we do not believe the “subject to valid existing rights” provision must be a bar to complying with the surface disturbance limitations in the ARMPA.

B. Proposed Landscape Scale Mitigation Must Be Strengthened to Address Affected Resources and Comply with Applicable Policy.

Appendix S of the CD-C FEIS describes landscape scale mitigation measures that are planned in the CD-C Project Area. These measures apply especially to conservation needs for mule deer, pronghorn, and sage-grouse. As discussed in section II of these comments, Appendix S, like many other aspects of the CD-C FEIS, lacks transparency and opportunities for public participation, which must be corrected. Following are additional specific concerns regarding the landscape scale mitigation plan described in Appendix S.

1. Potential mitigation areas should be carefully evaluated.

Many offsite mitigation areas identified in Appendix G, which are incorporated into Appendix S, are located in existing oil and gas fields. Obviously, this raises concerns and questions about suitability, durability and effectiveness of mitigation proposed in these areas. Appendix G states:

It is important to note that our site-selection exercise did not account for future oil and gas development potential. Many proposed offset sites are within the Atlantic Rim or Desolation Flats Natural Gas Fields, and therefore may be unsuitable because of future development potential (Map F-3). Prior to establishing sites for actual mitigation offsets, the development potential should be carefully evaluated and incorporated into the decision-making process.

Appendix G at 5.

We understand that thresholds established by the BLM for mule deer and sage-grouse in the Atlantic Rim project area have already been exceeded, which would mean that compensatory mitigation for impacts to mule deer and sage-grouse in the CD-C project area cannot be achieved in the Atlantic Rim area. Therefore, these areas should not be recognized as potential compensatory mitigation areas for development in the CD-C Project Area.

Other potential offsite mitigation areas identified in Appendix G may be encumbered by existing oil and gas leases, mining claims, mineral leases, ROWs, and other authorizations that could undermine or interfere with mitigation success. Again, this raises concerns about the suitability, durability and effectiveness of any mitigation project in these areas.

To address these concerns, we recommend that all of the potential off-site mitigation sites identified in Appendix G be analyzed in a NEPA or other public planning document to determine their feasibility for use as compensatory mitigation sites. Landscape scale mitigation requires a landscape scale approach. This cannot be accomplished through an ad hoc, well-by-well review based on limited about the suitability of sites for compensatory mitigation. We also encourage the BLM to investigate potential opportunities for compensatory mitigation *within* the 1 million acre project area. For example, protecting the integrity of a wildlife migration corridor or important sage-grouse habitat inside the project area could compensate for or offset impacts to those resources caused by both existing and proposed activities in other areas of the field.

2. Compensatory mitigation should be identified for additional resources that will be impacted by the project.

Appendix S concludes that compensatory mitigation is needed for only three species of wildlife: pronghorn antelope, mule deer and sage-grouse. Apparently, the BLM believes that impacts to *all* other natural resources (including air, soils, recreation, wildlife habitat, and water) would be avoided or minimized to a degree that avoids a need to compensate for the loss or impact. However, with nearly 9,000 new wells proposed on up to eight well pads per section in a vast area that already has 4,700 wells, it seems improbable that there will be no need for compensatory mitigation for other resources besides the three identified above.

It is unclear, for example, what mitigation measure or set of measures will achieve a no net loss standard. Appendix G defines no net loss as “when mitigation results in no negative change to baseline conditions (e.g. fully offset or balanced).” The construction and regular use of an extensive industrial road network in an area that currently lacks roads (the baseline condition) creates an impact to open space, to wildlife and wildlife habitat, and to recreation and visitor experiences. The avoidance and mitigation measures proposed in the FEIS do not remove the road network or well pads and industrial facilities from the landscape. There is still a significant change to baseline conditions. To achieve the no net loss standard requires the BLM to find a way to “offset or balance” the impact of the road network with mitigation somewhere else, perhaps by not developing a comparable area within the project site that might otherwise be developed.

The mitigation standards discussed in the FEIS, particularly in Appendix S, may not align with the standards and requirements outlined in the President’s November 3, 2015, mitigation memorandum. This memo provides in section 3(b) that:

Agencies' mitigation policies should establish a net benefit goal or, at a minimum, a no net loss goal for natural resources the agency manages that are important, scarce, or sensitive, or wherever doing so is consistent with agency mission and established natural resource objectives. When a resource's value is determined to

be irreplaceable, the preferred means of achieving either of these goals is through avoidance, consistent with applicable legal authorities. Agencies should explicitly consider the extent to which the beneficial environmental outcomes that will be achieved are demonstrably new and would not have occurred in the absence of mitigation (i.e. additionality) when determining whether those measures adequately address impacts to natural resources.

Based on this provision, we suggest that all sensitive species in the project area should be subject to a “net benefit goal” mitigation standard in all areas (not just in sage-grouse PHMA). And species such as the Wyoming pocket gopher and sage-grouse are so rare they should be considered “irreplaceable” and thus the mitigation standard should be avoidance in order to comply with the President’s memorandum.³

The President’s memo also contains this provision in section 1:

It shall be the policy of [the Department of the Interior] and all bureaus and agencies . . . to avoid and then minimize harmful effects to land, water, wildlife, and other ecological resources . . . caused by land- or water-disturbing activities, and to ensure that any remaining harmful effects are effectively addressed, consistent with existing mission and legal authorities.

So again, avoidance and minimization of impacts should be the priority in the CD-C FEIS. The BLM should ensure that this hierarchy of mitigation—first avoidance, then minimization, and last compensatory mitigation—is recognized in the CD-C FEIS. The authorization for up to eight wells per section under the preferred alternative seems to suggest that avoidance of impacts was not given sufficient attention in the FEIS.

In Appendix S, the BLM appears to limit the application of appropriate mitigation goals by confining itself only to resource values identified in the Rawlins RMP as worthy of compensatory mitigation. As noted earlier, the resources are limited to three wildlife species and *no other resource values*:

“Mitigation standard: a component of a land use plan’s resource objective that describes the extent to which mitigation will be applied (e.g. net gain, no net loss, net loss).”

FEIS Appendix S at 25.

At a minimum, however, the President’s memorandum calls for no net loss of land, water, wildlife and other ecological resources from federal actions or permitting. The BLM should ensure compliance with the President’s memo in the CD-C FEIS ROD. The Rawlins RMP also must be interpreted in compliance with this memorandum.

³ As stated in Section 1 of the President’s memo, “existing legal authorities contain additional protections for some resources that are of such irreplaceable character that minimization and compensation measures, while potentially practicable, may not be adequate or appropriate, and therefore agencies should design policies to promote avoidance of impacts to these resources.”

Because the FEIS does not identify or classify resources in a way that aligns with the President’s mitigation memo (i.e., important, scarce, sensitive, or irreplaceable resources should receive priority), it therefore fails to assign appropriate mitigation standards to resources in the project area. We recommend that this issue be addressed and corrected in the ROD, particularly relative to protection of sage-grouse.

The most striking aspect of this FEIS in general, and Appendix S in particular, is the failure to explain how the project, overall, will achieve a no net loss mitigation standard in the project area along with a net conservation gain standard inside designated sage-grouse PHMA. Large areas of public lands that today exist in relatively natural conditions will be roaded, fragmented, and industrialized by this massive project. To varying degrees, the mitigation proposed in the FEIS will avoid and reduce some of the impacts, but if this project is fully built, it is likely the nation’s largest onshore oil and gas project will be established in this area. The BLM must offset, balance, and compensate for this impact. Compounding the problem, the BLM cannot achieve landscape-scale mitigation goals on a piecemeal, project-by-project, approval-by-approval basis.

3. Approved development levels undercut the agency’s ability to achieve mitigation goals.

Finally, we are concerned that the BLM may not be able to perform the significant work and support activities that will be required to implement Appendix S if the 600 wells BLM is planning to allow are drilled each year. It will take a tremendous amount of work to meet the requirements in Appendix S to identify baseline conditions and trends, assess the specified attributes (soil/site stability, hydraulic function, and biotic function), conduct the detailed debit calculations, and then identify compensatory mitigation measures and mitigation sites. The BLM must ensure that the measures specified in Appendix S can actually be accomplished if the CD-C project is developed at the level contemplated; as discussed throughout these comments, however, BLM should not permit development at the proposed level.

C. Noise Protections Related to Sage-Grouse Should Reflect the Best Available Science

According to the CD-C FEIS, “[n]oise levels interfere with bird communication during mating periods resulting in lower bird attendance at leks. “ FEIS at 4-124. To mitigate this impact, the FEIS includes the following conservation measure: “[n]ew project noise levels should not exceed 10 dBA above baseline noise at the perimeter of the lek from 6:00 pm to 8:00 am during the breeding season (April 1–May 15).” FEIS 4-125.

In addition, the conservation and mitigation measures contained in Appendix C for the control of noise impacts describe measures that will be required by the BLM to reduce noise impacts:

1. Limit noise to less than 10 decibels above ambient measures (20-24 dBA) at sunrise at the perimeter of a lek during active lek season (Patricelli et al. 2010, Blickley et al. 2012).
2. Require noise shields when drilling during the lek, nesting, brood-rearing, or wintering season.

3. Locate new compressor stations outside priority habitats and design them to reduce noise that may be directed towards priority habitat.

FEIS at C-35.

The key conservation measure outlined in the CD-C FEIS to reduce noise impacts to sage-grouse—limiting noise at the lek during the breeding period to no more than 10 dBA above baseline from 6 pm to 8 am—is not consistent with the best available science and therefore fails to achieve the intended conservation objective of the ARMPA. These conservation measures, therefore, cannot be relied upon to reduce the impact of noise to a level that falls below the significance threshold identified in the FEIS. FEIS at 4-118. Thus, with respect to the impacts of noise on sage-grouse, the following statement in the FEIS is not correct: “The development of the CD-C project would be done in accordance with the ARMPA and the SGEO and those strategies have been found to provide sufficient regulatory mechanisms for the conservation of Greater Sage-Grouse.” FEIS at 4-144.

A recent (May 11, 2016) analysis by Ambrose, Patricelli and Copeland of noise provisions in Wyoming BLM’s Approved RMP Amendments show that BLM’s current noise protocols fail to reflect best available science; mischaracterize baseline ambient noise levels in typical sage-grouse habitat throughout rural Wyoming; and fail to provide an adequate level of protection for the sage-grouse. The Ambrose analysis, entitled *Review of Noise Protocols for Sage-Grouse*, is appended as Exhibit 1 and a work cited therein is included as Exhibit 1 supp.

According to these experts, the correct ambient baseline noise level in typical sage-grouse habitat in Wyoming is much lower than the 20-25 dBA values reported in the CD-C FEIS:

However, while the use of a fixed ambient value is a critical improvement over the use of measured baseline values, **using 20-24 dB is inappropriate as a measure of ambient noise**. Neither of the two papers cited in the rule, Patricelli et al. 2010 or Blickley et al. 2012, provide any justification for these ambient values. Neither of these papers report ambient values for representative areas during the lekking period. A more recent, peer-reviewed article suggests 16-20 dBA as appropriate ambient levels for sage-grouse habitat (Patricelli et al. 2013).

Exhibit 1 at 2 (emphasis in original).

The BLM must take note of the statement, above: “Neither of the two papers cited in the rule, Patricelli et al. 2010 or Blickley et al. 2012, provide any justification for these ambient values. Neither of these papers report ambient values for representative areas during the lekking period.” The absence of the best available science to support a 20-24 dBA ambient value undermines the validity of its use as a baseline for purposes of CD-C project implementation.

First, relying on best available science, Ambrose, Patricelli and Copeland recommend using 16 dBA as a “fixed baseline”:

Based on the Ambrose 2013 and 2014a studies, the ambient noise levels in typical sage-grouse habitat in Wyoming (and likely rangewide) are 14-17 dBA or less. **For the purposes of establishing noise stipulations relative to greater sage-grouse, we recommend using a fixed ambient of 16 dBA as a baseline; this is consistent with a peer-reviewed publication (Patricelli et al. 2013) and widely-used reports (e.g. EPA 1971).** Allowing 10 dB of noise from new projects, this leads to an allowable level of 26 dBA.

Exhibit 1 at 2 (emphasis provided in the original).

Second, the authors recommend using 26 dBA as a threshold for noise exposure: “For the purposes of assessing acoustic impacts to greater sage-grouse, we recommend using 26 dBA as the threshold for noise exposure (ambient 16 dBA + 10 dBA).” Exhibit 1 at 3. As reported by these experts, there is ample evidence to suggest that noise levels in excess of 26 dBA are harmful to sage-grouse. The other reason for establishing a threshold of 26 dBA is to address the problem of escalating baselines—incremental increases in noise exposure—which happens when the sounds of existing oil and gas development are considered to be part of the ambient baseline. The authors describe this phenomenon on page 5 of their report and stress that: “The inclusion of existing noise into ambient values clearly does not protect greater sage-grouse.” *Id.* at 5

Third, Ambrose, et al., recommend that: “In situations where existing noise levels at leks exceed 26 dBA before project initiation, new projects should not contribute to an increase in sound levels at leks; this can be accomplished through noise mitigation measures, such as pad siting and technology that limits the combined noise exposure.” Exhibit 1 at 4. Specifically, the authors state that:

There may be situations where sound levels at leks exceed an L50 of 26 dBA before project initiation due to existing noise sources, though recent data suggest that this is unlikely outside of heavily developed areas (Ambrose et al. 2014a and 2014b). In these cases, the best available evidence suggests that additional noise will increase the impact on these leks, as sage-grouse do not adapt to the presence of noise over time (as discussed below; Patricelli et al. 2013). Therefore, to limit impacts on sage grouse, new projects should not contribute to an increase in sound levels at leks already exceeding the noise limits. This rule would not preclude further development at sites that already have sources exceeding 26 dBA due to the non-additive way that multiple sound sources combine to determine overall noise levels. For example, a new source with an L50 9 dB quieter than the L50 of an existing source at the measurement site would add only 0.5 dB to the total noise exposure. Therefore new projects could proceed by increasing the distance to the lek or through the use of noise-mitigation technology.

Id.

Because the CD-C is an infill project, the recommendations above may be particularly important to understand and implement, and we encourage the BLM to heed the advice of these

scientists: “Therefore, to limit impacts on sage grouse, new projects should not contribute to an increase in sound levels at leks already exceeding the noise limits.” *Id.*

Fourth, the scientists recommend that, outside of lekking hours during the breeding season, reasonable efforts should be made to keep noise as close to these limits as possible:

Maintaining lek activity involves males and females foraging, roosting, nesting and brood-rearing before and after lekking times on a daily and seasonal basis, and noise impacts may also occur during these off-lek activities (e.g. Vehrencamp et al. 1989; Wallestad and Schladweiler 1974; Schoenberg 1982; Patricelli et al. 2013). Therefore, outside of lekking hours during the breeding season, reasonable efforts should be made to keep noise as close to these limits as possible.

Exhibit 1 at 4.

Finally, the authors describe and recommend scientifically defensible procedures for assessing compliance with noise protocols. We urge BLM to adopt these recommendations in the CD-C ROD. Exhibit 1 at 4.

For the reasons described in detail in the analysis by Ambrose, et al, we recommend that:

1. The CD-C ROD establish a field-wide, fixed ambient baseline value of 16 dBA;
2. The CD-C ROD limit total noise at the perimeter of occupied leks to 26 dBA (16 dBA + 10 dBA);
3. The CD-C ROD extend coverage of the noise limits by one hour, to 9 am, to protect more of the male display period; and
4. All other noise reductions strategies are implemented in the CD-C project area to reduce noise impacts to sage-grouse.

The BLM made a firm commitment in its plan to conserve the greater sage-grouse and to use best available science. The CD-C project analysis prepared by the BLM provides an opportunity to honor that commitment:

Continued Commitment to Research and Use of Best Available Science—
Through implementation of this strategy, new management issues and questions are likely to arise that may warrant additional guidance or study by technical experts, scientists, and researchers. The BLM is committed to continue working with individuals and institutions with expertise in relevant fields in order to ensure that land and resource management affecting conservation of the GRS and the sagebrush ecosystem continues to be guided by sound peer-reviewed research and the best available science.

See ROD and ARMPAs/ARMPs for the Rocky Mountain GRSG Sub-Regions September 2015, at 1-40.

Echoing and underscoring that commitment, the Management Objectives contained in the Approved RMP Amendments for sage-grouse state that: “[e]ffects of infrastructure projects, including siting, will be minimized using the best available science, updated as monitoring information on current infrastructure projects becomes available.” See ARMPA for Greater Sage-Grouse (September 2015) Management Objective 17, at 24.

Accordingly, the recommendations provided by Ambrose, Patricelli and Copeland, which represent the best available science, should be adopted in the CD-C ROD and applied in the CD-C Project Area.

II. THERE IS A NEED FOR IMPROVED TRANSPARENCY FOR IMPLEMENTATION OF THE CD-C PROJECT

The CD-C FEIS will likely be followed by a ROD that authorizes nearly 9,000 wells in addition to the 4,700 wells previously approved, making the CD-C project the largest onshore oil and gas project on the public lands. Under the preferred alternative, Alternative F, the BLM may authorize up to 600 wells per year on as many as eight well pads per section. FEIS at 2-1, 2-18. Specific locations of the 8,950 wells, and their well pads, access roads, compressor stations, waste disposal facilities, injection wells, pipelines, gravel quarries, man camps, and related “ancillary facilities” are unknown. Instead, these features—and their environmental impacts—will be analyzed in site-specific environmental assessments (EA) prepared by the Rawlins Field Office. It appears there will be a single EA prepared for each APD, up to 600 per year. Thus, under existing procedures, BLM personnel in the Rawlins Field Office will evaluate and authorize up to 600 wells and related facilities in as many as 600 separate EAs on an annual basis. Most importantly, these will be so-called internal EAs for which public comment is neither accepted nor requested by the BLM. This approach fails to ensure needed openness, transparency, and public participation opportunities that should accompany implementation of the CD-C FEIS.

To ensure a transparent, robust and scientifically defensible environmental review process, EAs prepared for APDs and ROWs should be made available for public review and comment prior to approval. The use of Programmatic EAs available for public review and comment prior to final decisions for groups of wells (for example, by watershed, or operator, or location) should be required. We note that the Atlantic Rim Project allows for “bundling” of wells for NEPA review, which provides a model for this. Spatial data relative to wells considered in bundles for APD or ROW approval should be made available to the public on e-planning websites.

To further enhance transparency, the APDs themselves should be posted on BLM’s website. The public should not be expected or required to physically travel to Rawlins in order to review operators’ drilling and surface use plans.

It is critically important for the BLM to ensure and provide for openness, transparency and opportunities for public participation in the development of America's largest onshore oil and natural gas project on the public lands. To achieve this goal, we suggest (in addition to an open and transparent NEPA process) the following: all written reports, plans and updates required by the ROD should be made available to the public without the need for a Freedom of Information Act request.

The FEIS contains several appendices that require operators to submit written reports and updates to BLM.⁴ These plans, and all associated reports, including the BLM-prepared "effectiveness reports" (Appendix I), "operational updates" (Appendix N), bi-annual reports (Appendix R), and mitigation, monitoring and adaptive management plans (Appendix S) should be readily available to the public by publication on the BLM's website.

Similarly, all meetings of groups or teams established in the ROD, such as the "CD-C discussion group", the "transportation planning committee," and the "CDC consultation group," should be open to the public and properly noticed at least 30 days in advance of such meetings.

We are most concerned about the lack of transparency displayed in Appendix S in the FEIS—Landscape Scale Mitigation. Public review is especially important regarding determinations of "no net loss," "net conservation gain" and compensatory mitigation. As discussed above, there are transparency requirements in the President's mitigation memorandum and the DOI's mitigation policy that must be complied with relative to these requirements.

To aid the process of developing effective mitigation, the BLM has proposed the creation of a CD-C discussion group. FEIS at S-19. Absent from the membership of the CD-C discussion group are environmental, conservation and other non-governmental organizations (NGO) with expertise and interest in mitigation. There is no mechanism to ensure that the "discussion group" operates in a transparent and open manner, yet this group would play a critical role in the process of developing and implementing mitigation: "The CD-C discussion group would need to create and add to/refine a list of projects/mitigation mechanisms that could be implemented as compensatory mitigation measures for residual impacts to Greater Sage-Grouse, pronghorn antelope, and mule deer as a result of development of the CD-C field." FEIS at S-19.

To correct these problems we request that 1) the membership on the group be expanded to include representatives from the conservation community; 2) that all meetings and conference calls of the CD-C discussion group be open to the public and properly noticed at least 30 days in advance; and 3) that the BLM, with assistance from the Solicitor's office, review the proposed function and activities of the CD-C discussion group for compliance with the Federal Advisory Committee Act (FACA).

The BLM must ensure openness, public participation, and transparency in the development of mitigation plans. As written, Appendix S fails to do so. In light of the above, we recommend that Appendix S be revised to include strong and clear language ensuring that

⁴ These include Appendices E, I, O, N, R, and S.

openness, transparency and opportunities for public participation are built into the process outlined in Appendix S. This is especially important for projects proposed in sage-grouse core areas because of the requirement to achieve a net conservation gain and the possibility of compensatory mitigation being required, both of which must be open, transparent and subject to public review and comment.

III. AIR QUALITY PROTECTION IN THE CD-C PROJECT AREA SHOULD INCLUDE LEAK DETECTION AND REPAIR REQUIREMENTS

We strongly urge the BLM to implement a quarterly, instrument-based leak detection and repair (LDAR) program in the CD-C Project Area. As the BLM is aware, the Environmental Protection Agency (EPA) lowered its national ambient air quality standard (NAAQS) for ozone in 2015 from 75 parts per billion (ppb) to a more protective 70 ppb. This new NAAQS emphasizes the need for LDAR.

According to the FEIS, based on a 3-year average, ozone concentrations would be in compliance with the NAAQS, but “ozone concentrations could exceed the level of the NAAQS during a single year.” FEIS at 2-30 (Table 2.4-2). The BLM also states in the FEIS that maximum 1-hour nitrogen dioxide (NO₂) impacts from drilling activities could exceed the 1-hour standard during the years when drilling occurs. However, the BLM assumes that they “would not result in a violation of the NAAQS or the companion Wyoming Ambient Air Quality Standard (WAAQS) since the standards are based on a 3-year average and drilling would not occur at the same location for a 3-year duration.” However, activity anywhere within the CD-C Project Area could impact the same area where air quality is of concern, whether or not a well is being drilled on a given pad for 3 years. Also important is that while the BLM’s modeling suggests that based on a 3- year average there would be no exceedance of the new ozone NAAQS under the preferred alternative (or any alternative), even an exceedance within a one-year period carries potential for short term environmental and/or health impacts.

Ozone is an incredibly harmful pollutant that causes both immediate and long-term health effects in humans.⁵ Exposure to ambient levels of ozone can lead to premature death in children and elderly adults. Ozone exposure can harm child development and adult reproductive health as well as lead to respiratory and cardiovascular impairments—in particular in young children and the elderly, but also in healthy adults especially those who engage in outdoor physical activity.

Given the harmful environmental and health implications of ozone pollution, we urge the BLM to require measures to cull ozone precursor emissions even where the state’s current requirements in the Concentrated Development Area (CDA) do not apply. In particular, we strongly urge the BLM to consider the implementation of a quarterly, instrument-based LDAR program. The CD-C FEIS does not currently propose LDAR requirements to detect and repair fugitive emissions leaks, but there are several reasons why the BLM should incorporate an LDAR requirement into the ROD:

⁵ American Lung Association. <http://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/ozone.html>.

- 1) Scientific studies suggest oil and gas emissions are higher than inventory estimates primarily due to avoidable fugitive emissions.

There is growing scientific consensus demonstrating that actual oil and gas emissions are higher than inventory estimates. This is primarily due to the fact that equipment malfunctions, avoidable operating conditions, and poor maintenance at a small number of sites leads to significant excess emissions. Importantly, the nature of these excess emission events are random and unpredictable. As a result, the scientific studies strongly support frequent inspections using modern leak detection technology to identify malfunctioning or defective equipment that can lead to leaks at the maximum number of sites possible as well as the installation of robust pollution controls.

The first of these studies, conducted by an independent team of scientists at the University of Texas, found that emissions from equipment leaks, pneumatic controllers, and chemical injection pumps were 38 percent, 63 percent, and 100 percent higher, respectively, than is estimated in national inventories. This study also found that 5 percent of the facilities were responsible for 27 percent of the emissions.

Two follow-up studies focusing specifically on emissions from pneumatic controllers and liquids unloading activities at wells found similar results. Specifically, the studies found that 19 percent of the pneumatic devices accounted for 95 percent of the emissions from the devices tested, and about 20 percent of the wells with unloading emissions accounted for 65 to 83 percent of those emissions. The average methane emissions per pneumatic controller were 17 percent higher than the average emissions per pneumatic controller in EPA's national greenhouse gas inventory.

Environmental Science & Technology published the results of a series of coordinated studies conducted at a diverse selection of facilities in the Barnett Shale region in Texas.⁶ Researchers obtained data using a suite of measurement approaches that included “top-down” atmospheric measurements and “bottom-up” facility-level measurements. Overall, both the top-down and bottom-up studies found emissions higher than those estimated by the EPA's Greenhouse Gas (GHG) Inventory, and in some cases, higher than those reported by operators to EPA under the Mandatory Greenhouse Gas Reporting Program.⁷ The bottom up estimate was 1.5 times higher than the EPA GHG inventory.⁸ This is consistent with the findings of a 2014 synthesis paper that reviewed over 20 years of technical literature on natural gas emissions in the U.S. and Canada and similarly found measured atmospheric emissions 1.5 times higher than those estimated in the national GHG inventory.⁹

⁶ Harriss et al., “Using Multi-Scale Measurements to Improve Methane emissions Estimates from Oil and Gas Operations in the Barnett Shale, Texas: Campaign Summary,” available at <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02305>.

⁷ *Id.*

⁸ *Id.*

⁹ Brandt, et al., “Methane Leaks from North American Natural Gas Systems,” available at <http://www.sciencemag.org/content/343/6172/733>. Summary.

These papers underscore the need for air protection policies that ensure operators routinely check for, and expeditiously repair, leaks and control venting.¹⁰ Accordingly, we urge BLM to require operators in the CD-C Project Area to inspect well sites for malfunctioning or improperly maintained equipment on at least a quarterly basis. And to control venting to the maximum extent possible from activities and equipment such as well completions, tanks, and dehydrators that can lead to significant pollution that, even in the short term, is harmful to public health.

2) Fugitive emissions are unpredictable; frequent LDAR inspections are the most appropriate solution.

Fugitive emissions are a significant contributor to oil and gas emissions and a recent scientific study, the largest of its kind in the U.S., suggests fugitive emissions are also random and unpredictable, making more frequent LDAR inspections key to addressing the problem. This study, published in *Environmental Science & Technology*, found a very low degree of predictability between certain well pad and operator parameters and detected fugitive emissions. The study looked for correlation between emissions detection and well count, gas production, oil production, water production, and percent energy from oil and found only weak relationships between some factors. The study concluded that, “this low degree of predictability indicates that these large emission sources are primarily stochastic and the frequent and widespread inspection of sites to identify and repair high emission sources is critical to reducing emissions.”¹¹

3) LDAR programs are cost-effective.

Not only are frequent instrument-based inspections necessary to detect and remediate equipment leaks and unintentional tank venting, they are also highly cost effective. As illustrated by the attached analysis (Exhibit 2 included at the end of these comments), performing quarterly instrument-based inspections, whether done in-house or through a third-party contractor, is highly cost effective. Under either scenario, the natural gas savings exceed the cost of the entire program. Even if gas savings are not monetized, quarterly, LDAR programs are among the most cost effective clean air measures available to dramatically reduce pollution from oil and gas facilities.

The attached spreadsheet, which the Wyoming Outdoor Council in conjunction with the Environmental Defense Fund (EDF) has previously submitted to the state of Wyoming is now likely a conservative estimate because EPA has since updated its emissions assumptions. Nevertheless, it provides useful information regarding cost-effectiveness. The spreadsheet is based on cost and emissions information in an ICF International report and an updated LDAR memorandum,¹² and on the final cost benefit analysis prepared by the Colorado Air Pollution

¹⁰ Lyon, et al., “Constructing a Spatially Resolved Methane Emission Inventory for the Barnett Shale Region.” Available at <http://pubs.acs.org/doi/abs/10.1021/es506359c>.

¹¹ Lyon, et al., “Aerial Surveys of Elevated Hydrocarbon Emissions from Oil and Gas Production Sites.” P. 4885. Available at <http://pubs.acs.org/doi/abs/10.1021/acs.est.6b00705>.

¹² ICF International, “Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries,” March 2014. LDAR analysis updated May 29, 2015. Memorandum from Joel Bluestein to Peter Zalzal.

Control Division (APCD) in support of the APCD's LDAR program in 2014.¹³ Specifically, the attached analysis – compiled by EDF – utilizes ICF's estimate of the costs to conduct quarterly LDAR in-house for a model 5-well site as the starting point. EDF increased the inspection time assumed by ICF by three hours per inspection to conservatively account for additional travel time that may be needed to travel to rural wells in Wyoming. This is based on Colorado's estimate that it would take operators an additional three hours to travel to wells outside of its Denver Metropolitan ozone nonattainment area.¹⁴

EDF also estimated the costs of conducting inspections using a third-party contractor. Colorado assumed a 30 percent profit margin for contractors that they added to the hourly rate for in-house inspectors.¹⁵ Colorado estimated that a third-party contractor could perform an inspection for \$ 134 per hour compared to the \$ 102 it would take an in-house employee. EDF used this assumption in the attached analysis and increased the hourly in-house inspection rate by 30 percent to portray the costs of hiring a contractor to perform LDAR inspections.

Per the attached spreadsheet, quarterly instrument-based inspections are highly cost-effective if operators perform them in-house or hire third-party contractors. Specifically, such inspections result in the following costs and benefits:

- \$ 4,265 per year (in-house), resulting in 10 tons of volatile organic compound (VOC) and 35 tons of methane reduced. Overall cost effectiveness is \$ 40 per ton of VOC reduced (not accounting for gas savings) and **negative** \$ 281 per ton of VOC reduced (accounting for gas savings).
- \$ 5,544 per year (contractors) with an overall cost-effectiveness of \$ 395 per ton of VOC reduced (not accounting for gas savings) and **negative** \$ 327 per ton of VOC reduced (accounting for gas savings).

Many operators can monetize the savings resulting from fixing leaks. In those cases where gas pipelines are available, operators can route the avoided gas losses to sales. In those instances where pipelines are not available currently, operators can often utilize the gas for onsite fuel. And, in many instances, gas infrastructure is in the process of being built and therefore, even if operators cannot route the saved product to sales, they will be able to do so in the near future.

ICF and the State of Colorado estimate that quarterly instrument-based inspections can achieve 60 percent reductions in leaks.¹⁶ Notably, this estimate is based on the assumption that IR cameras and other modern leak detection equipment can effectively detect leaks. It is not based on an estimate of the effectiveness of less effective sensory-based inspection methods such as audio, visual, olfactory inspection.

¹³ Colorado Air Pollution Control Division, Cost-Benefit Analysis for Proposed Revisions to AQCC Regulations No. 3 and 7 (February 7, 2014).

¹⁴ *Id.*, at p. 20-21

¹⁵ See Colorado Cost Benefit Analysis for Proposed Revisions to AQCC Regulations, p. 20

¹⁶ *Id.* At 27 (citing EPA reported data); ICF March 2014 report at 3-10.

- 4) The BLM itself has proposed a venting and flaring rule that aims to implement LDAR programs on public and tribal leases.

In addition to the fact that fugitives represent a large portion of harmful emissions at oil and gas sites and frequent LDAR inspections would be an effective strategy for reducing fugitive emissions, BLM's own proposed rule on venting, flaring and leaking of our nation's natural gas supplies aims to require LDAR programs on all public and tribal lands. 81 Fed. Reg. 6,616 (Feb. 8, 2016). Our organizations support the goals of the BLM's proposed rule and believe that the BLM should proactively include quarterly LDAR requirements in the ROD for the CD-C Project.

IV. PROPOSED DEVELOPMENT LEVELS SHOULD BE RECONSIDERED FOR THE CD-C PROJECT AREA

The development levels that would be sanctioned in the CD-C Project Area under the preferred alternative are radically out of alignment with BLM's approach and commitments to conservation of greater sage-grouse (and other resources), are based on an overly restrictive view of the agency's ability to manage development on existing leases and are not reasonably related to likely levels of development.

As discussed in detail above, the 9-Plan ARMPA imposes science-based limits on density of disturbance that are designed to protect sage-grouse and BLM has authority to ensure compliance as part of approving this project. Further, the agency has committed to mitigating impacts to other species, but the FEIS provides that "[r]oad and pipeline networks and well pads would be sited to avoid, **to the extent practicable**, sensitive wildlife habitat such as big game winter range and/or migration corridors to reduce fragmentation and minimize disturbance." FEIS at 2-18 (emphasis added). This lack of specific standards and implication of lax enforcement does not comport with BLM's obligation to first avoid and then minimize impacts. Finally, the projected levels of development are not justified by past and current activities or reasonable projections.

There is no sound reason to permit such high levels of development at this time; the project can proceed with a more reasonable level of development while still meeting the needs of the operators.¹⁷

The BLM has specified that Alternative F presented in the FEIS is its preferred alternative for implementation in the CD-C Project Area. Under this alternative, there would be certain specified protections for the Muddy Creek, Bitter Creek, Red Wash, and Chain Lake watersheds and a CD-C discussion group would be formed to address evolving energy issues.

However, the most significant provision under this alternative would be that operators would be limited "to no more than eight well pads per square mile on BLM administered lands to minimize surface disturbance and encourage directional drilling." FEIS at 2-18. Exceptions

¹⁷ Should increased levels of development actually become likely based on improved technology or other changed conditions, BLM would be able to evaluate how such development could proceed without causing unacceptable impacts, again based on available technology and data, subject to further NEPA analysis.

allowing a greater well pad density could be permitted to accommodate existing lease rights or provisions in the Rawlins RMP. *Id.* Efforts would be made to site oil and gas infrastructure so as to reduce impacts to sensitive wildlife habitats “to the extent practicable.” *Id.*

The allowance for up to 8 well pads per square mile on BLM-administered lands, let alone further “exceptions” permitting even more, does not provide sufficient protection for resources in the CD-C Project Area. Nor does it meet the development priorities outlined in the ARMPA: “Priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMAs and GHMAs. When analyzing leasing and authorizing development of fluid mineral resources, including geothermal, in PHMAs and GHMAs, and subject to applicable stipulations for the conservation of GRSG, priority will be given to development in non-habitat areas first and then in the least suitable habitat for GRSG.” Management Objective 14, ARMPA at 24. The ARMPA also provides that disturbance will be limited to one facility per square mile and to a cumulative five percent of suitable habitat. FEIS at 2-24, 2-25. The CD-C FEIS’s preferred alternative does not appear to reflect an attempt to prioritize or focus development outside of sage-grouse habitat first, as required by the ARMPA. *Id.*

There are 1,672 square mile sections in the CD-C Project Area and there are 980 federally owned sections. FEIS at 1-1 (Table 1-1). Under an allowance for up to eight well pads per square mile this means there could be up to 7,840 well pads permitted on the 980 federally owned sections, which is nearly the 8,950 total wells being planned in the entire project area pursuant to this FEIS.

Under Alternative F it is assumed that the number of multi-well pads will increase by 40 percent and 59 percent of the wells will be drilled directionally. FEIS at 4-8. However, it must be noted these are *assumptions*; there is no provision in the preferred alternative that *mandates* the use of directional drilling so as to reduce environmental impacts.¹⁸ And as noted, development may not even be limited to 8 well sites per section due to the provision for exceptions to this limit.

The BLM claims that “with the use of directional drilling technology, perhaps only one or two surface locations (well pads) per section would be needed, and the resultant surface disturbance could be 20 acres or less.” FEIS at 4-10. But no data or analysis is presented that supports this claim. And in fact the FEIS tends to counter this claim with statements like this: “The Proposed Action does not define the specific locations of any natural gas wells or associated facilities proposed for the CD-C project area. The analysis of impacts described in this chapter assumes that facility construction and well-drilling could occur anywhere within the project area.” *Id.* This brings into question the BLM’s claim that there will be 5,465 well pads developed under Alternative F, FEIS at 4-9 (Table 4.0-2), when its preferred alternative specifically allows for up to 8 well pads on each of the 980 sections owned by the federal

¹⁸ As stated in the FEIS, “Under Alternative F it is *assumed* that 52 percent of the new wells would be drilled from multi-well pads . . .” FEIS at 4-227 (emphasis added). Moreover, “[t]he directional drilling percentage is not a commitment on the part of the Operators and is not stated in their Project Description but is inferred from the disturbance totals and the per acre disturbance estimates described above.” *Id.* at 4-6.

government, and places no limits on how many of these well pads can be developed. It is clear there will only be limited controls on the level of surface disturbance under the preferred alternative, especially since protections for wildlife will only be put in place “to the extent practicable.”

In essence the BLM is planning to put in place an 80-acre well spacing plan for the CD-C Project Area, at least relative to surface density on federal lands. It would allow for up to 8 well pads per 640 acre federally-owned section, which represents 80 acre spacing. As can be seen on Map 4.0-2 in the FEIS, approximately 50 percent of the project area is already subject to an 80-acre spacing order from the Wyoming Oil and Gas Conservation Commission. FEIS at 4-12. But a significant portion of the project area, at least 30 percent, is subject to a less dense downhole well spacing order, 160 acres. *Id.* Many sections of BLM land are included in the 160-acre spacing provision, but now BLM is essentially converting those areas to 80 acre spacing. *See* FEIS at ES-2 (Map ES-1) (showing locations of BLM owned lands in the CD-C Project Area, many of which are in the 160 acre spacing areas shown in Map 4.0-2). Much of this 160-acre spacing area has very little existing development. FEIS at 1-2 (Map 1-1). This 160-acre spacing area also has very little existing disturbance; much of it with zero acres per section of disturbance or only 0-10 acres of disturbance. *Id.* at 2-5 (Map 2-1). Again, it is clear that the BLM’s preferred alternative will greatly increase environmental disturbance in the CD-C Project Area.

One of the most significant concerns regarding the BLM’s preferred alternative is the level of well drilling that is planned to be permitted and even encouraged. This level of drilling has little basis in the likely conditions that will prevail in the CD-C Project Area.

BLM is planning to allow, and assumes, that there could be 600 wells drilled per year in the CD-C Project Area. FEIS at 2-1. This would allow the 8,950 wells that are planned to be drilled in the 10-15 year window after project approval that BLM projects. *Id.* Yet in the past, only about two to three hundred wells have been drilled in the CD-C Project Area per year. Over the 10-year period ending December 31, 2013, drilling averaged 236 wells per year, with a peak in 2008 of 304 wells, and only 118 wells were drilled in 2013 under current economic conditions.¹⁹ *Id.* at 3-221.

Many variables will determine how many wells are actually drilled, including production success, engineering technology, economics, and lease stipulations. FEIS at 1-4, 2-18. “The actual pace and timing of development in the project area would be dependent on a variety of factors including natural gas demand, pricing, regulatory approvals, rig and manpower availability, weather, and corporate strategies.” *Id.* at 4-186. And, “[t]he total number of wells drilled would depend largely on variables outside of the Operators’ control...” *Id.* at 1-4.

The current price of natural gas is only about \$ 2.00 per MMBtu and the Energy Information Administration predicts only modest increases by 2020 with perhaps a greater increase by 2040, although under some scenarios there is little increase in price even by 2040. http://www.eia.gov/forecasts/aeo/executive_summary.cfm. There seems to be little chance that

¹⁹ We would note that this drilling took place during the development and pendency of this EIS. Scoping for the initial phase of this project began in 2005 and scoping for the revised CD-C project began in 2006. FEIS at 1-13. So this level of drilling is the best estimate of what to expect relative to well drilling in the CD-C Project Area.

well drilling levels in the CD-C Project Area will exceed the historical two to three hundred wells per year drilling level, at least in the next 10 years or so, when the well drilling is planned.

A comparison to well drilling in the Pinedale Anticline oil and gas field in Sublette County also shows that BLM's drilling projections for the CD-C are significantly over-optimistic. According to QEP Resources, which operates on the Pinedale Anticline, "[t]he Pinedale Anticline traps one of the largest accumulations of natural gas in the continental United States" and "[t]he thick and unique gas-charged section means Pinedale contains more gas per square mile than almost any other gas field in the United States." <http://www.qepres.com/operations/pinedale-anticline/>. According to the Wyoming State Geological Survey, "Pinedale field is the largest gas field in Wyoming and the sixth largest in the United States." <http://www.wsgs.wyo.gov/public-info/guide-pinedale>.

In September, 2008 the BLM completed its EIS for the Pinedale Anticline development project and approved drilling 4,399 additional wells. Well drilling was estimated to last through 2025, or 17 years. That would equate to 259 wells per year. And in fact, since the ROD for the Pinedale Anticline Project was approved on September 12, 2008, only 1,656 wells were drilled in the area between September 12, 2008 and September 12, 2015, seven years. <http://www.wy.blm.gov/jio-papo/papo/index.htm>. This equates to 237 wells per year.

Whatever else the CD-C field may be, it is not the Pinedale Anticline. While there are certainly natural gas reserves in the CD-C, they are not comparable to what is in the Pinedale Anticline, which is one of the biggest and most productive gas fields onshore in the continental United States. Yet drilling for that project only contemplated 259 wells per year being drilled and in fact only 237 wells have been drilled per year. Given these data it is impossible to see how the BLM can plan for, and to some extent promote, 600 wells per year being drilled in the CD-C Project Area. This is especially true given the two to three hundred wells per year historical level of drilling in the CD-C Project Area, which is in alignment with what has been seen in the Pinedale Anticline.

The significance of this is that the BLM should revise its development plans for the CD-C so as to recognize realistic development levels. It is *highly* unlikely there will be any need to accommodate 8,950 wells in this area on 80 acre surface spacing in the next 10-15 years. The data indicate that it is likely that no more than 2,000 to 4,500 wells will need to be accommodated in that time frame (these figures are arrived at by multiplying the 200-300 wells per year historical well-drilling development level that has been seen in the CD-C times the 10 to 15 year drilling development window that the BLM projects).

Allowing for development at this level would not in any way impair any valid existing rights that the operators have. They would have an opportunity to engage in significant levels of development for the foreseeable future. And if over time it became apparent even more development should be allowed or was needed there would be ample opportunity to accommodate any such additional development through preparation of a supplemental NEPA environmental analysis. This is what "adaptive management" contemplates—modifying plans based on actual facts that are observed and determined during initial implementation of a project.

And if only 2,000 to 4,500 wells will actually be drilled, there is also no need to allow for up to 7,840 well pads on 80 acre surface spacing on the federally owned sections of land, as Alternative F would currently permit. If 52 percent of the well pads will be multi-well, as is assumed under Alternative F (see footnote 18), no more than about 1,000 to 2,300 well pads need to be planned for. This would be a well pad density of only about 1 to 2.3 pads per federally owned section, far less than the 8 well pads per section that Alternative F would currently allow. And again, this level of drilling could be allowed while still allowing operators to fully exercise their lease rights, with allowance made for future supplemental NEPA analysis to accommodate additional development if needed.

