June 12, 2024

Submitted via Regulations.gov
Director Tracy Stone-Manning
Bureau of Land Management
U.S. Department of the Interior
1849 C Street NW, Room 5646
Washington DC 20240

Re: Notice of Availability: "Draft Resource Management Plan Amendment and Environmental Impact Statement for Greater Sage-Grouse Rangewide Planning" 89 Fed. Reg. 18963 (Mar. 15, 2024)

Dear Director Stone-Manning:

The American Petroleum Institute (API), the Independent Petroleum Association of America (IPAA), the Montana Petroleum Association (MPA), the North Dakota Petroleum Council (NDPC), and the Utah Petroleum Association (UPA) (collectively "The Associations") appreciate this opportunity to provide comments in response to the Bureau of Land Management's (BLM's or Bureau's) "Draft Resource Management Plan Amendment and Environmental Impact Statement for Greater Sage-Grouse Rangewide Planning" (Draft RMPA/EIS) Notice of Availability, published at 89 Federal Register 18,963 (March 15, 2024) (Draft RMPA/EIS Notice). The Associations and their members have historically been active participants in the development of Resource Management Plans and Plan Amendments for the greater sage-grouse (GRSG). The Associations and their members have consistently urged the Bureau to be guided by sound science in considering measures to conserve GRSG on BLM-managed lands and to ensure that any such measures are well-grounded in BLM's legal authority and respect existing commitments to leaseholders and others. As drafted, BLM's preferred alternative and other alternatives unduly minimize significant ongoing state and industry efforts benefitting GRSG and include significant legal and scientific flaws. The Associations therefore respectfully request that BLM consider these comments in addressing those flaws and formulating a lawful, scientifically-sound approach.

As always, the Associations and their members stand ready to work collaboratively with the Bureau on these important matters. Thank you for your kind attention to these comments.

Sincerely,

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<u>Comments Submitted by the Associations</u>

BLM's Draft Resource Management Plan Amendment and Environmental Impact Statement for Greater Sage-Grouse Rangewide Planning

89 Fed. Reg. 18,963 (March 15, 2024);

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I. The Associations' Interests in the Draft RMPA/EIS Rulemaking

The American Petroleum Institute (API) is a national trade association representing nearly 600 member companies that operate throughout the United States and are involved in all aspects of the oil and natural gas industry, including exploration, development, production, transportation, refining, and marketing. Many of our members operate on federal lands, including onshore areas managed by the Bureau of Land Management. For many years, API has worked collaboratively with the Department of the Interior (DOI) and its agencies, including BLM, to help provide for the continued safety of industry workers, protection of the environment, and proper economic development of resources in fulfillment of federal law. API members support responsible energy development on federal lands consistent with FLPMA's multiple use mandate and other applicable laws and regulations.

The Independent Petroleum Association of America (IPAA) is a national upstream trade association representing thousands of independent oil and natural gas producers and service companies across the United States. Independent producers develop 91 percent of the nation's oil and natural gas wells. These companies account for 83 percent of America's oil production, 90 percent of its natural gas and natural gas liquids (NGL) production, and support over 4.5 million American jobs.

The Montana Petroleum Association (MPA) is a Montana-based trade association representing over 150 member-companies involved in all aspects of the oil and natural gas industry. MPA's members include producers, refiners, suppliers, pipeline operators, transporters, and mineral owners as well as service and supply companies that support all segments of the industry and employ a substantial number of hard-working Montanans.

Established in 1952, the North Dakota Petroleum Council (NDPC) is a trade association that represents more than 550 companies involved in all aspects of the oil and gas industry, including oil and gas production, refining, pipelines, transportation, mineral leasing, consulting, legal work, and oil field service activities in North Dakota, South Dakota, and the Rocky Mountain Region.

The Utah Petroleum Association (UPA) is a statewide oil and gas trade association established in 1958 representing companies involved in all aspects of Utah's oil and gas industry. UPA members range from independent producers to midstream and service providers, to major oil and natural gas companies widely recognized as industry leaders responsible for driving technology advancement resulting in environmental and efficiency gains. UPA members operate extensively on federal lands and have a long history of stewardship and conservation.