Given the above, the BLM should modify the preferred alternative prior to issuance of the ROD. It should carefully reconsider the provisions in Alternatives B, C, and D, all of which would allow development at desired levels but with greater levels of *specified* environmental protection.²⁰ In addition, we note that Appendix C of the FEIS *requires* application of a phased development approach to concurrent reclamation as a Required Design Feature, FEIS at C-34, so even though consideration of a phased development alternative was rejected, this option needs to be reconsidered.²¹ These additional levels of protection should be incorporated into the preferred alternative. These other alternatives better reflect actual well drilling levels that are likely in the CD-C Project Area and would be based on more appropriate well pad densities, while still allowing operators to exercise their lease rights.

Alternative B, C, or D is almost certainly the “environmentally preferable” alternative which will have to be identified in the CD-C ROD. *See* 40 C.F.R. § 1505.2(b) (requiring the environmentally preferable alternative to be specified in the ROD). Given that one or more of these alternatives is clearly environmentally preferable to Alternative F, it would be appropriate to select one of these, or a combined version of them, as the preferred alternative in the ROD.

Section 1502 of the Council on Environmental Quality (CEQ) NEPA regulations requires an EIS to “state how alternatives . . . will or will not achieve the *requirements* of sections 101 and 102(1)” of NEPA. 40 C.F.R. § 1502.2(d) (emphasis added). Section 101 of NEPA creates the “productive harmony” standard and specifies a number of requirements to protect the environment. 42 U.S.C. §§ 4331 and 4332. A national policy expressed in the CEQ regulations is that agencies must “use all practicable means . . . to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions” 40 C.F.R. § 1500.2(f). Alternative F does not meet these standards and should be rejected in favor of Alternative B, C, or D, or a combined version of these alternatives, so that the “environmentally preferable” alternative is put in place in the CD-C Project Area. The Department of the Interior’s strategy for improving mitigation policies and practices and the Presidential Memorandum: *Mitigating Impacts on Natural Resources from Development and Encouraging Related Private*

²⁰ While the BLM says that Alternative D, the directional drilling alternative, which would only allow one new multi-well pad per section, would reduce the number of wells from 8,950 to 7,894, FEIS at ES-6, this is only 1000 wells less than the operators proposal, and as discussed, actually drilling even this number of wells in the next 10-15 years is highly unlikely. Permitting nearly 8000 wells to be drilled would more than meet any lease rights that have been granted in the foreseeable future, and as indicated any additional development needs could be accommodated through preparation of supplemental NEPA documents.

²¹ Another Required Design Feature is to “use directional and horizontal drilling to the extent feasible as a means to reduce surface disturbance in relation to the number of wells.” FEIS at C-34.

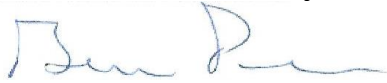
Investment both stand for the proposition that the environmentally preferable alternative should be selected for the CD-C.

CONCLUSION

Thank you for considering these comments regarding the Continental Divide-Creston Final Environmental Impact Statement. We encourage incorporation of these ideas and concerns into the Record of Decision for this project. Should you wish to discuss these comments further, please contact the undersigned.

Sincerely,

The Wilderness Society



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Enclosures

Review of noise protocols for sage-grouse in the BLM Approved Resource Management Plan Amendment for Sage-Grouse (9-Plan) and Wyoming Governor's Executive Order 2015-4 and recommendations for revisions

May 11, 2016

Skip Ambrose, Sandhill Company
Professor Gail Patricelli, University of California, Davis
Holly Copeland, The Nature Conservancy

Our understanding of noise impacts to wildlife and especially to sage-grouse have improved in recent years. Several studies have suggested that anthropogenic noise is detrimental to Greater sage-grouse (Rogers 1964; Braun 1998; Holloran 2005). Recent studies confirm this impact experimentally by introducing recordings of industrial noise to otherwise undisturbed leks, finding immediate and sustained declines in lek attendance compared to paired control leks (29% declines on leks with introduced gas drilling noise; 73% declines on leks with introduced vehicle noise); This study also found increased stress hormones and altered behaviors on these noise playback leks (Blickley 2012; Blickley et al. 2012a; Blickley et al 2012b). **These results suggest that effective management of the natural soundscape is critical to the conservation and protection of sage-grouse (Patricelli et al. 2013).**

Accordingly, the BLM's Approved Resource Management Plan Amendment for Sage-Grouse (9-Plan) and the Wyoming Governor's Executive Order (2015-4) both incorporate language intended to manage for noise levels near leks and reduce impacts to breeding grouse. We discuss each of these in detail and conclude with recommendations to ensure consistency with the best available science.

BLM Approved Resource Management Plan Amendment (RMPA)

The BLM's RMPA for Sage-Grouse (9-plan) in Appendix C on page 131 states:

“During lekking (March 1 to May 15), restrict noise to 10dB above ambient (not to exceed 20-24 dB) measured at the perimeter of an occupied lek to lekking birds from 6 pm to 9 am. (Patricelli et al. 2010, Blickley et al. 2012)”

This RMPA rule is a significant improvement over the Wyoming Governor's Executive Order, discussed below, for two reasons. First, this rule extends the period of protection from 6pm to 9am, rather than ending at 8am. This extra hour of protection is important—we have found that an average of 17% of matings occur after 8am, ranging from 4% of matings in one lek-year to 41% in another lek-year (based on detailed observations of 12 lek-years from 5 leks near Hudson, WY, between 2006 and 2014; Patricelli and Krakauer, unpublished data). Further, the mean departure time of birds from these leks is approximately 9:00 am, with activity extending some days until 11 am. Studies of lek attendance in Colorado and Montana also found that lek activity commonly continues past 8 am (Jenni and Hartzler 1978; Walsh et al. 2004).

Second, and more important, this RMPA rule improves upon the Wyoming Governor's Executive Order because it uses a fixed ambient value as a baseline. For the reasons discussed in detail below, this is critically important for effective protection of sage-grouse breeding activity.

However, while the use of a fixed ambient value is a critical improvement over the use of measured baseline values, **using 20-24 dB is inappropriate as a measure of ambient noise.** Neither of the two papers cited in the rule, Patricelli et al. 2010 or Blickley et al. 2012, provide any justification for these ambient values. Neither of these papers report ambient values for representative areas during the lekking period. A more recent, peer-reviewed article suggests 16-20 dBA as appropriate ambient levels for sage-grouse habitat (Patricelli et al. 2013). Even these recommended values, however, were proposed as interim values, to be used until high-quality long-term measurements could be collected across sage-grouse habitat in multiple representative locations. Such an effort has now been completed and the results, described below, represent the best available science for setting baseline noise levels.

The State of Wyoming, through the Sage-grouse Local Working Groups (LWGs), funded a recent effort to measure ambient noise levels in sage habitats in four of the eight LWG Areas in Wyoming in April 2014 (13-22 days, total of 1805 hours). The four working LWG areas were: Bighorn Basin, Wind River/Sweetwater River Basin, Bates Hole/Shirley Basin, and Upper Green River Basin. Lekking hours (6 pm to 8 am) averaged 14.2 dBA (L₉₀) and 15.4 dBA (L₅₀) (Ambrose et al. 2014a). Common sounds included in these L₅₀ measurements were birds, insects, and wind through vegetation, as well as farming, ranching, vehicles, and aircraft (but absent oil and gas development or other continuous noise sources). Therefore, this value represents ambient noise levels in typical sage-grouse habitat in Wyoming with some audible anthropogenic sounds, but does not include sounds of developed industrial areas. American National Standards Institute (ANSI) recommends using the L₉₀ as the “residual noise level” or “background ambient” and L₅₀ as “existing ambient.” In rural areas of Wyoming, prior to development, L₉₀ and L₅₀ values are very similar (<1.0 dBA difference), thus the choice is inconsequential.

It is important to note sound levels reported in Ambrose et al. (2014a) were often near the lower limit (noise floor) of the sound level meters used (13.5 dBA). This means that actual environmental sound levels were lower than reported by the meters. At one location, a very sensitive, 1” low-noise microphone (noise floor = 0 dBA) was deployed simultaneously with a standard ½” microphone. For this 7-day measurement period, the ½” microphone system reported L₉₀ and L₅₀ levels of 14.5 dBA and 16.7 dBA, respectively. For the same time period, the 1” microphone system reported L₉₀ and L₅₀ levels of 7.2 dBA and 14.0 dBA, respectively. In all likelihood, sound levels in rural, undeveloped Wyoming are lower than reported by Ambrose et al. (2014a) during lekking hours.

Based on the Ambrose 2013 and 2014a studies, the ambient noise levels in typical sage-grouse habitat in Wyoming (and likely rangewide) are 14-17 dBA or less. **For the purposes of establishing noise stipulations relative to greater sage-grouse, we recommend using a fixed ambient of 16 dBA as a baseline; this is consistent with a peer-reviewed publication (Patricelli et al. 2013) and widely-used reports (e.g. EPA 1971).** Allowing 10 dB of noise from new projects, this leads to an allowable level of 26 dBA.

Recent research in the Pinedale Anticline Project Area (PAPA) south of Pinedale, WY, provides further support for this recommendation. Twenty two leks were studied (19 on the PAPA and 3 outside the PAPA) by counting male grouse at the leks (2000-2014) (Wyoming Department Game and Fish, unpublished data) and measuring sound levels at the leks (2013-2014) (Ambrose et al. 2014b). L₅₀ dBA sound levels at the leks were strongly associated with Poisson-transformed trends in grouse counts ($R^2 = 0.552$, $P < 0.001$); the higher the L₅₀ dBA, the greater the likelihood of a declining trend. For leks on the PAPA, the average percent change from 2000 (the beginning of the observation period) for leks with L₅₀ >26 dBA was -69%, whereas the average change on leks with

noise <26 dBA was -29%. These data suggest that at L₅₀ sound levels of >26 dBA, negative impacts to sage-grouse due to anthropogenic noise begin to accelerate (see Figure 1).

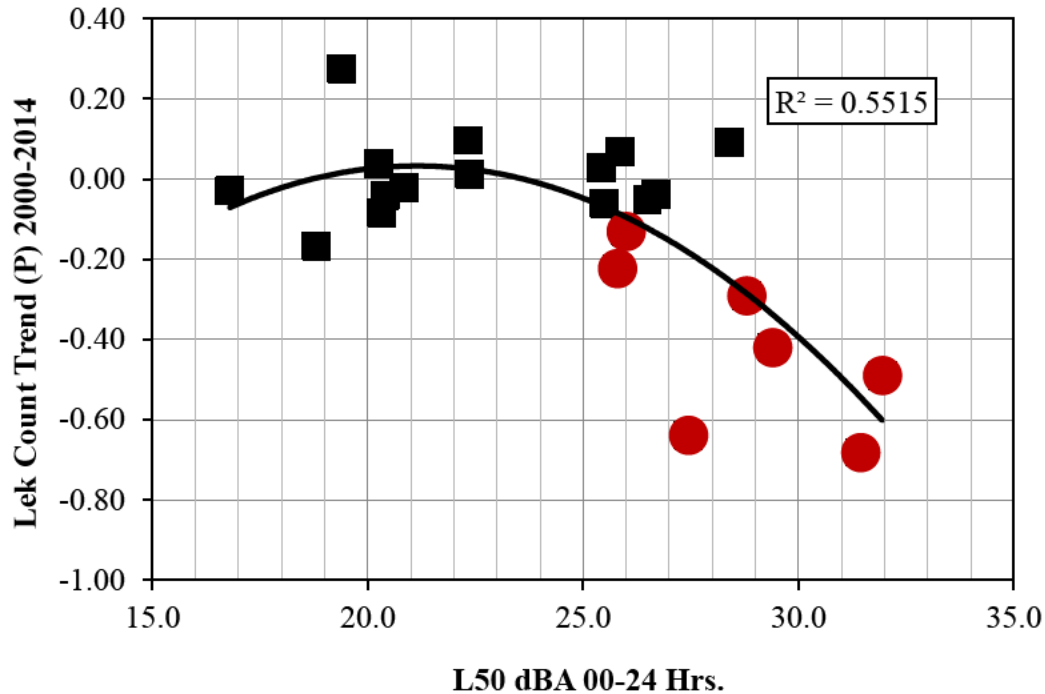


Figure 1. Trends of grouse counts (2000-2014) and L₅₀ dBA levels (2013-2014) at 22 leks (19 in the PAPA and 3 outside the PAPA). Larger, red symbols indicate that the leks have been inactive for 2 years or more. Trend lines are polynomial regression analysis.

The use of 26 dBA as a threshold is further supported by comparisons of the leks that have remained active or become inactive. We examined whether the proportion of leks that were inactive for at least the past 2 years (during noise measurement) was higher for leks exposed to L₅₀ noise levels of >26 dBA compared to leks exposed to <26 dBA. Of the leks that had L₅₀ values <26 dBA, 1 lek (10%) was inactive and 9 were active; of the leks that had L₅₀ values >26 dBA, 6 of 9 leks (66%) were inactive. Even in this small sample, this represents a significant increase in the probability of a lek becoming inactive when exposed to >26 dBA of noise (Fisher’s Exact Test, two-tailed p=0.02). Further, the median L₅₀ of inactive leks (28.8 dBA) was significantly higher than the median L₅₀ of active leks (23.9 dBA) (Mann-Whitney U=8, p<0.005).

Detailed recommendations for noise rules

For the purposes of assessing acoustic impacts to greater sage-grouse, we recommend using 26 dBA as the threshold for noise exposure (ambient 16 dBA + 10 dBA). For compliance with this limit, we recommend that measurement be made at the perimeter of the lek, with a Type I Sound Level Meter (capable of measuring the acoustic environment of the study area), for a minimum of 7 days (to cover normal variability due to different meteorological conditions) during the lekking period. The sounds of lekking birds will have minimal impacts on these measures. Pater et al. (2009) recommend noise measurement at the height most relevant to assessing noise impacts on wildlife (see also Delaney et al. 1999, Patricelli et al 2013, and others), which is also consistent with ANSI standards (1994, Section 7.3.2.4), therefore we recommend that SLM microphone height should be 12” to approximate ear height of greater sage-grouse; this microphone placement will also reduce the impact of wind, which could artificially inflate measures and count against compliance. We

recommend that the median of hourly L₅₀ values during monitoring period should be used to assess compliance (see Patricelli et al 2013 for explanation). Using this metric, one or more hours may exceed 26 dBA, but the median of all hours should be <26 dBA.

Situations When Existing Ambient Exceeds 26 dBA

There may be situations where sound levels at leks exceed an L₅₀ of 26 dBA before project initiation due to existing noise sources, though recent data suggest that this is unlikely outside of heavily-developed areas (Ambrose et al. 2014a and 2014b). In these cases, the best available evidence suggests that additional noise will increase the impact on these leks, as sage-grouse do not adapt to the presence of noise over time (as discussed below; Patricelli et al. 2013). Therefore, to limit impacts on sage grouse, new projects should not contribute to an increase in sound levels at leks already exceeding the noise limits. This rule would not preclude further development at sites that already have sources exceeding 26 dBA due to the non-additive way that multiple sound sources combine to determine overall noise levels. For example, a new source with an L₅₀ 9 dB quieter than the L₅₀ of an existing source at the measurement site would add only 0.5 dB to the total noise exposure. Therefore new projects could proceed by increasing the distance to the lek or through the use of noise-mitigation technology.

Hours Outside the Lekking Period

Maintaining lek activity involves males and females foraging, roosting, nesting and brood-rearing before and after lekking times on a daily and seasonal basis, and noise impacts may also occur during these off-lek activities (e.g. Vehrencamp et al. 1989; Wallestad and Schladweiler 1974; Schoenberg 1982; Patricelli et al. 2013). Therefore, outside of lekking hours during the breeding season, reasonable efforts should be made to keep noise as close to these limits as possible.

RECOMMENDED LANGUAGE FOR THE BLM RMPA

The most critical change to existing RMPA language is to replace to fixed ambient level of “20-24 dB” with “16 dBA”. However, additional changes to the language would provide guidance for consistent measurements to assess compliance:

Noise: Noise levels should not exceed 26 dBA at the perimeter of the lek during lekking hours (6 pm to 9 am) during the breeding season (March 1 to May 15); 26 dBA represents a level 10 dBA above existing ambient noise levels in sage-grouse habitats in rural Wyoming. Outside of lekking hours during the breeding season, reasonable efforts should be made to keep noise as close to these limits as possible. In situations where existing noise levels at leks exceed 26 dBA before project initiation, new projects should not contribute to an increase in sound levels at leks; this can be accomplished through noise mitigation measures, such as pad siting and technology that limits the combined noise exposure.

All compliance measurement should be made at the perimeter of the lek, with a Type I Sound Level Meter (capable of measuring the acoustic environment of the study area), for a minimum of 7 days (to cover normal variability due to different meteorological conditions), during lekking hours (6 pm to 9 am), during the breeding season (March 1 to May 15). Microphone height should be 12” to approximate ear height of greater sage-grouse. The median of hourly L₅₀ values during monitoring period should be used to assess compliance; using this metric, one or more hours may exceed 26 dBA, but the median of all hours will be <26 dBA. Measurement methods should follow published standards of the American National Standards Institute (ANSI).

The Wyoming Governor's Executive Order (2015-4):

“New project noise levels, either individual or cumulative, should not exceed 10 dBA (as measured by L₅₀) above baseline noise at the perimeter of the lek from 6:00 pm to 8:00 am during the breeding season (March 1 to May 15). Specific noise protocols for measurement and implementation will be developed as additional research and information emerges.”

Although this statement appears straightforward and logical, the Wyoming Governor's Executive Order has a critical deficiency because it fails define a fixed statewide “baseline noise” level and leaves the meaning of this term open for interpretation. “Baseline noise” could be interpreted to mean the baseline levels in a representative area with little to no human impact, or it could be interpreted as the noise levels at the proposed site before development occurs. The latter interpretation, establishing baseline noise on a lek-by-lek or site-by-site basis, will inevitably lead to inappropriately high measures of baseline, thereby increasing the allowable noise and providing insufficient protection for greater sage-grouse (Patricelli et al. 2013). This will occur 1) because accurate measurement of baseline noise levels at each lek or development site is difficult and expensive, 2) because nearly every error in the choice, placement, use, and maintenance of the equipment will lead to overestimation of baseline noise values, thus higher allowable noise limits, and 3) because even accurate measures would include existing activity in the baseline, leading to incremental increases in impacts to sage-grouse (Patricelli et al. 2013).

This third concern—about incremental increases in noise exposure—is especially critical. For example, assume that background noise levels at a lek in are 16 dBA during the lekking period (6pm to 9am). Assume in year 1 that a gas drilling operation is proposed 4.0 miles away, leading to an increase in the sound level at the lek to 21 dBA. This is less than 10 dBA over the baseline noise of 16 dBA, and thus would be in compliance with the EO. The new baseline noise at this lek would become 21 dBA. Then assume in year 2 a gas drilling operation is proposed 2.0 miles away, leading to an increase in the sound level at the lek to 27 dBA. This is less than 10 dBA over the baseline noise of 21 dBA, and thus would be in compliance. The new baseline noise would become 27 dBA. Then assume in year 3 a gas drilling operation is proposed 1.0 miles distant, leading to an increase in the sound level at the lek to 33 dBA. This is less than the 10 dBA over the baseline noise of 27 dBA, and thus would be in compliance. The new baseline noise would become 33 dBA. And so on. In this example, the “baseline noise” increases incrementally with each new and closer activity, even though no single project exceeded the 10 dBA over baseline threshold. This could continue until the drilling operation was 100 feet from the lek, with the same assessment of “no impact.” However, the best available evidence suggests that additional noise will increase the impact on these leks, because sage-grouse do not adapt to the presence of noise over time (Patricelli et al. 2013). In a 3-year experimental introduction of noise to leks, Blickley et al. (2012a) found an immediate decline in male lek attendance, which did not abate over time, and increased stress hormones in the second and third years of playback (Blickley et al. 2012b). The inclusion of existing noise into ambient values clearly does not protect greater sage-grouse.

Indeed, the Wyoming Governor's Executive Order has already been interpreted to mean that noise levels should be measured at lek edge before project initiation. The Noise Impact Analysis Report prepared by Behrens and Associates, Inc. for proposed infill drilling on the Jonah Field (Behrens and Associates, 2016), states the following: “In the absence of any newly developed protocols, based on the language in the EO the ambient/baseline noise level is taken to be measured L₅₀ sound levels between the hours of 6:00 p.m. and 8:00 a.m. as measured without any nearby drilling activity.” The

report states that there was no nearby drilling activity; however, “nearby” is not defined and the leks are described as having “existing oil and gas related facilities nearby”. While there may not have been drilling activity audible to the engineers, there is a great deal of gas field activity near the focal leks, contributing to ambient noise levels. The resulting measures of ambient noise reported (30.0 dBA L₅₀ at one lek and 36.3 dBA at another) are typical of rural areas with human activity, such as farm lands (EPA 1971). These values are also higher than measurements from the same locations collected by Sandhill Company (28.3 dBA L₅₀ and 29.0 dBA respectively; See attached). This discrepancy is likely due to microphone placement and the fact that the Behrens report did not exclude periods of wind exceeding 5 m/s, as described in ANSI standards. As a result, the report concluded that allowable noise levels on two focal leks were 40 dBA and 46 dBA. These values are extremely high. If undisturbed baseline noise is 14-17 dBA (or less, see above), the second lek would be exposed to noise levels 29-32 dB higher—and therefore more than 8 times louder—than baseline levels. Based on results from experimental studies (Blickley et al. 2012a and 2012b) and observational analyses (see above), are likely to cause a significant impact to sage-grouse populations. A detailed critique of this report is provided in Attachment A.

Commitment to Using “Best Science”

The BLM states a continued commitment to research and use of best available science in the RMPA: *“Through implementation of this strategy, new management issues and questions are likely to arise that may warrant additional guidance or study by technical experts, scientists, and researchers. The BLM is committed to continue working with individuals and institutions with expertise in relevant fields in order to ensure that land and resource management affecting conservation of the GRSG and the sagebrush ecosystem continues to be guided by sound peer-reviewed research and the best available science.”*

The Wyoming Executive Order ends with the statement *“Specific noise protocols for measurement and implementation will be developed as additional research and information emerges.”*

We emphasize that the research and information needed to establish a scientifically defensible ambient standard and develop specific protocols for measuring 10 dBA above this standard are already available. The critical problem with the Wyoming EO rule could be addressed by providing a specific protocol for implementation which specifies a fixed background noise level. We recommend setting this baseline as 16 dBA for both the RMPA and the Wyoming EO, as discussed above, thus setting maximum allowable noise levels at 26 dBA. The BLM’s RMPA ambient standard of 20-24 dBA is a critical improvement from no ambient standard in the Wyoming EO; however values above 16 dBA are too high based on the research cited above, and we recommend adjusting to 16 dBA as the fixed baseline.

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Second, and more important, this RMPA rule improves upon the Wyoming Governor's Executive Order because it uses a fixed ambient value as a baseline. For the reasons discussed in detail below, this is critically important for effective protection of sage-grouse breeding activity.

However, while the use of a fixed ambient value is a critical improvement over the use of measured baseline values, **using 20-24 dB is inappropriate as a measure of ambient noise.** Neither of the two papers cited in the rule, Patricelli et al. 2010 or Blickley et al. 2012, provide any justification for these ambient values. Neither of these papers report ambient values for representative areas during the lekking period. A more recent, peer-reviewed article suggests 16-20 dBA as appropriate ambient levels for sage-grouse habitat (Patricelli et al. 2013). Even these recommended values, however, were proposed as interim values, to be used until high-quality long-term measurements could be collected across sage-grouse habitat in multiple representative locations. Such an effort has now been completed and the results, described below, represent the best available science for setting baseline noise levels.

The State of Wyoming, through the Sage-grouse Local Working Groups (LWGs), funded a recent effort to measure ambient noise levels in sage habitats in four of the eight LWG Areas in Wyoming in April 2014 (13-22 days, total of 1805 hours). The four working LWG areas were: Bighorn Basin, Wind River/Sweetwater River Basin, Bates Hole/Shirley Basin, and Upper Green River Basin. Lekking hours (6 pm to 8 am) averaged 14.2 dBA (L₉₀) and 15.4 dBA (L₅₀) (Ambrose et al. 2014a). Common sounds included in these L₅₀ measurements were birds, insects, and wind through vegetation, as well as farming, ranching, vehicles, and aircraft (but absent oil and gas development or other continuous noise sources). Therefore, this value represents ambient noise levels in typical sage-grouse habitat in Wyoming with some audible anthropogenic sounds, but does not include sounds of developed industrial areas. American National Standards Institute (ANSI) recommends using the L₉₀ as the “residual noise level” or “background ambient” and L₅₀ as “existing ambient.” In rural areas of Wyoming, prior to development, L₉₀ and L₅₀ values are very similar (<1.0 dBA difference), thus the choice is inconsequential.

It is important to note sound levels reported in Ambrose et al. (2014a) were often near the lower limit (noise floor) of the sound level meters used (13.5 dBA). This means that actual environmental sound levels were lower than reported by the meters. At one location, a very sensitive, 1” low-noise microphone (noise floor = 0 dBA) was deployed simultaneously with a standard ½” microphone. For this 7-day measurement period, the ½” microphone system reported L₉₀ and L₅₀ levels of 14.5 dBA and 16.7 dBA, respectively. For the same time period, the 1” microphone system reported L₉₀ and L₅₀ levels of 7.2 dBA and 14.0 dBA, respectively. In all likelihood, sound levels in rural, undeveloped Wyoming are lower than reported by Ambrose et al. (2014a) during lekking hours.

Based on the Ambrose 2013 and 2014a studies, the ambient noise levels in typical sage-grouse habitat in Wyoming (and likely rangewide) are 14-17 dBA or less. **For the purposes of establishing noise stipulations relative to greater sage-grouse, we recommend using a fixed ambient of 16 dBA as a baseline; this is consistent with a peer-reviewed publication (Patricelli et al. 2013) and widely-used reports (e.g. EPA 1971).** Allowing 10 dB of noise from new projects, this leads to an allowable level of 26 dBA.

Recent research in the Pinedale Anticline Project Area (PAPA) south of Pinedale, WY, provides further support for this recommendation. Twenty two leks were studied (19 on the PAPA and 3 outside the PAPA) by counting male grouse at the leks (2000-2014) (Wyoming Department Game and Fish, unpublished data) and measuring sound levels at the leks (2013-2014) (Ambrose et al. 2014b). L₅₀ dBA sound levels at the leks were strongly associated with Poisson-transformed trends in grouse counts ($R^2 = 0.552$, $P < 0.001$); the higher the L₅₀ dBA, the greater the likelihood of a declining trend. For leks on the PAPA, the average percent change from 2000 (the beginning of the observation period) for leks with L₅₀ >26 dBA was -69%, whereas the average change on leks with

noise <26 dBA was -29%. These data suggest that at L₅₀ sound levels of >26 dBA, negative impacts to sage-grouse due to anthropogenic noise begin to accelerate (see Figure 1).

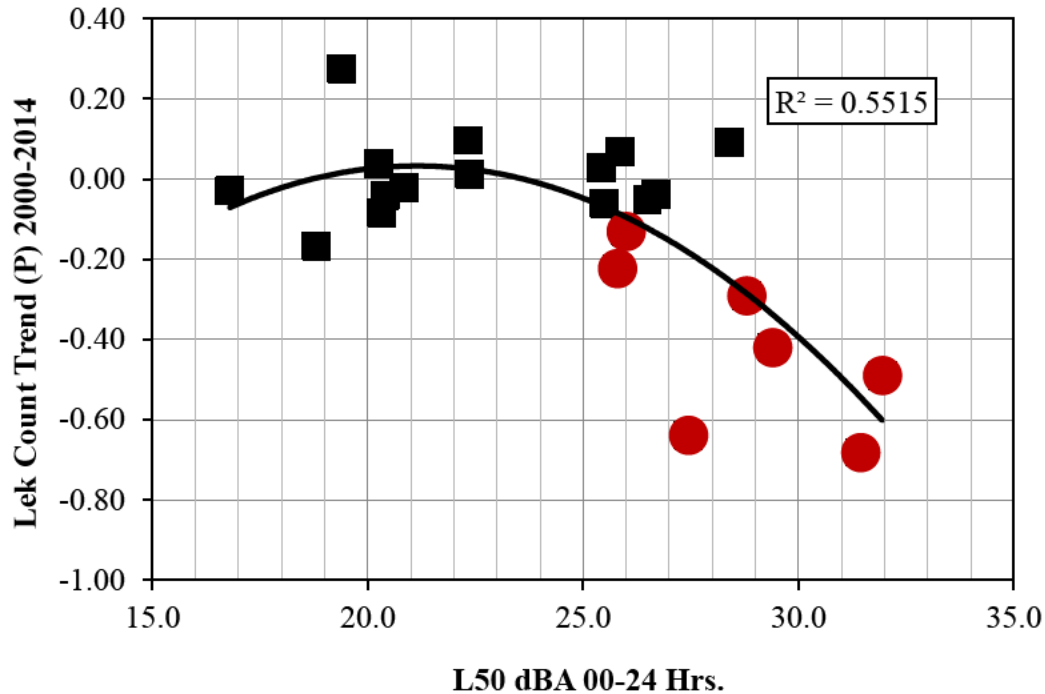


Figure 1. Trends of grouse counts (2000-2014) and L₅₀ dBA levels (2013-2014) at 22 leks (19 in the PAPA and 3 outside the PAPA). Larger, red symbols indicate that the leks have been inactive for 2 years or more. Trend lines are polynomial regression analysis.

The use of 26 dBA as a threshold is further supported by comparisons of the leks that have remained active or become inactive. We examined whether the proportion of leks that were inactive for at least the past 2 years (during noise measurement) was higher for leks exposed to L₅₀ noise levels of >26 dBA compared to leks exposed to <26 dBA. Of the leks that had L₅₀ values <26 dBA, 1 lek (10%) was inactive and 9 were active; of the leks that had L₅₀ values >26 dBA, 6 of 9 leks (66%) were inactive. Even in this small sample, this represents a significant increase in the probability of a lek becoming inactive when exposed to >26 dBA of noise (Fisher’s Exact Test, two-tailed p=0.02). Further, the median L₅₀ of inactive leks (28.8 dBA) was significantly higher than the median L₅₀ of active leks (23.9 dBA) (Mann-Whitney U=8, p<0.005).

Detailed recommendations for noise rules

For the purposes of assessing acoustic impacts to greater sage-grouse, we recommend using 26 dBA as the threshold for noise exposure (ambient 16 dBA + 10 dBA). For compliance with this limit, we recommend that measurement be made at the perimeter of the lek, with a Type I Sound Level Meter (capable of measuring the acoustic environment of the study area), for a minimum of 7 days (to cover normal variability due to different meteorological conditions) during the lekking period. The sounds of lekking birds will have minimal impacts on these measures. Pater et al. (2009) recommend noise measurement at the height most relevant to assessing noise impacts on wildlife (see also Delaney et al. 1999, Patricelli et al 2013, and others), which is also consistent with ANSI standards (1994, Section 7.3.2.4), therefore we recommend that SLM microphone height should be 12” to approximate ear height of greater sage-grouse; this microphone placement will also reduce the impact of wind, which could artificially inflate measures and count against compliance. We

recommend that the median of hourly L_{50} values during monitoring period should be used to assess compliance (see Patricelli et al 2013 for explanation). Using this metric, one or more hours may exceed 26 dBA, but the median of all hours should be <26 dBA.

Situations When Existing Ambient Exceeds 26 dBA

There may be situations where sound levels at leks exceed an L_{50} of 26 dBA before project initiation due to existing noise sources, though recent data suggest that this is unlikely outside of heavily-developed areas (Ambrose et al. 2014a and 2014b). In these cases, the best available evidence suggests that additional noise will increase the impact on these leks, as sage-grouse do not adapt to the presence of noise over time (as discussed below; Patricelli et al. 2013). Therefore, to limit impacts on sage grouse, new projects should not contribute to an increase in sound levels at leks already exceeding the noise limits. This rule would not preclude further development at sites that already have sources exceeding 26 dBA due to the non-additive way that multiple sound sources combine to determine overall noise levels. For example, a new source with an L_{50} 9 dB quieter than the L_{50} of an existing source at the measurement site would add only 0.5 dB to the total noise exposure. Therefore new projects could proceed by increasing the distance to the lek or through the use of noise-mitigation technology.

Hours Outside the Lekking Period

Maintaining lek activity involves males and females foraging, roosting, nesting and brood-rearing before and after lekking times on a daily and seasonal basis, and noise impacts may also occur during these off-lek activities (e.g. Vehrencamp et al. 1989; Wallestad and Schladweiler 1974; Schoenberg 1982; Patricelli et al. 2013). Therefore, outside of lekking hours during the breeding season, reasonable efforts should be made to keep noise as close to these limits as possible.

RECOMMENDED LANGUAGE FOR THE BLM RMPA

The most critical change to existing RMPA language is to replace to fixed ambient level of “20-24 dB” with “16 dBA”. However, additional changes to the language would provide guidance for consistent measurements to assess compliance:

Noise: Noise levels should not exceed 26 dBA at the perimeter of the lek during lekking hours (6 pm to 9 am) during the breeding season (March 1 to May 15); 26 dBA represents a level 10 dBA above existing ambient noise levels in sage-grouse habitats in rural Wyoming. Outside of lekking hours during the breeding season, reasonable efforts should be made to keep noise as close to these limits as possible. In situations where existing noise levels at leks exceed 26 dBA before project initiation, new projects should not contribute to an increase in sound levels at leks; this can be accomplished through noise mitigation measures, such as pad siting and technology that limits the combined noise exposure.

All compliance measurement should be made at the perimeter of the lek, with a Type I Sound Level Meter (capable of measuring the acoustic environment of the study area), for a minimum of 7 days (to cover normal variability due to different meteorological conditions), during lekking hours (6 pm to 9 am), during the breeding season (March 1 to May 15). Microphone height should be 12” to approximate ear height of greater sage-grouse. The median of hourly L_{50} values during monitoring period should be used to assess compliance; using this metric, one or more hours may exceed 26 dBA, but the median of all hours will be <26 dBA. Measurement methods should follow published standards of the American National Standards Institute (ANSI).

The Wyoming Governor's Executive Order (2015-4):

“New project noise levels, either individual or cumulative, should not exceed 10 dBA (as measured by L₅₀) above baseline noise at the perimeter of the lek from 6:00 pm to 8:00 am during the breeding season (March 1 to May 15). Specific noise protocols for measurement and implementation will be developed as additional research and information emerges.”

Although this statement appears straightforward and logical, the Wyoming Governor's Executive Order has a critical deficiency because it fails define a fixed statewide “baseline noise” level and leaves the meaning of this term open for interpretation. “Baseline noise” could be interpreted to mean the baseline levels in a representative area with little to no human impact, or it could be interpreted as the noise levels at the proposed site before development occurs. The latter interpretation, establishing baseline noise on a lek-by-lek or site-by-site basis, will inevitably lead to inappropriately high measures of baseline, thereby increasing the allowable noise and providing insufficient protection for greater sage-grouse (Patricelli et al. 2013). This will occur 1) because accurate measurement of baseline noise levels at each lek or development site is difficult and expensive, 2) because nearly every error in the choice, placement, use, and maintenance of the equipment will lead to overestimation of baseline noise values, thus higher allowable noise limits, and 3) because even accurate measures would include existing activity in the baseline, leading to incremental increases in impacts to sage-grouse (Patricelli et al. 2013).

This third concern—about incremental increases in noise exposure—is especially critical. For example, assume that background noise levels at a lek in are 16 dBA during the lekking period (6pm to 9am). Assume in year 1 that a gas drilling operation is proposed 4.0 miles away, leading to an increase in the sound level at the lek to 21 dBA. This is less than 10 dBA over the baseline noise of 16 dBA, and thus would be in compliance with the EO. The new baseline noise at this lek would become 21 dBA. Then assume in year 2 a gas drilling operation is proposed 2.0 miles away, leading to an increase in the sound level at the lek to 27 dBA. This is less than 10 dBA over the baseline noise of 21 dBA, and thus would be in compliance. The new baseline noise would become 27 dBA. Then assume in year 3 a gas drilling operation is proposed 1.0 miles distant, leading to an increase in the sound level at the lek to 33 dBA. This is less than the 10 dBA over the baseline noise of 27 dBA, and thus would be in compliance. The new baseline noise would become 33 dBA. And so on. In this example, the “baseline noise” increases incrementally with each new and closer activity, even though no single project exceeded the 10 dBA over baseline threshold. This could continue until the drilling operation was 100 feet from the lek, with the same assessment of “no impact.” However, the best available evidence suggests that additional noise will increase the impact on these leks, because sage-grouse do not adapt to the presence of noise over time (Patricelli et al. 2013). In a 3-year experimental introduction of noise to leks, Blickley et al. (2012a) found an immediate decline in male lek attendance, which did not abate over time, and increased stress hormones in the second and third years of playback (Blickley et al. 2012b). The inclusion of existing noise into ambient values clearly does not protect greater sage-grouse.

Indeed, the Wyoming Governor's Executive Order has already been interpreted to mean that noise levels should be measured at lek edge before project initiation. The Noise Impact Analysis Report prepared by Behrens and Associates, Inc. for proposed infill drilling on the Jonah Field (Behrens and Associates, 2016), states the following: “In the absence of any newly developed protocols, based on the language in the EO the ambient/baseline noise level is taken to be measured L₅₀ sound levels between the hours of 6:00 p.m. and 8:00 a.m. as measured without any nearby drilling activity.” The

report states that there was no nearby drilling activity; however, “nearby” is not defined and the leks are described as having “existing oil and gas related facilities nearby”. While there may not have been drilling activity audible to the engineers, there is a great deal of gas field activity near the focal leks, contributing to ambient noise levels. The resulting measures of ambient noise reported (30.0 dBA L₅₀ at one lek and 36.3 dBA at another) are typical of rural areas with human activity, such as farm lands (EPA 1971). These values are also higher than measurements from the same locations collected by Sandhill Company (28.3 dBA L₅₀ and 29.0 dBA respectively; See attached). This discrepancy is likely due to microphone placement and the fact that the Behrens report did not exclude periods of wind exceeding 5 m/s, as described in ANSI standards. As a result, the report concluded that allowable noise levels on two focal leks were 40 dBA and 46 dBA. These values are extremely high. If undisturbed baseline noise is 14-17 dBA (or less, see above), the second lek would be exposed to noise levels 29-32 dB higher—and therefore more than 8 times louder—than baseline levels. Based on results from experimental studies (Blickley et al. 2012a and 2012b) and observational analyses (see above), are likely to cause a significant impact to sage-grouse populations. A detailed critique of this report is provided in Attachment A.

Commitment to Using “Best Science”

The BLM states a continued commitment to research and use of best available science in the RMPA: *“Through implementation of this strategy, new management issues and questions are likely to arise that may warrant additional guidance or study by technical experts, scientists, and researchers. The BLM is committed to continue working with individuals and institutions with expertise in relevant fields in order to ensure that land and resource management affecting conservation of the GRSG and the sagebrush ecosystem continues to be guided by sound peer-reviewed research and the best available science.”*

The Wyoming Executive Order ends with the statement *“Specific noise protocols for measurement and implementation will be developed as additional research and information emerges.”*

We emphasize that the research and information needed to establish a scientifically defensible ambient standard and develop specific protocols for measuring 10 dBA above this standard are already available. The critical problem with the Wyoming EO rule could be addressed by providing a specific protocol for implementation which specifies a fixed background noise level. We recommend setting this baseline as 16 dBA for both the RMPA and the Wyoming EO, as discussed above, thus setting maximum allowable noise levels at 26 dBA. The BLM’s RMPA ambient standard of 20-24 dBA is a critical improvement from no ambient standard in the Wyoming EO; however values above 16 dBA are too high based on the research cited above, and we recommend adjusting to 16 dBA as the fixed baseline.

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Quarterly and Annual OGI LDAR Cost-Effectiveness Calculation ^[1]

Surveyor: Frequency:	Well Pad LDAR Conducted by Operator			Well Pad LDAR Conducted by Contractor		
	Quarterly	Semi-Annual	Annual	Quarterly	Semi-Annual	Annual
Methane Mcf Overall ^[2]	3,058	3,058	3,058	3,058	3,058	3,058
VOC emissions (mt)	16.14	16.14	16.14	16.14	16.14	16.14
Methane emissions (mt)	58.10	58.10	58.10	58.10	58.10	58.10
CH4/VOC Ratio	3.60	3.60	3.60	3.60	3.60	3.60
% Reduction	60%	50%	40%	60%	50%	40%
Methane Mcf reduced	1,835	1,529	1,223	1,835	1,529	1,223
VOC reduction (mt)	9.68	8.07	6.46	9.68	8.07	6.46
CH4 reduction (mt)	34.86	29.05	23.24	34.86	29.05	23.24
Time per Inspection (hrs)	5.7	5.7	5.7	5.7	5.7	5.7
Inspections per year	4	2	1	4	2	1
Inspection Time (hrs/yr)	22.7	11.3	5.7	22.7	11.3	5.7
Hourly Cost (\$/hr)	\$101.64	\$101.64	\$101.64	\$132.13	\$132.13	\$132.13
Initial set-up Cost, \$	\$230.51	\$230.51	\$230.51	\$299.66	\$299.66	\$299.66
Inspection Cost, \$/yr	\$2,305.10	\$1,152.55	\$576.27	\$2,996.63	\$1,498.31	\$749.16
Repair Cost, \$	\$1,728.82	\$1,440.69	\$1,152.55	\$2,247.47	\$1,872.89	\$1,498.31
Total Cost, \$	\$4,264.43	\$2,823.74	\$1,959.33	\$5,543.76	\$3,670.87	\$2,547.13
Recovered gas value ^[3] , \$	\$6,984.57	\$5,820.48	\$4,656.38	\$6,984.57	\$5,820.48	\$4,656.38
Net cost, \$	-\$2,720.15	-\$2,996.73	-\$2,697.05	-\$1,440.82	-\$2,149.61	-\$2,109.25
\$/mt VOC-No gas credit	\$440.42	\$349.95	\$303.53	\$572.54	\$454.94	\$394.59
\$/mt CH4-No gas credit	\$122.34	\$97.21	\$84.31	\$159.04	\$126.37	\$109.61
\$/mt VOC-Gas credit	-\$280.93	-\$371.39	-\$417.82	-\$148.80	-\$266.41	-\$326.76
\$/mt CH4-Gas credit	-\$78.04	-\$103.16	-\$116.06	-\$41.33	-\$74.00	-\$90.77
\$/Mcf CH4-No gas credit	\$2.32	\$1.85	\$1.60	\$3.02	\$2.40	\$2.08
\$/Mcf CH4-Gas credit	-\$1.48	-\$1.96	-\$2.21	-\$0.79	-\$1.41	-\$1.72

OGI Hourly LDAR Cost Calculation ^[4]

Labor		Capital and Initial Costs	
Inspection Staff	\$75,000	Infrared Camera	\$122,200
Supervision (@ 20%)	\$15,000	Photo Ionization Detector	\$5,000
Overhead (@10%)	\$7,500	Truck	\$22,000
Travel (@15%)	\$11,250	Recordkeeping System	\$14,500
Recordkeeping (@10%)	\$7,500	Total	\$163,700
Reporting (@10%)	\$7,500	Hours/yr	1,880
Fringe (@30%)	\$22,500	Hourly Labor Rate	\$77.79
Subtotal Costs	\$146,250	Training Hours	80
		Training Dollars	\$6,223
		Amortized Capital +Training	\$44,825
		Annual Labor	\$146,250
		Annual Total Cost	\$191,075
		Total Hourly Cost (LDAR conducted by operator)	\$101.64
		Total Hourly Cost (LDAR Conducted by contractors, 30% profit margin) ^[5]	\$132.13

Notes:

[1] Analysis compiled by EDF based on (1) ICF quarterly IR camera LDAR analysis and (2) additional assumptions. These assumptions include an additional 3 hours for inspection time to account for increased travel time (per CO Cost-Benefit analysis assumptions), and decreased repair time for semi-annual and annual inspections (equal to 2X the inspection time for annual and 2.5X for semi-annual, rather than 3X the inspection time for quarterly).