The Associations' member companies have a direct interest in how BLM plans to manage lands with respect to the greater sage-grouse (GRSG) and its habitat. These companies hold valid existing leases and are interested in future oil and natural gas leasing, exploration, and production activities in areas that will be directly affected by the BLM's management decisions. As such, our members are committed to federal wildlife conservation measures to protect the GRSG identified through environmental analysis performed under federal laws such as the National Environmental Policy Act of 1969 (NEPA) and other applicable state laws. For example, the Associations' members operate pursuant to well-developed state programs benefitting the GRSG, such as the

Wyoming Executive Order on Greater Sage Grouse, that demonstrate oil and gas development's successful coexistence with wildlife conservation. These efforts help protect wildlife while balancing the multiple uses of federal land in the manner in which Congress intended.

Given these significant interests, the Associations and their members have historically been active participants in the development of RMPs, including amendments to RMPs to address the greater sage grouse.[1] The Associations have consistently urged the Bureau to be guided by sound science in considering measures to conserve GRSG on BLM-managed lands and to ensure that any such measures are well-grounded in BLM's legal authority and respect existing commitments to leaseholders and others. As discussed more fully below, these concerns continue to apply to the Bureau's efforts.

II. Importance of Oil and Gas Development

A. Global Leadership in Energy Production

The U.S. is a global leader in both emission reductions[2] and energy production.[3] Oil and natural gas exploration and development on federal lands and waters provide enormous benefits to our nation and its citizens—for our economy, our environment, and our national security. Given the vital importance of energy production on public lands, overreaching land management regulations could place our domestic energy supply at risk, as do proposals that would undercut a balanced, all-of-the-above energy policy. Reduced production on public lands also harms local communities who depend upon the jobs and revenues generated by lawful energy development. To the extent the Draft RMPA/EIS reduces opportunities for energy development on public lands, the U.S. and its allies will likely import more oil and natural gas from countries with lower environmental standards and could revert to coal for power generation, resulting in higher emissions domestically and internationally—precisely the opposite of the Administration's overriding policy objectives.

The oil and natural gas industry produces and delivers nearly 70% of the energy our country uses. Our nation and the world will continue to need reliable, affordable energy for public health and economic growth, energy that will serve as the foundation for broader opportunities for decades to come. Energy production on public lands, including oil and natural gas production, is

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[1] For example, API has provided comments on BLM's December 2011 *Notice of Intent to Prepare Environmental Impact Statements and Supplemental Environmental Impact Statements to Incorporate Greater Sage Grouse Conservation Measures Into Land Use Plans and Land Management Plans*, 76 Fed. Reg. 77008 (Dec. 9, 2011); the December 27, 2011 *Report on National Greater Sage-Grouse Conservation Measures*; the October 2017 *Notice of Intent to Amend Land Use Plans Regarding Greater Sage-Grouse Conservation and Prepare Associated Environmental Impact Statements or Environmental Assessments*, 82 Fed. Reg. 47248 (Oct. 11, 2017); and the November 2021 *Notice of Intent to Amend Land Use Plans Regarding Greater Sage-Grouse Conservation and Prepare Environmental Impact Statements*, 86 Fed. Reg. 66331 (Nov. 21, 2021).

[2] According to EPA, "Between 1970 and 2020, the combined emissions of the six common pollutants (PM2.5 and PM10, SO2, NOx, VOCs, CO and Pb) dropped by 78 percent. This progress occurred while U.S. economic indicators remain strong." EPA, *Progress Cleaning the Air and Improving People's Health* (May 1, 2023), https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health#pollution.

[3] According to the Energy Information Administration (EIA), the United States is ranked first globally in total energy production from both natural gas and from petroleum and other liquids. U.S. Energy Info. Admin., *Total Energy Production from Natural Gas* (last visited June 14, 2023), https://www.eia.gov/international/rankings/world?pa=287&u=2&f=A&v=none&y=01%2F01%2F2021.

a crucial part of the nation's program for energy security and economic strength. Likewise, the oil and natural gas industry is essential to supporting a modern standard of living by providing communities with access to affordable, reliable, and cleaner energy. The Associations' members remain focused on public health and safety and have well-established policies in place for proactive community engagement and feedback aimed at fostering a culture of trust, inclusivity, and transparency. We believe that all people should be treated fairly, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. In this regard, it is crucial to bear in mind that energy development on federal lands promotes investment in rural areas where State and local economies depend on the industry for jobs, continued economic prosperity and revenue generated from state severance tax and other local taxes generated from these projects.

B. Support for Environmental Conservation

Our members also support the health and sustainability of public lands and resources. The oil and natural gas industry employs technology and strategies as part of its support for environmental stewardship—taking measures to prioritize protecting public health and the environment, while working to deliver plentiful energy. Measures for the protection of species, habitats and groundwater are all part of our approach to oil and natural gas development – projects are designed, managed and operated to identify and address potential environmental impacts associated with activities ranging from initial exploration to eventual closure and land reclamation. Our members strive to improve the compatibility of their operations with the environment while responsibly and economically developing energy resources and supplying high quality products and services to consumers. Indeed, across these varied operations, our members are working every day to further reduce impacts to air, water, and land resources, including to protected species and habitats.

The Associations' members are participants in federal, state, and private efforts to protect and conserve endangered and threatened species and other species of concern as well as their ecosystems. Our member companies have enrolled millions of acres in conservation plans and committed tens of millions of dollars to fund habitat conservation and restoration programs, including efforts targeted at the GRSG. They work closely with state wildlife management agencies, which have the local expertise to best manage wildlife resources as well as wildlife groups like the National Fish and Wildlife Foundation to develop plans and protocols for protecting wildlife. This collaboration has resulted in improved habitat and species health. Our industry also works with many stakeholder groups to understand migration patterns and routes in areas where we operate. Companies adapt operations to address impacts to these animal movements and habitats. We recognize the importance of protecting and maintaining these historic migrations.

This commitment to protecting wildlife extends to the greater sage-grouse. The oil and natural gas industry has long safeguarded GRSG and their habitat, implementing effective conservation measures to protect them amid ongoing energy exploration and production. As required by (and often even beyond) state regulations and existing BLM measures, companies in the oil and gas industry routinely implement measures to protect the sage grouse. These include but are not limited to training employees and contractors on sage grouse biology, activities that may affect sage grouse, and ways to avoid or reduce impacts; conducting pre-activity surveys by trained wildlife biologists; adhering to timing restrictions on clearing, side trimming, and herbicide applications; and scheduling work in a manner that takes account of critical timeframes for nearby sage grouse (e.g., maintaining adequate distance from sage grouse buffer zones, particularly during breeding periods, in order to preserve key habitat features); improving sage grouse habitat in areas near oil and gas production; and providing substantial grants to fund sage grouse research efforts. Thus, through voluntary programs and collaboration with state and federal wildlife management agencies as well as non-profit conservation organizations, industry is committed to sage grouse protection and natural habitat conservation.

C. Ensuring Access for Oil & Natural Gas Production on Federal Lands

Energy production on BLM lands provides immense value for the nation. BLM should ensure any of the alternatives provided in the Draft RMPA/EIS do not inadvertently limit access to large swaths of public lands that would otherwise be suitable for potential energy resource development of all kinds, including oil and natural gas production.

BLM manages approximately 245 million acres of surface estate of public lands in the United States (more than any other federal agency).[4] BLM also manages the federal government's onshore subsurface mineral estate (approximately 700 million acres).[5] The Congressional Research Service (CRS) recently explained the enormous importance of energy production on federal lands to the federal government, the states, local communities, and the nation as a whole.[6] Production of oil and natural gas from onshore federal lands represents almost 10% of total domestic production of crude oil and natural gas. CRS found that total revenues from oil and natural gas leases on onshore federal lands exceeded $4.2 billion in fiscal year 2019. This substantial return for the taxpayer is comprised of royalty payments, bonuses, interest payments on leases, rents, and other sources. In turn, these funds were disbursed to states (more than $2 billion), the Reclamation Fund (more than $1.5 billion), and the U.S. Treasury ($444 million), among other things.[7]

More recent data published by the Interior Department's Office of Natural Resources Revenue (ONRR) show that, for fiscal year 2023, energy production on federal and Tribal lands and federal offshore areas generated over $18.1 billion in revenues (from royalties, bonus bids, rents, and other sources).[8] For FY 2023, ONRR disbursed over $4.7 billion in funds collected from leasing activities on federal lands and waters to 33 states.[9] As stated by CRS, "[f]ederal revenues from oil and natural gas leases provide income streams that support a range of federal and state

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[4] The White House, *Department of the Interior*, *in* THE BUDGET FOR FISCAL YEAR 2024 (2023), https://www.whitehouse.gov/wp-content/uploads/2023/03/int_fy2024.pdf.