[2] For well pads, methane content of natural gas assumed to be 78.8%.

[3] Costs are based on gas value of \$3/Mcf gas. The original analysis used \$4/Mcf, but this has been updated to reflect current prices

[4] Hourly costs for IR Camera LDAR based on annualized rate of 5-year, 10%.

[5] Hourly cost for contractor includes 30% profit margin, per the CO Cost-Benefit Analysis Assumption.

From: laura_pardue@ios.doi.gov
To: [Laura \(Liz\) Pardue](#)
Cc: [John Blair](#); [Maria Najera](#); [Steven Avila](#); [Kimberly Jensen](#)
Subject: Interior Department Supported \$106 Billion in Recreation, Conservation, Water and Renewable Energy Investments, Supporting More than 860,000 Jobs in FY 2015
Date: Friday, June 17, 2016 6:04:35 AM
Attachments: [FY2015 Econ Report FINAL.pdf](#)
[FY15 DOI economic contributions report - FINAL.docx](#)

Friends,

U.S. Secretary of the Interior Sally Jewell today released the U.S. Department of the Interior's Economic Report for Fiscal Year 2015. The report highlights that Interior investments in recreation, conservation, water and renewable energy led to \$106 billion in economic output, and supported 862,000 jobs.

The press release with report highlights and the full report are attached; please let us know if you have any questions.

If your organization puts out any statements or tweets on this exciting news, please send them our way -- we'd love to see them and share with our team!

Thanks,
Office of Intergovernmental & External Affairs
Office of the Secretary
U.S. Department of the Interior
202-208-1923



U.S. Department of the Interior

Economic Report

FY 2015

June 17, 2016



Foreword by Secretary Sally Jewell

“We’re blessed with natural treasures – from the Grand Tetons to the Grand Canyon; from lush forests and vast deserts to lakes and rivers teeming with wildlife. And it’s our responsibility to protect these treasures for future generations, just as previous generations protected them for us.” *(President Obama, October 24, 2015)*

The Department of the Interior protects and manages the Nation’s natural resources and cultural heritage. We are America’s storyteller. We provide scientific information and we honor the country’s trust responsibilities to American Indians, Alaska Natives and affiliated island communities. Our lands, waters, ecosystems and cultural and historic resources are engines of prosperity.

The work we do here matters. Energy generated from public lands powers America’s homes and businesses; minerals and timber are the building blocks for many products we consume; grazing helps supply food for our families; and the landscapes, recreational opportunities, and shared history that draws Americans to Interior lands support jobs and businesses in communities across the country.

This is the story of the Department, and it is fundamental to our economy. With all we have done to help power America’s economy and create jobs, we can do even more with the right policies and investments. Investments in parks, refuges, national conservation lands, and environmental restoration create homegrown jobs that cannot be exported. Wind, solar, and geothermal power from public lands can put Americans to work supplying clean, affordable energy for our future. We can invest in infrastructure to deliver clean water to rural communities in need, while restoring watersheds and lands for future generations.

And while we are creating and supporting jobs across America, we are also investing in our country’s future. In FY 2015, we expanded job opportunities at Interior for our country’s young people by 120 percent. This past year alone, 23,858 youth were employed by Interior and another 12,530 were employed partnering organizations. Nearly 40 percent of all the youth employed at Interior work with the National Park Service and their partners. We are committed to working with young people to restore America’s most special places while inspiring the next generation to be good stewards of our planet.

With innovation and with renewed attention to the benefits of responsible stewardship we can help power our economy and create a lasting foundation for prosperity in America.

A Message from Kristen Sarri, Principal Deputy Assistant Secretary for Policy, Management and Budget

The Department of the Interior's (DOI) programs, activities, and services make critical contributions to our Nation's economy. They affect millions of Americans by supporting jobs in the United States and injecting billions of dollars into local economies. In FY 2015, the Department's activities created about \$170 billion in value added contributions, \$300 billion in economic output, and supported an estimated 1.8 million jobs.

To support the Department's mission, the President's budget request for FY 2017 includes \$13.4 billion for Interior. Many of the activities discussed in this report feature prominently in the President's FY 2017 Budget. For example, the Budget proposes investing in America's water infrastructure and applying science to address the Nation's water supply challenges, especially in the arid West. The Budget also provides support for onshore energy permitting and oversight on federal lands, with the Bureau of Land Management's (BLM) oil and gas program receiving an estimated 17 percent increase in funding compared to the 2016 enacted level. The funding increase will enhance BLM's capacity to oversee safe, environmentally-sound resource development and ensure a fair return to taxpayers, as BLM implements new regulations and rules, modernizes the automated permitting process, and enhances capability to recruit and retain critical oil and gas personnel.

Investments in America's great outdoors create and sustain millions of jobs and spur billions of dollars in national economic activity through outdoor recreation and tourism. The 2017 Budget proposes full funding for Land and Water Conservation Fund (LWCF) programs at Interior and the Department of Agriculture. This highly successful program reinvests royalties from offshore oil and gas activities into public lands across the Nation. Starting in 2017, the budget proposes to invest \$900 million annually into conservation and recreation projects, equal to the amount of receipts deposited in the LWCF each year, through a combination of discretionary (\$475 million) and mandatory (\$425 million) funding. These investments will conserve lands identified for collaborative, strategic conservation in and near national parks, refuges, and forests; increase access for hunting and fishing; protect historic battlefields; and provide grants to states for close-to-home recreation and conservation projects on non-federal lands. Visitors to these lands spend money in local gateway regions, and these expenditures generate and support economic activity within local economies.

This budget continues to advance development of renewable energy with \$97.3 million for clean energy programs. Over the summer of 2015, Interior's offshore wind energy leasing efforts led to beginning construction of the Nation's first offshore wind farm. This first-of-its-kind project provides a model for the future development of offshore wind energy in America.

The budget supports economic development in Indian Country by investing in programs which include natural resources management, conventional and non-renewable energy, grazing, timber and other forestry products, and irrigation water for agricultural activities. These programs contribute \$1 billion in annual revenues to tribes and individual Indians, and support almost 100,000 jobs across Indian Country. The Indian Energy Service Center is a specific example of an initiative to increase revenues from energy resources. The Center will expedite the leasing, permitting, and reporting for conventional and renewable energy on Indian lands, and provide resources to ensure development occurs safely, protects the environment, and manages risks appropriately, with technical assistance to support assessment of the social and environmental impacts of energy development. The Center will include staff from the Bureau of Indian Affairs (BIA), Office of Natural Resources Revenue, BLM, and the Office of the Special Trustee – all of which have responsibilities related to tribal energy advancement. Indian Affairs also supports opportunities for Native youth by providing funding for programs that promote academic achievement and cultural identity, and create social and economic opportunities in tribal communities. To support these efforts, the 2017 budget provides \$1.1 billion, an increase of over \$60 million, for education operations and construction. Through Indian Affairs programs, tribes support community infrastructure, education, and employment opportunities along with other components of long term sustainable development that work to improve the quality of life for their members.

During 2016, the National Park Service celebrates 100 years of preserving and sharing America's natural, cultural, and historic treasures. Spending by visitors to these parks generates and supports a considerable amount of economic activity within park gateway economies. Interior's 2017 budget will make investments to connect a new generation to "America's Best Idea," and to care for and maintain the national parks for the next 100 years. Overall, a total of \$560 million in current and \$300 million in permanent funds will allow the Park Service to make targeted, measurable upgrades to all of its highest priority, non-transportation assets, restoring and maintaining them in good condition.

Visitation to Interior's public lands supported an estimated \$26 billion in value added, \$45 billion in economic output, and about 396,000 jobs in 2015. This is only one small part of the Nation's outdoor economy. To better understand the value of the outdoor economy to our Nation, the Department of the Interior is partnering with the Department of Commerce's Bureau of Economic Analysis to analyze the impact of outdoor recreation on our nation's economy. Industry estimates show that consumer spending for outdoor recreation is greater than spending on household utilities and pharmaceuticals combined, yet the federal government does not fully quantify these benefits. By producing sound data on the tangible economic impacts of public lands and outdoor industry, we increase our understanding of the benefits that come from investing in them.

This report highlights Interior's commitment to integrating our conservation responsibilities with activities that create income and jobs. Our mission as stewards of our Nation's lands and cultural and natural resources puts us in an ideal position to conserve natural resources, create American jobs, and support communities.

Table of Contents

List of Tables	ii
List of Figures	ii
Glossary.....	iii
Executive Summary.....	iv
Chapter 1 Introduction and Overview	1
Background	1
The FY 2015 Report.....	5
Overview of Outputs Produced and Economic Values	6
Chapter 2 Value Added, Output, and Employment Estimates	11
Introduction	11
Value Added and Economic Contributions	16
Chapter 3 State-Level Estimates.....	26
Appendix A. Technical Information	35
Contributors.....	45

List of Tables

Table 1-1. Interior-Managed Resources: Production Quantities and Values, FY 2008-FY 2015.....	7
Table 2-1. Estimated Economic Contributions Resulting from Interior’s Activities.....	20
Table 2-2. Summary of FY 2015 Economic Contributions by Bureau	22
Table 3-1. Estimated Value Added Supported by Interior Activities, by Sector and State (FY 2015, \$ billions).....	28
Table 3-2. Estimated Total Output Supported by Interior Activities, by Sector and State (FY 2015, \$ billions).....	30
Table 3-3. Estimated Total Jobs Supported by Interior Activities, by Sector and State (FY 2015, jobs).....	33
Table A-2. BOEM and BSEE Administered Industry Economic Impact FY 2015.....	40

List of Figures

Figure 2-1. Economic Impacts.....	13
Figure 2-2. Economic Effects of Ecosystem Restoration.....	14
Figure 3-1. Top Ten States for Value Added in All Sectors (FY 2015, \$ billions).....	26
Figure 3-2. Top Ten States for Value Added in the Recreation Sector (FY 2015, \$ billions).....	27
Figure 3-3. Top Ten States for Jobs Supported in All Sectors.....	32
Figure 3-4. Top Ten States for Jobs Supported in the Recreation Sector.....	32
Figure A-1. Bureau of Reclamation Water Deliveries by Use for Central Valley Project (2009-2015).....	39

Glossary

Value Added: Measures the contribution of DOI's activities to the Gross Domestic Product (GDP) of a regional or the National economy. Value added is the difference between DOI's estimated total output (sales or receipts and other operating income) and the cost of any intermediate inputs (consumption of goods and services purchased from other industries or imported).

Economic Output: The total estimated value of production of goods and services supported by DOI. Output is the sum of all intermediate sales (business to business) and final demand (sales to consumers and exports).

Employment: The total number of jobs supported by DOI-managed activities.

Activities: As used to estimate economic contributions, "activities" means the full range of actions associated with facilitating the use of lands and waters managed by Interior. This includes actions undertaken by the Federal government as well as subsequent actions undertaken by private sector individuals and businesses.

Executive Summary

The U.S. Department of the Interior (DOI, or Interior) plays an integral role in conserving America's natural resources and heritage, honoring our cultures and tribal communities, and supplying the energy to power our future. Interior's people, programs, and responsibilities impact Americans across all 50 States. The Department is the steward of 20 percent of the Nation's lands, managing national parks, national wildlife refuges, and public lands and assisting States, Tribes, and others in the management of natural and cultural resources. Interior grants access to public lands and offshore areas for renewable and conventional energy development—covering roughly a quarter of the Nation's domestic supplies of oil and natural gas—while ensuring safety, environmental protection and revenue collection for the American public. Interior oversees the protection and restoration of surface mined lands and is the largest supplier and manager of water in the 17 Western States, assisting others with water conservation and extending water supplies and providing hydropower resources to power much of the 17 Western States. The Department serves as Trustee to American Indians and Alaska Natives, fulfilling essential trust responsibilities to tribal communities. Interior's Office of Insular Affairs (OIA) carries out the department's responsibilities for U.S.-affiliated Insular Areas, which include the territories of Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Mariana Islands, and three sovereign freely associated states (FAS, which includes the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau). The Department supports cutting edge research in geology, hydrology, and biology, informing resource management and community protection decisions at Interior and across the world.

This report represents the seventh in a series of annual economic reports initiated with a preliminary report released by Interior in December 2009.¹

Although estimates of value added and economic contributions provide important information on the effect of expenditures on outputs from Interior lands in local economies, there are additional economic values—that are not captured in market values—associated with DOI resources which, if measured, would give a more complete accounting of the effects of Interior's activities. For example, the complete accounting of impacts would include the value individuals place on recreation above and beyond their expenditures; contributions to U.S. energy security; preservation of natural habitats and endangered

Data Visualization

This year's report is paired with a web-based interactive data visualization tool that lets the user customize the contribution analysis by bureau, activity or state. You can view that site at my.usgs.gov/doidv/. NPS has a similar data visualization tool that displays results from the Visitor Spending Effects report by-year. This interactive tool is available at go.nps.gov/vse.

¹ More detailed treatments of some of the topics addressed in this report are available in the FY 2012 Economic Report: www.doi.gov/sites/doi.gov/files/uploads/FY2012%20DOI%20Econ%20Report%20%28Final%29%202013-09-25.pdf.

species; and opportunities associated with water use. A better understanding of how the services and functions of natural systems and processes help support the welfare and security of our citizens and communities will allow the Department to better execute the important and diverse work of its many missions and goals. Nearly every bureau and office has begun to consider how using an ecosystem services framework could enhance their ability to analyze, display, and communicate trade-offs. While there are established methods for estimating the value of environmental benefits, their estimation is outside the scope of this report.

In FY 2015 production and activities on DOI lands were associated with about \$170 billion in value added, about \$300 billion in economic output, and supported an estimated 1.8 million jobs. The value of all commodities and other inputs to production associated with Interior's activities decreased over the past year by about 15 percent in nominal terms, from \$159 billion in FY 2014 to \$135 billion in FY 2015. Much of this change reflects the fall in oil prices from a 2014 average near \$100 per barrel, to below \$50 per barrel in 2015. Information related to economic contributions, value added, employment, and other economic values associated with Interior's diverse activities is summarized below:

- **Recreation:** In FY 2015, Interior's lands hosted an estimated 443 million visits. The net economic value of a visit to Interior lands varies depending on the activity. For FY 2015, visitation to Interior sites provided an estimated \$26 billion in value added, \$45 billion in economic output, and supported about 396,000 jobs.
- **Renewable Energy:** In FY 2015, Interior lands and facilities produced 36.1 million MWh of hydropower. Interior lands host renewable power projects for solar (9,761 MW), wind (5,608 MW), and geothermal energy (2,157 MW).² In FY 2015, through the BLM and BIA renewable energy programs, Interior approved the installation of 492 MW in new solar power projects on public lands.³ Renewable energy activities contributed an estimated \$3 billion in output and supported 15,000 jobs. In aggregate, generating electricity with renewable energy reduces the amount of electricity supplied by fossil fuel plants, along with the associated emissions, and reduces our Nation's dependence on foreign oil. Market values of power typically do not reflect the adverse environmental and health costs to society associated with fossil fuel pollution or the corresponding benefits to society from substituting cleaner sources of energy.
- **Conservation:** The value added, economic contributions, and employment supported by DOI's conservation-related activities are difficult to measure separately because conservation is often a component of recreation, ecosystem restoration, water management, and even some mineral development activities. Many benefits of nature conservation accruing to households, communities, and economies are not defined with a set of consistent metrics nor are they bought and sold in markets. This creates challenges in the valuation of these goods and services.
- **Restoration:** Every Interior bureau engages in some form of restoration from physical structures to habitat and cultural resources. The Office of Surface Mining Reclamation and Enforcement's (OSMRE) Environmental Restoration program activities improve natural resources and reduce the risk to public health, safety, and general welfare by correcting problems from coal mining on Abandoned Mine Lands (AML). In FY 2015, OSMRE reclaimed or mitigated the equivalent of 12,339 acres of land on 566 projects. Similarly, the Bureau of Land Management's (BLM) AML Program enhances public safety and improves water quality by reducing or eliminating the

² Installed capacities as of December 2015.

³ There were no new approvals for geothermal or wind projects in FY 2015.

effects of past hardrock mining in the western U.S. The AML program utilizes a database to record and track the thousands of AML sites and features within the National System of Public Lands. The Abandoned Mine Site Cleanup Module (AMSCM) currently contains over 94,000 features, such as physical hazards and environmental impacts, associated with 50,500 AML sites. The Central Hazardous Materials Fund (CHF) is the Department's principal source of funds for the cleanup of the most highly contaminated sites located within national parks, national wildlife refuges, and on other Department-managed lands. Since the CHF was established in 1995, it has undertaken response action at more than 69 sites and completed cleanup at 20 sites, recovering a total of \$95.2 million and avoiding the approximate cost of \$478.3 million in work performed by responsible parties. The DOI Natural Resource Damage Assessment and Restoration (NRDAR) Program works across bureaus to ensure that responsible parties – not taxpayers – bear the cost of restoring resources injured by oil spills or hazardous substance releases around the nation. In FY 2015, the Restoration Program restored or enhanced 46,606 acres and 149 stream/shoreline miles to achieve desired habitat conditions to support trust species conservation.

- **Fossil Fuel Energy:** In FY 2015, Interior-managed lands and waters produced 782 million barrels of crude oil, 5 trillion cubic feet of natural gas, and 421 million tons of coal. Some average prices in FY 2015 included \$49/bbl for oil, \$3.05/mcf of natural gas, and \$10.19 per ton of Powder River Basin coal. Oil and natural gas prices are down significantly from last year (\$99/bbl for oil and \$4.41/mcf for natural gas). Oil, gas and coal produced from Interior lands provided an estimated \$94 billion in value added; an estimated economic output contribution of \$166 billion; and an estimated 800,000 jobs. External costs (greenhouse gas emissions, habitat loss, impacts to water quality, etc.) are associated with the development of oil, gas, and coal produced from Interior lands, and with the production and the use of these resources. As a general matter, market prices do not reflect many of these costs. Various regulations and other requirements designed to minimize adverse environmental impacts internalize some (but not all) of these external costs.
- **Non-fuel Minerals:** In FY 2015, Interior lands produced a wide variety of minerals. For example, an estimated that 2.5 million ounces of gold were produced from BLM lands in Nevada; the average price of gold in 2015 was \$1,170 per ounce. Non-fuel mineral production was associated with an estimated value added of \$6.7 billion; estimated economic output of \$13.3 billion; and estimated employment supported about 47,000 jobs. While minerals are generally traded in competitive markets (though some markets may be localized or thin), prices typically do not incorporate certain external costs associated with mining. Moreover, the Federal leasing system does not completely offset these costs, which are primarily associated with the environmental impacts of mining. Various regulations and other requirements designed to minimize adverse environmental impacts help to internalize some but not all of these external costs.

- **Forage and Grazing:** In FY 2015, Interior lands provided access to 10 million animal unit months (AUMs) of forage. Prices for forage vary widely, from \$1.69 per AUM fee on BLM-managed lands to \$20.20 on State and private grazing lands⁴. This production is associated with an estimated \$2.3 billion in economic output and supported about 40,000 jobs. The increase from FY 2014 (\$1.4 billion in output and 17,000 jobs) is partially due to an updated methodology from BLM that better reflects employment around grazing activities⁵. Value added figures were not readily available for forage and grazing. Forage prices do not fully reflect various ecosystem service values provided by rangelands or the total cost of grazing on Federal lands.
- **Timber:** In FY 2015, about 616,000 mbf (1 mbf = 1,000 board-feet) of sawtimber was harvested on BLM and tribal lands. Approximately 56 percent of the harvest came from lands managed by the Bureau of Indian Affairs (BIA), while the remaining 44 percent came from BLM-managed lands. This timber harvest was associated with about \$0.4 billion in value added, provided roughly \$1 billion in economic output, and supported about 4,600 jobs. Market prices do not fully reflect changes to various ecosystem service values provided by forest lands. In addition to traditional sawtimber, Interior forestry lands provide various other products including biomass, fuelwood, poles, posts, and a variety of other products (e.g., seeds, Christmas trees, and mushrooms). The economic contributions associated with some of these products were accounted for in this report; while others could not be explicitly analyzed.
- **Water:** Interior stores and delivers water for irrigation, municipal and industrial (M&I), and other uses. The value of water varies widely according to location, type of use and climatic conditions. Interior's irrigation (Reclamation and BIA) and M&I water supply activities are associated with \$27 billion in value added; about \$48 billion in economic output; and supported an estimated 361,000 jobs. Interior also delivers water to support in-stream flows, wildlife refuges, and other uses that are difficult to value fully and not typically reflected in economic contribution estimates.
- **Scientific Data:** Investments in research and development promote economic growth and innovation, ensure American competitiveness in a global marketplace, and are critical to achieving Interior's mission. Investments in Interior's research and development will improve U.S. strategic mineral supplies, understanding of ecosystem services, water use and availability, and natural hazard preparedness. Much scientific knowledge is difficult to value and monetize in markets, and hence is underprovided by the private sector.
- **Grants/Payments:** Activities related to grant and payment programs administered by Interior provided \$6.8 billion in value added; economic contributions of \$9.4 billion; and supported employment of 90,000 jobs.⁶ Within these totals:
 - Indian Affairs grants to support tribal governments provided value added of \$0.8 billion, economic contributions of \$1.2 billion, and supported about 9,000 jobs.
 - Grants and payments to Insular areas supported \$0.9 billion in valued added and supported employment of about 26,000 jobs. Economic output estimates supported by these grants and payments were not readily available.

⁴ BLM increased the federal grazing fee to \$1.69 in 2015 and then to \$2.11 in 2016, pursuant to the statutory requirements under the Public Rangelands Improvement Act of 1978. However, the 2014 price of \$1.35 was used for the contribution analysis due to the timing of the grazing data. Source for private and state grazing fee, USDA (https://www.nass.usda.gov/Charts_and_Maps/Grazing_Fees/gf_am.php)

⁵ A detailed explanation of BLM's methodology can be found in the Appendix.

⁶ It is possible that grants and payments support some of the economic activity reported for other sectors throughout this report. We have not attempted to correct for this source of potential double-counting.

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Chapter 1 Introduction and Overview

Background

The U.S. Department of the Interior's programs have a wide-spread impact across the country. Interior conserves America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future. The Department is the steward of 20 percent of the Nation's lands. Interior manages national parks, national wildlife refuges, and public lands and assists States, Tribes, and others in the management of natural and cultural resources. Interior provides access to public lands and offshore areas for renewable and conventional energy development—covering roughly a quarter of the Nation's domestic supplies of oil and natural gas and 40 percent of domestic coal—and seeks to ensure safety, environmental protection and a fair revenue return for the American public and taxpayers. Interior manages the protection and restoration of surface mined lands. The Department is the largest supplier and manager of water in the 17 Western States, assists others with water conservation and extending water supplies, and provides hydropower resources to power much of the 17 Western States. The Department serves as Trustee to American Indians and Alaska Natives. Interior's Office of Insular Affairs (OIA) carries out the Department's responsibilities for U.S.-affiliated Insular Areas, which include the territories of Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Mariana Islands, and three sovereign freely associated states (FAS, which includes the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau). The Department provides scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

Renewable Energy

The BLM is proceeding with a solar energy rulemaking process to implement competitive leasing rules for solar energy zones (SEZs). Current regulations limit the competitive process to responding to right-of-way applications. The proposed regulations would promote the use of "designated leasing areas" that include the BLM's SEZs. The rule would establish competitive processes, terms and conditions (including rental and bonding requirements) for solar and wind energy development rights-of-way both inside and outside the designated leasing areas, and provide incentives for leases in designated leasing areas.

As of April 2016, the BLM authorized over 100 wind energy testing sites, and 40 wind energy projects with 5,608 megawatts of capacity, enough to supply the power needs of nearly 2 million homes. In FY 2015, BLM's solar, wind and geothermal activities supported \$1.2 billion in output and about 8,300 jobs.

Data continue to indicate a strengthening economic recovery with a stronger outlook for consumption due to income growth and stable prices.⁷ Labor markets continue to strengthen.⁸ The goods and services provided by the lands managed by DOI helped to support this economic recovery. These goods and services include outputs bought and sold in markets (such as oil and gas) as well as ecosystem goods and services that are not typically bought and sold in markets (such as clean water, recreation, and habitat for fish and wildlife), but which underpin many activities that do have market values. Ecosystems (and their service flows) provide a form of wealth – natural capital – that people depend on for a range of important benefits. Unlike manufactured capital, and human capital (skills), there are limited options for creating new natural capital, though degraded or damaged ecosystems can sometimes be restored. Further, manufactured capital may not be a good substitute for natural capital.

Improving Ecosystem Services using Geomorphic Reclamation

When restoring mined lands (“reclamation”), the approach we choose affects long-term benefits for society and the economy. Traditional reclamation approaches may further disturb the stability of the existing natural landforms. Geomorphic reclamation recreates the original surface forms surrounding a mined area, mimicking the drainage patterns of a natural landscape, and avoiding the need for on-going erosion maintenance. Steep rock lined ditches are replaced by meandering streams, and terraced hillsides are replaced by natural-looking slopes designed to convey water without excessive erosion or sediment loading. The end result is a visually appealing site in a stable hydrologic equilibrium that promotes a self-sustaining ecosystem, virtually indistinguishable from the surrounding landscapes. The geomorphic technique, originally developed in 2002 at New Mexico coal mining sites, is now used throughout the country in active and abandoned mine sites. Interior encourages geomorphic reclamation as an approach requiring less maintenance and promoting diverse and natural-looking wildlife habitat. Indiana’s Minnehaha Slurry site (near the Minnehaha Fish and Wildlife Area) received a 2015 Abandoned Mine Reclamation Award for well executed geomorphic design.

⁷ Annual real GDP increased 2.4 percent between 2015 and 2016.

(https://www.bea.gov/newsreleases/national/gdp/2016/pdf/gdp1q16_adv.pdf). Total nonfarm payroll employment rose by 125,000 in March 2016. The annual (unadjusted) average unemployment rate was 6.2% in 2014; it was 5.3% in 2015

(http://data.bls.gov/timeseries/LNU04000000?years_option=all_years&periods_option=specific_periods&periods=Annual+Data). In March 2016, the unemployment was 5.0 percent, and the number of unemployed persons was 8.0 million. GDP, or Gross Domestic Product, is a commonly used measure of economic performance and measures the value of the goods and services produced by an economy. “Real” measures reflect quantities independent of prices, allowing comparison of measures over periods in which prices have changed. GDP represents the market value of all final goods and services produced in a country, i.e., domestic value added which can be shown to be identical to the sum of payments to labor (i.e. salaries, wages and bonuses) plus payments to capital (i.e. production and replacement of existing capital). GDP is an incomplete measure of wellbeing or economic welfare.

⁸ See Bureau of Labor Statistics: <http://www.bls.gov/news.release/empst.nr0.htm>

Natural resources bought and sold in markets (e.g., oil, minerals, timber, forage, fish, etc.) contribute to a wide range of intermediate and final products. In addition, people value the environment directly even where there is no market for environmental amenities. Furthermore, people may be unaware of the full benefit they receive from these resources.

A better understanding of how the services and functions of natural systems and processes help support the welfare and security of our citizens and communities will allow the Department to better execute the important and diverse work of its many missions and goals. The general concepts associated with ecosystem services are well accepted and nearly every bureau and office has begun to consider how using an ecosystem services framework could enhance their ability to analyze, display, and communicate trade-offs. The scope and magnitude of such consideration however, varies within and among bureaus and offices.

DOI, with USGS in the lead, is working to identify common measures and evaluation techniques to enable managers to apply ecosystem service concepts in a cost effective manner in natural resource management decisions. Incorporating ecosystem services into decision processes can shape how DOI bureaus and offices define problems, formulate solutions, and communicate with stakeholders. Including ecosystem service concepts help bureaus and offices more comprehensively consider the full range of benefits and costs associated with their actions, particularly those that affect the public through changes in ecosystems or natural resources. DOI recognizes that it is important to think about developing and implementing methods that are transparent, reproducible, transferable, scalable and defensible.

Some ecosystem services are traded in markets (e.g., commercial fisheries, timber, etc.) and valuation using market prices is relatively straightforward. But many ecosystem services are “public goods” that are not traded in markets; without market prices there is no ready measure of value for these services.⁹

⁹ The ecosystem services provided by Interior-managed lands are typically provided free of charge, and people who benefit from ecosystem services may not be directly involved in determining the supply of services. There are numerous empirical studies to assess the value of outdoor recreation and numerous applications of economic

Commemorating the 50th Anniversary of the National Historic Preservation Act

October 15, 2016, marks the 50th anniversary of the passage of the National Historic Preservation Act. Upon signing the law, President Lyndon Johnson remarked:

"We have come here this morning to give part of our country back to its people." This law "will help us to preserve for our children the heritage of this great land we call America..."

Initially driven by concerns over urban renewal and sprawl, the National Historic Preservation Act has resulted in cultural, educational, aesthetic and economic benefits for thousands of communities across America. Each year, millions of visitors to historic sites on our public lands and on tribal lands contribute to the economic well-being of nearby communities. Visitor spending supports economic contributions, employment, and tax revenue. Tens of thousands of visitor education centers, historic buildings, museum collections exhibits, and other important sites listed on or eligible for the National Register of Historic Places maintain cherished local traditions and have become prime destinations for domestic and international visitors.

One ecosystem service of particular importance to land managers is carbon sequestration. The social cost of carbon can help inform decisions regarding carbon sequestration. The social cost of carbon is an estimate of the economic costs associated with a small increase in carbon dioxide (CO₂) emissions, conventionally one metric ton, in a given year. This dollar figure also represents an estimate of the value of damages avoided for a small emissions reduction, or an action that will sequester carbon (i.e., the benefit of a CO₂ reduction).¹⁰

Basic scientific knowledge is often not sold in markets, and hence is underprovided by the private sector. Beyond helping Interior bureaus achieve their missions, scientific information (such as that produced by USGS) is an input to production processes and decisions that help promote economic growth and innovation and ensure American competitiveness in a global market. Interior's bureaus are engaged in a variety of activities designed to provide basic research, scientific and technical information, and to transfer technology to decision makers in the public and private sectors. The information produced by Interior is a critical input that helps support private markets, the production processes of private entities, and many public sector decisions.

The USGS has a number of ongoing research efforts that will assist DOI bureaus and offices by providing analytic support to implement ecosystem service analysis. These include:

- An assessment of the various existing toolkits available to value the associated ecosystem services of the San Pedro River. This research project evaluated how effective the various tools could be in evaluating associated ecosystem services under different scenarios. USGS is currently in the process of updating this research given recent changes in some of the tools available.¹¹
- Leadership for the Sustaining Environmental Capital (SEC) Initiative, which seeks to develop, integrate, and enhance natural resource management decision support tools, systems and information to better enable managers to account for the benefits the public receives from ecosystem services, and to provide guidance for using ecosystem services information in management decisions. The SEC Initiative consists of three pilot studies (Chesapeake Bay, Pacific Northwest, and Delaware River) and will lay the foundation for identifying common ecosystems service methods, practices, and outputs that may support enhanced decision making. The SEC Initiative will be located online through the SEC Dashboard.

analysis being used to assess the value of various environmental amenities (access to open space, access to water resources, and local air quality). In general, the analytic approaches used in these studies are either a revealed or stated preference approach (or in some cases a combination).

¹⁰The most recent estimates published by the Interagency Working Group on the Social Cost of Carbon are an average of \$36 per ton of carbon emitted for emissions occurring in 2015. Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. Revised, July 2015. <https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf>.

¹¹ <http://pubs.usgs.gov/sir/2012/5251/>

The FY 2015 Report

This report represents the seventh in a series of annual reports initiated by Interior in December 2009.¹² The remainder of this chapter presents an overview of the key outputs supported by Department activities. The chapter also provides a summary of Interior's economic contributions, value added, employment supported, and economic values associated with some of the outputs.

The analysis in this year's report reflects the effects of the ongoing drought in many Western States. One way to visualize the impact of the drought in California is to look at the changes in the Bureau of Reclamation's water deliveries to the Central Valley Project (CVP), California (Figure A-1). CVP irrigation deliveries decreased 85 percent over the period from 2012-2015. The reduced irrigation deliveries decreases Interior's economic impact but has not substantially impacted California's agricultural industry as a whole. The value of the agricultural output in the CVP delivery area has remained approximately constant due to greater utilization of groundwater and other surface water sources, as well as changes in cropping patterns. Deliveries for municipal and industrial (M&I) uses in the CVP area decreased 68 percent over the same period. Reduced M&I deliveries decreased Interior's economic contribution but some of these impacts may also have been mitigated via water transfers or water conservation efforts. California's Agricultural production in 2013 accounted for about 2% of California's GDP, about 13% of US agricultural GDP and about 0.3% of US GDP¹³.

Drought impacts are expected to reduce estimated 2015 water year surface water delivery for agriculture by 8.7 MAF, resulting in an estimated increase in groundwater pumping of 6 MAF, and net reduction in total irrigation deliveries of about 10% of the total approximate 26 MAF irrigation use in California. Resulting impacts statewide from the 2015 drought are expected to be a loss of about 14% of total State agricultural revenues and about 21,000 jobs. As of March 2, 2016, 63 local Emergency Proclamations from city, county, tribal governments and special districts have been received by the Governor's office and the Association of California Water Agencies has identified hundreds of local water agencies, including municipalities that have implemented water conservation actions.¹⁴ The mitigation strategies identified above are not necessarily all equally available over the long-term. If the drought continues into future years, further crop shifting, conservation efforts, water transfers and land fallowing would be anticipated.

¹² More detailed treatments of topics from this report are available in the FY 2012 Economic Report.

¹³ California Agricultural Statistics Review 2014-2015. GNP data from U.S. Bureau of Economic Analysis, "Table 3. Current-Dollar Gross Domestic Product (GDP) by State, 2014:III-2015:III," bea.gov/regional/index.htm (accessed April 5, 2016).

¹⁴ In past years, total California irrigation deliveries have been around 26 MAF, with 18 MAF from surface water, and 8 MAF from groundwater. An 8.7 MAF drought-related reduction in surface water availability for agriculture implies a 48% reduction. However, due to increased pumping of groundwater, the total reduction in agricultural water use was 2.7 MAF, or about 10% of typical agricultural use. (https://watershed.ucdavis.edu/files/biblio/Economic_Analysis_2015_California_Drought_Executive_Summary.pdf). The calculations in the text are derived as follows: US agriculture as a percentage of total GDP = 1.21% (http://www.bea.gov/industry/gdpbyind_data.htm, GDP by industry / VA, GO, II); CA GDP in 2013 was \$2.2 trillion (http://www.dof.ca.gov/HTML/FS_DATA/LatestEconData/FS_Misc.htm); CA as a percentage of US GDP = $2,050,693/15,526,715 = 13.2\%$ (http://bea.gov/newsreleases/regional/gdp_state/2014/pdf/qgsp0814.pdf); CA agriculture as a percentage of CA GDP = $46,651/2,202,678 = 2.12\%$

This report presents information on: the physical and biological “outputs” supported by Interior activities; and on the economic value added, gross output, and employment supported by Interior:

- *Gross output* (or economic contributions) represents the value of industrial or other production.
- *Value added* nets out the cost of intermediate inputs (i.e., goods and services purchased from other industries or imported that are used as inputs to produce a good or service). This measure is the most appropriate metric when considering Interior’s contributions to the Nation’s GDP. Of the measures used in the report, value added most accurately captures the dollar-value of Interior-managed resources in the U.S. economy. Value added estimates are not available on a comprehensive basis for all Interior resources; this information is provided where such values are readily available.
- *Employment* represents the estimated annualized number of full and part-time jobs supported by spending related to a particular activity.

Economic contributions—whether measured by labor income, value added, or output—are an incomplete measure of “economic value.”¹⁵ Economic contributions measure how programs, expenditures, and investments translate to economic growth, employment, and income. Economic value is defined in terms of relative value, and is equal to the amount an individual or society is willing to give up in other goods and services in order to obtain a good, service, or state of the world. More specifically, the economic value of a resource is the amount that society is willing to pay for the resource (not how much they actually pay for the resource). This report focuses on economic contributions, and offers some discussion of economic values as well.

While this report relied on generally similar methodologies to estimate value added, output and employment, the results are not directly comparable to those of earlier reports due to changes in some of the underlying modeling. Additional information is provided in Appendix A.

Overview of Outputs Produced and Economic Values

Table 1-1 summarizes the quantities of the key outputs produced by Interior in FY 2015. The table also provides information (where such information is readily available) on the unit economic values for each commodity. This report provides a range of economic values associated with each resource, and reports total production for the year. The table does not associate production with individual unit prices, so the report does not provide a total value for the annual production.

¹⁵ *Economic contributions* do not account for any activity that might occur even without the event or policy. *Economic Impacts* are more narrowly defined as net changes to an economy that would not be seen without the event or policy. *Economic benefits* refer to total net values, which include both market and nonmarket values.

Table 1-1. Interior-Managed Resources: Production Quantities and Values, FY 2008-FY 2015

Commodity ^a		FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Recreation ^b	<i>Visits to Interior sites (millions)</i>	n/a	415	439	434	417	407	423	443
	<i>Economic value per visit (2015-\$)</i>				\$37 to \$64				
Crude Oil ^c	<i>Federal production (millions of barrels)</i>	581	651	724	658	632	671	723	782
	<i>WTI - Average price per bbl (2015-\$)</i>	\$118.51	\$74.19	\$92.14	\$103.35	\$98.34	\$102.40	\$99.42	\$48.66
Natural Gas ^d	<i>Federal production (trillions of cubic feet)</i>	6.8	6.7	6.6	6.1	5.7	5.2	5.1	4.9
	<i>Average wellhead price per thousand cubic feet (2015-\$)</i>	\$9.48	\$4.40	\$5.20	\$4.30	\$2.78	\$3.72	\$4.42	\$3.05
Coal ^e	<i>Federal production (millions of tons)</i>	471	509	488	478	470	461	420	421
	<i>Average price per short ton subbituminous coal (2015-\$)</i>	\$12.64	\$13.62	\$13.99	\$14.88	\$9.43	\$10.91	\$11.83	\$10.19
Hardrock Minerals – Gold ^f	<i>Estimated gold production on Federal lands (2008-2011) and Federal lands in NV (2012-2015) (kg)</i>	100,190	95,890	99,330	100,620	76,223	76,223	77,738	74,661
	<i>Average gold price per ounce (calendar year)</i>	\$901	\$1,001	\$1,201	\$1,602	\$1,702	\$1,402	\$1,272	\$1,170
Forage ^g	<i>BLM, AUMs permitted (millions)</i>	8.6	8.6	8.7	9.1	8.9	8.5	8.3	8.3
	<i>Price per animal unit month (2015-\$)</i>				\$1.35 to \$20.20				
Timber ^h	<i>BLM commercial sawtimber harvested (thousand board-feet, mbf)</i>	162,902	190,504	183,558	218,467	208,943	236,889	252,689	271,501
	<i>BIA harvested timber (mbf)</i>	530,972	426,250	396,532	359,697	333,209	336,320	261,089	344,787
	<i>Total for BLM and BIA (mbf)</i>	693,874	616,754	580,090	578,164	542,152	573,209	513,778	616,288
	<i>Average Western OR BLM received price per mbf (2015-\$)</i>	\$196.08	\$169.46	\$100.62	\$97.58	\$	\$	\$154.34	\$188.86
					123.17	128.50			

(Table continues)

Commodity ^a		FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Electricity Generation									
Hydroelectric	<i>Net generation (million MWh)</i>	40.8	39.5	35.8	48.6	47.5	39.8	38.0	36.1
Geothermalⁱ	<i>New approved capacity (MW)</i>	0	67.5	30	312	70	110	0	0
Windⁱ	<i>New approved capacity (MW)</i>	110	4	150	654	1815	826	0	0
Solarⁱ	<i>New approved capacity (MW)</i>	0	0	2,744	1,975	489	1,000	768	492
	<i>Average electricity spot price per MWh^j</i>								
	<i>Mid-Columbia (Northwest)</i>	\$65.08	\$35.70	\$35.94	\$29.13	\$22.25	\$31.97	\$38.59	\$26.00
	<i>SP-15 (California)</i>	\$79.45	\$38.36	\$40.26	\$36.91	\$34.61	\$42.48	\$51.95	\$36.00
Water Irrigation, and Municipal & Industrial	<i>Million acre-feet delivered (estimated)^k</i>	n/a	n/a	n/a	n/a	26.7	27.3	24.4	24.9
	<i>\$ per acre-foot^l</i>								\$0 to \$4,500
Ecosystem Services	Ecosystem services are measured in many different metrics; information on annual flows of these services is not readily available. Because most ecosystem services are not bought and sold in markets, prices are not readily available.								
Data and Information	Interior collects and provides public information ranging from satellite data to species counts. This information is a critical input that helps support private markets, the production processes of private entities, and many public sector decisions. Some of the benefits of this information are relatively well quantified, but not all of Interior's major information investments are in fields with mature standardized methods to analyze these benefits.								

(Table continues)

Notes to Table 1-1

^a Unit values are FY 2015 market values or estimated economic value, depending on the commodity.

^b Currently available datasets do not track visitors' activities. Low end estimate is the mean study value for "general recreation"; high end estimate is for "wildlife viewing." This range also includes activities such as sightseeing, camping, picnicking and visiting beaches. Source: John Loomis (2005) "Updated Outdoor Recreation Use Values on National Forests and Other Lands," updated to 2015-\$ using consumer price index.

^c Production is based on ONRR production volumes. Includes production on tribal land. Crude oil prices are West Texas Intermediate (WTI) per-barrel spot prices from EIA.gov. WTI is a benchmark price used for indexing crude oil.

^d Production is based on ONRR production volumes. Includes production on Tribal land. Natural gas prices are U.S. wellhead price per mcf from EIA.gov.

^e 2008-2011 coal prices from EIA.gov: http://www.eia.gov/totalenergy/data/annual/pdf/sec7_21.pdf, updated to 2015-\$ using the CPI-U; 2015 price data are from ONRR Monthly Market Analysis reports

^f Gold figures for 2008-2011 are estimates of gold production from the Federal estate. Production for 2012-2015 represents production from Federal estate in Nevada based on data from the State of Nevada.

^g The low-end value is the Federal grazing fee; the high-end value is the 11 Western State average rental price for private forage in 2015, as reported by the USDA, National Agriculture Statistics Service. For FY2015, BIA permitted an estimated 2.15 Million AUMs. Historic BIA grazing data are not available.

^h Source: BLM Data. Data include sawtimber harvested for commercial use. Additional sawtimber is harvested from BLM managed lands under the Stewardship Program and Special Forest Products Program. These volumes represent a relatively small proportion of the volume and are not shown in this table. Other wood-based timber products not included in these volumes include biomass, posts, poles, fuelwood, and "other."

ⁱ Source: BLM data. Generation information is not available for these resources. The data represents approved capacity. In FY 2015 there was no new capacity approved. We estimate economic contributions based on installed capacity for the calendar year.

^j Prices are annual average on-peak. Source: EIA – Electric Market National Overview, Regional Spot Prices.

^k Does not include deliveries for facilities where water users, rather than the Bureau of Reclamation, have operating and maintenance responsibilities. Irrigation-water deliveries make up about 90 percent of total deliveries; M&I deliveries make up about 10 percent. Some Reclamation-supplied water is also delivered for other uses, such as supplying National Wildlife Refuges or supporting instream flows.