[5] BLM, *About the BLM Oil and Gas Program* (last visited June 14, 2023), https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/about#:~:text=The%20BLM%20manages%20the%20Federal,benefit%20of%20the%20American%20public.

[6] BRANDON S. TRACY, CONG. RES. SERV., R46537, REVENUES AND DISBURSEMENTS FROM OIL AND NATURAL GAS PRODUCTION ON FEDERAL LANDS (2020), https://crsreports.congress.gov/product/pdf/R/R46537.

[7] *Id.*

[8] DOI, *Interior Department Announces $18.24 Billion in Fiscal Year 2023 Energy Revenue* (Nov. 9, 2023), https://www.doi.gov/pressreleases/interior-department-announces-1824-billion-fiscal-year-2023-energy-revenue#:~:text=Today%2C%20Interior%E2%80%99s%20Office%20of%20Natural%20Resources%20Revenue%20announced,federal%20and%20Tribal%20lands%20and%20federal%20offshore%20areas.

[9] *Id.*

policies and programs."

As stated by CRS, "[f]ederal revenues from oil and natural gas leases provide income streams that support a range of federal and state policies and programs."

III. History of BLM Efforts to Protect the GRSG

There is an extensive history of sage grouse protection and conservation efforts at both the federal and state levels. BLM and U.S. Forest Service launched their National GRSG Planning Strategy in 2011 to amend federal land use plans with sage-grouse conservation measures and have continued efforts to conserve GRSG since that time.

Recognizing that different areas have individualized needs and concerns, BLM's protection efforts have often been tailored to specific region or states. In 2015, BLM and USFS adopted amendments and revisions to 98 RMPs across 10 western states, addressing the management of 67 million acres of land through several regulatory efforts addressing different regions.[10] The 2015 Plans established new GRSG priority habitat designations with heightened management protections across the 67 million acres of federal land, including "Priority Habitat Management Areas" and "General Habitat Management Areas", in addition to other priority habitat designations in certain states. As a result of the comprehensive GRSG protections contained in the 2015 Plans, the U.S. Fish and Wildlife Service determined that listing the species under the Endangered Species Act was "not warranted."[11]

BLM again sought to amend GRSG RMPs in its 2019 Plan Amendments that aimed to improve alignment with state GRSG management strategies and strengthen cooperation with states. BLM's 2019 Plan Amendments were contained in six separate regulatory efforts that each focused on a specific state or region.[12] Each Plan Amendment was specifically designed to address the unique issues and interests of an individual state or limited region, as opposed to the current effort to address GRSG habitat in ten states in one regulatory effort.

Although the 2019 Amendments have been temporarily enjoined, they have not been vacated.[13] The District Court found that plaintiffs challenging the 2019 Amendments were likely to succeed in their claims that BLM failed to: (1) consider a reasonable range of alternatives (only two alternatives were evaluated in the EIS), (2) take a "hard look" at the environmental consequences of the regulatory changes, (3) adequately consider cumulative impacts, and (4) provide notice of the removal of mandatory compensatory mitigation prior to the final EIS.[14] BLM's proposed changes in the current Draft RMPA/EIS go far beyond the limited issues raised

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[10] *See* 80 Fed. Reg. 57,633 (Plan Amendments for Great Basin Region Greater Sage-Grouse Sub-Regions of Idaho and Southwestern Montana; Nevada and Northeastern California; Oregon; and Utah); 80 Fed. Reg. 57,332 (Plan Amendments for Rocky Mountain Region Greater Sage-Grouse Sub-Regions Northwest Colorado, and Wyoming); 80 Fed. Reg. 57,639 (Plan Amendments for the Rocky Mountain Region Greater Sage-Grouse Sub-Regions of Lewistown, North Dakota, Northwest Colorado, and Wyoming; New Plans for Billings, Buffalo, Cody, HiLine, Miles City, Pompeys Pillar National Monument, South Dakota, and Worland) ("2015 Plans").
[11] *See* 80 Fed. Reg. 59,857.
[12] *See* 84 Fed. Reg. 10324 (Oregon); 84 Fed. Reg. 10,327 (Northwest Colorado); 84 Fed. Reg. 10,325 (Idaho); 84 Fed. Reg. 10,322 (Wyoming); 84 Fed. Reg. 10,323 (Nevada and Northeastern California); 84 Fed. Reg. 10,328 (Utah).
[13] *W. Watersheds Project v. Schneider*, 417 F. Supp. 3d 1319 (D. Idaho 2019)
[14] *Id.*

in the preliminary injunction.