^l Values depending on region, end-use, and other circumstances; the high end of the range would be relatively rare.

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Chapter 2 Value Added, Output, and Employment Estimates

Introduction

Table 2-1 presents information on Interior's economic contributions, value added, and employment by activity for FY 2015. Table 2-2 presents contributions by bureau.

Economic contributions are a measure of the cumulative effects of spending as it cycles through the economy.¹⁶ Value added is the contribution of an activity to overall Gross Domestic Product (GDP) and equals the difference between an industry's gross output (e.g., sales or receipts and other operating income, commodity taxes, and inventory change) and the cost of its intermediate inputs (including energy, raw materials, semi-finished goods, and services that are purchased from all sources).¹⁷

Employment represents jobs supported in the National economy, above and beyond Interior employees. These economic measures should not be confused with, and do not represent, measures of economic benefits or net economic effects resulting from Interior's implemented activities or policies. The distinction between economic contributions or impacts and economic

Concepts: Economic Contributions and Benefits

The results of an economic contributions analysis should not be equated to an analysis that measures net economic benefits. Net economic benefits are a measure of the extent to which society is better (or worse) off because of a given policy, program or event. Net economic benefits can include measures of market values and non-market values.

Economic contributions analysis estimates the total output, value added, and jobs supported by a flow of expenditures through the economy. Conversely, an analysis of net economic benefits relies on market-based valuation methods as well as non-market valuation methods to derive monetary estimates of benefits and costs to determine the net economic benefits to society.

There are two elements in the value of any commodity: the market price, and any additional "nonmarket" benefits that aren't reflected in the price. For example, ecosystem services may not be fully reflected in area land prices.

Surveys often show that people are willing to pay more for recreation than they actually spend. Economists call this additional value consumer surplus or net economic value.

¹⁶ For additional information on economic contribution and economic impact analysis, see: Watson, P., J. Wilson, D. Thilmany, and S. Winter. 2007. Determining Economic Contributions and Impacts: What is the difference and why do we care? *The Journal of Regional Analysis and Policy*, 37(2): 140-146.

¹⁷ The components of value added consist of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus. GDP measures the value of the goods and services produced by the U.S. economy in a given time period. The output approach to economic contributions totals up the sale prices at every step of the chain, in effect double-counting the contributions of intermediate goods. The value added approach focuses on the change in sale price at each step, avoiding this double-counting. The measure of output does not account for external costs and benefits not reflected in market prices. The implication of not including these costs is that statistics on gross sales or output may over or understate the actual contribution a given activity or sector makes to the economy. Value added is a more appropriate concept when considering Interior's contributions to the Nation's GDP, though GDP does not fully capture changes in economic welfare. Where possible, this report addresses the economic value of Interior's resources and programs, but the focus of the report remains the economic impacts or contributions of the Department of the Interior.

benefits as well as the limitations associated with an economic contribution analysis are discussed in the FY 2012 Economic Report.¹⁸ Economic welfare costs also are not fully measured by changes in GDP. GDP fails to capture nonmarket values, such as environmental improvement or environmental damages. These can be important components of total economic welfare. GDP can sometimes be misleading: for example, the expenditures incurred in cleaning up an oil spill would increase GDP, however, there is a general recognition that oil spills have substantial negative effects, including economic effects that may or may not be quantified; GDP measures frequently do not capture many of these effects and thus may provide little information about the net economic costs incurred by individuals and society overall.¹⁹

The Department's economic contributions are a by-product of the Department carrying out its unique mission, which is primarily to manage Federal lands and waters and make investments that conserve and restore natural landscapes and cultural heritages of the Nation. In many cases, increasing goods and services and associated supporting jobs each year ultimately lies with the private sector. Making wise public investments such as investing in landscapes through reclamation and restoration and providing environmental stewardship enables the private sector to sustainably create far more jobs and economic output than would otherwise be possible for generations to come.

Figure 2-1 and Figure 2-2 illustrate the distinction between economic impacts and economic value using a habitat restoration project as an example.

¹⁸ One of the important limitations is that contribution analysis is a static approach and does not incorporate potential price changes over time or other shifts in labor or capital resources as a result of changes in the scale or scope of economic activities. A different type of modeling approach (computable general equilibrium models) would be necessary to incorporate price changes and other economy wide resource shifts. The FY 2012 report can be found at: http://www.doi.gov/ppa/economic_analysis/upload/FY2012-DOI-Econ-Report-Final-2013-09-25.pdf.

¹⁹ In the Department's economic report for FY 2011, Chapter 7 discussed externalities associated with Interior's activities. This chapter is available on the Department's website at <http://www.doi.gov/ppa/upload/Chapter-7.pdf>.

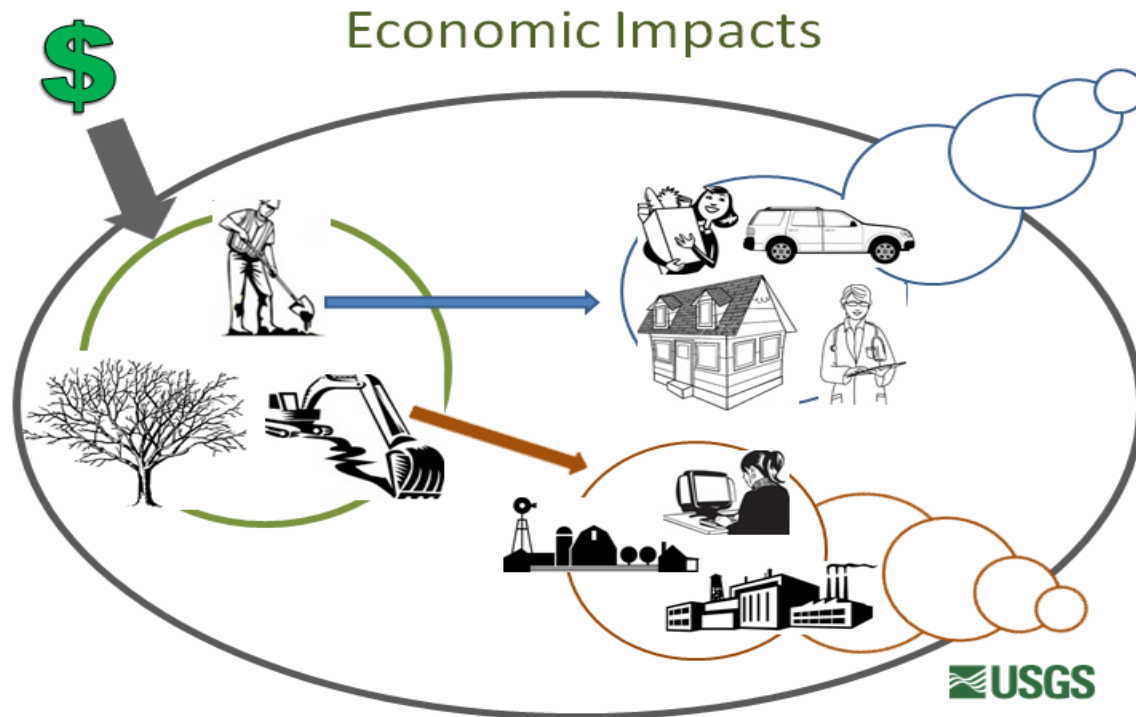


Figure 2-1. Economic Impacts

Figure 2-1 illustrates the economic impacts associated with a habitat restoration project. The spending associated with the restoration activities generates successive rounds of spending that ripple through households and businesses. A restoration project (shown on the left side of the figure) involves hiring workers and machinery. The total spent on these and other project costs are the **direct** contributions. Workers spend their salary on things like housing, transportation, healthcare, and food. The stimulus from this worker spending is the **indirect** contribution. The **induced** contributions are the stimulus provided by the project ordering machinery: manufacturers increase their use of labor and material inputs in response to these market signals.

Economic Effects of Ecosystem Restoration

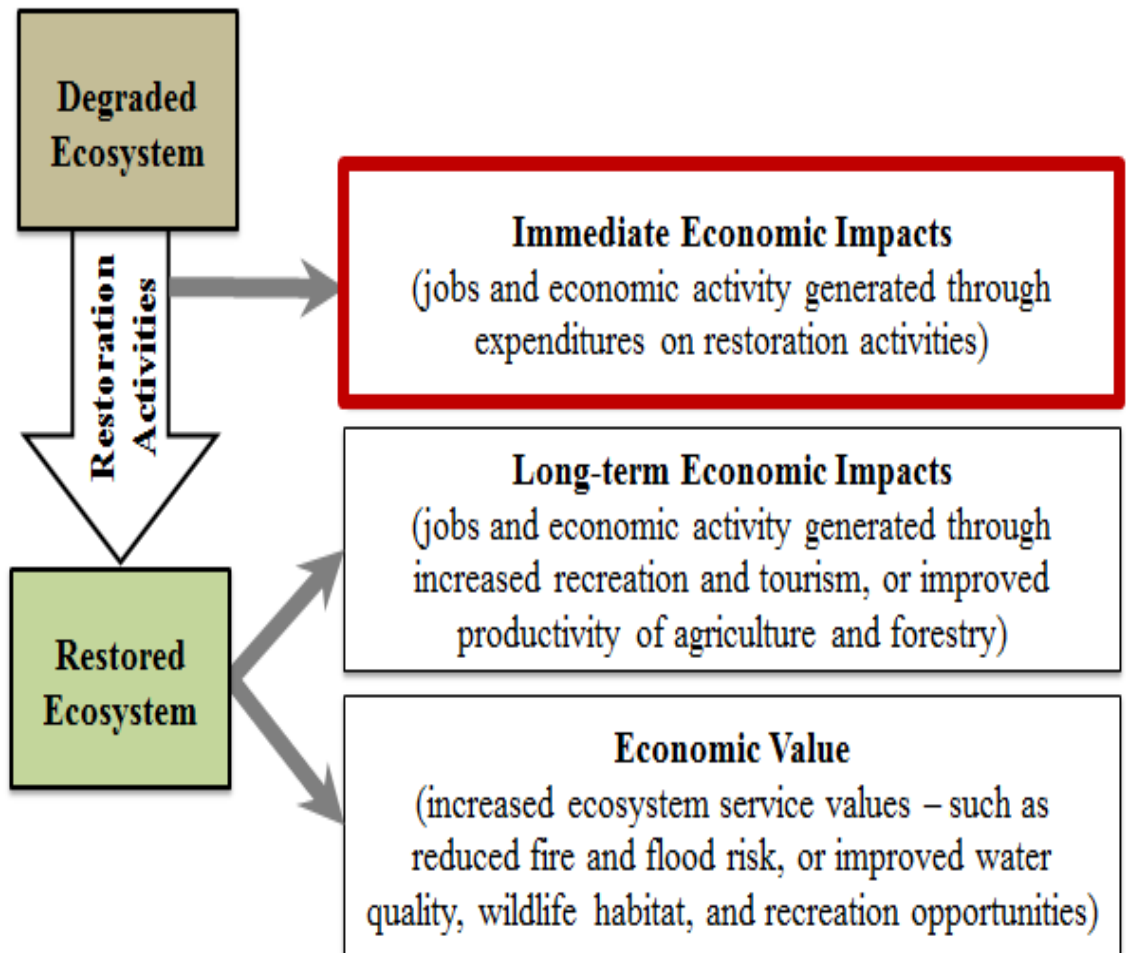
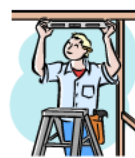


Figure 2-2. Economic Effects of Ecosystem Restoration

Figure 2-2 illustrates the longer-term economic values associated with the restoration activities and these values are distinct from the immediate economic impacts.

Concept: Value Added



	Standing Trees	Timber	Lumber	Framing	Finished House
Sale Price	\$10	\$100	\$1,000	\$10,000	\$100,000
Input Price	\$0	\$10	\$100	\$1,000	\$10,000
Value Added	\$10	\$90	\$900	\$9,000	\$90,000

The graphic provides a stylized example to illustrate the concept of value added. Trees on a timber lease may ultimately end up as part of a newly constructed house, though there are several supply-chain steps in between. The output approach to economic contributions totals up the sale prices at every step of the chain, in effect double-counting the contributions of intermediate goods. The value added approach focuses on the change in sale price at each step, avoiding this double-counting.

The measure of output does not account for external costs and benefits not reflected in market prices.²⁰ The implication of not including these costs is that statistics on gross sales or output may over- or understate the actual contribution a given activity or sector makes to the economy. *Value added* is a more appropriate concept when considering Interior's contributions to the nation's GDP, though GDP does not fully capture changes in economic welfare.²¹ Where possible, this report addresses the economic value of Interior's resources and programs, but the focus of the report remains the economic impacts or contributions of the Department of the Interior.

²⁰ In the Department's economic report for FY 2011, Chapter 7 discussed externalities associated with Interior's activities. This chapter is available on the Department's website at <http://www.doi.gov/ppa/upload/Chapter-7.pdf>

²¹ Economic welfare costs also are not fully measured by changes in GDP. GDP fails to capture nonmarket values, such as environmental improvement or environmental damages. These can be important components of total economic welfare. GDP also can sometimes be misleading: for example, cleanup costs from an oil spill would increase GDP, however, this provides little information about the total economic costs incurred by individuals and society overall.

Value Added and Economic Contributions

DOI's FY 2015 value added and output are estimated to be \$167 billion and \$296 billion, respectively. The value added and economic contributions are estimated to have supported 1.8 million jobs in FY 2015. The value of all commodities and other inputs to production associated with Interior's activities decreased over the past year by about 15 percent in nominal terms, from \$159 billion in FY 2014 to \$135 billion in FY 2015. Much of this change reflects the fall in oil prices from a 2014 average near \$100 per barrel, to below \$50 per barrel in 2015. Changes in value for individual inputs vary significantly across commodities due to changes in commodity prices and production levels. This was clearly the case for oil and gas production in FY 2015. Detailed estimates of value added, economic contributions, and employment estimates are presented in Table 2-1. Some highlights for value added, economic contributions, and employment are presented below.

Recreation: An estimated 443 million visits to DOI lands contributed about \$26 billion in value added, \$46 billion in output, and supported 396,000 jobs.

Renewable energy: Activities related to geothermal, wind, and solar energy rights-of-way grants for renewable energy facilities on BLM lands contributed an estimated \$1.2 billion in output, and supported about 8,300 jobs. Hydropower contributed about \$1.4 billion in value added, \$2.2 billion in output, and supported about 6,700 jobs.

New renewable energy generating capacity can reduce the amount of energy generated with conventional fuels. This offers two major sources of cost savings: (1) reduced operating and fuel costs; and (2) reduced greenhouse-gas and particulate emissions. The average wholesale market value is about \$40 to \$50 per MWh for the marginal generation that an additional unit of renewable energy would displace. Emissions costs can be estimated based on health effects, and by applying estimates of the social cost of carbon.

Energy from Fossil Fuels: Activities related to oil, gas, and coal contributed an estimated \$94 billion in value added, \$166 billion in economic output, and supported 780,000 jobs. Average oil and natural gas prices are down significantly from last year and are reflected in the decreased economic contributions.

Non-fuel minerals: Activities related to BLM-managed locatable minerals in Nevada and hardrock leasables in Missouri contributed an estimated \$4.2 billion to value added, \$8.5 billion in output, and supported about 28,000 jobs. In addition, activities related to salable and other leasable minerals

National Park Service Socio-economic Monitoring Program

The NPS Social Science Program is in the process of establishing a socioeconomic monitoring program (SEM). This effort will allow for a variety of indicator variables to be tracked over time across the NPS. These results will be reported at park, regional and national levels and provide visitor information currently not available. Approaches for establishing the SEM are under development and expected to be in place to generate information by early 2017.

authorized by the BLM contributed \$2.5 billion to value added, \$4.9 billion in output, and supported about 19,000 jobs.

Timber: Activities related to timber contributed an estimated \$0.4 billion in value added, \$1.1 billion in output, and supported about 4,600 jobs.

Forage: Activities related to forage and grazing on public and Indian land contributed an estimated \$2.3 billion in output, and supported about 40,000 jobs. This increase from FY 2014 (\$1.4 billion in output and 17,000 jobs) is partially due to an updated methodology from BLM that better reflects employment around grazing activities²².

Water: Interior's irrigation (Reclamation and BIA) and M&I water activities are associated with \$27 billion in value added; about \$48 billion in economic output; and supported an estimated 361,000 jobs. Activities associated with irrigation alone (both Reclamation and BIA) contributed an estimated \$22.3 billion in value added, \$40 billion in output, and supported 325,000 jobs. Activities associated with municipal and industrial water contributed about \$5 billion in value added, \$8 billion in output, and supported 36,000 jobs.

Grants and payments: Activities related to major grants and payments contributed an estimated \$6.8 billion in value added, \$9.4 billion in output, and supported about 90,000 jobs. Indian Affairs's support for tribal governments contributed about \$0.8 billion in value added, \$1.2 billion in output, and supported about 8,800 jobs.²³

Insular Affairs: Interior's activities related to Insular Affairs contributed about \$0.9 billion in value added (equivalent to a share of GDP ranging from 2 percent for Guam to 81 percent for Micronesia); and supported about 25,600 jobs.

Science: The Department's bureaus have varying levels of involvement with scientific and technical

Science and Decision Making

The Science and Decisions Center, a small multidisciplinary USGS center, works to increase the use and value of scientific information in decision making through research and applications in five science areas: ecosystem services, decision science, resilience, participatory science, and natural resource economics. Its work in natural resource economics includes valuing ecosystem services and natural resources; valuing the use of scientific information in decision making; multi-resource analyses evaluating benefits and costs for alternative decisions and scenarios; and studies on environmental markets concepts and use. SDC currently is assessing ecosystem services values in the Great Dismal Swamp National Wildlife, Ding Darling National Wildlife Refuge, and in the California Rangelands. SDC is conducting multi-resource analysis proofs-of-concept in the Powder River Basin (WY) and in the Piceance Basin (CO). Work on environmental markets includes assessments of policy, economic, and ecological impacts of biodiversity and habitat markets.

²² A detailed explanation of BLM's methodology can be found in the Appendix.

²³ It is possible that grants and payments support some of the economic activity reported for other sectors throughout this report. We have not attempted to correct for this source of potential double-counting.

research and innovation, and technology transfer. The economic value associated with these activities is difficult to measure. The FY 2015 enacted budget for the Department of the Interior included \$863 million for research and development. Much of the funding was for applied research (\$685 million), while basic research and development received \$53 million and \$89 million, respectively.²⁴ The U.S. Geological Survey is the largest research and development organization within the Department, both in terms of budget and personnel, and typically accounts for about 80 percent of the Department's R&D budget. The programs supported through these funds greatly advance knowledge and technology, which helps the Department meet its mission objectives. The economic values associated with the production and dissemination of scientific information are only partly incorporated in the market prices of traded goods and services.

The Department's scientific, technical and engineering personnel are engaged in a broad range of cooperative activities to develop and disseminate innovative technologies, including:²⁵

- Publishing over 8,900 reports, books, papers, fact sheets, and other publications.
- Collaborating on 826 Cooperative Research and Development Agreements, of which 586 were new in FY 2015. In addition, the Department was engaged in at least 318 other collaborative R&D relationships.
- Disclosure of seven new inventions. In addition, eight patents were filed and three patents were received.
- Managing 20 licenses for inventions and other intellectual property earning over \$105,000.

Sustainable Stewardship: Sustainable stewardship of natural resources requires strong investments in research and development in science and engineering to inform decision-making. The Department supports cutting edge research in geology, hydrology, biology, and many other fields of science and engineering, informing resource management and community protection at Interior and across the world.

Youth: The Department of the Interior works to expand job opportunities, engagement and education for youth on our public lands and to facilitate partnerships and volunteer programs that leverage resources for accomplishing the Department's mission. In FY 2015, Interior's youth programs and partnerships provided 36,388 employment opportunities for people between the ages of 15 and 35 interested in working with Interior and organization partners. This was an increase of about 120% over FY 2014 employment (16,644 jobs). In FY 2015, 23,858 youth were employed by DOI and 12,530 were employed by partners; 14,541 (40%) of these jobs were with the National Park Service (NPS) and their partners. These programs and partnerships enable participating youth to gain valuable work experience to strengthen their skills and knowledge base. Interior bureaus benefit by attracting and retaining qualified employees, especially as youth hires can convert to permanent positions, be promoted to a new position, or receive new job assignments.

²⁴ https://www.whitehouse.gov/sites/default/files/omb/budget/fy2017/assets/ap_19_research.pdf.

²⁵ Additional information on technology transfer can be found in the Department of the Interior Annual Report on Technology Transfer FY 2015 Activities. January 2016, www.doi.gov/sites/doi.gov/files/DOI-2015-Tech-Transfer-Annual-Report.pdf

Table 2-1. Estimated Economic Contributions Resulting from Interior's Activities

Category	Direct Economic Contribution (billions, 2015-\$)	Total Economic Contributions: Direct + Indirect + Induced¹ (billions, 2015-\$)	Value Added (billions, 2015-\$)	Total Domestic Jobs Supported
DOI Payroll ~72,000 employees in 2015	4.84	6.54	3.61	40,990
Grants & Payments to non-Federal Entities ²	4.68	9.40	6.82	89,546
Support for Tribal Governments	0.52	1.17	0.78	8,830
Public Resources as Inputs to Production				
Recreation and Tourism	23.21	45.49	25.64	396,188
Energy				
Oil, gas and coal	74.42	165.55	94.34	776,773
Hydropower	1.19	2.16	1.40	6,721
Wind Power	0.01	0.05	n/a	255
Geothermal	0.07	0.20	0.00	948
Solar	0.29	0.99	n/a	7,076
Locatable Minerals and Hardrock Leasables ³	3.57	8.48	4.20	28,413
Salable and Other Leasable minerals	2.05	4.86	2.54	18,501
Other Production				
Irrigation water	16.46	39.85	22.33	325,392
M&I water	3.92	8.03	4.99	35,890
Grazing	0.97	2.29	n/a	39,601
Timber	0.39	1.051	0.37	4,630
Total	136.59	296.10	167.01	1,779,754

¹ The direct effect is the known or predicted change in the local economy that is to be studied. The indirect effect is the business to business transactions required to satisfy the direct effect. Finally, the induced effect is derived from local spending on goods and services by people working to satisfy the direct and indirect effects.

² This category excludes payments via U.S. Treasury.

³ Contribution estimates are based on production from Federal lands in Nevada (for locatable minerals) and Eastern States (for leasable hardrock minerals primarily in Missouri) only. In addition to Nevada, locatable mineral production from Federal lands exists in many Western States. With the exception of Nevada, information on production by ownership (private, State, or Federal) was not available.

Note: Totals may not add due to rounding. The value added and economic contribution estimates do not capture output or employment effects beyond payroll spending and natural resource production. Bureaus are engaged in various other activities funded by appropriations, e.g., land acquisition, ecosystem restoration, BLM's mine land reclamation, construction, road building, education, etc.

Table 2-2. Summary of FY 2015 Economic Contributions by Bureau

Production Inputs (DOI Activity)	FY 2015			
	Direct Economic Contribution ²⁶ (billions, 2015-\$)	Total Economic Contribution (billions, 2015-\$)	Total Value Added (billions, 2015-\$)	Total Domestic Jobs Supported
Bureau				
National Park Service				
Recreation ¹	16.89	32.04	18.36	295,339
Fish and Wildlife Service				
Recreation	2.10	4.72	2.58	35,684
Bureau of Indian Affairs²				
Oil, gas and coal	4.33	14.65	9.38	51,695
Irrigation water	2.50	7.41	3.03	45,212
Grazing	0.02	0.06		718.45
Timber	0.04	0.27	0.09	1,182
Other minerals ³	0.00	0.01	0.00	20.29
<i>BIA Subtotal</i>	6.91	22.39	12.51	98,828
Bureau of Land Management				
Oil, gas and coal	29.50	64.50	36.64	232,983
Geothermal	0.07	0.20	-	948
Locatable Minerals and Hardrock				
Leasable Minerals	3.57	8.48	4.20	28,413
Salable and Other Leasable Minerals	2.05	4.85	2.54	18,481
Grazing	0.95	2.23		38,883
Timber	0.35	0.78	0.27	3,448
Recreation	2.97	5.93	3.17	43,932
Wind	0.01	0.05	-	255
Solar	0.29	0.99	-	7,076

²⁶ In some cases the direct economic contribution equals a sales value.

Production Inputs (DOI Activity)	FY 2015			
Bureau	Direct Economic Contribution²⁶ (billions, 2015-\$)	Total Economic Contribution (billions, 2015-\$)	Total Value Added (billions, 2015-\$)	Total Domestic Jobs Supported
<i>BLM Subtotal</i> (Table continues)	39.74	88.02	46.82	374,419
Bureau of Reclamation				
Hydropower	1.19	2.16	1.40	6,721
Irrigation water	13.96	32.44	19.30	280,180
M&I water	3.92	8.03	4.99	35,890
Recreation	1.25	2.81	1.53	21,233
<i>BOR Subtotal</i>	20.32	45.43	27.22	344,024
Bureau of Ocean Energy Management/ Bureau of Safety and Environmental Enforcement	40.59	86.40	48.31	492,094
<i>Subtotal: All Bureau Production Contributions</i>	126.55	278.99	155.80	1,640,388

DOI Budgetary Items	FY 2015			
Payroll	Amount (billions, 2015-\$)	Total Economic Contribution (billions, 2015-\$)	Total Value Added (billions, 2015-\$)	Total Domestic Jobs Supported
National Park Service	1.37	1.85	1.02	11,576
Fish and Wildlife Service	0.66	0.89	0.49	5,584
Bureau of Land Management	0.68	0.93	0.51	5,804
Bureau of Reclamation	0.40	0.54	0.30	3,367
Bureau of Safety and Environmental Enforcement	0.07	0.10	0.06	628

DOI Budgetary Items	FY 2015			
	Amount (billions, 2015-\$)	Total Economic Contribution (billions, 2015-\$)	Total Value Added (billions, 2015-\$)	Total Domestic Jobs Supported
(Table continues)				
Bureau of Ocean Energy Management	0.06	0.08	0.04	479
Indian Affairs	0.47	0.64	0.35	4,019
US Geological Survey	0.66	0.90	0.50	5,628
Office of Surface Mining Reclamation and Enforcement	0.04	0.05	0.03	320
Office of Insular Affairs	0.01	0.002	0.001	11.11
Other Interior Offices	0.42	0.57	0.31	3,575
<i>Subtotal DOI Payroll (~72,000 employees in 2015)</i>	4.84	6.54	3.61	40,990
Grants, Payments, and Tribal Support				
Grants and Payments to non-Federal Entities ⁴	4.68	9.40	6.82	89,546
Support for Tribal Governments	0.52	1.17	0.78	8,830
<i>Subtotal Grants, Payments and Tribal Support</i>	5.20	10.57	7.60	98,376
Total DOI Production and Budget	134.52	296.10	167.01	1,779,754

¹ Recreation sales value and economic contribution estimates include values from U.S. territories.

² Does not include sales of renewable energy on tribal land.

³ Source: BIA data. Due to data limitations, values may not match those reported by ONRR.

⁴ Excludes payments via U.S. Treasury.

Chapter 3 State-Level Estimates

This chapter presents the results of the analysis on a State-by-State basis for value added, output, and employment. Table 3-1, Table 3-2, and Table 3-3 present State-by-State estimates of value added, economic output, and employment.

Figure 3-1 shows the ten States that contribute the largest estimated value added. The components that contribute to this value added include energy production; grants and payments; recreation; and timber and forage production. The State with the largest value added is Texas (about \$20 billion in FY 2015), followed by Wyoming (about \$12 billion in FY 2015). Most of this value added is related to Federal lands that support onshore or offshore oil and gas production.

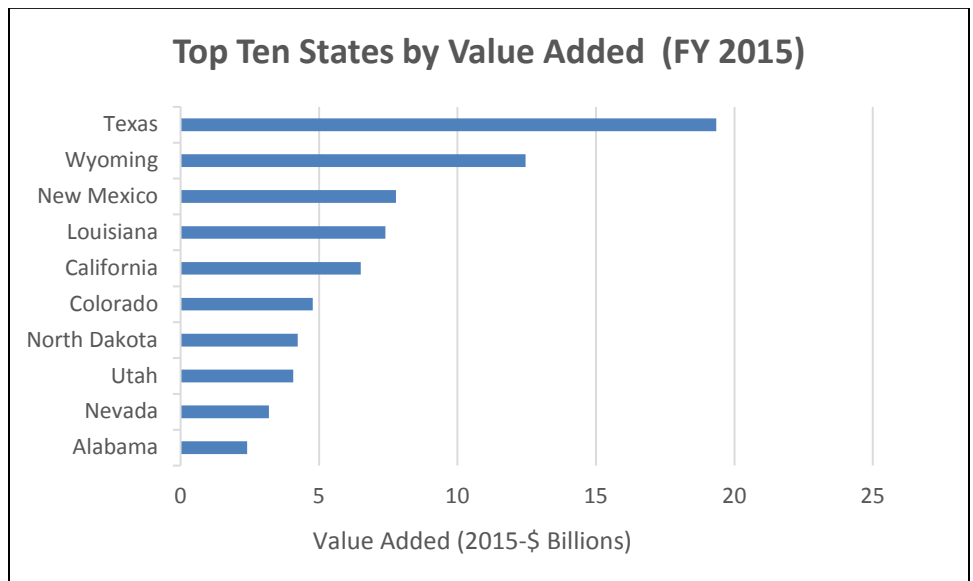


Figure 3-1. Top Ten States for Value Added in All Sectors (FY 2015, \$ billions)

Figure 3-2 shows the top ten States for value added associated with recreation on DOI lands. . The State with the largest recreation value added is California (almost \$2.5 billion in FY 2015), followed by Alaska (about \$1.3 billion in FY 2015).

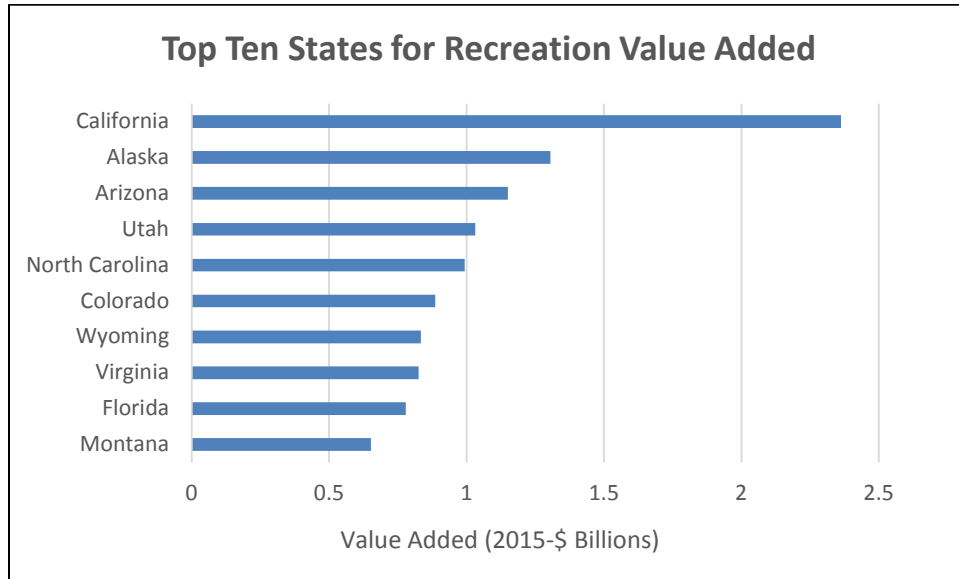


Figure 3-2. Top Ten States for Value Added in the Recreation Sector (FY 2015, \$ billions)

Table 3-1. Estimated Value Added Supported by Interior Activities, by Sector and State (FY 2015, \$ billions)

State	Recreation Value Added ^{1,2}	Energy & Minerals Value Added ^{2,3}	Grazing & Timber Value Added ^{2,4}	Major Grants & Payments Value Added ⁵	DOI Payroll Value Added ⁶	All Sectors Value Added ⁷
Alabama	0.05	2.31	0.00	0.04	0.00	2.40
Alaska	1.31	0.63	0.00	0.10	0.06	2.10
Arizona	1.15	0.31	0.00	0.07	0.13	1.66
Arkansas	0.13	0.18	0.00	0.03	0.01	0.36
California	2.36	3.66	0.00	0.24	0.24	6.51
Colorado	0.89	3.39	0.01	0.21	0.28	4.78
Connecticut	0.00	0.15	0.00	0.01	0.00	0.17
Delaware	0.00	0.04	0.00	0.01	0.00	0.05
District of Columbia	0.57	0.00	0.00	0.00	0.05	0.62
Florida	0.78	1.24	0.00	0.05	0.04	2.10
Georgia	0.33	0.62	0.00	0.03	0.03	1.01
Hawaii	0.35	0.20	0.00	0.01	0.01	0.57
Idaho	0.22	0.20	0.00	0.05	0.06	0.53
Illinois	0.04	0.60	0.00	0.05	0.01	0.71
Indiana	0.06	0.27	0.00	0.03	0.01	0.37
Iowa	0.04	0.12	0.00	0.02	0.00	0.19
Kansas	0.03	0.29	0.00	0.02	0.01	0.35
Kentucky	0.08	0.27	0.00	0.05	0.01	0.41
Louisiana	0.05	7.27	0.00	0.04	0.03	7.40
Maine	0.22	0.05	0.01	0.02	0.01	0.30
Maryland	0.19	0.72	0.00	0.02	0.02	0.95
Massachusetts	0.41	0.28	0.00	0.02	0.04	0.75
Michigan	0.17	0.37	0.00	0.05	0.02	0.60
Minnesota	0.08	0.24	0.01	0.05	0.03	0.41
Mississippi	0.12	1.79	0.00	0.02	0.01	1.94
Missouri	0.20	0.29	0.00	0.04	0.02	0.55
Montana	0.65	0.49	0.00	0.10	0.05	1.30
Nebraska	0.03	0.10	0.00	0.02	0.01	0.16
Nevada	0.49	2.59	0.00	0.05	0.05	3.19
New Hampshire	0.00	0.05	0.00	0.01	0.00	0.07
New Jersey	0.14	0.35	0.00	0.02	0.01	0.52

State	Recreation Value Added^{1,2}	Energy & Minerals Value Added^{2,3}	Grazing & Timber Value Added^{2,4}	Major Grants & Payments Value Added⁵	DOI Payroll Value Added⁶	All Sectors Value Added⁷
New Mexico	0.20	6.99	0.00	0.50	0.09	7.78
New York	0.50	0.78	0.00	0.04	0.03	1.35
North Carolina	0.99	0.64	0.00	0.04	0.02	1.69
North Dakota	0.06	4.09	0.00	0.06	0.02	4.23
Ohio	0.14	0.60	0.00	0.04	0.01	0.79
Oklahoma	0.07	1.02	0.00	0.04	0.03	1.16
Oregon	0.63	0.14	0.30	0.05	0.08	1.19
Pennsylvania	0.38	0.81	0.00	0.10	0.04	1.33
Rhode Island	0.01	0.06	0.00	0.01	0.00	0.08
South Carolina	0.09	0.24	0.00	0.02	0.01	0.36
South Dakota	0.21	0.05	0.00	0.03	0.03	0.32
Tennessee	0.52	0.22	0.00	0.04	0.02	0.80
Texas	0.25	18.97	0.00	0.09	0.04	19.35
Utah	1.03	2.78	0.00	0.19	0.06	4.06
Vermont	0.00	0.03	0.00	0.01	0.00	0.04
Virginia	0.83	1.04	0.00	0.04	0.14	2.05
Washington	0.46	0.48	0.00	0.06	0.08	1.08
West Virginia	0.05	0.13	0.00	0.05	0.02	0.25
Wisconsin	0.06	0.23	0.03	0.04	0.02	0.39
Wyoming	0.83	10.77	0.00	0.82	0.04	12.46

¹ Recreation value added based on visitor spending at units managed by BLM, BOR, FWS and NPS.

² BIA data are not included in these totals due to lack of State-specific information.

³ Energy & Minerals value added is based on activities related to onshore and offshore oil and gas, coal, non-metallic minerals, and geothermal, wind, and solar electricity generation. Information related to BIA's mineral activities are not available at the State level.

⁴ Timber contributions are based on harvests on BLM and BIA lands. BIA timber contributions are based on BLM's FY 2015 per-ccf contributions for each State. Grazing value added is not available.

⁵ Grants and Payments value added include AML, PILT, Royalties and certain other grants (Sport Fish, Wildlife Restoration, State and Tribal Wildlife Grants, LWCF with GOMESA, Historic Preservation, CIAP, CESCO, Preserve America, Save America's Treasures, Refuge Revenue Sharing).

⁶ DOI payroll value added is the economic contribution of DOI employees spending their pay.

⁷ These totals represent value added supported by energy, minerals, grazing, timber, salaries and grants and payments in each of the 50 States and the District of Columbia. The economic contributions reported in Table 2-1 were estimated using a national-level model that includes interstate "leakages" not captured in State-level models. Therefore, a sum of State totals would not equal the national total.

Table 3-2. Estimated Total Output Supported by Interior Activities, by Sector and State (FY 2015, \$ billions)

State	Recreation Total Output^{1,2}	Energy & Minerals Total Output^{2,3}	Grazing & Timber Total Output^{2,4}	Major Grants & Payments Total Output⁵	DOI Payroll Total Output⁶	All Sectors Total Output⁷
Alabama	0.08	4.49	0.00	0.06	0.01	4.64
Alaska	2.20	0.87	0.00	0.13	0.10	3.31
Arizona	1.94	0.49	0.09	0.10	0.22	2.84
Arkansas	0.25	0.33	0.00	0.05	0.01	0.64
California	4.01	6.76	0.09	0.36	0.41	11.62
Colorado	1.52	5.70	0.17	0.31	0.48	8.18
Connecticut	0.00	0.26	0.00	0.02	0.00	0.29
Delaware	0.00	0.06	0.00	0.01	0.00	0.08
District of Columbia	0.83	0.00	0.00	0.00	0.07	0.90
Florida	1.31	2.18	0.00	0.07	0.07	3.63
Georgia	0.57	0.94	0.00	0.05	0.06	1.62
Hawaii	0.55	0.27	0.00	0.02	0.02	0.85
Idaho	0.44	0.41	0.43	0.08	0.10	1.46
Illinois	0.06	1.04	0.00	0.08	0.02	1.20
Indiana	0.11	0.49	0.00	0.05	0.01	0.65
Iowa	0.06	0.21	0.00	0.04	0.01	0.32
Kansas	0.06	0.49	0.00	0.04	0.02	0.60
Kentucky	0.15	0.42	0.00	0.08	0.01	0.65
Louisiana	0.09	15.46	0.00	0.06	0.06	15.67
Maine	0.38	0.08	0.02	0.02	0.01	0.52
Maryland	0.30	1.01	0.00	0.03	0.04	1.37
Massachusetts	0.66	0.47	0.00	0.03	0.06	1.21
Michigan	0.30	0.65	0.00	0.07	0.03	1.04
Minnesota	0.15	0.43	0.04	0.08	0.05	0.74
Mississippi	0.22	3.67	0.00	0.03	0.02	3.93
Missouri	0.35	0.47	0.00	0.06	0.03	0.91
Montana	1.30	1.06	0.29	0.15	0.10	2.90
Nebraska	0.06	0.16	0.00	0.03	0.02	0.27
Nevada	0.84	4.99	0.23	0.07	0.09	6.21
New Hampshire	0.01	0.08	0.00	0.02	0.01	0.11
New Jersey	0.22	0.58	0.00	0.03	0.02	0.86

State	Recreation Total Output^{1,2}	Energy & Minerals Total Output^{2,3}	Grazing & Timber Total Output^{2,4}	Major Grants & Payments Total Output⁵	DOI Payroll Total Output⁶	All Sectors Total Output⁷
New Mexico	0.39	12.00	0.31	0.69	0.16	13.56
New York	0.76	1.30	0.00	0.05	0.05	2.17
North Carolina	1.76	0.97	0.00	0.06	0.03	2.81
North Dakota	0.12	6.37	0.00	0.09	0.03	6.62
Ohio	0.25	1.05	0.00	0.07	0.02	1.39
Oklahoma	0.13	1.87	0.00	0.06	0.05	2.11
Oregon	1.14	0.24	1.03	0.07	0.14	2.63
Pennsylvania	0.66	1.44	0.00	0.17	0.06	2.32
Rhode Island	0.02	0.09	0.00	0.01	0.00	0.13
South Carolina	0.15	0.38	0.00	0.03	0.01	0.57
South Dakota	0.39	0.08	0.02	0.04	0.06	0.59
Tennessee	0.88	0.38	0.00	0.06	0.03	1.35
Texas	0.44	33.36	0.00	0.14	0.07	34.01
Utah	1.90	4.82	0.17	0.29	0.11	7.29
Vermont	0.00	0.05	0.00	0.01	0.00	0.07
Virginia	1.41	1.47	0.00	0.06	0.24	3.18
Washington	0.76	0.73	0.01	0.09	0.13	1.73
West Virginia	0.08	0.23	0.00	0.09	0.03	0.43
Wisconsin	0.11	0.42	0.09	0.06	0.04	0.72
Wyoming	1.47	16.59	0.29	1.14	0.06	19.55

¹ Recreation total output is based on visitor spending at units managed by BLM, BOR, FWS and NPS.

² BIA data are not included in these totals due to lack of State-specific information.

³ Energy & Minerals total output is based on activities related to onshore and offshore oil and gas, coal, non-metallic minerals, and geothermal, wind, and solar electricity generation. Information related to BIA's mineral activities are not available at the State level.

⁴ Timber contributions are based on harvests on BLM and BIA lands. BIA timber contributions are based on BLM's FY 2015 per-ccf contributions for each State. BLM's grazing contributions are based on a state-specific estimate of jobs supported per 1,000 animal unit months (AUMs). BIA grazing contributions are not available at the State level.

⁵ Grants and Payments total output include AML, PILT, Royalties and certain other grants (Sport Fish, Wildlife Restoration, State and Tribal Wildlife Grants, LWCF with GOMESA, Historic Preservation, CIAP, CESCO, Preserve America, Save America's Treasures, Refuge Revenue Sharing).

⁶ DOI payroll total output is the economic contribution of DOI employees spending their pay.

⁷ These totals represent total output supported by energy, minerals, grazing, timber, salaries and grants and payments in each of the 50 States and the District of Columbia. The economic contributions reported in Table 2-1 were estimated using a national-level model that includes interstate "leakages" not captured in State-level models. Therefore, the sum of State totals will not equal the national total.

Table 3-3 shows estimates of the number of jobs supported in each State; and Figure 3-3 shows the employment supported for the top ten States. In FY 2015, energy production-related activities on Interior lands (and offshore) supported about 191,000 jobs in Texas, and over 89,000 in Louisiana. Figure 3-4 shows the top ten States by recreation-related employment. In FY 2015, recreation on Interior-managed lands supported over 36,000 jobs in California and over 20,000 jobs in Alaska.

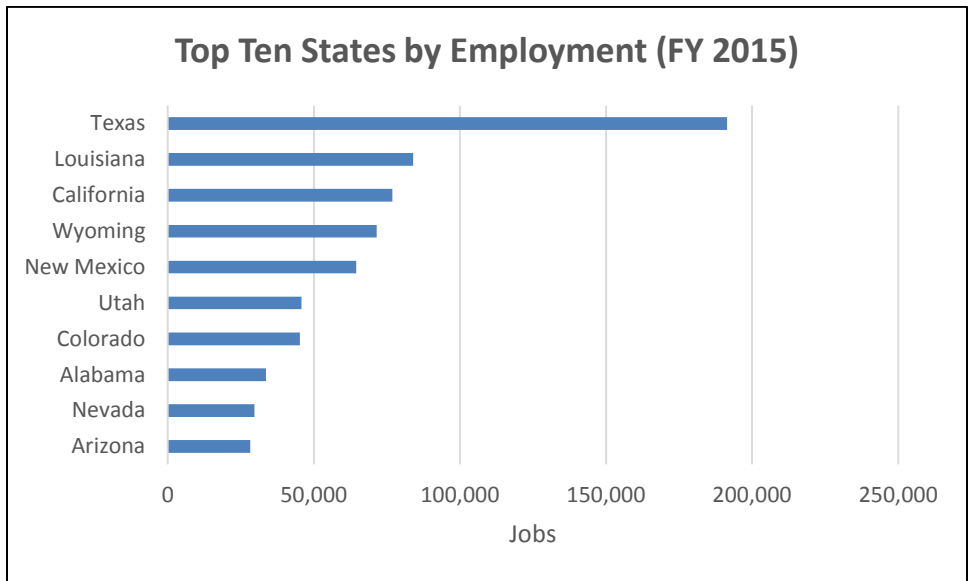


Figure 3-3. Top Ten States for Jobs Supported in All Sectors

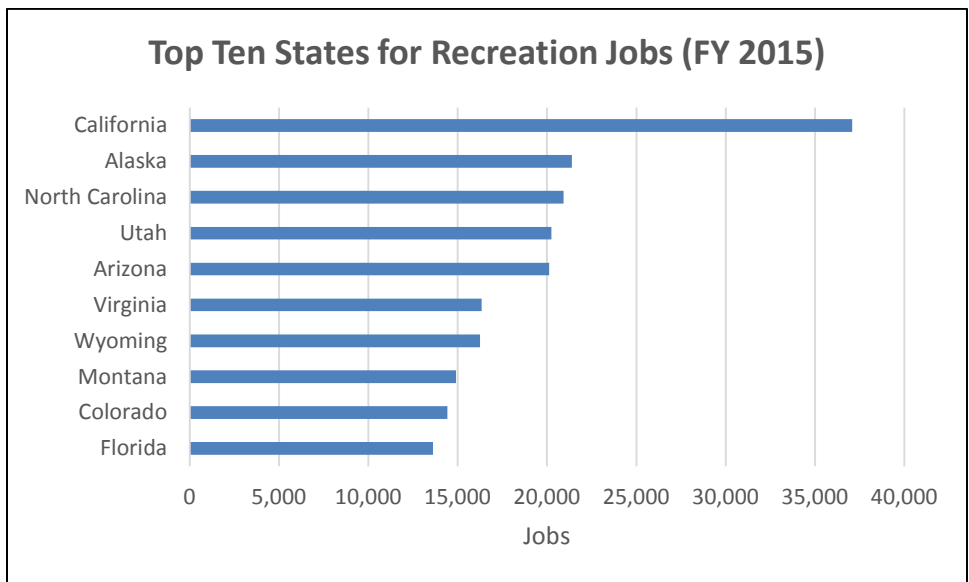


Figure 3-4. Top Ten States for Jobs Supported in the Recreation Sector

Table 3-3. Estimated Total Jobs Supported by Interior Activities, by Sector and State (FY 2015, jobs)

State	Recreation ^{1,2}	Energy & Minerals ^{2,3}	Grazing & Timber ^{2,4}	Major Grants & Payments ⁵	DOI Payroll ⁶	Total ⁷
Alabama	1,023	31,881	0	584	65	33,553
Alaska	21,390	2,899	0	1,038	718	26,045
Arizona	20,122	3,161	2,390	870	1,698	28,241
Arkansas	3,156	1,797	0	504	107	5,564
California	37,087	33,780	998	2,302	2,723	76,889
Colorado	14,418	22,409	2,316	2,704	3,365	45,212
Connecticut	48	1,477	0	138	21	1,684
Delaware	51	386	0	112	12	561
District of Columbia	7,525	0	1	11	409	7,946
Florida	13,624	12,433	0	599	556	27,212
Georgia	6,560	5,791	18	478	431	13,279
Hawaii	5,275	1,679	0	170	162	7,285
Idaho	4,739	1,702	5,988	829	883	14,141
Illinois	611	5,741	0	572	113	7,037
Indiana	1,389	2,673	0	417	107	4,586
Iowa	729	1,215	0	319	43	2,307
Kansas	546	2,780	0	359	131	3,817
Kentucky	1,798	2,512	0	744	108	5,163
Louisiana	932	81,905	8	599	488	83,933
Maine	4,521	522	0	243	124	5,411
Maryland	3,182	6,180	0	211	271	9,843
Massachusetts	6,882	2,670	0	188	405	10,146
Michigan	3,370	3,683	0	631	216	7,900
Minnesota	1,554	2,397	0	649	357	4,957
Mississippi	2,923	24,273	0	308	144	27,648
Missouri	4,281	2,838	107	594	275	8,096
Montana	14,905	4,227	3,213	1,526	865	24,735
Nebraska	727	970	2	281	153	2,133
Nevada	7,896	17,206	3,288	555	681	29,626
New Hampshire	89	492	162	150	45	938
New Jersey	2,331	3,351	5	214	152	6,053
New Mexico	4,223	43,494	8,240	7,162	1,317	64,436
New York	7,487	7,305	5	348	330	15,475
North Carolina	20,923	6,006	0	524	251	27,706
North Dakota	1,255	21,012	24	941	251	23,483
Ohio	2,972	5,813	0	540	141	9,467
Oklahoma	1,289	9,396	1	533	361	11,580
Oregon	12,178	1,441	7,961	634	1,145	23,359
Pennsylvania	7,633	7,845	0	1,313	444	17,235
Rhode Island	253	537	0	118	17	925

State	Recreation ^{1,2}	Energy & Minerals ^{2,3}	Grazing & Timber ^{2,4}	Major Grants & Payments ⁵	DOI Payroll ⁶	Total ⁷
South Carolina	1,836	2,373	0	288	78	4,575
South Dakota	5,112	537	275	383	467	6,775
Tennessee	9,800	2,208	0	586	233	12,828
Texas	4,634	184,657	484	1,108	478	191,361
Utah	20,252	18,011	3,967	2,654	833	45,716
Vermont	58	305	0	136	33	532
Virginia	16,346	8,847	0	484	1,793	27,469
Washington	7,415	4,393	371	680	889	13,747
West Virginia	1,091	1,333	0	811	245	3,480
Wisconsin	1,371	2,339	0	579	283	4,571
Wyoming	16,250	40,037	3,300	11,345	497	71,428

¹ Recreation jobs are based on visitor spending at units managed by BLM, BOR, FWS and NPS.

² BIA data are not included in these totals due to lack of State-specific information.

³ Energy & Minerals jobs are based on activities related to onshore and offshore oil and gas, coal, non-metallic minerals, and geothermal, wind, and solar electricity generation. Information related to BIA's mineral activities are not available at the State level.

⁴ Timber contributions are based on harvests on BLM and BIA lands. BIA timber contributions are based on BLM's FY 2015 per-ccf contributions for each State. Grazing contributions are based on a state-specific estimate of jobs supported per 1,000 animal unit months (AUMs). BIA grazing contributions are not available at the State level.

⁵ Grants and Payments jobs include Mineral Revenue Payments, PILT, AML, and certain other grants (Sport Fish, Wildlife Restoration, State and Tribal Wildlife Grants, LWCF with GOMESA, Historic Preservation, CIAP, CESCO, NPS Grants, and Refuge Revenue Sharing).

⁶ DOI payroll jobs are the economic contribution of DOI employees spending their pay.

⁷ These totals represent jobs supported by recreation, energy, minerals, grazing, timber, salaries and grants and payments in each of the 50 States. The jobs reported in Table 2-1, were estimated using a national-level model that includes interstate "leakages" not captured in State-level models. Therefore, the sum of State totals will not equal the national total.

Appendix A. Technical Information

This is the seventh Economic Contribution report produced by DOI. While all of the reports relied on the best available data and sound methods, there are changes across years as improved data, methods, and models are identified or become available. When making comparisons of DOI's economic contribution estimates across years, it is important to identify all of the factors that might contribute to estimates changing from one year to the next. These factors can include:

- Changes in land use. These might be due to changes in resource demand or management decisions, or reflect a natural progression in a project's life cycle, such as a shift from construction to operational status.
- Changes in the data describing a resource's annual economic output. These might be due to actual changes in the quantity or price of a good produced, or changes in data collection and assumptions.
- Changes in the economic models that describe the underlying structure of local economies. For most sectors, these models are developed independent of this report. In some cases, new models that better describe individual sectors replaced models used in prior reports. In other cases, the assumptions and data within the models changed significantly from year to year.

IMPLAN

This analysis primarily employs the widely used I/O software and data system known as IMPLAN for estimating the economic contribution of Interior activities in terms of output (sales), value added, and employment (jobs). In particular, this analysis uses IMPLAN data released in 2013²⁷. The underlying data drawn upon by the IMPLAN software is collected by the Minnesota IMPLAN Group (MIG) from multiple Federal and State sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S. Census Bureau. Additional information about the IMPLAN modeling software can be found at: <http://www.implan.com/>.²⁸

²⁷ BLM used 2014 IMPLAN data

²⁸ The most recent version of IMPLAN (Version 3.0) incorporated a number of changes, with one of the most notable being an improvement in the method used for calculating Regional Purchase Coefficients (RPCs). IMPLAN Version 2.0 had been criticized for its use of non-survey based RPCs, which have been shown to produce higher estimates than survey-based data. IMPLAN Version 3.0 attempts to deal with these criticisms through an improved method for estimating RPCs. The new method uses a gravity model that considers the size and proximity of alternative markets to give an improved estimation of imports and exports than the econometric-based estimates in Version 2.0. A study by Koontz, Loomis, and Winter (2011) showed that the differences in the IMPLAN Version 3.0 software can result in lower estimates of employment and income effects for tourism impacts. A job in IMPLAN is the annual average of monthly reports for that industry. This is the same definition used by CEA, BLS, and BEA nationally. One 12-month job is equivalent to two 6-month jobs. The employment data come from a series of surveys taken multiple times each year. The workers are counted regardless of status, thus jobs are permanent, part-time, temporary and seasonal. The data from the surveys are summed and averaged to obtain an "average annual employment."

OSMRE

- The majority of the Office of Surface Mining Reclamation and Enforcement's activities related to reclamation of abandoned mine lands are encompassed by funding from the Abandoned Mine Lands (AML) fund. The impact of these funds is captured in the entry for Grants and Programs reported earlier in the report.

Indian Affairs, BIA, and BIE

- Sales volumes and values for BIA's oil, gas and coal activities are based on data from ONRR.
- Drilling costs for oil, gas, and dry wells were calculated for each State where Indian wells were completed in FY 2015. Costs per well were calculated as the total costs for each type of well (oil, gas, or dry) divided by the total number of completed wells of each type. The cost data were taken from "The Oil & Gas Producing Industry in Your State" (IPAA, October 2012).
- Economic contributions associated with contractual support provided to tribal governments were evaluated by applying State and local government multipliers.
- Irrigation: The Department of the Interior's Bureau of Indian Affairs (BIA) manages 17 irrigation projects on Indian reservations in the Western United States. The overall approach for estimating economic contributions and employment estimates is similar to that used for Reclamation's irrigation activities. Economic contributions and employment estimates were estimated for agricultural activities associated with BIA operated irrigation projects using data from the USDA National Agricultural Statistics Service (NASS). 2012 Census of Agriculture, Volume 2, American Indian Reservations. The Census of Agriculture does not provide complete coverage of all reservations. Irrigated acreage data were combined with average crop revenue per acre for irrigated acreage calculated based on data in the 2012 Agricultural Census. The agricultural revenue values in the Census were indexed to 2015 dollars using the NASS food grain prices received index. The multipliers used were based on IMPLAN grain farming sector. The values reported for Irrigation represent the value of the crops produced using irrigation water supplied by BIA. This value overstates the actual production attributable to BIA, as some level of production would occur without the irrigation water delivered by BIA, and water is only one of many inputs into agricultural production.

BLM

- The BLM estimates the contributions from oil and gas activities by adding the value of the gross output to drilling costs and then removing inter-industry sales to derive a final demand figure. A multiplier is then applied to final demand to derive the contribution estimates. The rationale for including drilling costs in the initial sum is that drilling costs are not accounted for in the IMPLAN production function for oil and gas extraction. Note that BLM's results are developed independently of BOEM's figures for offshore production, and use a different approach. This complicates a direct comparison between the onshore and offshore analyses. The BLM considers onshore direct output to include 1) oil and gas well drilling, with costs taken from the Independent Petroleum Producers Association report IPAA Oil & Gas Producing Industry in Your State; and 2) oil and gas sales, based on sales volume and sales value for the fiscal year with preliminary sales year data provided by the Office of Natural Resources Revenue (ONRR). Final demand is taken to be the sum of these two items less inter-industry sales.

- BLM uses IMPLAN to estimate the economic contributions associated with salable minerals and other leasable minerals (i.e., other than oil, gas, and leasable hardrock minerals). The method parallels that of oil and gas production described above. Production and unit prices for leasable minerals for the fiscal year are based on preliminary sales year data provided by ONRR. Salable minerals production data for the fiscal year are from BLM's internal database LR2000; commodity price data are based on the USGS annual Mineral Commodity Summaries (MCS). Preliminary FY2015 sales year data on leasable mineral sales volume and value were received from ONRR on 12/11/2015 through a special data request.
- The economic contributions of hardrock mining on the Federal estate were estimated at a national level using an approach similar to the approach used in FY 2013 and FY 2014. The primary limitation in generating useable estimates of hardrock mineral production is identifying the portion coming from Federal lands. These data are generally unavailable. The production estimates from Nevada and Missouri account for the vast majority of production value from Federal lands. USGS's annual MCS provide commodity prices that were used in this analysis.
- For livestock grazing, the BLM developed state-specific economic contribution estimates associated with 1,000 Animal Unit Months (AUMs) – commonly termed response coefficients. An example of a response coefficient is “1,000 AUMs for grazing beef cattle support approximately X direct jobs in state X.” These response coefficients were revised this fiscal year using data primarily from the 2012 Census of Agriculture in combination with IMPLAN (2013 data). The results in the prior four DOI Economic Reports used response coefficients derived using data primarily from the 2007 Census of Agriculture, and also from the Census' American Community Survey, in combination with IMPLAN (2007 data). Due to the revisions of the response coefficients, the FY15 economic contribution estimates associated with livestock grazing are not comparable to prior years. The 2012 Census of Agriculture provides information on a specific subset of livestock that best reflects the animals that actually graze on BLM-managed lands – specifically, employment, income, sales, and expense data from operations classified by the North American Industry Classification System (NAICS) as beef cattle ranching and farming (112111) and sheep and goat farming (1124). In addition, the 2012 Census of Agriculture contains information related to self-employment as well as individuals who are unpaid or family laborers. In some areas unpaid or family labor represent a significant component of the labor used to run ranches and farms. The analysis assumes that the grazing operations included in the Census of Agriculture are representative of those operations using public forage from lands managed by the BLM. It is possible that ranchers utilizing public lands have different spending or employment patterns than grazing operations as a whole, but using the Census of Agriculture provides a standard dataset for comparison across states. In addition, because the Census of Agriculture is only available every five years it is assumed that the response coefficients will remain constant from year-to-year. The economic contribution estimates associated with livestock grazing on BLM-managed lands were derived by multiplying response coefficients by the AUMs authorized on bills (associated with leases or permits to graze livestock on BLM managed lands) that were due during a given fee year. Economic contribution estimates in this report are based on the most current data on livestock grazing use on BLM-managed lands - fee year 2014 (3/1/2014 through 2/28/2015).

- Timber value is composed of the sales receipts for harvested sawtimber, sales of Special Forest Products, and stewardship timber sales. Contracts for sawtimber are typically sold at auction, and the BLM receives the agreed payments when timber is actually cut and sold. Special Forest Products include fuelwood, posts, poles, etc. While the sales are negotiated, the BLM tries to follow the stipulation that sale prices will not go below 10 percent of the estimated market value. Stewardship Program timber sales are associated with BLM bartering goods (timber products) for services (land treatments) done by outside contractors. The product value is used to offset the total cost of service work in the contract.
- Estimates reflect economic contribution from commercial sales of timber, primarily wood-based products. The BLM's forestry and woodlands management program also manages public access to a variety of other forestry products including personal use fuelwood (fuelwood gathered by individuals for personal use rather than by companies for commercial resale) and non-wood Special Forest Products (such as Christmas Trees, native seeds, mushrooms, and floral/greenery). Non-wood Special Forest Products from BLM-managed lands generated over \$815,000 in sales in FY2015. Personal use fuelwood gathered from BLM-administered lands in FY2015 amounted to about 85,000 CCF. Assuming a market price of \$200 per cord (EIA, 2014), the market value of this fuelwood is almost \$13.5 million. The BLM collected around \$430,000 in permit fees for personal fuelwood collection.”
- Economic contributions related to constructing and operating wind, solar, and geothermal energy projects were derived using the Jobs and Development Economic Impact (JEDI) models produced by the National Renewable Energy Laboratory (NREL). Prior to FY 2013, economic contributions associated with geothermal energy development were developed using IMPLAN based on sales volume and value from ONRR and drilling data from BLM. Therefore, the economic contribution estimates for FY 2014 and FY 2015 should not be compared to prior years.
- The significant drop in the market price for oil and gas in 2015 reduced the average effective prices for oil and gas in FY 2015 and thus did effect the calculated economic contribution estimates. While DOI's contribution to the economy may decline, society receives benefits from lower oil and gas prices as consumers have more disposable income to spend elsewhere creating its own economic impacts.

Reclamation

- FWS trip-related multipliers and average visitor expenditures were used to estimate impacts for Reclamation's recreation activities. The analysis relies on Reclamation visitation data collected during 2010-2013 and applies current expenditures per day, value added, output, and employment multipliers from FWS.
-
- Prior to FY14, valuations of economic impacts from Reclamation's agricultural water deliveries in the Central Valley Project (CVP) area assumed that all crops grown in the CVP area used only Reclamation water supplies. However, Reclamation's water supply is only supplemental. Therefore, an adjustment was made to the value of CVP crops by comparing the calculated irrigation requirements to Reclamation's actual water deliveries.

- Reclamation is utilizing GIS imagery to document the type and acreage of irrigated crops grown. Some Reclamation projects do not have GIS data and have not been included. GIS acreage from 2015, combined with 2014 State-level yields and prices provided by the USDA, are used to estimate gross crop value. The Reclamation M&I water economic contributions are associated with operating systems for water, sewage, etc. The economic contribution of delivering M&I water was estimated by using total 2005 M&I contract amounts in acre-feet, and multiplying the total amounts by recent average market M&I water rates for major urban areas derived from various studies that the Bureau of Reclamation Technical Services Center combined and analyzed. For the Central Valley Project in California actual M&I delivery data was used in both FY 2014 and 2015.
- The value of hydroelectricity generated at Reclamation facilities was estimated using regional wholesale prices for Reclamation major hydropower production areas as follows: BPA, \$0.035/kWh; Parker Davis, \$0.009/kWh; Boulder-Hoover, \$0.016/kWh; Loveland, \$0.041/kWh; Billings, \$0.033/kWh; Sacramento, \$0.055/kWh; and Salt Lake City, \$0.03/kWh.

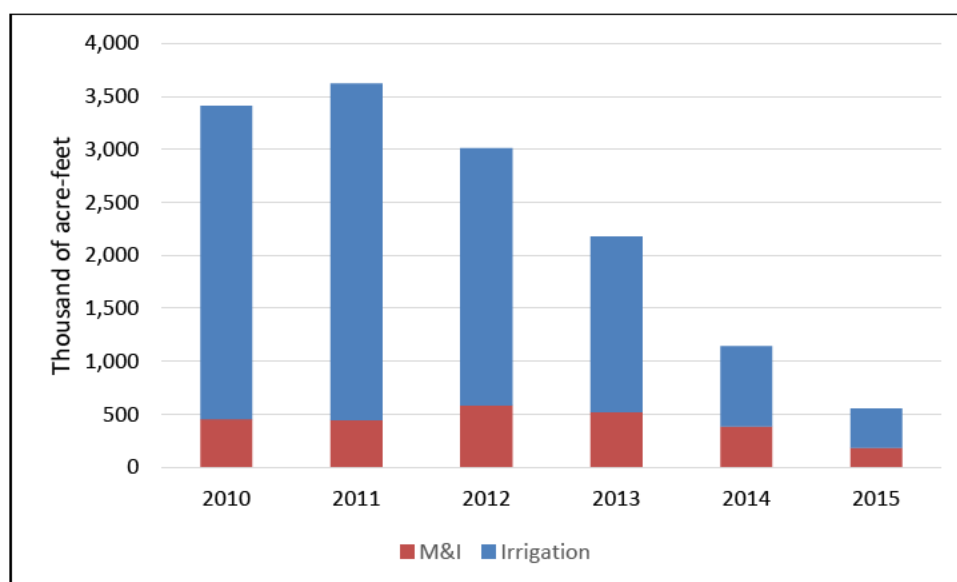


Figure A-1. Bureau of Reclamation Water Deliveries by Use for Central Valley Project (2009-2015)

BOEM and BSEE

- The total FY 2015 economic contributions of oil and gas activity on the federal Outer Continental Shelf (OCS) are less than estimated for FY 2014 (\$113 billion in total U.S. output, \$64 billion in total value added and 651,000 domestic jobs sustained). This reduced economic impact is the result of low oil prices which persisted throughout the year and the corresponding reduction in government revenues.
- The BOEM maintains an in-house socio-economic impact model, MAG-PLAN, for economic impact analyses to support its lease sale planning duties. MAG-PLAN identifies the industry sectors that contribute to offshore oil and gas activity (e.g., wells drilled, platforms installed, etc.) and calculates the size of the direct impact in each sector.
- The basis for calculating the FY 2015 impacts of OCS oil and gas activity is the sales value of FY 2015 OCS oil and gas production as published by the Office of Natural Resources Revenue.²⁹

²⁹ <http://statistics.onrr.gov/ReportTool.aspx>

- As shown in Table A-2, the sales value of OCS production in FY 2015 was \$40.6 billion. Because different sources of spending generate different degrees of economic impact, we distributed this sales value among industry spending, government revenue, and after-tax profits to enable the calculation of total economic impact and individual State impacts. The portion of industry profits that flow to foreign entities has spending impacts that cannot be separated from those of other U.S. activities that generate income abroad, so we omit any spending impact from this portion of total sales. That leaves \$35.6 billion of OCS stimulated direct spending in the U.S. economy, shown in the second column of Table A-2. The rows in Table A 2 identify the individual components that we estimated to arrive at these totals.

Table A-1. BOEM and BSEE Administered Industry Economic Impact FY 2015

	OCS Oil, Gas, and NGL Sales Value (\$ millions)	Resulting Direct Domestic Spending (\$ millions)	Resulting Total Domestic Output (\$ millions)	Resulting Total Domestic Value Added (\$ millions)	Domestic Jobs Sustained ('000s)
Industry Spending	\$20,294	\$20,294	\$54,944	\$28,435	301
Government Revenue (includes profit and dividend tax revenues)	\$8,395	\$8,395	\$14,369	\$10,625	94
After-(both profit and dividend) Tax Profits	\$11,898	\$6,870	\$17,089	\$9,254	97
After-Tax Profits to Rest of World	\$5,028	NA	NA	NA	NA
After-Tax Profits remaining in U.S.	\$6,870	\$6,870	\$17,089	\$9,254	97
Sales Value	\$40,587	\$35,559	\$86,402	\$48,315	492

NB: Totals may not sum due to rounding

- The analysis assumes that direct industry spending (i.e., capital and operating expenditures) was 50 percent of total sales value in FY 2015.³⁰ BOEM applied MAG-PLAN national multipliers for direct, indirect, and induced spending (a total multiplier of 2.71) to estimate the total domestic output, value added (using a MAG-PLAN industry spending ratio of \$1.40 in total value added for every dollar of direct spending), and employment (using a MAG-PLAN ratio of 14.8 total jobs per million dollars of direct offshore oil and gas industry spending).
- Estimated after-tax profits (after both profit and dividend taxes) were estimated to be \$11.9 billion. These were distributed across domestic and foreign entities through both dividends and retained earnings. To calculate this distribution, EIA data were used to split profits into retained earnings and shareholders dividends and further to split retained earnings into those that would be spent domestically versus internationally.
- BOEM used Bureau of Economic Analysis, Department of Commerce data to split dividends into those for domestic versus foreign shareholders. Domestic dividends were assigned a 15 percent tax rate and those tax revenues were included with government spending. Of the after-tax domestic dividends we assume, based on two empirical studies, that 25 percent is reinvested and the remainder is spent.
- Government leasing revenues, corporate tax, and dividend tax are all treated together. Using appropriate IMPLAN Federal and state government institutional spending patterns we estimate a composite multiplier 1.72 for total output, a ratio of \$1.27 in total value added for every dollar of direct government revenue, and 11.21 total jobs per million dollars in direct spending.
- Additional analysis was required to estimate the distribution of economic impacts by State. BOEM's MAG-PLAN model provides percentages of industry spending economic impacts for each of the five Gulf of Mexico (GOM) States while aggregating the remainder to the "rest of U.S." The five GOM states account for 68% of total OCS generated spending and jobs and 65% of total value added. For the remainder of the U.S., we used State Bureau of Labor and Statistics (BLS) employment data for each of the ten largest MAG-PLAN sectors identified outside of the Gulf States and weighted industry spending accordingly.
- For the government revenue sector, we allocated the spending and job components of grant and revenue sharing programs to the state which receives the funds. We allocated the remaining leasing revenue and tax revenue between states in the proportion in which each receives government funds based on historical Federal funds distributions to states as reported by the Bureau of the Census.³¹
- Note that BOEM's results are developed independently of BLM's figures for onshore production, using a different approach. This complicates a direct comparison between the offshore and onshore analyses. BOEM considers offshore direct output to include several related supporting sectors, including steel product manufacturing, water transportation, air transportation, food supply, etc. Interindustry sales are removed in calculating final demand.

³⁰ Previous calculations of the BOEM contribution have estimated this percentage to be 40% of total sales value based on results of our in-house leasing model, IMODEL. However, as the effective sales price of oil has fallen significantly from previous years, this factor was re-evaluated for FY 2015. As such, we determined that 50% of sales value is a more appropriate figure. Based on published estimates, oil companies report a cost savings of approximately 10 percent as a result of lower oil prices. Our new factor of 50% generates a total industry spending approximately 10 percent lower than what was estimated for FY 2014 and provides what we view as a reasonable estimate of FY 2015 industry spending.

³¹ U.S. Census Bureau Statistical Abstract Table 467: Federal Funds - - Summary Distribution by State and Island Areas: 2007. <http://www.census.gov/compendia/statab/2010/tables/10s0467.xls>.

Grants and Payments

- The total grants and payments included in the report represent all grants and payments for bureaus and Interior-wide programs in FY 2015, including current and permanent Payment in Lieu of Taxes (PILT) payments, mineral revenue payments and all AML grants to States and tribes. The DOI Office of Budget provided State-level data for the grants and payments analyzed in this report.
- The report includes a total of \$4.68 billion in grants and payments. The FY 2016 Budget in Brief reports actual FY 2015 grants and payments totaling \$4.83 billion. Variances between the two figures can be attributed for certain grant and payment totals to the exclusion of program administration costs in grant awards, Coastal Impact Assistance Program (CIAP) payments made during FY 2015, and payments to support tribal governments.
- Economic contribution estimates use national-level multipliers for the appropriate sectors. The State-level analysis of employment impacts related to grants and payments included in Chapter 3 only includes those categories for which State-level data were available. Including information on impacts of the full array of grant programs and payments would likely increase employment impacts. The State analysis uses State-level multipliers for the appropriate sectors for each grant category.
- Energy and mineral leasing revenues (bonuses, rents, and royalties) disbursed to the U.S. Treasury help fund various government functions and programs through the General Fund of the U.S. Treasury. Royalty payments are divided into offshore and onshore categories. All employment and output impacts for onshore and offshore royalties were included in the category of Energy and Minerals for the national and State-level analyses.
- The State-level analysis includes a preliminary estimation of the impacts of Federal offshore royalty payments (to States via Treasury). Additional details on these calculations are included in the BOEM section above.
- Federal law requires that all monies derived from mineral leasing and production activities on Federal and American Indian lands be collected, properly accounted for, and distributed. For Federal onshore lands, the revenues are generally shared between the States in which the Federal lands are located and the Federal government. In most cases, States receive about 50 percent of the revenues associated with mineral production on Federal public lands within their borders.³² In the case of American Indian lands, all monies collected from mineral production are returned to the Indian Tribes or individual Indian mineral lease owners. Revenues associated with Federal offshore lands are distributed to several accounts of the U.S. Treasury and certain coastal States with special Federal offshore tracts adjacent to their seaward boundaries. Coastal States, with certain Federal offshore 8(g) tracts adjacent to their seaward boundaries, receive 27 percent of the revenues.
- Mineral revenue payments include receipts for sales in the National Petroleum Reserve – Alaska, Mineral Leasing Associated Payments, National Forest Fund Payments to States, and Payments to States from Lands Acquired for Flood Control, Navigation, and Allied Purposes.
- Grants and Payments include mineral revenue payments to States associated with onshore production, and grant programs funded by offshore leasing and other sources of revenues.
- Land Acquisitions: Output and employment contribution estimates for land acquisition are derived using State and national-level multipliers. It is assumed that 90 percent of funds goes to landowners and 10 percent goes to transaction costs. Much of the money land owners receive is

³² Alaska is an exception, receiving 50 percent of revenues for production from the National Petroleum Reserve A (NPR-A), and 90 percent elsewhere.

likely to go into savings, be used to pay off loans, or be subject to tax. It is therefore assumed that landowners will spend only 50 percent of funds they receive. These expenditures are modeled as a household income change for households with annual incomes greater than \$150,000. The remaining 10 percent of funds are assumed to go to service providers associated with real estate transaction costs or monitoring and administration of easements. Specific services associated with land acquisition could include land appraisal, title examination and legal services, environmental site assessments, and ecological inventory and management planning. IMPLAN sector 440 is used to model the services associated with land acquisition.³³ Temporal issues complicate the analysis, as there may be a delay between the date of the purchase, the date the landowner receives the funds, and the dates the landowner spends the funds. Contributions are typically reported for one year, and only a small portion of the funds received by landowners is likely to be spent in that same year; monitoring expenditures will also often be incurred in perpetuity whereas transaction costs are all up-front. As a simplifying assumption, all landowner expenditures and service fees are assumed to occur in the same year that the transaction takes place.

Payroll Impacts

- The domestic jobs supported by Interior in Table 2-1 represent additional jobs above and beyond Interior employees.
- For Table 2-1, 2015 payroll data were obtained from Department of the Interior Human Resources data systems. The payroll data include salary data based on the duty-station of all Interior employees through pay period 17.
- DOI payroll contributions are estimated using the IMPLAN Labor Income Change activity. Leakages in this IMPLAN activity include payroll taxes and salaries earned by employees who commute from outside of the local area (and thus primarily spend their salaries outside of the local area). Contributions are based on household spending patterns for a distribution of household income levels. Household spending patterns account for leakages related to personal taxes and savings. For the payroll contributions shown in Table 2-1, a national multiplier was used to estimate the employment contributions of Interior payroll, equaling 8.5 jobs per \$1 million.
- For State-level salary effects shown in Tables 3-1 and 3-2, 2015 payroll data and State-level multipliers were used. Since State multipliers do not capture leakages outside of each State, the total of State salary impacts will not equal the national-level salary employment impacts.
- The total salary paid and number of employees for each Bureau does not necessarily reflect FTE data typically reported in budget documents. These data were used to estimate total salary impacts rather than data on total FTE's, which would not have been a complete estimate of total salary impacts of DOI employees.

Recreation Impacts

- Total recreation economic and employment at the national-level are larger than the sum of the state level contributions because interstate expenditures are leaked from state level models but are included in the national level model.

³³ In previous years, we used Sector 374 (management, scientific, and technical consulting services). The change to Sector 440 is related to IMPLAN's switch to a 536-sector scheme.

- Last year's report did not include data for NPS and FWS units in U.S. territories. This year's report does include these areas in the economic analysis for NPS units. Visitation data for NPS reported in Table 1-1 includes visitation for all NPS units including U.S. territories. FWS does maintain some visitation data for sites outside of the continental United States, Hawaii, and Alaska, and future analysis could include these areas.
- Visitation and expenditure data sources included the following: FWS Fishing, Hunting, and Wildlife-Associated Recreation Survey; NPS visitor surveys, and data from *2015 National Park Visitor Spending Effects, Economic Contributions to Local Communities, States, and the Nation*, (Cullinane Thomas, et al. 2015). We calculated site-level impacts of visitor spending for BLM sites using Forest Service expenditure data, and for Reclamation expenditures based on the FWS Fishing, Hunting, and Wildlife-Associated Recreation survey. Spending profiles associated with these data sources were used to develop estimates of average expenditures. BLM visitation estimates are from BLM's Recreation Management Information System (RMIS). BLM used results from the U.S. Forest Service's National Visitor Use Monitoring (NVUM) survey to estimate the distribution of visitor types and the associated expenditure profile.
- For the Bureau of Reclamation, most project recreation sites are managed by Reclamation partners, including both Federal and non-Federal entities.
- NPS and FWS visitation data are for 2015. USBR visitation data are for 2012; BLM are for FY 2013. However, the economic contribution estimates for BOR are based on 2011 spending information in 2013\$ (from FWS). Multipliers used for BOR are from the 2008 version of IMPLAN. Multipliers used for NPS and FWS are from the 2013 version of IMPLAN.
- The FWS National Survey of Hunting, Fishing, and Wildlife Associated Recreation State-level data were used to determine the average recreationist's trip spending per day.
- The BOR and FWS recreation valued added figures are based on the ratio of NPS valued added to total output.

Contributors

The Office of Policy Analysis would like to acknowledge the following staff of the Department of the Interior who developed economic contribution information and collaborated across bureaus and offices in order to produce this Report:

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**U.S. Department
of the Interior**

www.doi.gov

News Release

Date: June 17, 2016

Contact: Interior_press@ios.doi.gov

Interior Department Supported \$106 Billion in Recreation, Conservation, Water and Renewable Energy Investments, Supporting More than 860,000 Jobs in FY 2015

WASHINGTON, D.C. – U.S. Secretary of the Interior Sally Jewell today released the *U.S. Department of the Interior's Economic Report for Fiscal Year 2015*. The report highlights that Interior investments in recreation, conservation, water and renewable energy led to \$106 billion in economic output, and supported 862,000 jobs. Interior's activities related to fossil fuel extraction and mining also contributed \$179 billion to the national economy, down from \$241 billion from the prior year due to market forces and commodity price reductions.

The report found that national parks, national wildlife refuges, national monuments and other public lands managed by Interior hosted an estimated 443 million recreational visits in 2015—up from 423 million in 2014—and that these visits alone supported \$45 billion in economic output and about 396,000 jobs nationwide.

“This report sends a strong signal to everyone that the Department of the Interior is a powerful, indispensable economic engine,” Secretary Jewell said. “Our parks and other public lands support outdoor recreation, promote renewable energy and allow us to harness other domestic energy resources, create jobs and promote economic development in communities across the nation.”

Through continued programs and partnerships for youth, the Department provided 36,388 job opportunities in FY 2015, a 120 percent increase over the previous year. In FY 2015, 23,858 youth were employed by Interior and 12,530 were employed by partners.

Secretary Jewell noted that many of Interior's activities—such as scientific research and conservation of parks, wetlands and wildlife habitat—have economic values that are not easily calculated, and are not included in the report's totals.

“Much of the value of our lands and historic sites cannot be expressed in dollars,” said Secretary Jewell. “Beyond their contributions to clean air, clean water and wildlife habitat, many are

priceless treasures that belong to all Americans and help define our cultural heritage for present and future generations.”

Last April, Secretary Jewell announced that the Federal Recreation Council and the Commerce Department’s Bureau of Economic Analysis entered into a cooperative venture to complete a broader economic analysis covering the outdoor recreation sector. That report will document the industry’s value and contributions to the national economy, specifically shedding light on the role public lands and waters play, and will develop a baseline for informing future decision-making, governance and long-term management of public lands and waters.

This report differs from other economic contribution studies in that it is a comprehensive analysis of the economic impacts from DOI activities. This report includes data from reports produced by Bureau of Land Management (BLM) and the National Park Service (NPS) that focus on impacts from specific agencies and activities.

In total, the report identifies about \$300 billion in economic output and 1.8 million jobs supported through Interior’s activities including: tourism and outdoor recreation at parks, monuments and refuges, water management, energy and mineral development on public lands and waters, wildlife conservation, hunting and fishing, support for American Indian tribal communities and U.S. island territories, as well as scientific research and innovation endeavors.

The Department’s diverse portfolio includes the management of some 500 million acres of public lands, and another 1.7 billion acres offshore on the Outer Continental Shelf. In addition, the Department is the nation’s largest supplier and manager of water in 17 Western states. It oversees cutting-edge scientific research in the areas of geology, hydrology and biology and serves as Trustee for 567 federally-recognized American Indian and Alaska Native tribes.

Some highlights from the report include:

Conservation: The economic contributions and employment supported by the Department’s conservation-related activities are difficult to measure separately because conservation is often a component of recreation, ecosystem restoration, water management, and wildlife habitat.

Forage and Grazing: Interior lands provided access to more than 10 million animal unit months of forage in 2015. Forage and grazing activities supported \$2.3 billion in economic output and about 40,000 jobs.

Fossil Fuel Energy: Fossil fuel energy produced from Interior lands in 2015 included 782 million barrels of crude oil, 5 trillion cubic feet of natural gas, and 421 million tons of coal, supporting \$166 billion in economic output and about 777,000 jobs.

Total economic output for FY 2015 is about \$58 billion less than FY 2014, largely due to changes in the price for oil and natural gas. For example, in FY 2014, oil traded for about \$100 per barrel. By FY 2015, market conditions changed significantly, lowering the price per barrel by 50 percent. Similar changes occurred in the natural gas and coal markets, despite increases in production on public lands for oil and coal.

Grants and Payments: Grant and payment programs administered by Interior support activities such as reclamation of abandoned mine lands, historic preservation, habitat conservation, and tribal governance. These activities supported \$9 billion in economic output and 90,000 jobs in 2015.

Non-fuel (Hardrock) Minerals: Hardrock mining on Interior lands produced a wide variety of minerals. For example, an estimated 2.5 million troy ounces of gold from BLM lands in Nevada's hardrock mining activities supported \$13 billion in economic output and over 47,000 jobs.

Recreation: National parks, national wildlife refuges and other lands managed by the Department hosted an estimated 443 million visits, supporting \$45 billion in economic output and about 396,000 jobs.

Renewable Energy: Interior lands and facilities produced 36 million MWh of hydropower. The BLM and the Bureau of Indian Affairs (BIA) approved the installation of 492 MW in new solar energy projects on public and tribal lands. Renewable energy activities supported an estimated \$3 billion in economic output and resulting in about 15,000 jobs in 2015.

Restoration: Nearly every Interior bureau engages in some form of restoration, for resources ranging from physical structures to habitat and cultural resources.

- The Office of Surface Mining Reclamation and Enforcement's Environmental Restoration program activities improve natural resources and reduce risk to public health, safety and general welfare. In FY 2015 OSMRE reclaimed or mitigated the equivalent of 12,339 acres of land on 566 projects.
- The DOI Natural Resource Damage Assessment and Restoration Program works across bureaus to ensure that responsible parties, not taxpayers, bear the cost of restoring resources injured by oil spills or hazardous substance releases. In FY 2015, this program restored or enhanced 46,606 acres and 149 streams/shoreline miles to achieve habitat conditions to support species conservation.

Scientific Data: Investments in research and development promote economic growth and innovation, ensure American competitiveness in a global marketplace, and are critical to achieving Interior's mission. Investments in Interior's research and development through the U.S. Geological Survey (USGS) and other agencies will improve U.S. strategic mineral supplies, understanding of ecosystem services, water use and availability, and natural hazard preparedness. Much scientific knowledge is difficult to value and monetize, and may be under provided.

Timber: Over half a billion board feet of timber harvested on BLM and tribal lands supported \$1 billion in economic output and about 4,600 jobs.

Water: The Bureau of Reclamation and the BIA store and deliver water for agricultural, municipal and industrial users, supporting \$48 billion in economic output and 361,000 jobs in 2015.

This year's report is paired with a web-based data visualization tool that lets the user customize the contribution analysis by bureau, activity or state. You can view that site and download the full economic report, with a discussion of the analysis and methodology applied, [here](#).

###

From: Nada Culver
To: [Androff, Blake](mailto:Blake.Androff@ios.doi.gov)
Cc: [Schneider, Janice](mailto:Janice.Schneider@ios.doi.gov)
Subject: RE: FW: TWS report on planning for oil and gas leasing
Date: Monday, June 27, 2016 3:59:08 PM
Attachments: [TWS No Exit Report-FinalDraft-6-23-16.pdf](#)

We will be releasing the report tomorrow – June 28th. In case it's helpful, I've attached the last draft, which will be finalized tomorrow and posted along with a number of supporting documents.

Nada Culver

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From: Androff, Blake [mailto:blake_androff@ios.doi.gov]
Sent: Thursday, June 23, 2016 2:26 PM
To: Nada Culver
Cc: Schneider, Janice
Subject: Re: FW: TWS report on planning for oil and gas leasing

Thanks, Nada. Any idea what day you expect this to go live?

Blake Androff

Director of Communications

U.S. Department of the Interior

Office: (202) 208-6416 | Cell: (202) 725-7435

On Thu, Jun 23, 2016 at 4:22 PM, Nada Culver <nada_culver@tw.s.org> wrote:

Hi Janice and Blake- I wanted to let you know that The Wilderness Society is releasing a report next week that proposes improvements to the BLM's approach to planning for oil and gas leasing and development. We've often highlighted how the vast majority of public lands and minerals are available to leasing. This report includes some more research into how the agency's guidance leads to that result, as well as the effects that has on planning and conservation, then provides recommendations as well.

We'll be able to provide a preview copy of the report, likely Monday, but I wanted to let you know it was coming and that there may be a preview in the National Journal this week.

Happy to provide more information if it would be helpful, too.

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FIXING THE BLM'S Indiscriminate Energy Leasing

Decades of adherence to the belief that all lands should be available for oil and gas leasing has kept our public lands from being protected and put them at unnecessary risk for destruction. It's time to update the BLM's approach and give the public more of a say in managing our public lands.

Introduction

This report describes how the U.S. government agency that oversees 700 million subsurface acres of oil and gas resources on nearly 250 million acres of public lands is saddled with outdated and unbalanced policies, often contradicting its own mandate to manage the land for multiple uses.

Ninety percent of the public lands managed by the Bureau of Land Management are open to oil and gas leasing and mineral resources even in areas with little or no potential for developing these resources, compromising potential for protecting wildlife and recreation, while encouraging speculative leasing.

The report provides a series of recommendations that would, if adopted by the BLM, lead to more

balanced decision-making. It lays out specific ways for the agency to better weigh the benefits of leasing a particular area with the potential harm. Such an approach would drive better decisions for the American people, the owners of U.S. public lands.

The Problem

The BLM is not fulfilling its duty to manage public lands for multiple uses.