Departing from the approaches in the 2015 and 2019 GRSG planning efforts, the current Draft RMPA/EIS would revise a total of 77 RMPs across ten Western states, amending the management of up to 69 million acres of land *in one regulatory action*. Despite the fact these planning efforts affect even more acres of land than prior Amendment efforts and are addressing a substantial number of RMPs, BLM has confined its plans to a singular regulatory effort, in stark contrast to BLM's approach to both the 2015 and 2019 Plan Amendments.

IV. In Establishing GRSG Protections, BLM Must Respect the Multiple Use Mandate of FLPMA

A. The Existing Legal & Regulatory Framework Provides Robust Conservation and Environmental Protection for BLM Lands

A bedrock principle of administrative law is that agency regulations must be based on statutory authority. Congressional statutes define the permissible bounds of a federal agency action.[15] This is especially true for federal agencies seeking to exercise authority over federal lands, as the Constitution's Property Clause expressly provides: "**The *Congress* shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States**."[16] Agency actions with significant consequences for federal land use management should be based on clear congressional authorizations.[17] Accordingly, Congress has the right and power to determine the proper balance of uses for federal lands, and against that constitutional backdrop, Congress has established the Multiple Use Framework to guide BLM's effectuation of that legislative purpose.

The Multiple Use Framework ensures that conservation and environmental protection are considered in connection with *every* use of public lands. Before adoption of this Framework, the Mineral Leasing Act (MLA) long ago established a structured process set by DOI to use public lands for resource extraction (such as oil and gas).[18] Under the MLA, federal onshore lands with possible fossil energy resources are available for exploration and production and may be leased by BLM to lessees in exchange for lease payments and royalties (except where those activities have been prohibited by law). While the MLA provides broad authority for use of federal onshore areas for energy production, Congress provided special exclusions and protections for national parks

[15] *See, e.g.*, 5 U.S.C. § 706(2)(C) (finding unlawful agency actions "in excess of statutory jurisdiction, authority, or limitations, or short of statutory right"); *West Virginia v. EPA*, 142 S. Ct. 2587, 2609 (2022) ("Agencies have only those powers given to them by Congress, and 'enabling legislation' is generally not an 'open book to which the agency [may] add pages and change the plot line.'" (brackets in original)).
[16] U.S. CONST. ART. IV, § 3, cl. 2 (emphasis added); *see also Utah Div. of State Lands v. United States*, 482 U.S. 193, 201 (1987) ("The Property Clause grants Congress plenary power to regulate and dispose of land within the Territories . . . ."); *Kleppe v. New Mexico*, 426 U.S. 529, 536 (1976) ("[D]eterminations under the Property Clause are entrusted primarily to the judgment of Congress.").
[17] *Cf. Gundy v. United States*, 139 S. Ct. 2116, 2123 (2019) ("So the answer requires construing the challenged statute to figure out what task it delegates and what instructions it provides.").
[18] *See* 30 U.S.C. § 181.

and monuments, certain areas protected as part of the National Wilderness Preservation System, and lands in incorporated cities, towns, and villages.[19]

Under FLPMA, Congress specifically instructed that federal lands must be managed "on the basis of multiple use and sustained yield unless otherwise specified by law."[20] Key terms like "multiple use" and "sustained yield" are expressly defined in FLPMA by Congress.[21] The Multiple Use Framework, as defined in 43 U.S.C. § 1702(c), requires BLM to consider a variety of factors when managing public lands:

> *The term "**multiple use**" means the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.*[22]

Likewise, the term "sustained yield" means "the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple use."[23]

Conservation and environmental protection considerations do not preempt permitted use of public lands in this context. The Multiple Use Framework accounts for the fact that public land use must be multifaceted and still meet present resource needs.