The Bureau of Land Management rarely closes lands to oil and gas leasing in its resource management plans, despite the risk leasing poses to wildlife, cultural and other valuable resources. But this approach is in conflict with the agency's guiding management principle, the multiple use mandate.



Oil and gas development threaten many of our public lands, like the Pawnee National Grassland in Colorado.
Photo: Mason Cummings/TWS

Common sense would dictate that the BLM close areas with other important values than oil and gas potential, particularly areas unlikely to be developed. But the BLM's internal guidance, and the way that the agency interprets that guidance, has made it extremely difficult to actually close lands to leasing. Instead, the BLM continues to create opportunities for energy speculation at a high cost to recreation, wilderness and wildlife.

An examination of current BLM policies and management practices shows that there is little effort to protect at least some public lands from oil and gas leasing.¹

As a result, the vast majority of U.S. public lands (90 percent) are available for leasing—regardless of whether those lands have other important values that should be protected and regardless of whether the BLM's own data show there is low—or even no—potential for oil and gas. This fundamental flaw in the BLM's guidance has led to a current total of 32 million acres leased for oil and gas development, with less than 13 million under development.²

When public lands with low energy development potential are leased to oil and gas companies,

taxpayers lose out on revenue, as well as other important uses of these lands like recreation and wildlife management. In fact, a Congressional Budget Office report recently concluded that, for parcels leased between 1996 and 2003 (all of which have reached the end of their 10-year exploration period), only about 10 percent of onshore leases issued competitively and three percent of those issued noncompetitively actually entered production.³

The BLM needs to update its approach—it's time to bring 25-year-old policies into this century. In the short term this means issuing immediate guidance for protecting sensitive lands and lands with low energy development potential, and in the long term, commencing a formal revision to BLM's planning guidance.

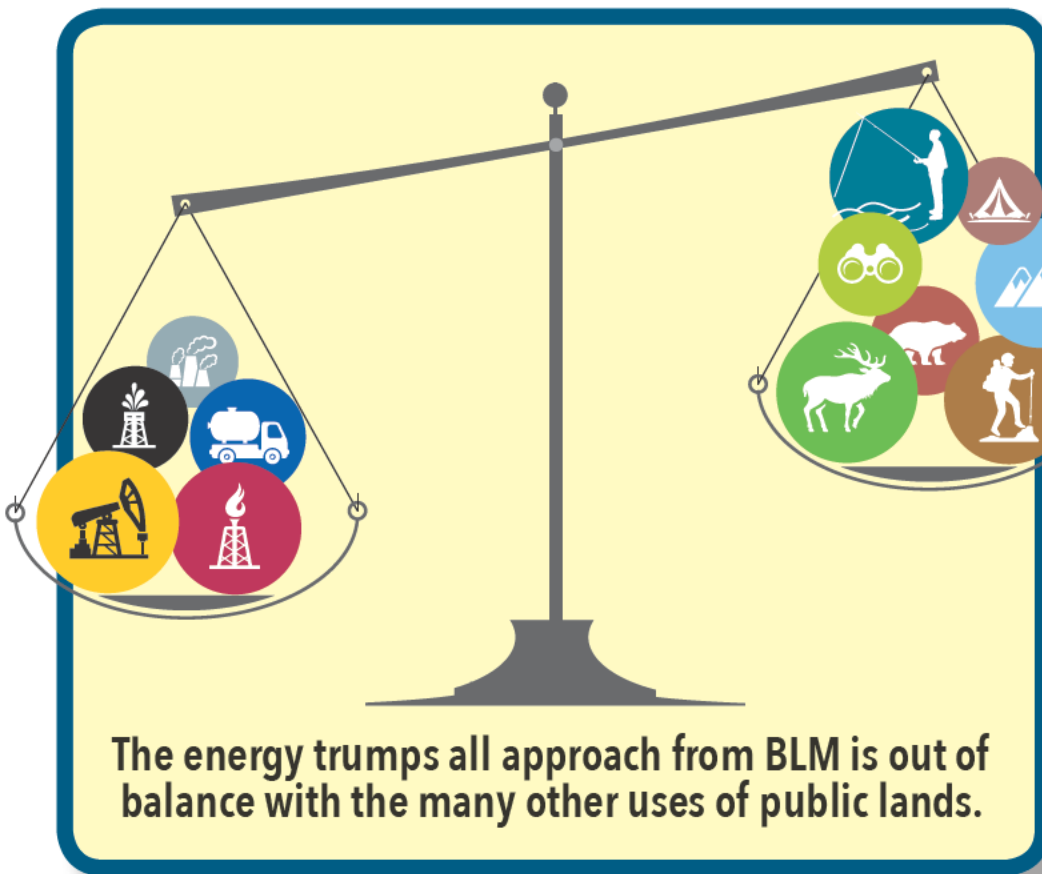
Misguided Guidance

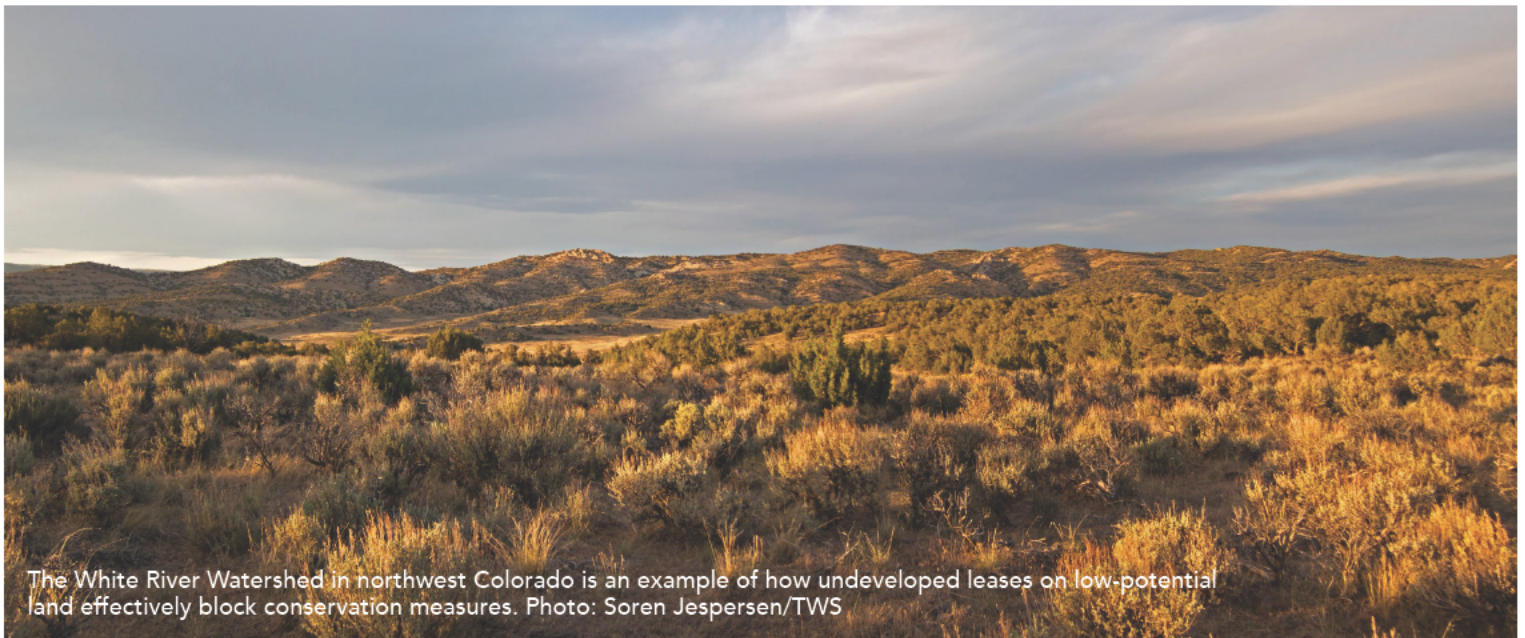
The BLM's handbook and how BLM interprets that handbook are out of step with the agency's guiding principles.

No decisions affect the future of public lands more than those made in BLM resource management plans.

In these plans, created for all public lands being considered for development, the agency sets out management guidelines. Typically, some areas are open for recreation, some are set aside for grazing and others are designated as open or closed to oil and gas leasing. Then different conditions are set forth for how those activities—particularly oil and gas leasing—are to be carried out.

BLM's Handbook on Planning for Fluid Mineral Resources (Handbook H-1624-1⁴) provides guidance to field offices on how to navigate the planning process for oil and gas resources. Under this guidance, field offices are supposed make decisions based on the likelihood of





The White River Watershed in northwest Colorado is an example of how undeveloped leases on low-potential land effectively block conservation measures. Photo: Soren Jespersen/TWS

certain resources being developed in a particular area. They take steps to identify the potential of oil and gas development and to predict where future drilling activity will take place and where impacts from this development will be focused.

This handbook directs the agency staff to formulate management prescriptions for oil and gas resources in light of where recoverable deposits of oil and gas are most likely to exist, referred to as “development potential.”⁵ The handbook, and additional guidance, also direct BLM to project “reasonably foreseeable development,” looking at both potential and “resource conflicts or controversies,” which can form the basis for refining expectations of where development is most likely and appropriate.⁶

However, the agency does not utilize that information to prepare for and address potential resource conflicts at the planning stage. The approach mandated by the mineral resources handbook *should* enable BLM to focus on the areas most likely to be targeted for development, and leave open for other uses the areas with low development potential or the potential to come into conflict with other values.

But under current BLM management policy—despite the guidance in its own handbook—the agency does not close areas with no or low development potential to leasing, regardless of the potential for resource conflict.

In fact, rather than closing areas with high conservation

value which are unlikely to be developed, the agency actually tends to set less protective conditions for leasing in areas with no or low development potential. As a result, resource conflicts are often exacerbated, where they could be avoided.

A Road to Nowhere

The BLM has lost control of leasing and development decisions on the lands it manages, leading to many other problems.

The BLM is required to hold quarterly lease sales; the lands auctioned off are usually nominated by the industry—regardless of the other uses and values of those lands. Once lands are nominated, they will almost certainly be put up for sale. Once they are sold, it is nearly impossible for the BLM to manage them for other uses. As long as most lands are open for leasing, the BLM will continue to have its management policies dictated by the fossil fuel industry.

Allowing oil and gas companies to control the leasing process leads to many other issues:

➡ **It precludes lands from being managed for multiple values.**

The BLM’s mandate to manage our public lands for multiple use and sustained yield requires consideration of a host of natural and cultural resources.⁷ BLM’s

Greater Sage-Grouse: A Conservation Case Study



Greater sage-grouse
Photo: Mason Cummings/TWS

In 2015, the BLM finalized plans for federal lands in 10 states to address conservation of the greater sage-grouse and its habitat—including the threat of oil and gas development. Yet of approximately 104 million acres of federal minerals, only about two percent—were actually closed to oil and gas leasing.

Notably, in many western land management plans written to address greater sage-grouse protection, almost all of the designated priority (high-value) habitat was completely outside of areas with high or medium oil and gas potential (96 percent in Nevada, 100 percent in California, 100 percent in the Idaho/Southwestern Montana plan, 100 percent in Oregon and over 90 percent in Utah). However, none of these plans closed any areas to oil and gas leasing; instead, they remain open to speculative leasing—a lost opportunity to make stronger decisions for conserving the greater sage-grouse.

current guidance reiterates that some lands are more valuable for other uses than for oil and gas leasing,⁸ but the agency's own policies create numerous and daunting obstacles to achieving a balance between development and other uses.

Chief amongst these is the fact that BLM often identifies the presence of development potential and undeveloped leases as precluding other designations and management actions that would otherwise benefit recreation, wilderness and wildlife.

► It impedes meaningful conservation from taking place on sensitive lands.

While leases in low-potential areas (most federal leases) are not likely to be developed, their presence serves to preclude proactive management for other important resources.

For example:

- In the **Bighorn Basin Resource Management Plan in Wyoming**, the BLM considered whether to manage 43 inventoried units, totaling over 476,000 acres, to protect their wilderness characteristics.⁹ But ultimately, none of the units are being managed to protect wilderness characteristics, because they contain oil and gas leases.¹⁰
- In the **White River Resource Management Plan Amendment in Colorado**, the BLM expressly stated that undeveloped leases on low-potential lands had effectively prevented management to protect wilderness characteristics, stating: "139,900 acres of lands with wilderness characteristics have been classified as having low, very low, or no potential....While there is no 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."¹¹
- Similarly, in the **Colorado River Valley Resource Management Plan in Colorado**, the BLM stated it would not manage the Grand Hogback Citizens' Wilderness Proposal for the protection of wilderness characteristics based on the presence

WHY SPECULATIVE LEASING MATTERS

It's putting a majority of our public lands at risk

A staggering amount of lands with low or no oil and gas potential are open to leasing.

Our analysis of areas with low or no potential for oil and gas development shows that the vast majority of these lands are still open to leasing. And they often are leased, presumably with the hope that energy prices will rise, that new ways to extract marginal energy will be found or that the leases could be sold to another company.

The resulting speculative, non-producing leases have precluded forward-thinking, commonsense policies such as managing for wilderness-quality lands and important wildlife habitat.

Our analysis showed that:

- 95 percent of low-, very low- and no-potential lands are open to leasing in the **Bighorn Basin Resource Management Plan in Wyoming**.¹⁵
- 88 percent of low- and no-potential areas are open to leasing in the **Kremmling Resource Management Plan in Colorado**.¹⁶
- 80 percent of low-potential lands are open to leasing in the **Price Resource Management Plan in Utah**.¹⁷
- All of the low-potential sage-grouse habitat is open to leasing in Idaho. No productive oil and gas wells have ever been drilled in Idaho.

It allows a designation double standard

Its easy to get a speculative lease that prevents conservation of environmentally valuable areas, but very difficult to get a designation that would protect them.

For lands to be protected for their wilderness characteristics, an intensive land inventory process must occur. The process seeks to determine if lands meet specific criteria; then a determination of whether they can be managed as wilderness must take place.¹⁸

In the same way, protection and designation of Areas of Critical Environmental Concern (lands with identified important natural and cultural values) are mandated under BLM's governing statute.¹⁹ However, in order to maintain or designate new Areas of Critical Concern in its resource management plans, the BLM requires that an analysis demonstrate the area hold certain relevant and important characteristics that require special management.

Even then, designating the land as an Area of Critical Environmental Concern is only one of the options considered by the agency.²⁰ Consequently, while oil and gas leasing does preclude other management uses, conservation-focused management faces a higher bar. That is an unacceptable double standard.

of oil and gas leases, even though the leases had never been developed.¹²

➔ **It prevents us from effectively achieving our national climate targets.**

Implicit in the decision to leave lands open for development is the lack of consideration of the climate consequences of developing the resources found there—even though the Secretary of the Interior and the Director of the BLM have both called upon the BLM to do more to anticipate and address the contributions of public lands to climate change.

For many reasons, including climate impacts, it is unrealistic and unwise to presume 90 percent of oil and gas resources on public lands should be developed—yet that is precisely the position the BLM takes each time it refuses to close areas to oil and gas leasing.

➔ **It undermines the public’s engagement in the land planning process.**

Time and again, public input and polling show that Americans strongly support managing important lands for something other than oil and gas development. But the current practice of keeping oil and gas resources open at any cost conflicts with that input. It is also, as we have shown, out of step with other federal policies directing identification and management of natural and cultural resources and features for conservation purposes.

➔ **It causes poor fiscal stewardship of taxpayer-owned resources.**

Lands are routinely obtained for well below-market value, according to research from the non-partisan Congressional Budget Office, and can be held for a nominal annual fee for the duration of the 10-year lease term.¹³ Oil and gas companies routinely extend the terms of the leases they hold indefinitely through “suspensions,” which can last decades, with no annual fees.

Under these circumstances, it is no surprise that speculation and hoarding of publicly managed oil and gas resources are commonplace. This rampant speculation contributes to the nearly two-thirds of

leased acreage not being developed. Not only is this a waste of the agency resources invested in preparing these leases for sale, it also deprives taxpayers of potential income.

When leases are not developed and not producing, they are not a good investment for the public. Non-producing leases generate less than two percent of total revenue generated by the federal onshore system; 90 percent comes from royalties paid on producing leases.¹⁴

➔ **Other resources are endangered by oil and gas leases that include insufficient protections.**

The Kremmling Field Office in Colorado provides an object lesson in the problems arising from leasing lands with low development potential without meaningful protections. For example, in each of the five lease sales including the Kremmling Field Office from 2010 to 2015, nominations have included low- or no-potential areas.²¹

Lease nominations within low-potential areas are also regularly (and often successfully) protested specifically because of the weak stipulations and lack of protection for other resources. Nominations in the Kremmling Field Office within low or no potential areas were protested based on inadequate protections for fisheries and water quality (June 2014), wildlife (August 2012) and permitted recreation activities (May 2013), and also highlighted the contradiction of BLM putting these resources at risk from speculative leasing and drilling in areas that it had already concluded had no value for oil and gas development.²²

Land within low- and no-potential areas has frequently been leased by the Kremmling Field Office, even though it is rarely drilled. In fact, most active leases issued by the office fall in low or no potential areas, and, unsurprisingly, they are not being actively developed.²³

Better decision-making during the planning process would have helped the BLM avoid administration and preparation cost for lease sales, handle subsequent protests and prevent undue risks to other important resources.

“Well, we know better now. We know that healthy, intact ecosystems are fundamental to the health of our wildlife—and our nation. They clean our air and provide our drinking water, they store carbon and combat climate change, and they are critical to our economy.

But if their integrity is undermined by a haphazard web of transmission lines, pipelines and roads, where does that leave us 50 years from now? Or 500?

It’s an issue that can’t be solved by simply creating a new national park or wildlife refuge—although there’s no doubt that we need those places to serve as critical anchors for conservation.

What we need is smart planning, on a landscape-level, irrespective of manmade lines on a map.

We need to take a holistic look at an ecosystem—on land or in the ocean—to determine where it makes sense to develop, where it makes sense to protect the natural resources, and where we can accomplish both.”

-SECRETARY OF THE INTERIOR, SALLY JEWELL



Continental Divide Trail in Colorado.
Photo: Bob Wick/BLM

Solutions for better management practices

The BLM's policies must reflect the interests of all stakeholders.

The BLM's policies are long overdue for an update that includes input from others besides just the oil and gas industry. A prime example is the agency's Handbook on Planning for Fluid Mineral Resources, which has not been overhauled since 1990.

Both in theory and in practice, the handbook undermines opportunities for protecting lands for other uses, does not provide a path for closing areas to leasing and leads to low- and no-potential areas being open to oil and gas leasing without necessary protections.

BLM's approach to leasing must be updated to reflect the agency's legal mandate, and it must take into account both development potential and conflicts with other resources and users:

➤ **More lands must be closed to oil and gas development.**

BLM plans should set out a framework for oil and gas development that would support closing lands to leases where warranted and opening lands to leasing, with appropriate protections, where development is likely. Lands that have low or no potential for leasing should not be open to leasing unless and until conditions change—an eventuality that BLM has addressed in the Dinosaur Trail Master Leasing Plan:

Leasing within the MLP would progress in phases to address resource values and concerns. Leasing would first occur in the southern portion of the MLP where the oil and gas occurrence potential is rated medium to high. Leasing within...areas of low oil and gas potential... would occur once the BLM has completed additional analysis and planning.²⁴

If the BLM closes or defers leasing in low-potential areas, and conditions change to make development in those areas more likely, the agency can then

complete additional analysis and planning to ensure that development occurs responsibly and accounts for current resource conditions. For example, BLM could commit to completing a master leasing plan in the event that there is demonstrated industry interest in leasing and developing low-potential areas.

By taking a proactive approach to managing oil and gas development as just one of the many uses of our public lands, BLM can also reduce unnecessary costs associated with speculative leasing and undeveloped lands, while making room for designating and managing lands for other uses, such as recreation, wilderness values, and fish and wildlife.

In addition, by taking control of leasing, BLM can better meet other priority goals for land use planning, such as accounting for and managing the contribution of federal lands to climate change and protecting important wildlife migration corridors.

➤ **More balanced management is needed.**

A more thoughtful, realistic approach would be consistent with BLM's mandate to manage the public lands for multiple use and sustained yield.

The agency's governing statute identifies a wide range of uses and values and provides for using lands "for some or all of these resources" and "with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output."²⁵

The courts have ruled that "[i]t is past doubt that the principle of multiple use does not require BLM to prioritize development over other uses."²⁶ Even the BLM itself has made it clear that this is a practice that is out of step with its own directives:

The BLM recognizes that, in some cases, leasing of oil and gas resources may not be consistent with protection of other important resources and values, including units of the National Park System; national wildlife refuges; other specially designated areas; wildlife; and cultural, historic, and paleontological values. **Under applicable laws and policies, there is no presumed preference for oil and gas development over other uses.**²⁷



Photo: Simon Fraser University - flickr

Other aspects of BLM's legal obligations also support limiting or eliminating leasing in low- and no-potential areas, including for purposes of protecting other important resources. For example, BLM is subject to numerous requirements to "minimize" the environmental and other impacts of oil and gas leasing and development.²⁸

Faithfully applying a current understanding of laws and policies would lead to closing more lands to oil and gas leasing, consistent with the agency's multiple use obligations.

 **A smarter approach would have minimal impacts on oil and gas production.**

Modernizing the handbook with an approach that provides for closing lands to leasing and limits leasing in low- or no-potential areas would not only support BLM's obligation to consider managing lands for fish and wildlife, recreation and wilderness values, but also have minimal impacts on industry objectives.

In locations like the Ely District in Nevada, where federal minerals are almost 90 percent open to leasing, only 32 wells were authorized over the past 101 years (as of May 21, 2014), even though there are 936 active leases covering just over two million acres of public land.²⁹

Closing these lands to speculative leasing will not harm responsible oil and gas development. If conditions change so that development in those areas is more likely, BLM can then complete additional analysis and planning to manage additional development. For example, BLM could commit to completing a master leasing plan in the event that there is demonstrated industry interest in leasing and developing low potential areas.

 **The BLM's own master leasing plans provide a working model for improved management.**

The BLM has already taken a more proactive and prescriptive approach to managing oil and gas leasing and development through master leasing plans. Incorporate practices such as closing lands to leasing to minimize resource conflicts and requiring phasing of leasing and development to reflect priorities while also limiting damage to other resources.³⁰ As the handbook

states, "The MLP establishes a guiding framework for the development of the area and provides a vision for how future development will proceed."³¹

These tools and concepts could be scaled up to inform agency decision-making at the land-use planning level.

Recommendations

These policy recommendations provide an exit from the "energy trumps all" path the BLM is currently pursuing.

We recommend these specific steps be taken:

1. INTERIM GUIDANCE SHOULD BE ISSUED

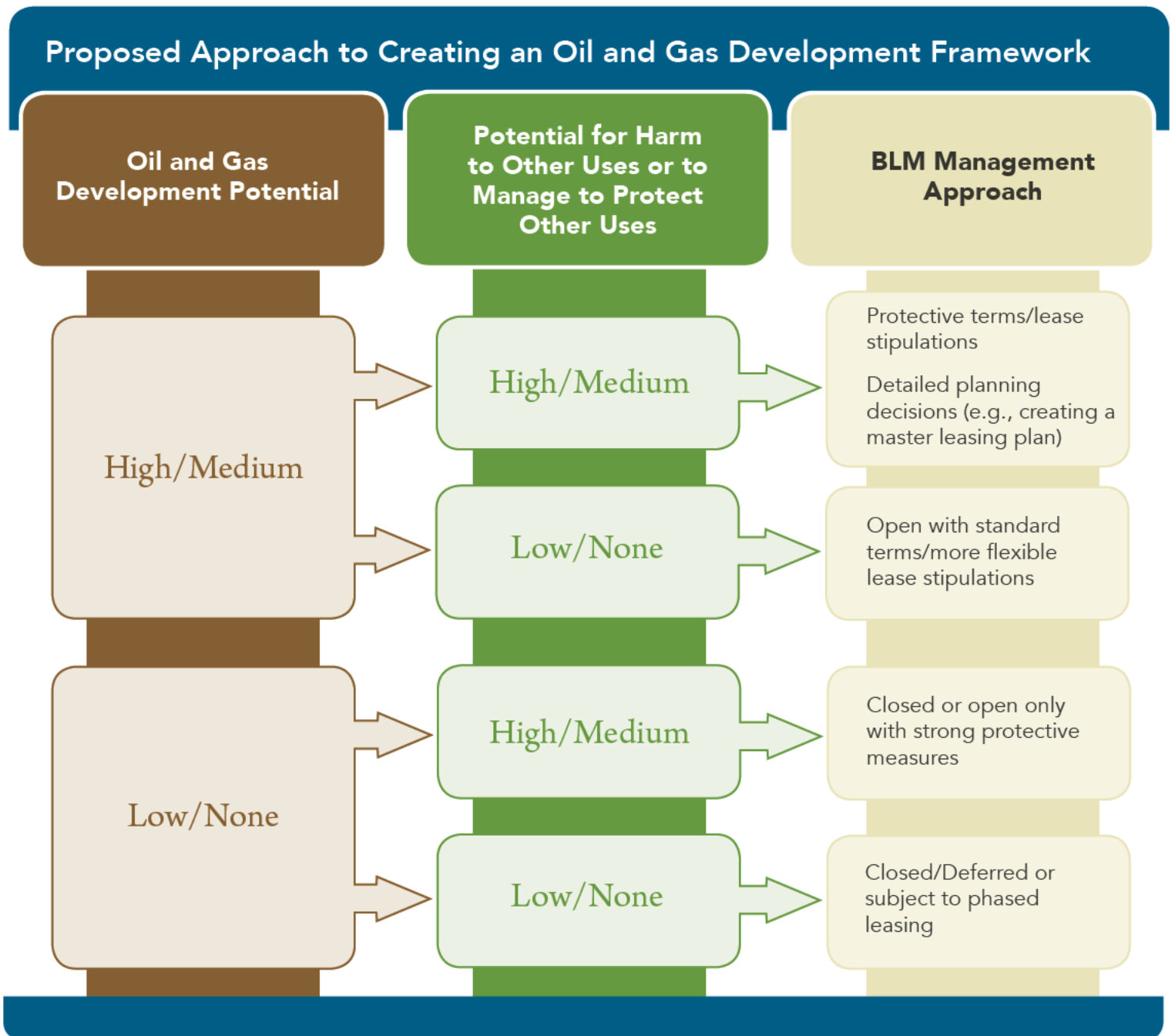
IMMEDIATELY. To clarify the manner in which Handbook 1624-1 should be applied in preparing resource management plans, guidance should be issued that:

- a. There is no presumption that lands should be available for oil and gas leasing; rather, determinations should be based on resource potential, likely conflicts and potential harm to other resources or uses.
- b. The BLM should collect and update information on development potential, likely impacts of development on other resources and uses, and possible designations or management priorities that would conflict with leasing. Based on this information, the BLM should construct a development framework taking into account support for a variety of resources and uses.
- c. Lands that have high or medium development potential should be considered for designation as available for leasing, but with appropriate protections where other uses or resources are present—and with the understanding that some lands with high or medium potential may still be better suited to management for other uses.
- d. Lands that have low or no development potential should be considered for closure or deferral pursuant to phased leasing, with the understanding that where there is a significant potential for other uses to be supported by closure or harmed by development, these lands should be closed.

2. THE HANDBOOK ON PLANNING FOR FLUID MINERAL RESOURCES SHOULD BE UPDATED TO CLARIFY AND INCORPORATE THESE KEY CONCEPTS AS SOON AS POSSIBLE.

3. INTERIM GUIDANCE ON EVALUATING LEASE SALE NOMINATIONS SHOULD BE ISSUED TO ADDRESS THE CURRENT IMBALANCE AND SIGNIFICANT PROBLEMS THE HANDBOOK HAS ALREADY GENERATED. When assessing lease proposals under existing resource management plans where more than 75 percent of minerals are open for leasing, BLM should take a hard look at whether decisions on availability for leasing would have been made differently based on current guidance.

An updated approach to planning for oil and gas leasing should meaningfully account for development potential and conflicts with other resources, as depicted in the below table.



- 1 A more in-depth study accompanies this report. <https://wilderness.org/resource/no-exit-fixing-blm%E2%80%99s-indiscriminate-energy-leasing-whitepaper>
- 2 http://www.blm.gov/style/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION_/energy/oil_gas_statistics/data_sets.Par.69959.File.dat/summary.pdf
- 3 https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51421-oil_and_gas_options.pdf, p. 19.
- 4 http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.44374.File.dat/H_1624_1.pdf
- 5 There are eight steps set out in the handbook, which focus first on identifying existing conditions and potential, as well as the impacts that would arise from oil and gas development if existing management remains in place. In the process of formulating alternatives to the existing management, the handbook directs the BLM to focus on how to maximize keeping lands open to leasing, stating that alternatives should be “exploring opportunities for enhancing or expanding resources or resource uses” and will “identify any subsurface management constraints or mitigating measures that are required to take advantage of opportunities and to resolve any problems.” A detailed overview of the decision process set out in the Handbook accompanies this report. <https://wilderness.org/sites/default/files/Planning%20for%20Leasing%20Overview.pdf>. See H-1624-1, pp. III-10 - III-11.
- 6 See H-1624-1, pp. III-7 - III-8, Instruction Memorandum 2004-089.
- 7 See 43 U.S.C. §§ 1701(a)(7)-(8), 1702(c), 1702(h).
- 8 See Instruction Memorandum 2010-117, p. 2. (“The BLM recognizes that, in some cases, leasing of oil and gas resources may not be consistent with protection of other important resources and values, including units of the National Park System; national wildlife refuges; other specially designated areas; wildlife; and cultural, historic, and paleontological values. Under applicable laws and policies, there is no presumed preference for oil and gas development over other uses.”)
- 9 Bighorn Basin Proposed RMP, p. 3-191.
- 10 See Bighorn Basin Proposed RMP, Appendix S at Table S-1. (“Rationale for Not Managing Lands with Wilderness Characteristics for Naturalness, Outstanding Opportunities for Solitude, and Primitive and Unconfined Recreation, by Field Office and Unit.”) See, e.g., regarding Unit 508 AK: “It is recommended not to manage for wilderness characteristics because of the existing leases for oil and gas.”
- 11 See White River Proposed RMP, pp. 4-289-4-290.
- 12 See Colorado River Valley Proposed RMP, p. 3-135.
- 13 The Congressional Budget Office found that fully one-quarter of leases are issued for the minimum bid of \$2 per acre—meaning the cost of holding public lands is de minimus. See https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51421-oil_and_gas_options.pdf, p. 18.
- 14 https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51421-oil_and_gas_options.pdf, p. 2.
- 15 Bighorn Basin Proposed RMP, p. 4-89.
- 16 Kremmling Proposed RMP, p. 2-28.
- 17 Price Proposed RMP, p. 304.
- 18 See BLM Manuals 6310 (Conducting Wilderness Characteristics Inventory of BLM Lands) and 6320 (Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process).
- 19 43 U.S.C. § 1712(c)(3).
- 20 See BLM Manual 1613 (Areas of Critical Environmental Concern).
- 21 See EA for the KFO June 2014 Competitive Oil & Gas Lease Sale (November 2013) at p. 10 (“According to the Reasonable Foreseeable Development report (RFD), there is low potential for oil and gas development in the location of the Jackson County parcels (BLM, 2008).”); May 2013 Competitive Oil & Gas Lease Sale PDF Maps at p. 2 (showing nominated lease parcels in T. 11 N, R. 76 W, an area with no potential for oil or gas under the 1991 RFD); August 2011 Competitive Oil & Gas Lease Sale Map (showing the location of COC74901 within T. 2 N, 79 W, an area with low or no oil and gas potential under the 1991 RFD); August 2010 Competitive Oil & Gas Lease Sale Map (showing the location of COC74518 within T. 11 N, R. 81 W and within an areas of low or no oil or gas potential under the 1991 RFD); May 2010 Competitive Oil & Gas Lease Sale Map (showing the location of COC74397 within T. 10 N, R. 82 W, an area with low or no oil or gas potential under the 1991 RFD).
- 22 Leases within areas with low or no potential have been protested in at least each of the past three lease sales in the KFO. See CO BLM Lease Sale Archive June 2014, May 2013 and August 2011 lease sale protests.
- 23 See 2008 RFD Report, p. 6 (stating that 210,852 acres of federal mineral estate are currently under lease) and Draft Kremmling RMP Appendix V, p. V-3 (indicating that at least 115,200 acres of low and no potential areas—more than half of the total leased—are under lease in the KFO); see Rocky Mountain Wild, “Oil and Gas Leasing and Development in Colorado as of March 2015.”
- 24 White River Proposed RMP, Table 2-17a-2.
- 25 43 U.S.C. § 1702(c).
- 26 New Mexico Ex. Rel. Richardson v. BLM, 565 F.3d 683, 710 (10th Cir. 2009).
- 27 Instruction Memorandum 2010-117, p. 2.
- 28 See 43 C.F.R. § 3101.1-2 (reasonable measures may be required to minimize adverse impacts on leases); 43 C.F.R. § 2920.7(b)(2) (land use authorizations shall minimize damage to specified environmental resources); BLM Standard Lease Form 3100-11 (lessees “must” conduct their operations so as to minimize adverse impacts); Onshore Order No. 1 §§ IV and III(F)(a)(3) (operators “must” minimize adverse impacts and BLM may require reasonable measures to minimize adverse impacts when APDs are approved); BLM Gold Book (several provisions referencing minimization including a provision to “minimize undesirable impacts to the environment”).
- 29 See BLM Nevada Preliminary EA for the Dec. 2015 Oil and Gas Lease Sale, p. 1.4.
- 30 H-1624-1, Chapter V, pp. V-1-V-7.
- 31 *Ibid.*, p. V-2.

Our mission is to protect wilderness and inspire Americans to care for our wild places.



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wilderness.org

From: Michael Saul
To: Secretary_jewell@ios.doi.gov
Cc: director@blm.gov
Subject: Petition for Rulemaking under 43 C.F.R. 14.2 - electronic copy
Date: Tuesday, July 12, 2016 12:52:55 PM
Attachments: [Petition for a Moratorium on the Leasing of Federal Fossil Fuels 7-12-2016.pdf](#)

Dear Secretary Jewell,

Please find attached an electronic copy of a Petition, submitted pursuant to the Administrative Procedures Act, 5 U.S.C. § 553(e) and the regulations of the Department of the Interior, 43 C.F.R. § 14.2, by the Center for Biological Diversity on behalf of itself and the 263 other Petitioners listed herein, seeking promulgation of a rule imposing a moratorium on the leasing of federal public land fossil fuels under the Mineral Leasing Act. The Petition is being submitted today via United States mail, this electronic copy is provided for your convenience.

A compact disc containing electronic copies of the references cited in the Petition will also be submitted under separate cover.

Any response and all correspondence related to this Petition should be directed to the Center for Biological Diversity at:

Center for Biological Diversity
1536 Wynkoop Street, Suite 421
Denver, Colorado 80202
telephone: (303) 915-8308
email: msaul@biologicaldiversity.org

Sincerely,

Michael A. Saul
Senior Attorney, Center for Biological Diversity



**BEFORE THE
SECRETARY OF THE INTERIOR**

**PETITION FOR A MORATORIUM
ON THE LEASING OF FEDERAL
FOSSIL FUELS ON PUBLIC LANDS**

JULY 2016



Petition for a Moratorium on the Leasing of Federal Public Land Fossil
Fuels Under the Mineral Leasing Act, 30 U.S.C. §§ 226, 241

Before the United States Department of the Interior

July 12, 2016



“[U]ltimately, if we’re going to prevent large parts of this Earth from becoming not only inhospitable but uninhabitable in our lifetimes, we’re going to have to keep some fossil fuels in the ground rather than burn them and release more dangerous pollution into the sky.” President Barack Obama¹

I. Notice of Petition

To: Secretary of the Interior, U.S. Department of the Interior, Washington, DC 20240

Through this petition, the Center for Biological Diversity, on behalf of the undersigned petitioners listed below, request that the Secretary of the Interior issue an order pursuant to her authorities and obligations under 30 U.S.C. §§ 226 and 241 imposing an immediate moratorium on the new leasing of *all* federal public land fossil fuels. Specifically, in light of Secretarial Order No. 3338 which imposed a moratorium on the leasing of coal, the requested order should address all other onshore fossil fuels and halt the offering or issuance of any new leases of federal oil, gas, tar sands, and oil shale. The moratorium should remain in effect pending completion of a comprehensive review of all federal fossil fuel leasing programs, and development of policies to ensure any future leasing is consistent with a pathway to meeting the United States’ goal of holding global warming “well below 2°C above pre-industrial levels” and pursuing efforts to “limit the temperature increase to 1.5°C above pre-industrial levels,” as articulated in the Paris Agreement adopted at the 2015 United Nations Framework Convention on Climate Change Conference of the Parties (Paris Agreement).² Such action is necessary to address the serious threats to climate, health, safety, and biodiversity posed by greenhouse gas emissions from the continued extraction and combustion of fossil fuels from the federal mineral estate.

As detailed in this petition, and reflected in recent actions by the administration related to coal, the Secretary's legal authority to impose such a moratorium is clear. In light of the United States’ international obligations under the U.N. Framework Convention on Climate Change and the acknowledged need to keep the vast majority of fossil fuels in the ground to have any realistic chance of avoiding the worst consequences of catastrophic warming, the scientific and ethical case for imposing the moratorium is equally clear.

On January 15, 2016, the Secretary issued Secretarial Order No. 3338, exercising her discretion under the Mineral Leasing Act and other applicable statutes in order to consider, *inter alia*, “how best to assess the climate impacts of continued Federal coal production and combustion and how to address those impacts in the management of the program to meet both the Nation’s energy needs and its climate goals, as well as how best to protect the public lands

¹ The White House, Statement by the President on the Keystone XL Pipeline, Office of the Press Secretary (Nov. 6, 2015), <https://www.whitehouse.gov/the-press-office/2015/11/06/statement-president-keystone-xl-pipeline>

² See United Nations Framework Convention on Climate Change, Conference of the Parties Nov. 30-Dec. 11, 2015, Adoption of the Paris Agreement Art. 2, U.N. Doc. FCCC/CP/2015/L.9 (Dec. 12, 2015), available at <http://unfccc.int/resource/docs/2015/cop21/eng/109.pdf> (“Paris Agreement”).

from climate change impacts.”³ To this end, Order 3338 directed BLM to prepare a broad, “programmatic environmental impact statement.”⁴ Order 3338 found that “Continuing to conduct lease sales or approve lease modifications during this programmatic review risks locking in for decades the future development of large quantities of coal under current rates and terms that the PEIS may ultimately determine to be less than optimal.”⁵

Here, Petitioners request the issuance of an additional Secretarial Order extending this moratorium to the sale and issuance of any future onshore federal fossil fuel leases (coal, oil and gas, oil shale, and tar sands) until and unless it can be demonstrated that resumption of such leasing is consistent with our national and international climate goals and obligations. Petitioners further request that BLM’s analysis of these issues take the form of a programmatic environmental impact statement.

The right of an interested party to petition a federal agency is a freedom guaranteed by the first amendment: “Congress shall make no law ... abridging the ...right of people ... to petition the Government for redress of grievances.”⁶ Under the Administrative Procedures Act (APA), all citizens have the right to petition for the “issuance, amendment, or repeal” of an agency rule.⁷ A “rule” is the “whole or a part of an agency statement of general or particular applicability and future effect designed to implement, interpret, or prescribe law or policy.”⁸ This petition is filed pursuant to the rulemaking petition regulation of the Department of the Interior (DOI) at 43 C.F.R. § 14.2. DOI is required by its regulations and the APA to respond to this petition in a timely manner: “The petition will be given prompt consideration and the petitioner will be notified promptly of action taken.”⁹

II. Petitioners

The Center for Biological Diversity (“the Center”) submits this Petition on behalf of itself and the Petitioners listed in Attachment 1. The Center is a nonprofit environmental organization dedicated to the protection of imperiled species and their habitats through science, education, policy, and environmental law. The Center has over 991,000 members, supporters and activists dedicated to the conservation of endangered species and wild places, protection of human health and welfare, and combating climate change. The Center submits this Petition on its own behalf,

³ U.S. Department of the Interior, Secretarial Order No. 3338 at 8 (Jan. 15, 2016).

⁴ *Id.* at 6.

⁵ *Id.*

⁶ U.S. Const., Amend I. *See also United Mine Workers v. Illinois State Bar Ass’n*, 389 U.S. 217, 222 (1967) (right to petition for redress of grievances is among most precious of liberties without which the government could erode rights).

⁷ 5 U.S.C. § 553(e); 43 C.F.R. §14.2 (Department of Interior regulation providing that “any person may petition for the issuance, amendment or repeal of a rule”).

⁸ 5 U.S.C. § 551(4).

⁹ 43 C.F.R. §14.3; *see also* 5 U.S.C. § 555(e) (“Prompt notice shall be given of the denial in whole or in part of a written application, petition, or other request of an interested person made in connection with any agency proceeding.”).

on behalf of its members and staff with an interest in protecting our national public lands and the wild habitats they encompass from the damages of further unnecessary fossil fuel extraction and the damages of climate change, and on behalf of the undersigned petitioners listed below in Attachment 1.

Any response and all correspondence related to this petition should be directed to the Center. The Center for Biological Diversity's mailing contact information for the purposes of this Petition is:

The Center for Biological Diversity
1536 Wynkoop Street, Suite 421
Denver, CO 80202
Tel: 303-915-8308

III. Introduction and Executive Summary

Petitioners formally request that pursuant to her discretionary authority over mineral leasing under of the Mineral Leasing Act of 1920, as amended, and the Mineral Leasing Act for Acquired Lands of 1947 (collectively MLA),¹⁰ the Secretary of the Interior issue an order imposing an immediate moratorium on the leasing of *all* federal public land fossil fuels. Specifically, in light of Secretarial Order No. 3338 which imposed a moratorium on the leasing of coal, the requested order should address all other onshore fossil fuels and halt the offering or issuance of any new leases of federal oil, gas, tar sands, and oil shale. The moratorium should remain in effect pending completion of a comprehensive programmatic environmental review of the entire federal public lands leasing program, and until, following such review, any future leasing can be shown to be consistent with a pathway to meeting the United States' goal of limiting global warming to well below 2°C and pursuing efforts to limit warming to 1.5°C above pre-industrial levels.

The requested moratorium is necessary to address the serious threats to climate, health, safety, and biodiversity posed by greenhouse gas emissions from the continued extraction and combustion of fossil fuels from the federal mineral estate, and to preserve a reasonable likelihood of limiting global warming to 1.5°C above pre-industrial levels consistent with the Paris Agreement adopted at the 2015 United Nations Framework Convention on Climate Change Conference of the Parties (Paris Agreement).¹¹ The President has acknowledged that “this agreement sends a powerful signal that the world is firmly committed to a low-carbon future.”¹²

¹⁰ See 30 U.S.C. § 181-287.; see also Mineral Leasing Act for Acquired Lands of 1947, 30 U.S.C. § 351-360.

¹¹ The Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature “to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.” Paris Agreement Art. 2.

¹² See Paris Agreement; The White House, Statement by the President on the Paris Climate Agreement, Office of the Press Secretary (Dec. 12, 2015), <https://www.whitehouse.gov/the-press-office/2015/12/12/statement-president-paris-climate-agreement>.

The already severe impacts of global warming on the United States and the rest of the world from *current* atmospheric carbon dioxide (CO₂) levels highlight the urgency of staying below the 1.5°C target so as to avoid truly catastrophic impacts to people and planet.¹³ As CO₂ levels continue to rise past 400 parts per million (ppm),¹⁴ the consequent effects of global warming are becoming ever more apparent. Extreme weather events, such as severe droughts, floods, and heat waves, and other climate disruptions are responsible for an estimated 400,000 deaths globally each year on average, with hundreds of millions of additional people adversely affected.¹⁵ Arctic sea ice loss, rising seas, growing food insecurity, bleaching of coral reefs, and biodiversity loss are mounting worldwide. The United States has experienced similar devastation at home, with coastal communities and the country's most vulnerable populations of the poor, the elderly, the sick and children bearing the brunt of public health effects, property damage, and food insecurity. Indeed, the Environmental Protection Agency (EPA) concluded in April 2009 that “the evidence provides compelling support for finding that greenhouse gas air pollution endangers the public welfare of both current and future generations. The risk and the severity of adverse impacts on public welfare are expected to increase over time.”¹⁶

Immediate and aggressive greenhouse gas emissions reductions are necessary to limit warming to a 1.5°C rise above pre-industrial levels. Put simply, there is only a finite amount of CO₂ that can be released into the atmosphere without rendering the goal of meeting the 1.5°C (or even a 2°C) target virtually impossible. Globally, proven fossil fuel reserves, let alone additional recoverable resources,¹⁷ if extracted and burned, would release enough CO₂ to exceed this limit

¹³ A target of 1.5°C, while obviously more protective of the climate than a 2°C target, may itself be too high. Dr. James Hansen and colleagues have recommended limiting warming to 1°C to “stabilize climate and avoid potentially disastrous impacts on today’s young people, future generations, and nature”. See Hansen, J.M. *et al.*, Assessing “dangerous climate change”: required reduction of carbon emissions to protect young people, future generations and nature, 8 PLoS ONE 8 e81648 (2013).

¹⁴ See National Oceanic and Atmospheric Administration, Recent Monthly Average Mauna Loa CO₂, <http://www.esrl.noaa.gov/gmd/ccgg/trends/> (Dec. 2015 concentration of 401.85 ppm).

¹⁵ DARA and the Climate Vulnerability Forum. (2012) *Climate Vulnerability Monitor, 2nd Edition: A Guide to the Cold Calculus of a Hot Planet*. DARA Internacional, Madrid, 62 pp. <http://www.daraint.org/wp-content/uploads/2012/10/CVM2-Low.pdf> (“DARA”).

¹⁶ U.S. Environmental Protection Agency, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496, 66,498-99 (Dec. 15, 2009) (“Final Endangerment Finding”).

¹⁷ According to the Congressional Research Service, “[p]roved reserves are those amounts of oil, natural gas, or coal that have been discovered and defined at a significant level of certainty, typically by drilling wells or other exploratory measures, and which can be economically recovered. In the United States, proved reserves are typically measured by private companies, who report their findings to the Securities and Exchange Commission because those reserves are considered capital assets. Because proved reserves are defined by strict rules, they do not include all of the oil or gas in a region, but only those amounts that have been carefully confirmed. . . . Undiscovered resources are amounts of oil and gas estimated to exist in unexplored areas. Estimates of undiscovered resources for the United States are made by the U.S. Geological Survey for resources on land, and by the U.S. Bureau of Ocean Energy Management, Regulation and Enforcement (formerly the Minerals Management Service) for resources offshore. These assessments are based on observation of geological characteristics similar to producing areas and many other factors. Reported statistics for undiscovered resources may vary greatly in precision and accuracy (determined retrospectively), which are directly dependent upon data availability, and their quality may differ for different fuels

several times over.¹⁸ Consequently, the vast majority of fossil fuels must remain in the ground. The physical question of what amount of fossil fuels can be extracted and burned without negating a realistic chance of meeting a 1.5°C or even 2°C target is relatively easy to answer. The question of what level of risk of not meeting the target is acceptable, along with the questions of *which* fossil fuels can be burned and by *whom*, are inherently political and ethical questions. But, as demonstrated below, under *any* formulation, the majority of United States fossil fuels, particularly federal fossil fuels, must stay in the ground.

The Fifth Assessment Report of the International Panel on Climate Change (IPCC) and other expert assessments have established global carbon budgets, or the total amount of remaining carbon that can be burned while maintain some probability of staying below a given temperature target. According to the IPCC, total cumulative anthropogenic emissions of CO₂ must remain below about 1,000 gigatonnes (GtCO₂) from 2011 onward for a 66% probability of limiting warming to 2°C above pre-industrial levels.¹⁹ The Paris Agreement aim of limiting the temperature increase to 1.5°C requires a more stringent carbon budget of only 400 GtCO₂ from 2011 onward (of which more than 100 GtCO₂ has already been emitted)²⁰ for a 66% probability of limiting warming to 1.5°C above pre-industrial levels.²¹ Increasing the odds of meeting these targets requires meeting even stricter carbon budgets.²² Given that global CO₂ emissions in 2014 alone totaled 36 GtCO₂,²³ humanity is rapidly consuming the remaining burnable carbon budget needed to have even a 66% chance of meeting the 1.5°C temperature limit.

In order for the world to stay within a carbon budget consistent with a 1.5°C temperature limit, significant fossil fuels around the world need to be left in the ground. The United States alone contains enough recoverable fossil fuels, split about evenly between federal and non-federal resources, that if extracted and burned, would approach the entire global carbon budget

and different regions.” Whitney, Gene et al., U.S. Fossil Fuel Resources: Terminology, Reporting and Summary. Cong. Research Serv., R40872 (2010)

¹⁸ See, e.g., IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change at 64 & Table 2.2 [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)] at 63-64 & Table 2.2. (“IPCC AR5 Synthesis Report”); Cmons, Marlene and Jeff Nesbit, Keep It In the Ground, Sierra Club et al. (Jan. 25, 2016) at 6

¹⁹ IPCC, The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change; Summary for Policymakers (2013) at 27 (“IPCC AR5 Physical Science Basis”). See also IPCC AR5 Synthesis Report at 63-64 & Table 2.2. Higher probabilities of success require stricter carbon limits; to have an 80% probability of staying below the 2°C target, the budget from 2000 is 890 GtCO₂, with less than 430 GtCO₂ remaining. See Meinshausen, M. et al., Greenhouse gas emission targets for limiting global warming to 2 degrees Celsius, 458 Nature 1158–1162 (2009) (“Meinshausen et al. 2009”) at 1159; Carbon Tracker Initiative, Unburnable Carbon – Are the world’s financial markets carrying a carbon bubble? (2011) (“Carbon Tracker Initiative 2013”) available at <http://www.carbontracker.org/wp-content/uploads/2014/09/Unburnable-Carbon-Full-rev2-1.pdf>.

²⁰ From 2012-2014, 107 GtCO₂ was emitted (see Annual Global Carbon Emissions at <http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html>). Given additional emissions in 2015, the remaining carbon budget for 1.5°C would now be well below 300 GtCO₂ (approximately 450 Gt CO₂e)

²¹ IPCC AR5 Synthesis Report at 64 & Table 2.2.

²² See Meinshausen et al. 2009 at 1159; Carbon Tracker Initiative 2013.

²³ See Global Carbon Emissions at <http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html>.

for a 2°C target, and exceed the remaining budget for a 1.5°C limit.²⁴ Clearly, even if the rest of the world somehow reduced its carbon emissions to near zero, the United States still could not safely burn all of its own fossil fuel resources. The majority of United States fossil fuels simply must be kept in the ground.

Recent analysis shows that the potential emissions from federal fossil fuel resources are between 349 and 492 GtCO₂e, with unleased fossil fuels comprising 91% of these potential emissions.²⁵ In other words, unleased federal fossil fuels, if extracted and burned, would consume between roughly 70 and 100% of a *global* budget of 450 GtCO₂e, the amount remaining at the start of 2016 under a budget scenario that itself has only a 66% chance of limiting temperature increase to 1.5°C.²⁶ Under a more cautionary budget (i.e., one with a higher probability of success), unleased federal fossil fuels alone could exceed the entire global budget. Continued leasing of these fossil fuels, without examining the climate consequences of such action, is incompatible with any reasonable domestic and international path to limiting warming to 1.5°C or even 2°C.

While the climate consequences of a gigatonne of CO₂ emitted from the combustion of a barrel of oil are the same regardless of whether it was extracted from federal or non-federal lands, the legal, political and economic hurdles of keeping federal fossil fuels in the ground are far simpler to overcome than for fossil fuels from non-federal lands; the Secretary of the Interior can simply refrain from issuing any new leases for their extraction.

The MLA, 30 U.S.C. §§ 181-287, together with the Mineral Leasing Act for Acquired Lands, 30 U.S.C. §§ 351-360, the National Environmental Policy Act, 42 U.S.C. §§ 4321-4370, and the Federal Land Policy and Management Act, 43 U.S.C. §§ 1701-1787, provides the Secretary the explicit legal authority to halt public lands fossil fuel leasing in order to respond to the threats posed by climate change. The Secretary has broad discretion under the MLA as to when, how, and if federal fossil coal,²⁷ oil and gas,²⁸ and oil shale and tar sands²⁹ may be offered

²⁴ See Mulvaney, Dustin *et al.*, *The Potential Greenhouse Gas Emissions of U.S. Federal Fossil Fuels*, EcoShift Consulting (2015) (“Mulvaney *et al.* 2015”) at 4.

²⁵ *Id.* Using a metric of CO₂e (which also includes the radiative or climate forcing potential of non-CO₂ greenhouse gases such as methane), Mulvaney *et al.*'s study calculated that extraction and combustion of total U.S. fossil fuels would produce 697 to 1070 GtCO₂e of emissions, with federal fossil fuels responsible for between 349 and 492 GtCO₂e. The potential GHG emissions of unleased federal fossil fuel resources range from 319 to 450 492 GtCO₂e. *et al.*

²⁶ *Id.* The emission potential of unleased federal fossil fuels are estimated at 319-450 GtCO₂e. The global carbon budget at the start of 2015 for a 66% chance of limiting temperature increase to 1.5°C was approximately 300 GtCO₂ which is equivalent to ~450 GtCO₂e, meaning that the potential emissions of unleased federal fossil fuels would consume 70 to 100% of this global budget. There is no single universally applicable factor for converting between CO₂ and CO₂e because the ultimate radiative forcing potential of fossil fuel extraction and combustion depends on a number of assumptions regarding the production and use of those fuels. In this Petition we use a conversion factor of 1 GtCO₂ = 1.5 GtCO₂e based on Table 1 in Meinshausen *et al.* 2009.

²⁷ 30 U.S.C. § 201(a)(1) (Secretary “shall, in his or her discretion,” offer coal lands for leasing); see *Arnold v. Morton*, 529 F.2d 1101 (9th Cir. 1976); *WildEarth Guardians v. Salazar*, 783 F. Supp. 2d 61, 63 (D.D.C. 2011)

for lease. This discretion has been consistently upheld by the courts.³⁰

On January 15, 2016, the Secretary issued Secretarial Order No. 3338, exercising her discretion under the MLA and other applicable statutes in order to consider, *inter alia*, “how best to assess the climate impacts of continued Federal coal production and combustion and how to address those impacts in the management of the program to meet both the Nation's energy needs and its climate goals, as well as how best to protect the public lands from climate change impacts.”³¹ Order 3338 found that “Continuing to conduct lease sales or approve lease modifications during this programmatic review risks locking in for decades the future development of large quantities of coal under current rates and terms that the PEIS may ultimately determine to be less than optimal.”³² This logic applies equally forcefully to federal oil and gas resources.

Through this petition, Petitioners seek issuance of an additional Secretarial Order extending this moratorium on coal leasing to the pause from issuance of *any* onshore federal fossil fuel leases (coal, oil and gas, oil shale, and tar sands) until and unless (a) the Department completes a Programmatic Environmental Impact Statement for the cumulative climate impacts of all federal fossil fuel leasing programs; and (b) it can be demonstrated that resumption of such leasing is consistent with our national and international climate goals and obligations.

(quoting *Indep. Petroleum Ass'n of Am. v. DeWitt*, 279 F.3d 1036, 1040 (D.C. Cir. 2002)) (Secretary is “permitted” but not require to lease particular tracts for coal mining); *see also* U.S. Department of the Interior, Secretarial Order No. 3338 at 6 (Jan. 15, 2016).

²⁸ 30 U.S.C. § 226(a) (“[a]ll lands subject to disposition under this Act which are known or believed to contain oil or gas deposits *may* be leased by the Secretary”) (emphasis added); *see also Udall v. Tallman*, 380 U.S. 1, 4 (1965); *United States ex rel. McLennan v. Wilbur*, 283 U.S. 414, 417 (1931); *McDonald v. Clark*, 771 F.2d 460, 463 (10th Cir. 1985); *McTiernan v. Franklin*, 508 F.2d 885, 887 (10th Cir. 1975); *Duesing v. Udall*, 350 F.2d 748, 750 (D.C. Cir. 1965); *Cont'l Land Res.*, 162 I.B.L.A. 1, 7 (2004).

²⁹ 30 U.S.C. § 241(a)(1).

³⁰ *See, e.g. Krueger v. Morton*, 539 F.2d 235, 238-40 (D.C. Cir. 1976); *see also NRDC v. Hughes*, 437 F. Supp. 981, 983-85 (D.D.C. 1977).

³¹ Secretarial Order No. 3338 at 8 .

³² Secretarial Order No. 3338 at 8 .

IV. Statutory Background

Management of federal lands is governed by the Property Clause, Article IV, § 3, cl. 2, and executive authority is exercised within the statutory framework established by an interconnected system of laws including the Federal Land Policy and Management Act, National Forest Management Act, National Wildlife Refuge Administration Act, Mineral Leasing Act, Mineral Leasing Act for Acquired Lands, Federal Onshore Oil and Gas Leasing Reform Act, Surface Mining Control and Reclamation Act, and others.

A. The Mineral Leasing Act

The modern legal status of federal onshore oil, gas, coal, and shale oil begins with the Mineral Leasing Act of 1920.³³ Prior to the MLA, fossil fuels on federal lands were generally managed as “locatable” minerals under the General Mining Law of 1872. The MLA, by contrast, provides for the private extraction of fossil fuels through a leasing system, which does not confer a unilateral private right to acquisition by discovery, prospecting, or the like. The MLA governs federal leasing of onshore oil, gas, shale, tar sands, and coal, although the system governing coal leases is distinct from that governing other fossil fuels, and is subject to additional requirements under both the Federal Coal Leasing Amendments of 1976³⁴ and the Surface Mining Control and Reclamation Act of 1977. The Mineral Leasing Act for Acquired Lands makes lands acquired by the United States also subject to the leasing provisions of the MLA.³⁵

From the enactment of the MLA until the mid-1980s, most federal oil, gas, and coal leasing was conducted on a noncompetitive basis, save within certain areas designated as “known geological structures.”³⁶ The Federal Onshore Oil and Gas Leasing Reform Act (FOOGLRA) left the fundamental statutory provisions and leasing structure of the MLA in place, but imposed an initial competitive bidding requirement on all offered leases—although leases can later be sold noncompetitively if they receive no bid at auction—as well as giving the Forest Service authority to issue or withhold consent to leasing on National Forest System lands.³⁷ The Energy Policy Act of 2005 similarly left the basic leasing structure in place, with minor amendments.³⁸

Federal coal leasing is principally governed by the MLA, 30 U.S.C. § 201, which authorizes the Secretary of the Interior to “in his discretion, upon the request of any qualified applicant or on his own motion, from time to time, offer such lands for leasing.”³⁹ All Coal

³³ 30 U.S.C. §§ 181-287.

³⁴ See 30 U.S.C. § 201.

³⁵ 30 U.S.C. § 352 (acquired lands” may be leased by the Secretary under the same conditions as contained in the leasing provisions of the mineral leasing laws”).

³⁶ See Beneke, Patricia J., *The Federal Onshore Oil and Gas Leasing Reform Act of 1987: A Legislative History and Analysis*, 4 J. Min. L. & Pol’y (1988).

³⁷ See 30 U.S.C. §§ 188, 195, 226.

³⁸ See 43 U.S.C. §§ 15927, 15942.

³⁹ 30 U.S.C. § 201(a)(1). See also Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. §§ 1201-1328.

leasing today occurs not in formally designated coal-producing regions⁴⁰, but through a nomination process known as leasing-by-application.⁴¹ The lease-by-application program, however, clearly preserves the Secretary’s full statutory discretion to reject any lease, and indeed requires rejection if the issuance of the lease would be contrary to the public interest.⁴² On January 15, 2016, the Secretary exercised this authority to pause most federal coal leasing in order to allow “the BLM to conduct a broad, programmatic review of the Federal coal program it administers.”⁴³

The equivalent statutory provisions governing discretion over federal oil, gas, tar sands, and oil shale leasing are 30 U.S.C. §§ 226(a) and 241, which provides simply that “[a]ll lands subject to disposition under [the MLA] which are known or believed to contain oil or gas deposits may be leased by the Secretary,”⁴⁴ and that “[t]he Secretary of the Interior is hereby authorized to lease to any person or corporation qualified under this chapter any deposits of oil shale, and gilsonite (including all vein-type solid hydrocarbons) belonging to the United States and the surface of so much of the public lands containing such deposits, or land adjacent thereto, as may be required for the extraction and reduction of the leased minerals, under such rules and regulations, not inconsistent with this chapter, as he may prescribe.”⁴⁵

The Bureau of Land Management (BLM) is the agency responsible for leasing all lands subject to disposition under the MLA, including Forest Service lands. FOOGLRA and its implementing regulations additionally require Forest Service consent prior to BLM leasing of National Forest System Lands.⁴⁶ Although the MLA states that, for oil and gas, “[l]ease sales shall be held for each State where eligible lands are available at least quarterly and more frequently if the Secretary of the Interior determines such sales are necessary,”⁴⁷ quarterly leasing is not required if no lands are “eligible” and “available” due to factors including withdrawal from the operation of the MLA under FLPMA, allocation decisions under an applicable land management plan, need for additional environmental review, or exercise of

⁴⁰ See U.S. Bureau of Land Management, Coal Operations, http://www.blm.gov/wo/st/en/prog/energy/coal_and_non-energy.html (accessed Apr 29, 2016) (“[B]ecause demand for new coal leasing in recent years has been associated with the extension of existing mining operation on authorized federal coal leases, all current leasing is done by application.”)

⁴¹ See 43 C.F.R. Subpart 3425.

⁴² See 43 C.F.R. § 3425.1-8 (“An application for a lease shall be rejected in total or in part if the authorized officer determines that . . . leasing of the lands covered by the application, for environmental or other sufficient reasons, would be contrary to the public interest.”); see also *Arnold v. Morton*, 529 F.2d 1101, 1105 (9th Cir. 1976) (“It is quite evident that the Secretary has no obligation to issue any lease on public lands.”); *WildEarth Guardians v. Salazar*, 783 F. Supp. 2d 61, 63 (D.D.C. 2011) (quoting *Indep. Petroleum Ass’n of Am. v. DeWitt*, 279 F.3d 1036, 1040 (D.C. Cir. 2002)) (Secretary is “permitted” but not required to lease particular tracts for coal mining).

⁴³ U.S. D.O.I. Secretarial Order No. 3338 at 7.

⁴⁴ 30 U.S.C. § 226(a); see also 30 U.S.C. § 352 (acquired lands” may be leased by the Secretary under the same conditions as contained in the leasing provisions of the mineral leasing laws”).

⁴⁵ 30 U.S.C. § 241(a)(1).

⁴⁶ See 30 U.S.C. §226(h); 43 C.F.R. §3101.7(c).

⁴⁷ 30 U.S.C. § 226(b)(1)(A).

Secretarial discretion.⁴⁸

There is a long line of judicial decisions interpreting 30 U.S.C. § 226 as conferring on the Secretary discretion whether or not to offer any particular lands for lease.⁴⁹ FOGLRA did not repeal or alter this authority. The one court to consider a claim that FOGLRA reduced Secretarial discretion over the decision whether or not to lease rejected this argument, finding that the 1987 switch to a competitive bidding system did not alter the Secretary's fundamental discretion as to which leases she will offer up for bid.⁵⁰

The sole appellate court to address the question squarely has held that a decision to reject or defer action on federal oil and gas leasing is within the bounds of valid Secretarial discretion.⁵¹ In *Bob Marshall Alliance v. Hodel*, the Court of Appeals held:

the Mineral Leasing Act gives the Interior Secretary discretion to determine which lands are to be leased under the statute. 30 U.S.C. § 226(a) (1982); see *Mountain States*, 499 F. Supp. at 391-92. We have held that the Mineral Leasing Act "allows the Secretary to lease such lands, but does not require him to do so The Secretary has discretion to refuse to issue any lease at all on a given tract." *Burglin v. Morton*, 527 F.2d 486, 488 (9th Cir. 1975) (citing *Udall v. Tallman*, 380 U.S. 1, 4, (1965)), cert. denied, 425 U.S. 973, (1976). Thus refusing to issue the Deep Creek leases, far from removing Deep Creek from the operation of the mineral leasing law, would constitute a legitimate exercise of the discretion granted to the Interior Secretary under that statute.⁵²

The Department of the Interior has similarly previously, and repeatedly, utilized its

⁴⁸ See 43 C.F.R. § 3120.1-1; U.S. Bureau of Land Management, Oil and Gas Leasing Reform – Land Use Planning and Lease Parcel Reviews, Instruction Memorandum No. 2010-117, § III.A & n.viii (2010) (“Eligible lands include those identified in 43 CFR 3120.1-1 as being available for leasing (BLM Manual 3120, Competitive Leases). They are considered available for leasing when all statutory requirements have been met, including compliance with the NEPA, appropriate reviews have been conducted, and lands have been allocated for leasing in the RMP (BLM Handbook H-3101-1, Issuance of Leases).”)

⁴⁹ See, e.g., *Udall v. Tallman*, 380 U.S. 1, 4 (1965); *United States ex rel. McLennan v. Wilbur*, 283 U.S. 414, 417 (1931); *McDonald v. Clark*, 771 F.2d 460, 463 (10th Cir. 1985); *McTiernan v. Franklin*, 508 F.2d 885, 887 (10th Cir. 1975); *Duesing v. Udall*, 350 F.2d 748, 750 (D.C. Cir. 1965); *Cont'l Land Res.*, 162 I.B.L.A. 1, 7 (2004).

⁵⁰ *Western Energy Alliance v. Salazar*, 709 F.3d 1040, 1044 (10th Cir. 2013) (“Before the MLA was amended by the Federal Onshore Oil and Gas Leasing Reform Act of 1987 . . . it was well established that the Secretary had extremely broad discretion and was not obligated to issue any lease on public lands “[t]he MLA, as amended by the Reform Act of 1987, continues to vest the Secretary with considerable discretion to determine which lands are ‘to be leased’ under § 226(b)(1)(A).”); compare *Impact Energy Resources, LLC v. Salazar*, No. 2:09-CV-435, 2010 U.S. Dist. LEXIS 91095, at *16 (D. Utah Aug. 31, 2010), *aff'd on other ground*, 693 F.3d 1239 (10th Cir. 2012) (stating that it is “undisputed that . . . prior to a lease sale the Secretary has discretion to decide which lands will be offered for lease.”)

⁵¹ See *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1229-30 (9th Cir. 1988) (rejecting holdings in *Mountain States Legal Found. v. Hodel*, 668 F. Supp. 1466, 1474 (D. Wyo. 1987) (finding that delay in processing leasing proposals can constitute an impermissible withdrawal of public lands) and *Mountain States Legal Found. v. Andrus*, 499 F. Supp. 383, 391 (D. Wyo. 1980) (same)).

⁵² *Bob Marshall Alliance*, 852 F.2d at 1230.

discretionary authority over mineral leasing to impose a nationwide coal leasing moratorium.⁵³ Significantly, the District of Columbia Circuit upheld the validity of a 1970-76 moratorium on new coal leases, part of a series of various moratoria from 1970 to 1981.⁵⁴ Under the pre-1976 “preference right” coal leasing scheme, speculation on coal leases was widespread. Even prior to the enactment of the 1976 Coal Leasing Amendments and the Surface Mining Control and Reclamation Act, the Department of the Interior recognized widespread problems, and in 1973, the then Secretary issued Order No. 2952, which provided:

In the exercise of my discretionary authority under Section 2(b) of the Mineral Leasing Act, as amended (30 U.S.C. § 201(b)), I have decided not to issue prospecting permits for coal under that section until further notice and to reject pending applications for such permits in order to allow the preparation of a program for the more "orderly" development of coal resources upon the public lands of the United States under the Mineral Leasing Act, with proper regard for the protection of the environment.

Accordingly, no prospecting permits for coal under Section 2(b) of the Mineral Leasing Act, *supra*, shall be issued until further notice. All pending applications for such permits shall be rejected. . . .⁵⁵

During this moratorium, the Interior Department undertook preparing a series of national and local Environmental Impact Statements (EISs) for coal leasing. Lease applicants, however, challenged the moratorium on two principal grounds: first, that the moratorium failed to implement the policy of the Mining and Minerals Policy Act of 1970⁵⁶ to “foster and encourage the development of coal resources,” and second, that the Secretary arbitrarily and capriciously determined that the moratorium did not require preparation of an EIS under the National Environmental Policy Act (“NEPA”), 42 U.S.C. § 4332. The court in *Krueger v. Morton*⁵⁷ rejected both of these claims, finding that “the Secretary had the right, before receiving or approving applications, to order a pause for refreshment of his judgment by further investigation, public input, comprehensive consideration, and rulemaking directed toward the hopefully better implementation of the Mineral Leasing Act in light of NEPA and other significant factors.”⁵⁸

Although the moratorium eventually ended and coal leasing resumed, the courts did require the Secretary through the EIS process to at least consider the alternative of *not* resuming the national coal leasing program.⁵⁹ Secretarial Orders 2952 and 3338 provide a clear model for

⁵³ See *NRDC v. Hughes*, 437 F. Supp. 981, 983-85 (D.D.C. 1977) (discussing history and reform of coal leasing).

⁵⁴ See *Krueger*, 539 F.2d 235, 238-40 (D.C. Cir. 1976); see also *NRDC v. Hughes*, 437 F. Supp., 983-85.

⁵⁵ United States Department of the Interior, Secretarial Order 2952 (Feb. 1973); see also *Krueger*, 539 F.2d at 237.

⁵⁶ 30 U.S.C. § 21a.

⁵⁷ *Krueger*, 539 F.2d 235 (D.C. Cir. 1976).

⁵⁸ *Id.* at 239.

⁵⁹ See *NRDC v. Hughes*, 437 F.Supp. at 990-91 (requiring DOI to address “the threshold question as to *whether* the proposed [coal leasing] policy is even *necessary*”)

an approach to the national deferral of oil and gas leasing pending comprehensive review of the climate consequences of the federal fossil fuel leasing program and implementation of a national strategy to limit such impacts. As the court held in *Krueger*, the Secretary has the right pursuant to 30 U.S.C. §§ 201 and 226, to order a “pause for refreshment of her judgment” of the leasing program in order to ensure any renewed leasing program is consistent with our nation's climate goals.

On January 15, 2016, the Secretary issued Order No. 3338, again pausing the coal leasing program for review and reconsideration, explicitly including the impacts of climate change resulting from coal combustion:

The United States has pledged to the United Nations Framework Convention on Climate Change (UNFCCC) to reduce its greenhouse gas (GHG) emissions by 26-28 percent below 2005 levels by 2025. The Obama Administration has made, and is continuing to make, unprecedented efforts to reduce GHG emissions in line with this target through numerous measures. Numerous scientific studies indicate that reducing GHG emissions from coal use worldwide is critical to addressing climate change.

At the same time, as noted above, the Federal coal program is a significant component of overall United States' coal production. Federal coal represents approximately 41 percent of the coal produced in the United States, and when combusted, it contributes roughly 10 percent of the total U.S. GHG emissions.

Many stakeholders highlighted the tension between producing very large quantities of Federal coal while pursuing policies to reduce U.S. GHG emissions substantially, including from coal combustion. Critics also noted that the current leasing system does not provide a way to systematically consider the climate impacts and costs to taxpayers of Federal coal development.

With respect to the climate impacts of the Federal coal program, the PEIS should examine how best to assess the climate impacts of continued Federal coal production and combustion and how to address those impacts in the management of the program to meet both the Nation's energy needs and its climate goals, as well as how best to protect the public lands from climate change impacts.⁶⁰

Congress has plainly conferred on the Secretary, and the courts have recognized, equivalent discretionary authority under 30 U.S.C. §§ 226 and 241 as to whether or not to issue leases for, oil, gas, tar sands, or oil shale under those sections. In order to permit a

⁶⁰ U.S. D.O.I. Secretarial Order No. 3338 at 4, 8.

comprehensive nationwide evaluation of and response to the threat of climate change, the Secretary can and should, via Secretarial Order, defer action all new and pending applications and nominations for such leases, in order to conduct a comprehensive review of the entire federal fossil fuel leasing program, and to promulgate rules and policies ensuring that any new federal coal, oil, gas, tar sand, and oil shale leasing, and the emissions resulting from the extraction and combustion of federal fossil fuels, are consistent with a pathway to limit warming to 1.5°C above pre-industrial levels.

B. The National Environmental Policy Act

The National Environmental Policy Act (NEPA), 43 U.S.C. §§ 4331-4347, requires federal agencies to inform themselves and the public of the direct, indirect, and cumulative effects of all major federal actions, and to consider alternatives, including no action, to proposed actions.⁶¹ The indirect and cumulative effects of federal public land leasing policy plainly include, as set forth below, a significant national and global contribution to greenhouse gas emissions. The Department of Interior can best satisfy its obligation to consider the cumulative impacts of fossil fuel gas leasing by preparing a Programmatic Environmental Impact Statement considering all onshore fluid mineral leasing. Indeed, the Council on Environmental Quality's recent "Guidance on Effective Use of Programmatic NEPA Reviews" explains that programmatic NEPA review is appropriate when agencies must evaluate "multiple actions," including "similar actions or projects in a region *or nationwide*."⁶² The Department has already determined that a Programmatic Environmental Impact Statement is the appropriate method for evaluating the climate impacts of federal coal leasing.⁶³

V. Reasons for Action on Petition

A. Climate Change Poses a Well-Documented Threat to the United States and the World

On December 12, 2015, nearly 200 governments, including the United States, agreed to the commitments enumerated in the Paris Agreement to "strengthen the global response to the threat of climate change"⁶⁴ The Paris Agreement codified the international consensus that the climate crisis is an urgent threat to human societies and the planet, with the parties recognizing that:

Climate change represents an *urgent and potentially irreversible threat to human*

⁶¹ See, e.g., 40 C.F.R. §§ 1500.1(b), 1502.4, 1502.5, 1506.10, 1508.7 and 1508.25; *Center for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1221-23 (9th Cir. 2008)

⁶² Council on Environmental Quality, Memorandum Re: Effective use of Programmatic NEPA Reviews 14 (Dec. 18, 2014), available at https://www.whitehouse.gov/sites/default/files/docs/effective_use_of_programmatic_nepa_reviews_final_dec2014_s earchable.pdf.

⁶³ Secretarial Order 3338.

⁶⁴ Paris Agreement, Art. 2(1).

societies and the planet and thus requires the widest possible cooperation by all countries, and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions (emphasis added).⁶⁵

Numerous authoritative scientific assessments have established that climate change is causing grave harms to human society and natural systems, and these threats are becoming increasingly dangerous. The Intergovernmental Panel on Climate Change, in its 2014 Fifth Assessment Report, stated that: “[w]arming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased” and that “[r]ecent climate changes have had widespread impacts on human and natural systems.”⁶⁶

The United States’ 2014 Third National Climate Assessment, prepared by a panel of non-governmental experts and reviewed by the National Academy of Sciences and multiple federal agencies similarly stated that “[t]hat the planet has warmed is ‘unequivocal,’ and is corroborated through multiple lines of evidence, as is the conclusion that the causes are very likely human in origin”⁶⁷ and “[i]mpacts related to climate change are already evident in many regions and are expected to become increasingly disruptive across the nation throughout this century and beyond.”⁶⁸ The United States National Research Council similarly concluded that: “[c]limate change is occurring, is caused largely by human activities, and poses significant risks for—and in many cases is already affecting—a broad range of human and natural systems.”⁶⁹

The IPCC and National Climate Assessment further decisively recognize the dominant role of fossil fuels in driving climate change:

While scientists continue to refine projections of the future, observations unequivocally show that climate is changing and that the warming of the past 50 years is primarily due to human-induced emissions of heat-trapping gases. These emissions come mainly from burning coal, oil, and gas, with additional contributions from forest clearing and some agricultural practices.⁷⁰

⁶⁵ Paris Agreement, Decision, Recitals.

⁶⁶ IPCC AR5 Synthesis Report at 2.

⁶⁷ Melillo, Jerry M., *Climate Change Impacts in the United States: The Third National Climate Assessment*, Terese (T.C.) Richmond, and Gary W. Yohe, Eds., U.S. Global Change Research Program, doi:10.7930/J0Z31WJ2 (2014) (Third National Climate Assessment) at 61 (quoting IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and H. L. Miller, Eds., Cambridge University Press, 1-18.).

⁶⁸ Third National Climate Assessment at 10.

⁶⁹ National Research Council, *Advancing the Science of Climate Change* (2010), available at www.nap.edu. (“Advancing the Science of Climate Change”) at 2.

⁷⁰ Third National Climate Assessment at 2.

CO₂ emissions from fossil fuel combustion and industrial processes contributed about 78% to the total GHG emission increase between 1970 and 2010, with a contribution of similar percentage over the 2000–2010 period (*high confidence*).⁷¹

These impacts emanating from the extraction and combustion of fossil fuels are harming the United States in myriad ways, with the impacts certain to worsen over the coming decades absent deep reductions in domestic and global GHG emissions. EPA recognized these threats in its 2009 Final Endangerment Finding under Clean Air Act Section 202(a), concluding that greenhouse gases from fossil fuel combustion endanger public health and welfare: “the body of scientific evidence compellingly supports [the] finding” that “greenhouse gases in the atmosphere may reasonably be anticipated both to endanger public health and to endanger public welfare.”⁷² In finding that climate change endangers public health and welfare, EPA has acknowledged the overwhelming evidence of the documented and projected effects of climate change upon the nation:

Effects on air quality: “The evidence concerning adverse air quality impacts provides strong and clear support for an endangerment finding. Increases in ambient ozone are expected to occur over broad areas of the country, and they are expected to increase serious adverse health effects in large population areas that are and may continue to be in nonattainment. The evaluation of the potential risks associated with increases in ozone in attainment areas also supports such a finding.”⁷³

Effects on health from increased temperatures: “The impact on mortality and morbidity associated with increases in average temperatures, which increase the likelihood of heat waves, also provides support for a public health endangerment finding.”⁷⁴

Increased chance of extreme weather events: “The evidence concerning how human induced climate change may alter extreme weather events also clearly supports a finding of endangerment, given the serious adverse impacts that can result from such events and the increase in risk, even if small, of the occurrence and intensity of events such as hurricanes and floods. Additionally, public health is expected to be adversely affected by an increase in the severity of coastal storm events due to rising sea levels.”⁷⁵

Impacts to water resources: “Water resources across large areas of the country are at serious risk from climate change, with effects on water supplies, water quality, and adverse effects from extreme events such as floods and droughts. Even areas of the country where an increase in water flow is projected could face water resource problems from the supply and water

⁷¹ IPCC AR5 Synthesis Report at 46.

⁷² Final Endangerment Finding, 74 Fed. Reg. at 66,497.

⁷³ Final Endangerment Finding, 74 Fed. Reg. at 66,497

⁷⁴ Final Endangerment Finding, 74 Fed. Reg. at 66,497

⁷⁵ Final Endangerment Finding at 66,497-98.

quality problems associated with temperature increases and precipitation variability, as well as the increased risk of serious adverse effects from extreme events, such as floods and drought. The severity of risks and impacts is likely to increase over time with accumulating greenhouse gas concentrations and associated temperature increases.”⁷⁶

Impacts from sea level rise: “The most serious potential adverse effects are the increased risk of storm surge and flooding in coastal areas from sea level rise and more intense storms. Observed sea level rise is already increasing the risk of storm surge and flooding in some coastal areas. The conclusion in the assessment literature that there is the potential for hurricanes to become more intense (and even some evidence that Atlantic hurricanes have already become more intense) reinforces the judgment that coastal communities are now endangered by human-induced climate change, and may face substantially greater risk in the future. Even if there is a low probability of raising the destructive power of hurricanes, this threat is enough to support a finding that coastal communities are endangered by greenhouse gas air pollution. In addition, coastal areas face other adverse impacts from sea level rise such as land loss due to inundation, erosion, wetland submergence, and habitat loss. The increased risk associated with these adverse impacts also endangers public welfare, with an increasing risk of greater adverse impacts in the future.”⁷⁷

Impacts to energy, infrastructure, and settlements: “Changes in extreme weather events threaten energy, transportation, and water resource infrastructure. Vulnerabilities of industry, infrastructure, and settlements to climate change are generally greater in high-risk locations, particularly coastal and riverine areas, and areas whose economies are closely linked with climate-sensitive resources. Climate change will likely interact with and possibly exacerbate ongoing environmental change and environmental pressures in settlements, particularly in Alaska where indigenous communities are facing major environmental and cultural impacts on their historic lifestyles.”⁷⁸

Impacts to wildlife: “Over the 21st century, changes in climate will cause some species to shift north and to higher elevations and fundamentally rearrange U.S. ecosystems. Differential capacities for range shifts and constraints from development, habitat fragmentation, invasive species, and broken ecological connections will likely alter ecosystem structure, function, and services, leading to predominantly negative consequences for biodiversity and the provision of ecosystem goods and services.”⁷⁹

In addition to these acknowledged impacts on public health and welfare generally, climate change is causing and will continue to cause serious impacts on natural resources that the

⁷⁶ Final Endangerment Finding at 66,498.

⁷⁷ Final Endangerment Finding at 66,498

⁷⁸ Final Endangerment Finding at 66,498

⁷⁹ Final Endangerment Finding at 66,498 *see also* Third National Climate Assessment at 195-219.

Department of Interior is specifically charged with safeguarding.⁸⁰

Impacts to Public Lands: Climate change is causing and will continue to cause specific impacts to public lands and resources. Although public lands provide a variety of public benefits, one recent Forest Service attempt at quantification estimates the public land ecosystem services at risk from climate change at between \$14.5 and \$36.1 billion annually.⁸¹ In addition to the general loss of public land resources, irreplaceable species and aesthetic and recreational treasures are at risk of permanent destruction. High temperatures are causing loss of glaciers in Glacier National Park; the Park's glaciers are expected to disappear entirely by 2030, with ensuing warming of stream temperatures and adverse effects to aquatic ecosystems.⁸² With effects of warming more pronounced at higher latitudes, tundra ecosystems on Alaska public lands face serious declines, with potentially serious additional climate feedbacks from melting permafrost.⁸³ In Florida, the Everglades face severe ecosystem disruption from already-occurring saltwater incursion.⁸⁴ Sea level rise will further damage freshwater ecosystems and the endangered species that rely on them.

Impacts to Biodiversity and Ecosystems: Across the United States ecosystems and biodiversity, including those on public lands, are directly under siege from climate change—leading to the loss of iconic species and landscapes, negative effects on food chains, disrupted migrations, and the degradation of whole ecosystems.⁸⁵ Specifically, scientific evidence shows that climate change is already causing changes in distribution, phenology, physiology, genetics, species interactions, ecosystem services, demographic rates, and population viability: many animals and plants are moving poleward and upward in elevation, shifting their timing of breeding and migration, and experiencing population declines and extirpations.⁸⁶ Because climate change is occurring at an unprecedented pace with multiple synergistic impacts, climate change is predicted to result in catastrophic species losses during this century. For example, the IPCC concluded that 20% to 30% of plant and animal species will face an increased risk of extinction if global average temperature rise exceeds 1.5°C to 2.5°C relative to 1980-1999, with an increased risk of extinction for up to 70% of species worldwide if global average temperature

⁸⁰ See Federal Land Policy and Management Act of 1976, 43 U.S.C. §§ 1701(a)(8), 1712(c)(1); Multiple-Use Sustained Yield Act of 1960, 16 U.S.C. § 528; National Environmental Policy Act of 1969, 42 U.S.C. §§ 4331-4332.

⁸¹ Esposito, Valerie *et al.*, Climate Change and Ecosystem Services: The Contribution and Impacts on Federal Public Lands in the United States, USDA Forest Service Proceedings RMRS-P-64 at 155-164 (2011).

⁸² U.S. Environmental Protection Agency, Climate Change and Public Lands: National Parks at Risk (1999).

⁸³ See National Climate Assessment at 48; MacDougall, A. H., *et al.*, Significant contribution to climate warming from the permafrost carbon feedback, 5 Nature Geoscience 719-721 (2012), doi:10.1038/ngeo1573.

⁸⁴ See National Climate Assessment at 592; Foti, R., *Met al.*, Signs of critical transition in the Everglades wetlands in response to climate and anthropogenic changes, 110 Proceedings of the National Academy of Sciences 6296-6300, (2013), doi:10.1073/pnas.1302558110.

⁸⁵ National Climate Assessment at 13.

⁸⁶ See Parmesan, C. and G. Yohe, A globally coherent fingerprint of climate change impacts across natural systems, 421 Nature 37 (2003); Root, T. *et al.*, Fingerprints of global warming on wild animals and plants, 421 Nature 57 (2003); Chen, I. *et al.*, Rapid range shifts of species associated with high levels of climate warming, 333 Science 1024 (2011).

exceeds 3.5°C relative to 1980-1999.⁸⁷

In sum, climate change, driven primarily by the combustion of fossil fuels, poses a severe and immediate threat to the health, welfare, ecosystems and economy of the United States. These impacts are felt across the nation, including upon the public lands the Secretary of the Interior is charged with safeguarding. A rapid and deep reduction of emissions generated from fossil fuels is essential if such threats are to be minimized and their impacts mitigated.

B. The 2015 Paris Agreement and the Underlying U.N. Framework Convention on Climate Change Commit the United States to Addressing the Global Climate Emergency and Limiting Fossil Fuel Extraction

On December 12, 2015, 197 nation-state and supra-national organization parties meeting in Paris at the 2015 United Nations Framework Convention on Climate Change Conference of the Parties consented to an agreement (Paris Agreement) committing its parties to take action so as to avoid dangerous climate change.⁸⁸ As the United States has signed the treaty on April 22, 2016⁸⁹ as a legally binding instrument through executive agreement,⁹⁰ the Paris Agreement commits the United States to critical goals—both binding and aspirational—that mandate bold action on the United States’ domestic policy to rapidly reduce greenhouse gas emissions.⁹¹

The United States and other parties to the Paris Agreement recognized “the need for an effective and progressive response to the urgent threat of climate change on the basis of the best available scientific knowledge.”⁹² The Paris Agreement articulates the practical steps necessary to obtain its goals: parties including the United States have to “reach global peaking of greenhouse gas emissions *as soon as possible* . . . and to *undertake rapid reductions* thereafter in

⁸⁷ IPCC, *Climate Change 2007: Synthesis Report*. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change 48 [Core Writing Team, Pachauri, R.K and Reisinger, A.(eds.)] (2007). Other studies have predicted similarly severe losses: 15%-37% of the world’s plants and animals committed to extinction by 2050 under a mid-level emissions scenario, *see* Thomas *et al.*, *Extinction risk from climate change*, 427 *Nature* 145 (2004)); the potential extinction of 10% to 14% of species by 2100 if climate change continues unabated, *see* Maclean, I. M. D. and R. J. Wilson, *Recent ecological responses to climate change support predictions of high extinction risk*, 108 *Proc. Natl. Acad. Sci.* 12337-12342 (2011); and the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species, *see* Warren, R. J. *et al.*, *Increasing Impacts of Climate Change Upon Ecosystems with Increasing Global Mean Temperature Rise*, 106 *Climatic Change* 141 (2011).