A number of the alternatives do not align with this constitutional and statutory framework. For example, under Alternative 3, 69 million acres of public lands – over a quarter of all BLM-managed public lands - would be declared Priority Habitat Management Areas that would be off-limits to future oil and gas leasing activity. There would be no effort made to accommodate important uses of public lands over a vast area aside from allowing already approved activities to continue. In the absence of a sound scientific basis for such sweeping prohibitions – which is not

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[19] *Id.*; *see also* 16 U.S.C. §1133(d)(3) (special provisions governing mineral leasing in designated wilderness areas); 30 U.S.C. § 226(h) (special provisions for national forest system lands).
[20] 43 U.S.C. § 1701(a)(7).
[21] *See id*. § 1702(c), (h).
[22] *Id*. § 1702(c).
[23] *Id.* § 1702(h).

apparent in the Draft RMPA/EIS – Alternative 3 would be inconsistent with BLM's statutory mandate.

B. Recent BLM Actions Unduly Limit Oil and Gas Development on Federal Lands

The Draft RMPA/EIS comes on the heels of a series of actions by BLM that seek to unduly limit oil and gas development on federal lands, including but not limited to the Bureau's recently-finalized Public Lands Rule.[24] In that rule, BLM elevates "conservation" to a "first among equals" among uses of public lands. Under the Public Lands Rule, conservation is given priority over all other productive uses in contravention of the Multiple Use requirements of FLPMA.

BLM has also recently finalized its Renewable Energy Rule, which recalibrates federal land management regulations to promote and incentivize greater deployment of wind and solar energy projects.[25] The rule provides more favorable land management provisions for renewable energy as compared to traditional energy projects like oil and natural gas development, which remain critical for U.S. energy security. These changes contrast sharply with the substantial additional burdens contained in BLM's recent revisions to its oil and natural gas leasing regulations.[26] The Associations' members support responsible energy development on federal lands consistent with FLPMA's multiple use mandate and other applicable laws and regulations. We also agree with the general imperative to adopt reforms to increase energy production on public lands consistent with an "All of the Above" energy policy. However, the Renewable Energy Rule relies on a procedurally deficient analysis to underpin changes that alter basic principles of federal land management, creates an unlevel playing field among energy sources on federal lands, and potentially restricts access for oil and natural gas development in some areas for decades to come.

These recent actions fail to comply with BLM's fundamental grant of authority from Congress. As discussed above, FLPMA and its Multiple Use Framework generally govern the use of lands administered by BLM.[27] Under FLPMA, Congress specifically instructed that federal lands must be managed "on the basis of multiple use and sustained yield unless otherwise specified by law."[28] The Multiple Use Framework accounts for the fact that public land use must be multifaceted and still meet present resource needs. The principal uses contemplated under the Multiple Use Framework are "limited to[] domestic livestock grazing, fish and wildlife development and utilization, mineral exploration and production, rights-of-way, outdoor recreation, and timber production."[29] While conservation is certainly an important element to be considered by BLM in managing public lands, it cannot be promoted in such a way as to exclude

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[24] Final rule, *Conservation and Landscape Health*, prepublication version available at [Public Lands Rule | Bureau of Land Management (blm.gov)].
[25] 89 Fed. Reg. 35634.
[26] Final rule, Fluid Mineral Leases and Leasing Process, prepublication version available at [Fluid Mineral Leases and Leasing Process Final Rule (Unofficial Prepublication) (blm.gov)].
[27] *See, e.g.*, 43 U.S.C. § 1702(c) (defining "multiple use"). While the proposed rule would apply to lands administered by BLM under RMPs implementing the multiple-use mandate of FLPMA, it would not apply to other lands administered by BLM which typically have a primary purpose designated by Congress. We encourage BLM to maintain clarity on this point so that neither BLM nor the regulated community of public land users must labor under uncertainty about the scope of application of the regulations.
[28] 43 U.S.C. § 1701(a)(7).
[29] 43 U.S.C. § 1702(*l*).

or diminish any "principal or major uses."

Therefore, in drafting and amending Resource Management Plans (RMPs), BLM must respect the multiple use mandate of FLPMA. The Associations are concerned that certain aspects of the Draft RMPA/EIS may fail to adhere to the statutory requirements designed to ensure that public lands are accessible and available for leasing for all sources of energy. BLM should reconsider its proposed alternatives and adopt approaches consistent with FLPMA and the Multiple Use Framework.

V. Management Area Identifications/Boundaries and Restrictions Must be Based on Sound Science

A key theme of BLM's Draft RMPA/EIS is the Bureau's adoption of "new science." The "new science" permeates many aspects of BLM's proposed approach. However, as discussed further below, there are a number of respects in which recent papers relied on by the Bureau are flawed in ways BLM does not acknowledge. In moving forward with RMP amendments, BLM needs to take a more open and discerning approach to the science on which it amendments are based.

A. BLM Must Recognize the Issues with its Population Assessment

A key factor in BLM's overall approach is an assessment of the status of GRSG populations. Yet certain aspects of BLM's assessment – particularly its assessment of long-term population trends – is skewed by reliance on papers such as O'Donnell, et al. (2021). This paper introduced a new software-based approach to standardizing state-collected, long-term sage grouse lek count data in order to produce range-wide population assessments. Although the authors make no mention of trends in the data, these are apparent in the figures. Notably, as data standardization and data quality increased, population fluctuations – as evidenced by male lek counts – become apparent. Standardized monitoring protocols were first introduced for the 1983 counts but were not adhered to by all states. Also, from 1995 onwards lek counts dramatically increased, as did data quality, as indicated by the smaller standard deviations associated with the more recent data. Therefore, the frequently cited dramatic population decline since the 1960s looks more like an artifact of inadequate sampling, with only large leks being sampled.[30] Additionally, large amounts of lek count data, including data from Colorado, failed to meet uniform standards. In fact, it was not until 2016 that Colorado began to collect repeated observations of the same lek, the same day and had not digitized its records gathered prior to 2006.

These and other issues documented in O'Donnell et al. (2021) underscore the fact that inferring population trends from lek count data is an evolving science and that a lack of consistent data collection, as documented by Shyvers et al. (2018)) in the Parachute-Piecance-Roan population in Colorado, raises serious questions about these and population trends estimated by Coates et al. (2021). These issues are compounded by the fact that the data relied on to assess population trends end in 2019, when many sage grouse were at a low ebb in their population cycle, thus biasing perceptions (that populations are in a consistent decline). Data from Utah and

[30] Garton 2011.

Wyoming show populations rising again in 2021, underscoring the importance of putting population estimates in proper context.

B. BLM Should Not Rely on Genetics in Seeking to Identify Habitat and Connectivity Needs

Management of GRSG habitats needs to be based up demonstrable threats, not hypothetical concerns that are theoretical in nature. Oyler-McCance et al. (2022[31]) and other recent papers by Cross et al. (2018[32] and 2023[33]) and Row et al. (2018[34]), share a common theme and aim: that genetic connectivity of sage grouse populations (via protection of and/or reestablishment of natural migration corridors) is "vital" to their conservation and needs to be incorporated into resource management plans. Oyler-McCance et al. (2022) also argue for a redrawing of current GRSG management boundaries based upon their analysis of genetic data. However, all of the analyses from these papers are based upon selectively-neutral genetic markers (microsatellites) that occupy non-transcribed sections of DNA between functional genes, and therefore have no role in survival of the organism, are not subject to natural selection, nor of adaptive importance. Unless a microsatellite locus is closely linked to a specific gene (i.e. nearby on the same chromosome) microsatellites can only provide an index of levels and patterns of genetic variation found within and among populations.

A central issue with this paper – and the others on genetic connectivity by the same authors – is the fact that none has provided any data or reference to other studies that may have identified current genetic issues in any of the sage grouse populations studied. For example, there is no evidence presented that inbreeding depression or severe paucity of genetic variation are resulting in a measurable reduction in fitness and population decline. Similarly, the authors have not made a convincing argument as to why historical patterns of genetic variation should be retained when climate change will shift the traits favored by natural selection. Their case rests wholly upon theoretical concerns and undemonstrated potential problems. Without a bona fide genetic issue having been identified, the authors are proposing a range-wide, landscape-level solution for a hypothetical problem that is not known to exist.[35]

The genetic networks and connectivity analyses are presented as if they are describing very recent gene flow, but all they actually show is the genetic similarity between their sampling sites. The authors do not present any data, or reference any radio-tracking studies, to support their

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[31] Oyler-McCance SJ, Cross TB, Row JR, Schwartz MK, Naugle DE, Fike JA, Winiarski K, Fedy BC (2022) New strategies for characterizing genetic structure in wide-ranging, continuously distributed species: A Greater Sage-grouse case study. Plos one. 2022 Sep 13;17(9):e0274189.