⁸⁸ Paris Agreement, Art. 2.

⁸⁹ For purposes of this Petition, the term “treaty” refers to its international law definition, whereby a treaty is “an international law agreement concluded between states in written form and governed by international law” pursuant to article 2(a) of the Vienna Convention on the Law of Treaties, 1155 U.N.T.S. 331, 8 I.L.M. 679 (Jan. 27, 1980).

⁹⁰ *See* United Nations Treaty Collection, Chapter XXVII, 7.d Paris Agreement, List of Signatories; U.S. Department of State, *Background Briefing on the Paris Climate Agreement*, (Dec. 12, 2015), <http://www.state.gov/r/pa/prs/ps/2015/12/250592.htm>.

⁹¹ Although not every provision in the Paris Agreement is legally binding or enforceable, the U.S. and all parties are committed to perform the treaty commitments in good faith under the international legal principle of *pacta sunt servanda* (“agreements must be kept”). Vienna Convention on the Law of Treaties, Art. 26.

⁹² *Id.*, Recitals.

accordance with best available science,”⁹³ imperatively commanding that developed countries specifically “should continue taking the lead by undertaking economy-wide absolute emission reduction targets”⁹⁴ and that such actions reflect the “highest possible ambition.”⁹⁵

The Paris Agreement codifies the international consensus that climate change is an “urgent threat” of global concern,⁹⁶ and commits all signatories to achieving a set of global goals. Importantly, the Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature “to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels”⁹⁷ (emphasis added).

In light of the severe threats posed by even limited global warming, the Paris Agreement established the international goal of limiting global warming to 1.5°C above pre-industrial levels in order to “prevent dangerous anthropogenic interference with the climate system,” as set forth in the UNFCCC, a treaty which the United States has ratified and to which it is bound.⁹⁸ The Paris consensus on a 1.5°C warming goal reflects the findings of the IPCC and numerous scientific studies that indicate that 2°C warming would exceed thresholds for severe, extremely dangerous, and potentially irreversible impacts.⁹⁹ Those impacts include increased global food and water insecurity, the inundation of coastal regions and small island nations by sea level rise and increasing storm surge, complete loss of Arctic summer sea ice, irreversible melting of the Greenland ice sheet, increased extinction risk for at least 20-30% of species on Earth, dieback of the Amazon rainforest, and “rapid and terminal” declines of coral reefs worldwide.¹⁰⁰ As scientists noted, the impacts associated with 2°C temperature rise have been “revised upwards, sufficiently so that 2°C now more appropriately represents the threshold between ‘dangerous’

⁹³ *Id.*, Art. 4(1).

⁹⁴ *Id.*, Art. 4(4).

⁹⁵ *Id.*, Art. 4(3).

⁹⁶ *Id.*, Recitals.

⁹⁷ *Id.*, Art. 2.

⁹⁸ See U.N. Framework Convention on Climate Change, Cancun Agreement. Available at <http://cancun.unfccc.int/> (last visited Jan 7, 2015); United Nations Framework Convention on Climate Change, Copenhagen Accord. Available at http://unfccc.int/meetings/copenhagen_dec_2009/items/5262.php (last accessed Jan 7, 2015). The United States Senate ratified the UNFCCC on October 7, 1992. See <https://www.congress.gov/treaty-document/102nd-congress/38>.

⁹⁹ See Paris Agreement, Art. 2(1)(a); U; U.N. Framework Convention on Climate Change, Subsidiary Body for Scientific and Technical Advice, Report on the structured expert dialogue on the 2013-15 review, No. FCCC/SB/2015/INF.1 at 15-16 (June 2015); IPCC AR5 Synthesis Report at 65 & Box 2.4.

¹⁰⁰ See Jones, C. et al, Committed Terrestrial Ecosystem Changes due to Climate Change, 2 *Nature Geoscience* 484, 484–487 (2009); Smith, J. B. et al., Assessing Dangerous Climate Change Through an Update of the Intergovernmental Panel on Climate Change (IPCC) ‘Reasons for Concern’, 106 *Proc. Natl. Acad. Sci.* 4133, 4133–37 (2009); Veron, J. E. N. et al., The Coral Reef Crisis: The Critical Importance of <350 ppm CO₂, 58 *Marine Pollution Bulletin* 1428, 1428–36, (2009); Warren, R. J. et al., Increasing Impacts of Climate Change Upon Ecosystems with Increasing Global Mean Temperature Rise, 106 *Climatic Change* 141 (2011); Hare, W. W. et al., Climate Hotspots: Key Vulnerable Regions, *Climate Change and Limits to Warming*, 11 *Regional Environmental Change* 1, 1–13 (2011); Frieler, K. M. et al., Limiting Global Warming to 2°C is Unlikely to Save Most Coral Reefs, *Nature Climate Change*, Published Online (2013) doi: 10.1038/NCLIMATE1674; M. Schaeffer et al., Adequacy and Feasibility of the 1.5°C Long-Term Global Limit, *Climate Analytics* (2013).

and ‘extremely dangerous’ climate change.”¹⁰¹ Consequently, a target of 1.5 °C or less temperature rise is now seen as essential to avoid dangerous climate change and has largely supplanted the 2°C target that had been the focus of most climate literature until recently.

It has been widely agreed among the world’s climate scientists that the vast majority of fossil fuels must stay in the ground in order to limit the global temperature rise to 2°C of warming above pre-industrial levels.¹⁰² As described above, it is also widely recognized that a limit of 2°C of warming is woefully insufficient to protect the world’s most vulnerable populations and natural systems, with an upper limit of 1.5 °C or less warming required to reduce the risks and impact to human and ecological communities.¹⁰³ While staying “well below” 2°C of warming will itself require immediate and ambitious measures, to meet the scientifically dictated and ecologically, economically and ethically required target of 1.5 °C warming or less, measures even more ambitious than those aimed at a 2°C target are necessary. That which is clearly required to meet a 2°C target becomes an absolute imperative to meet a 1.5°C target. One such measure, straightforward, practical, consistent with the Paris Agreement, and wholly within the authority of the executive branch of the United States government, is a moratorium on new fossil fuel leasing on federal lands.

C. Staying Below a 1.5 or 2°C Temperature Target Requires Adherence to a Strict Carbon Budget with the Vast Majority of Fossil Fuels Left in the Ground

Immediate and aggressive greenhouse gas emissions reductions are necessary to keep warming below a 1.5° or 2°C rise above pre-industrial levels. Put simply, there is only a finite amount of CO₂ that can be released into the atmosphere without rendering the goal of meeting the 1.5°C target virtually impossible. A slightly larger amount could be burned before meeting a 2°C became an impossibility. Globally, fossil fuel reserves, if all were extracted and burned, would release enough CO₂ to exceed this limit several times over.¹⁰⁴

The question of what amount of fossil fuels can be extracted and burned without negating a realistic chance of meeting a 1.5 or 2°C target is relatively easy to answer, even if the answer is framed in probabilities and ranges. The IPCC Fifth Assessment Report and other expert assessments have established global carbon budgets, or the total amount of remaining carbon that can be burned while maintain some probability of staying below a given temperature target. According to the IPCC, total cumulative anthropogenic emissions of CO₂ must remain below about 1,000 gigatonnes (GtCO₂) from 2011 onward for a 66% probability of limiting warming to

¹⁰¹ Anderson, K. and A. Bows, Beyond ‘Dangerous’ Climate Change: Emission Scenarios for a New World, 369 *Philosophical Transactions, Series A, Mathematical, Physical, and Engineering Sciences* 20, 20–44 (2011).

¹⁰² McGlade, Christophe & Ekins, Paul. The geographic distribution of fossil fuels unused when limiting global warming to 2°C, 517 *Nature* 187 (Jan. 2015) (“McGlade and Ekins”).

¹⁰³ U.N. Subsidiary Body for Scientific and Technological Advice, Report on the structured expert dialogue on the 2013-2015 review (2015), FCCC/SB/2015/INF.1 (2014), <http://unfccc.int/resource/docs/2015/sb/eng/inf01.pdf>.

¹⁰⁴ Ciments at 6, 33 n.2.

2°C above pre-industrial levels.¹⁰⁵ Given more than 100 GtCO₂ have been emitted since 2011,¹⁰⁶ the remaining portion of the budget under this scenario is well below 900 GtCO₂. To have an 80% probability of staying below the 2°C target, the budget from 2000 is 890 GtCO₂, with less than 430 GtCO₂ remaining.¹⁰⁷

To have even a 50% probability of achieving the Paris Agreement goal of limiting warming to 1.5°C above pre-industrial levels equates to a carbon budget of 550-600 GtCO₂ from 2011 onward,¹⁰⁸ of which more than 100 GtCO₂ has already been emitted. To achieve a 66% probability of limiting warming to 1.5°C requires adherence to a more stringent carbon budget of only 400 GtCO₂ from 2011 onward,¹⁰⁹ of which less than 300 GtCO₂ remained at the start of 2015. An 80% probability budget for 1.5°C would have far less than 300 GtCO₂ remaining. Given that global CO₂ emissions in 2014 alone totaled 36 GtCO₂,¹¹⁰ humanity is rapidly consuming the remaining burnable carbon budget needed to have even a 50/50 chance of meeting the 1.5°C temperature goal.¹¹¹

1. Global and United States Fossil Fuels Exceed any Rational Carbon Budget

The science is clear that the vast majority of the world's fossil fuels must remain in the ground in order to maintain any reasonable hope of limiting global warming to 1.5° or even 2°C above pre-industrial levels. While there is significant variation in estimates, all recent scientific analyses have concluded that global fossil fuel reserves and resources far exceed the carbon budgets needed to stay below a 1.5° or 2°C temperature target.¹¹²

Two recent studies estimated that oil, gas, and coal resources considered currently economically recoverable contain potential greenhouse gas emissions estimated at 2,900

¹⁰⁵ IPCC AR5 Physical Science Basis at 27; IPCC AR5 Synthesis Report at 63-64 & Table 2.2.

¹⁰⁶ From 2012-2014, 107 GtCO₂ was emitted (*see* Annual Global Carbon Emissions at <http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html>).

¹⁰⁷ Carbon Tracker Initiative at 6; Meinshausen *et al.* 2009 at 1159

¹⁰⁸ IPCC AR5 Synthesis Report at 64 & Table 2.2.

¹⁰⁹ *Id.*

¹¹⁰ *See* Global Carbon Emissions, <http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html>

¹¹¹ In addition to limits on the *amount* of fossil fuels that can be utilized, emissions pathways compatible with a 1.5 or 2°C target also have a significant temporal element. Leading studies make clear that to reach a reasonable likelihood of stopping warming at 1.5° or even 2°C, global CO₂ emissions must be phased out by mid-century and likely as early as 2040-2045. *See, e.g.* Rogelj, Joeri et al., Energy system transformations for limiting end-of-century warming to below 1.5°C, 5 Nature Climate Change 519, 522 (2015). United States focused studies indicate that we must phase out fossil fuel CO₂ emissions even earlier—between 2025 and 2040—for a reasonable chance of staying below 2°C. *See, e.g.* Climate Action Tracker, USA Rating Assessment webpage, <http://climateactiontracker.org/countries/usa> (accessed Apr 29, 2016). Issuing new legal entitlements to explore for and extract federal fossil fuels for decades to come is wholly incompatible with such a transition.

¹¹² Analyses by the Carbon Tracker Initiative estimated that 80% of proven fossil fuel reserves must be kept in the ground to have a reasonable probability (75-80%) of staying below even 2°C. This estimate includes only the fossil fuel reserves that are considered currently economically recoverable with a high probability of being extracted. *See* Carbon Tracker Initiative at 2, 6.

GtCO₂¹¹³ and 4196 GtCO₂¹¹⁴ respectively. Other sources estimate even greater global fossil fuel reserves at 3,677 to 7,120 GtCO₂.¹¹⁵ When considering all fossil fuel resources (defined as those recoverable over all time with both current and future technology irrespective of current economic conditions), potential combustion emissions have been estimated at nearly 11,000 GtCO₂¹¹⁶ upwards to 31,353 and 50,092 GtCO₂.¹¹⁷

Even the lowest of these estimates (2,900 GtCO₂) is more than three times greater than the most generous carbon budget nominally consistent with a 2°C temperature limit (~900 GtCO₂), while the largest (50,092 GtCO₂) is over 160 times greater than the remaining budget for a 66% probability of not exceeding a 1.5°C limit (<300 GtCO₂).

As stated by one study, “the disparity between what resources and reserves exist and what can be emitted while avoiding a temperature rise greater than the agreed 2C limit is therefore stark.”¹¹⁸ Another recent report on global carbon reserves found that:

The reserves of coal, oil and natural gas outlined in this report contain enough carbon to rocket the planet far beyond the 2°C limit. Warming from fossil fuels puts other carbon sinks at risk. As permafrost melts and peat bogs dry, they emit enormous quantities of carbon dioxide, furthering a chain reaction where the release of carbon results in a warmer world, which in turn releases more carbon.¹¹⁹

While global carbon budgets provide a straightforward and relatively objective framework for determining the total *amount* of fossil fuels that can be combusted consistent with pathways to meeting our climate targets, the question of what level of risk of not meeting the target is acceptable, along with the questions of *which* fossil fuels can be burned and by *whom*, are inherently political and ethical questions. But, under *any* formulation, the vast majority of United States fossil fuels, must stay in the ground if we are to have any realistic hope of staying below 1.5°C, or even 2°C of warming.

A recent detailed analysis found that the United States alone contains enough recoverable fossil fuels, split about evenly between federal and non-federal resources, which if extracted and burned, would generate enough greenhouse emissions (median estimate 840 GtCO₂e) to

¹¹³ McGlade and Ekins at 187-192.

¹¹⁴ Raupach, M. et al., Sharing a quota on cumulative carbon emissions. 4 Nature Climate Change 873 (2014) (“Raupach *et al*”) at Figure 2.

¹¹⁵ IPCC, 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change at Table 7.2 [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. (“IPCC AR5 Mitigation of Climate Change”)

¹¹⁶ McGlade and Ekins at 188.

¹¹⁷ IPCC AR5 Mitigation of Climate Change at Table 7.2.

¹¹⁸ McGlade and Ekins at 188.

¹¹⁹ Cmons at 6.

consume more than half the entire global carbon budget for a 2°C target (~900 GtCO₂, equivalent to ~1350 GtCO₂e), and greatly exceed the remaining budget for a 1.5°C target (~300 GtCO₂ equivalent to ~450 GtCO₂e).¹²⁰ Clearly, even if the rest of the world somehow reduced its carbon emissions to near zero, the United States still could not safely burn all of its own fossil fuels.

This analysis highlights the impossibility of reconciling continued leasing of federal fossil fuels with a pathway to keeping warming from exceeding 1.5°C. Total remaining fossil fuel resources in the United States, including both federal and non-federal resources, are estimated to equate to 697 to 1070 GtCO₂e of emissions.¹²¹ Federal fossil fuels represent about half (46-50%) of that total at between 349 and 492 GtCO₂e of potential emissions,¹²² and the vast majority (91%) of federal fossil fuels are still unleased.¹²³ Overall the potential greenhouse gas emissions of unleased federal fossil fuel resources are enormous, estimated at 319 to 450 GtCO₂e. In other words, unleased federal fossil fuels, if extracted and burned, would consume between 70 and 100% of a *global* budget of 300 GtCO₂ (equivalent to ~450 GtCO₂e), the amount remaining at the start of 2015 under a budget scenario that itself has only a 66% chance of limiting temperature increase to 1.5°C. Continued leasing of these resources, without examining the climate consequences of such action, is incompatible with any reasonable path to limiting warming to 1.5°C or even 2°C.

Various efforts have been made to ascribe portions of the global carbon budget to specific countries or regions, based on factors ranging from equity to economics.¹²⁴ One medium-range estimate of a U.S. carbon quota allocates 158 GtCO₂ to the United States, equivalent to 11% of the global carbon budget needed for a 50% chance of limiting warming to 2°C.¹²⁵ Potential emissions from unleased federal fossil fuels (319 to 450 GtCO₂e) vastly exceed even this highly non-precautionary U.S. carbon budget.

¹²⁰ See Mulvaney *et al.* 2015 at 4. Using a metric of CO₂e (which also includes the radiative forcing potential of non-CO₂ greenhouse gases such as methane), this study calculated that extraction and combustion of total U.S. recoverable fossil fuels would produce 697 to 1070 GtCO₂e of emissions, with a median estimate of 840 GtCO₂e. To compare these emissions to the global carbon budgets for 1.5°C and 2°C, we converted these carbon budgets from to GtCO₂ to GtCO₂e by applying a conversion factor of 1 GtCO₂ = 1.5 GtCO₂e based on Table 1 in Meinshausen *et al.* 2009.

¹²¹ Mulvaney *et al.* 2015 at 19 Table 2.

¹²² *Id.* at 18.

¹²³ *Id.*

¹²⁴ See, e.g. Raupach *et al.*.

¹²⁵ Raupach *et al.* at 875. We use a mid-range estimate of the U.S. carbon quota (158 GtCO₂) from Raupach *et al.* (2014). This mid-range estimate was calculated using a “blended” scenario of sharing principles for allocating the global carbon budget among countries. The “blended” scenario is midway between an “inertia” approach (sharing based on current emissions) and “equity” approach (sharing based on population). Raupach *et al.* (2014) estimates the U.S. carbon quota using a “blended” sharing approach at 158 GtCO₂ which is 11% of the global carbon budget of 1400 GtCO₂ for a 50% chance of staying below 2°C. See Raupach *et al.* (2014) at Supplementary Figure 7. This Petition employs the United States emissions quotas in Raupach *et al.* for illustration purposes only; this Petition does not endorse the equity assumptions made therein..

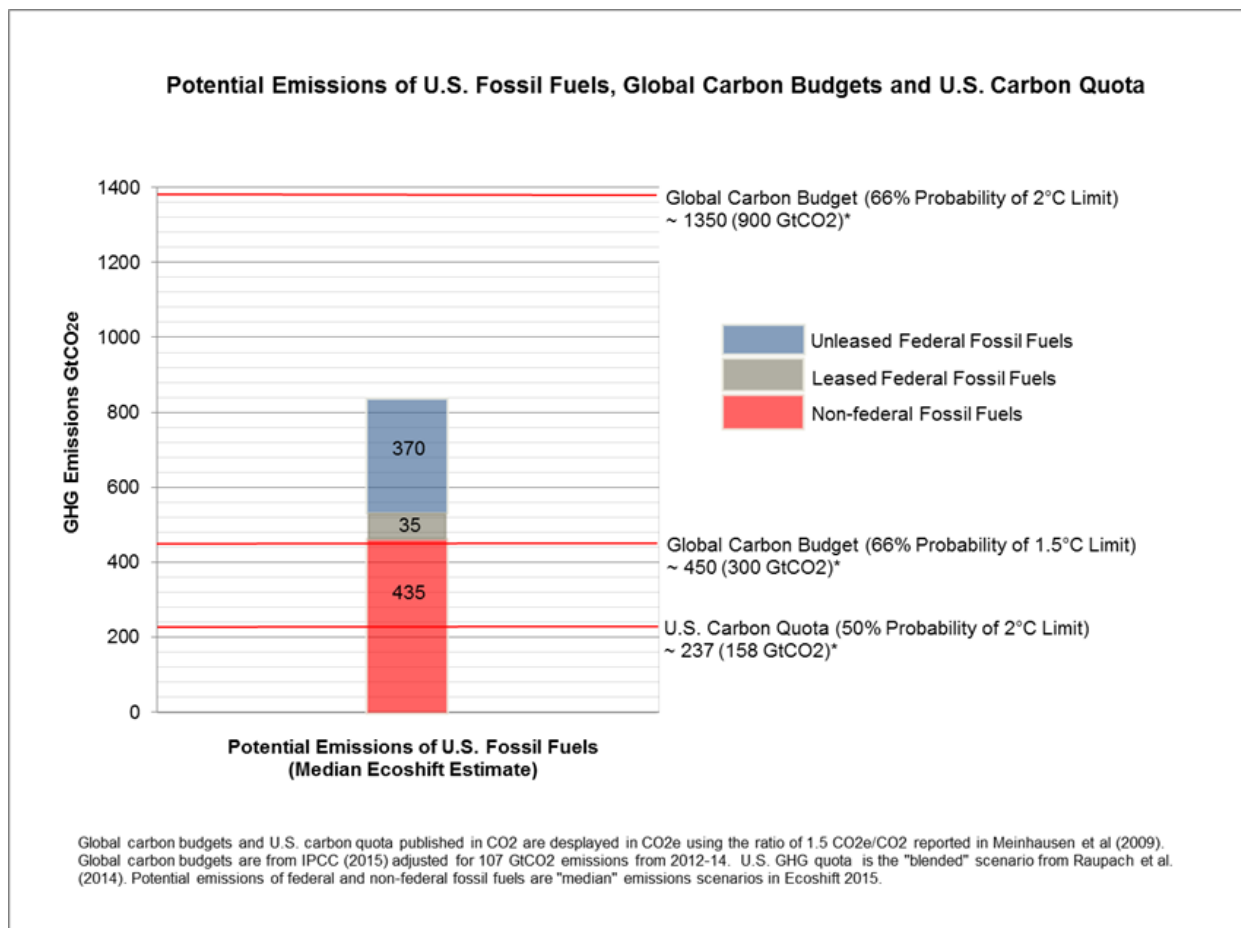


Figure 1: Relationship of United States Fossil Fuel Resources and Global Carbon Budgets for 1.5 and 2°C Emissions Pathways.¹²⁶

As described above and illustrated in Figure 1, United States resources greatly exceed the entire global budget for a 66% chance of limiting warming to 1.5°C. Emissions from use of the median estimate of non-federal fossil fuels (435 GtCO₂e) themselves would use up almost the entire global budget, while unleased fossil fuels alone (370 GtCO₂e) would utilize over 80% of that budget. Even under a carbon budget in which great risk to human health, prosperity, and stability and the planet’s natural systems is tolerated (only 50% chance of staying below 2°C) the United States still cannot utilize the entirety of its non-federal fossil fuel resources, much less those under direct federal control. Because decisions as to whether or not these non-federal fossil

¹²⁶ Figure 1 illustrates the relationship between potential United States greenhouse gas emissions from federal and non-federal fossil fuels resources (per the median estimate from Mulvaney *et al.* 2015, in GtCO₂e) and three representative carbon budgets: (1) 66% probability of limiting warming to 2°C, per IPCC AR5 (2014) (1000 Gt from 2011-2100, less 107 Gt emitted 2012-14); (2) 66% probability of limiting warming to 2°C, per IPCC AR5 (2014) (400 Gt from 2011-2100, less 107 Gt emitted 2012-14); (3) a representative United States allocation, under a “blended” equity scenario, for a 50% probability of limiting warming to 2°C, per Raupach *et al.* (2014). For purposes of this comparison, GtCO₂ estimates from IPCC and Raupach *et al.* have been converted to GtCO₂e at a ratio of GtCO₂ to 1.5 GtCO₂e, per Meinhausen *et al.* 2009, Table 1.

fuels are developed are in part beyond direct federal management under existing law,¹²⁷ and therefore they are more likely to be developed, it is difficult to formulate a scenario that leaves room for any significant new development of federal fossil fuels.¹²⁸

A recent analysis of the “production horizons” for currently-leased federal fossil fuels, using the U.S. Energy Information Agency’s (“EIA”) 2016 “reference case” for fossil fuel production indicates that federal fuels under lease will remain in production long past the point global carbon budgets necessary for a 66 percent probability of remaining under 1.5°C and 2°C are exceeded.¹²⁹ Assuming global CO₂ emissions continue at 2014 rates, analysis of the EIA data indicates that federal oil under lease will remain in production through 2055, federal coal through 2041, and federal gas through 2044, greatly exceeding thresholds for a reasonable likelihood of keeping warming under 1.5°C (2021) or 2°C (2036).¹³⁰

Finally, while the climate consequences of a gigatonne of CO₂ emitted from the combustion of a barrel of oil are the same regardless of whether it was extracted from federal or non-federal lands, the legal, political and economic hurdles of keeping most federal fossil fuels in the ground are far simpler to overcome than for non-federal lands; the Secretary of the Interior can simply refrain from issuing any new fossil fuel leases.

2. The United States’ Path to 1.5°C Necessarily Includes Federal Fossil Fuels

The federal government manages approximately 650 million acres, or 29% of the 27 billion acres of land in the United States, and about 700 million acres of subsurface resources. The federal government also owns the submerged lands on the Outer Continental Shelf. Within these federal lands and waters are enormous fossil fuel deposits, which if extracted and burned, would release hundreds of billions of tons of greenhouse gasses.¹³¹ These lands and oceans, including their coal, oil, gas, oil shale, and tar sands resources, are owned by the American public and are to be managed for public welfare by federal agencies, primarily within the Department of the Interior, according to federal law.

¹²⁷ While the federal government may lack direct land management authority as to whether non-federal fossil fuels are extracted, the federal government does have significant authority under the Clean Air Act and other statutes to dictate if and how they are combusted. Still, oversight and control of federal fossil fuels is inherently greater than for the non-federal estate.

¹²⁸ Because any reasonable carbon budget necessarily limits future development to a small portion of even existing declared, proven fossil fuel reserves, such budgets render completely superfluous the further exploration of recoverable resources to establish additional proved reserves. See IPCC AR5 Synthesis Report at 64 & Table 2.2; Ciments at 5-6. Under any pathway to 1.5° or even 2°C, new reserves that could be established by leasing and exploration of additional resources are simply unburnable.

¹²⁹ Dustin Mulvaney *et al.*, Over-Leased: How Production Horizons of Already Leased Federal Fossil Fuels Outlast Global Carbon Budgets, EcoShift Consulting 2016 (“Mulvaney *et al.* 2016”).

¹³⁰ Mulvaney *et al.* 2016 at 1, 5 & Figure 1.

¹³¹ Mulvaney *et al.* 2015 at 4. For a detailed discussion of the sources, definitions, assumptions, and methodology employed in this analysis, see Mulvaney *et al.* 2015 at 12-17.

The fate of these federal fossil fuels, and their potential development and resulting emissions, are subject to significant executive discretion. At the direction of the executive, the Department of the Interior can affirmatively enact programs to develop these fossil fuels, further contributing to the climate crisis as they do now, or they can exercise their existing discretion and halt new federal fossil fuel leasing, reduce greenhouse gas emissions and start the United States down the path to a decarbonized economy. Unfortunately, current federal policy consists largely of auctioning off publicly owned fossil fuels to private companies for extraction and sale in domestic and international markets.¹³² Such federal fossil fuel leasing contributes significantly to domestic and global greenhouse gas pollution while industrializing and degrading America's public lands and oceans.

From 2003 to 2014 approximately 25% of all United States and 3-4% of global fossil fuel greenhouse gas emissions are attributable to the Department of the Interior's leasing program.¹³³ Since 2008 the Obama administration has leased more than 35 million acres of federal public lands and oceans to the fossil fuel industry, with nearly 13 million acres of that total onshore.¹³⁴ Under current resource management plans, about 90% of lands administered by the Bureau in the 11 western states are available for new oil and gas leasing,¹³⁵ with additional acres available for new federal coal, oil shale, and tar sands leases.¹³⁶ More than 67 million acres of public land and oceans — an area 55 times larger than Grand Canyon National Park — are already leased to the fossil fuel industry. These leases contain up to 43 GtCO₂e.¹³⁷ And these staggering numbers are just the tip of the iceberg; more that 90% of the emissions potential of the federal mineral estate is contained in fossil fuel deposits that have yet to be leased, with onshore oil, gas, tar sands, and oil shale comprising over half that total.¹³⁸ These resources contain up to 450 GtCO₂e — nearly half of the total remaining potential greenhouse emissions from all United States fossil fuel

¹³² See The White House, Obama Administration Record on an All-of-the-Above Energy Strategy, Executive Office of the President, https://www.whitehouse.gov/sites/default/files/docs/clean_energy_record.pdf (last visited Dec. 20, 2015) (last visited Dec. 20, 2015).

¹³³ See Energy Information Administration, Sales of Fossil Fuels Produced from Federal and Indian Lands, FY 2003 through FY 2013 (June 2014) <http://www.eia.gov/analysis/requests/federallands/pdf/eia-federallandsales.pdf>; Climate Accountability Institute. Memorandum from Richard Heede to Friends of The Earth and Center for Biological Diversity (2015), available at: http://webiva-downton.s3.amazonaws.com/877/3a/7/5721/Exhibit_1-1_ONRR_ProdEmissions_Heede_7May15.pdf; Stratus Consulting, Greenhouse Gas Emissions from Fossil Energy Extracted from Federal Lands and Waters: An Update, 13 (2014) available at <http://wilderness.org/sites/default/files/Stratus-Report.pdf>.

¹³⁴ U.S. Energy Information Administration, Sales of Fossil Fuels Produced from Federal and Indian Lands, FY 2003 through FY 2013 (June 2014); U.S. Bureau of Land Management, Oil and Gas Statistics (2016), available at http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/statistics.html.

¹³⁵ See The Wilderness Society, Open For Business: How Public Lands Management Favors the Oil and Gas Industry (2014), available at http://wilderness.org/sites/default/files/TWS%20--%20BLM%20report_0.pdf.

¹³⁶ See U.S. Department of the Interior, Approved Land use Plan Amendments/Record of Decision for Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the Bureau of Land Management in Colorado, Utah, and Wyoming (March 2013).

¹³⁷ Mulvaney *et al.* 2015 at 3.

¹³⁸ Mulvaney *et al.* 2015 at 18.

resources— and more than enough to propel the world far past a 1.5°C target.¹³⁹ Clearly, the current federal leasing program, if continued, is simply incompatible with any rational climate policy.

Staying within a carbon budget compatible with a 1.5°C target will necessitate leaving substantial portions of global and United States fossil fuels undeveloped. Unleased federal fossil fuel resources are among the easiest of such resources to leave in the ground, given the clear authority of the Secretary of the Interior to exercise discretion over leasing. Importantly, the issuance of additional federal fossil leases are not necessary in order to manage a prompt, just, and orderly transition to a 100% renewable energy economy in the United States. There is already more than sufficient non-federal coal, oil, and gas to exceed even the largest conceivable domestic carbon budget.¹⁴⁰

Beginning the phase-out of fossil fuel production by ceasing new onshore leases for public fossil fuels would be a significant step toward the U.S. meeting the greenhouse gas emissions reduction targets announced under the Paris Agreement. The first systematic quantitative assessment of the emissions consequences of a cessation of federal leasing (both onshore and offshore) found that:

[U]nder such a policy, U.S. coal production would steadily decline, moving closer to a pathway consistent with a global 2°C temperature limit. Oil and gas extraction would drop as well, but more gradually, as federal lands and waters represent a smaller fraction of national production, and these resources take longer to develop. Phasing out federal leases for fossil fuel extraction could reduce global CO₂ emissions by 100 million tonnes per year by 2030, and by

¹³⁹Mulvaney *et al.* 2015 at 18. Although coal accounts for the largest share of the United States’ public lands CO₂ emissions, the contribution of oil and gas is highly significant. In addition to the emissions from the combustion of the oil and gas itself, emissions from drilling, stimulation, gathering, processing, and transmission operations also contribute greenhouse gas pollution, particularly via release of methane. This extremely potent greenhouse gas traps eighty-six times as much heat as carbon dioxide over a twenty-year period. IPCC AR5 Physical Science Basis Chapter 8 & Table 8.7. Although efforts continue to determine the precise amount of methane release from oil and gas operations, EPA has estimated that “oil and gas systems are the largest human-made source of methane emissions and account for 37 percent of methane emissions in the United States and is expected to be one of the most rapidly growing sources of anthropogenic methane emissions in the coming decades.” U.S. Environmental Protection Agency, Natural Gas STAR Program, Basic Information, Major Methane Emission Sources and Opportunities to Reduce Methane Emissions. EPA’s estimate is based on an estimated calculation of methane emissions, rather than measured actual emissions, which indicate that methane emissions may be much greater in volume than calculated. Miller, S. M. *et al.* Anthropogenic Emissions of Methane in the United States, Proc. Natl. Acad. Sci. Early Edition, DOI: 10.1073/pnas.1314392110 (2013).

¹⁴⁰Mulvaney *et al.* 2015 at 6 & Figure 2; *see also* Raupach *et al.*, Supplementary Figure 7; McGlade and Ekins, 189 Table 1. This Petition cites Raupach and McGlade and Ekins’s studies on U.S. emissions quotas for illustration purposes only; this Petition does not endorse equity assumptions made therein.

greater amounts thereafter.¹⁴¹

The ultimate success or failure of the United States' and global community's climate mitigation efforts depends in large part on whether countries are willing and able to leave the majority of their fossil fuel deposits in the ground. As discussed above, existing statutory authority confers considerable discretion on the Secretary of the Interior over the potential leasing of fossil fuels. Because extraction of non-federal fossil fuels is governed in part by economic and legal factors outside the direct control of the federal executive branch, any immediate federal effort to curb United States fossil fuel production should begin with federally-controlled fossil fuels. And because executive authority to limit federal fossil fuel production is strongest with regard to unleased fossil fuels, the easiest and most straightforward starting point is a cessation of new fossil fuel leasing.

By immediately deferring all new federal fossil fuel leasing, and eventually withdrawing federal lands from availability for leasing,¹⁴² the Secretary can immediately remove somewhere between 319 and 450 GtCO₂e of unleased fossil fuels from becoming part of the pool of potential global greenhouse gas emissions.¹⁴³ She can do this now, under existing statutory authority, without Congressional action.¹⁴⁴ Fundamentally, Congress chose, in the Mineral Leasing Act and all its subsequent amendments, to vest authority in the Executive to elect when, where, and how to make oil, gas, and coal available for leasing to private developers. The courts have long and consistently recognized that discretion. Given the scope of the climate crisis, the vast amounts of federal fossil fuels already under lease, and the pressing need to keep carbon in the ground to avert catastrophic climate change, the Secretary can and must exercise her discretion to ensure that no new leases for oil, gas, coal, oil shale, or tar sands be issued for federal public lands until a comprehensive strategy is in place to keep the United States' contributions to global greenhouse gas emissions within a range likely to limit warming to 1.5°C.

VI. Text of Proposed Order

Pursuant to 43 C.F.R. §14.2, and the reasons set forth above, Petitioners hereby request that the Secretary of the Interior issue a Secretarial Order consistent with or identical to the following proposed language:

Pursuant to my discretionary authority under the Mineral Leasing Act (e.g., 30 U.S.C §§ 201, 226, 241, 352) and other statutes, and based on the reasons discussed herein, I conclude that further evaluation, additional receipt of public input, and comprehensive consideration of the Federal public lands fossil fuel

¹⁴¹ Peter Erickson and Michael Lazarus, *How Would Phasing Out U.S. Federal Leases for Fossil Fuel Extraction Affect CO₂ Emissions and 2°C Goals?* 1, 31-32, Stockholm Environment Institute Working Paper 2016-02 (May 2016).

¹⁴² See 43 U.S.C. § 1714(a).

¹⁴³ Mulvaney *et al.* 2015 at 18.

¹⁴⁴ See 30 U.S.C. §§ 226(c), 241 & *supra* Part IV.

program is warranted, and accordingly, I hereby direct BLM to take the following measures:

(i) Pause on the Issuance of New Federal Fossil Fuel Leases.

a. Pending Completion of Programmatic Review. No new nominations for fossil fuel leases shall be processed, nor lease sales conducted, prior to completion of the review described in part (ii). For pending nominations, no lease sales will be held, leases issued, or modifications approved, prior to completion of the review described in part (ii).

b. After Completion of Programmatic Review. Pursuant to my discretionary authority under the Mineral Leasing Act, I hereby determine that no federal public lands shall be considered eligible or available for fossil fuel mineral leasing until the satisfactory completion of the comprehensive environmental and climate review described in part (ii) and certification, based on the information provided in that review, that leasing is consistent with the United States' goal of limiting climate change to 1.5° Celsius above pre-industrial levels.


(ii) Comprehensive Programmatic Environmental Impact Statement. BLM shall prepare a Programmatic Environmental Impact Statement addressing the cumulative climate impacts of all Federal oil and gas, oil shale, tar sands, and coal leasing.

VII. Conclusion

As President Obama has recognized, “[u]ltimately, if we’re going to prevent large parts of this Earth from becoming not only inhospitable but uninhabitable in our lifetimes, we’re going to have to keep some fossil fuels in the ground rather than burn them and release more dangerous pollution into the sky.”¹⁴⁵The federal fossil fuel estate is the obvious and essential place where this global effort to keep fossil fuels in the ground must begin. Consequently, through this petition, Petitioners seek issuance of a Secretarial Order placing a moratorium on the issuance of *all* onshore federal fossil fuel leases (coal, oil and gas, oil shale, and tar sands) until and unless it can be demonstrated that resumption of such leasing is consistent with our national and international climate goals and obligations.

¹⁴⁵ Statement by the President on the Keystone XL Pipeline.

Respectfully submitted this 12th day of July, 2016,



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Petition for a Moratorium on the Leasing of Federal Public Land
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Petition for a Moratorium on the Leasing of Federal Public Land Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land
Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land
Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land
Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land
Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land
Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land
Fossil Fuels – List of Petitioners

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Petition for a Moratorium on the Leasing of Federal Public Land
Fossil Fuels – List of Petitioners

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Attachment B - List of References

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From: maria_najera@ios.doi.gov
Subject: EMBARGOED: Interior Department Announces Final Rule to Reduce Methane Emissions & Wasted Gas on Public, Tribal Lands
Date: Tuesday, November 15, 2016 11:16:49 AM
Attachments: [Methane Waste Prevention Rule Press Release for Embargoed Notifications.docx](#)

Friends:

U.S. Secretary of the Interior Sally Jewell today will announce the Methane and Waste Prevention Rule – a final rule that will reduce the wasteful release of natural gas into the atmosphere from oil and gas operations on public and Indian lands. The rule updates 30-year old regulations governing venting, flaring, and leaks of natural gas, and will help curb waste of public resources, reduce harmful methane emissions, and provide a fair return on public resources for federal taxpayers, tribes and states.

Attached is a press release on today's news. It is EMBARGOED until 12:00 pm ET.

Please let us know if you have any questions.

Thank you,

Office of Intergovernmental & External Affairs
Office of the Secretary
U.S. Department of the Interior
202-208-1923



OFFICE OF THE SECRETARY
**U.S. Department
of the Interior**

www.doi.gov

News Release

Date: November 15, 2016

Contacts: Interior_Press@ios.doi.gov

Kimberly Brubeck (BLM) (202) -208-5832

Interior Department Announces Final Rule to Reduce Methane Emissions & Wasted Gas on Public, Tribal Lands

Final Rule Limits Venting, Flaring and Leaking from Oil & Gas Operations to Reduce Waste and Harmful Emissions, Provide Fair Return to Taxpayers

WASHINGTON, DC – As part of the Interior Department’s reform agenda to create a cleaner and more sustainable energy future, and in furtherance of the Obama Administration’s Climate Action Plan, U.S. Secretary of the Interior Sally Jewell today announced the Methane and Waste Prevention Rule – a final rule that will reduce the wasteful release of natural gas into the atmosphere from oil and gas operations on public and Indian lands. The rule updates 30-year old regulations governing venting, flaring, and leaks of natural gas, and will help curb waste of public resources, reduce harmful methane emissions, and provide a fair return on public resources for federal taxpayers, tribes and states.

“This rule to prevent waste of our nation’s natural gas supplies is good government, plain and simple,” said Sally Jewell. “We are proving that we can cut harmful methane emissions that contribute to climate change, while putting in place standards that make good economic sense for the nation. Not only will we save more natural gas to power our nation, but we will modernize decades-old standards to keep pace with industry and to ensure a fair return to the American taxpayers for use of a valuable resource that belongs to all of us.”

The United States is the largest natural gas producer in the world, yet the American public has not benefited from the full potential of this energy resource due to venting, flaring, and leaks of significant quantities of gas during the production process. In fact, enough natural gas was lost between 2009 and 2015 to serve more than 6 million households for a year. According to a 2010 Government Accountability Office (GAO) report, that amount of wasted gas means states, tribes and federal taxpayers lose millions of dollars annually in royalty revenue for the Federal Government and the states that share it.

In addition, venting and leaks during oil and gas operations lead to significant emissions of harmful methane – a greenhouse gas at least 25 times more potent than carbon dioxide..

The rule, which will be phased in over time, requires oil and gas producers to use currently available technologies and processes to cut flaring in half at oil wells on public and tribal lands. Operators also must periodically inspect their operations for leaks, and replace outdated equipment that vents large quantities of gas into the air. Other parts of the rule require operators to limit venting from storage tanks and to use best practices to limit gas losses when removing liquids from wells. To ensure a fair return to the American taxpayer, the rule also clarifies when operators owe royalties on flared gas, and restores the government's congressionally authorized flexibility to set royalty rates at or above 12.5 percent of the value of production.

The rule also protects the environment. Without government action, U.S. methane emissions are projected to increase substantially. The rule makes an important contribution to the Obama Administration's [goal to cut methane emissions](#) from the oil and gas sector by 40 – 45 percent from 2012 levels by 2025. This rule projects cutting methane emissions by as much as 35%.

“This rule will benefit the American public and the environment,” said Assistant Secretary for Land and Minerals Management Janice Schneider. “The rule responds to recommendations from several government studies, as well as stakeholder and tribal input. The result is an effective rule that not only gets more of our nation's natural gas into pipelines but also reduces pollution and cuts greenhouse gas emissions.”

The Bureau of Land Management (BLM) developed the final rule after robust outreach efforts. In 2014, the agency conducted initial public and tribal meetings. Publication of the draft rule was followed by a public comment period that generated hundreds of thousands of comments, and during which the BLM held additional public meetings and tribal consultation. The BLM also carefully coordinated with states and the Environmental Protection Agency to avoid inconsistency or redundancy in regulations.

The BLM's previous rules addressing venting and flaring were adopted long before new technologies unlocked vast new natural gas supplies in the United States. But recent technological advances allow operators to produce more oil and gas with less waste. About 40 percent of natural gas now vented or flared from onshore Federal leases could be economically captured with currently available technologies, according to a 2010 GAO report.

“America's natural gas helps power our economy – it's a resource, not a waste product, and it's time we start treating it that way,” said BLM Director Kornze. “With better planning and today's affordable technology, we can cut waste in half. This common-sense rule will save enough gas to supply every household in the cities of Dallas and Salt Lake City combined – every year.”

More information about the rule [is available here](#) along with Regulatory Impact Analysis and Environmental Assessment. A fact sheet on the rule is [also available](#).

The BLM's onshore oil and gas management program is a major contributor to our nation's oil and gas production. The BLM manages more than 245 million acres of land and 700 million acres of subsurface estate, making up nearly a third of the nation's mineral estate. Domestic production from 96,000 Federal onshore oil and gas wells accounts for 11 percent of the Nation's natural gas supply and 5 percent of its oil. In Fiscal Year 2015, operators produced 183.4 million

barrels of oil, 2.2 trillion cubic feet of natural gas, and 3.3 billion gallons of natural gas liquids from onshore federal and Indian oil and gas leases. The production value of this oil and gas exceeded \$20.9 billion and generated over \$2.3 billion in royalties, which were shared with tribes, individual Indian owners, and states.

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