[32] Cross TB, Schwartz MK, Naugle DE, Fedy BC, Row JR, Oyler-McCance SJ (2018) The genetic network of greater sage-grouse: range-wide identification of keystone hubs of connectivity: Ecology and Evolution, v. 8, no. 11, p. 5394-5412.

[33] Cross TB, Tack JD, Naugle DE, Schwartz MK, Doherty KE, Oyler-McCance SJ, Pritchert RD, Fedy BC (2023) The ties that bind the sagebrush biome: integrating genetic connectivity into range-wide conservation of greater sage-grouse. R. Soc. Open Sci. 10: 220437. https://doi.org/10.1098/rsos.220437

[34] Row JR, Doherty KE, Cross TB, Schwartz MK, Oyler-McCance SJ, Naugle DE, Knick ST, Fedy BC (2018) Quantifying functional connectivity: the role of breeding habitat, abundance, and landscape features on range-wide gene flow in sage-grouse. Evol. Appl. 11, 1305–1321. (doi:10.1111/eva.12627)

[35] Additionally, Oyler-McCance et al.'s (2022) own genetic data show remarkably high levels of microsatellite variation within populations sampled (i.e. average heterozygosities of 0.657 to 0.805).

assertions. While some of the genetic similarity in microsatellite allele frequencies may be due to recent gene flow, genetic similarity can also be the result of shared ancestry with little or no recent gene flow. For example, a historical population may became subdivided, and the two "new" populations retain high genetic similarity due to their large population sizes. Alternatively, genetic similarity can be the result of an extinction and recolonization event.

Similarly, the authors assume that genetic drift due to small population size and/or isolation is making some populations more genetically divergent. However, this and other patterns of genetic connectivity reported by Oyler-McCance et al. (2022), as well as Cross et al. (2018), Row et al. (2018), and Cross et al. (draft), all relied on those same data sets. However, genetic divergence can also be an artifact of translocations of thousands of GRSG that took place starting in the 1940s. Those translocations involved moving thousands of sage grouse from thriving to declining populations, as well as from agricultural areas to areas outside of agricultural production. As documented by Reese and Connelly (1997[36]), "Those included 5,881 [sage grouse] moved up to 483 km in 30 translocation attempts into 19 counties in the state [of Wyoming]," as well as later translocations in Wyoming, Utah, and Idaho (Patterson 1952[37]; Reese and Connelly 1997; Kohl et al. 2019).

Therefore, the results of Oyler-McCance et al. (2022) and other genetic connectivity papers contain genetic artifacts of artificial gene flow from thousands of translocated sage grouse that were moved within and among states decades ago. Without taking the obvious first step of excluding populations that had received translocations or accounting for the downstream effects of translocations (i.e. using diffusion models), the results and management recommendations are, at best, highly questionable. A one-sentence mention of the potential influence of translocations on their results was found in Oyler-McCance et al. (2022): that translocations in Utah "complicate the interpretation of the structure found here." However, the authors did not provide any explanation as to how or why their results and "interpretation" of those results would have been affected by translocations or are "complicated" by them. In short, Oyler-McCance et al. (2022) effectively ignored the issue of historical translocations.

The authors of Oyler-McCance et al. (2022) also make no mention of translocations as a practical management solution if any of the following three scenarios come to be:

> 1) An inbreeding issue is found or a population undergoes a severe bottleneck such that most of its genetic variation has been depleted, individual fitness has declined, and therefore, it is in need of "genetic rescue."
>
> 2) Genetic variants with high fitness (i.e. individuals possessing genes with greater survival potential or disease resistance) are discovered in other populations and the populations receiving translocations of those individuals would benefit.
>
> 3) A population has declined to a point that a population augmentation via translocation of individuals from a more abundant population is needed to prevent its extirpation.

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36 Reese, KP, and JW Connelly (1997) Translocations of sage-grouse Centrocercus urophasianus in North America. Wildlife Biology 3:235–241.

37 Patterson, R.L. (1952) The sage grouse in Wyoming. - Sage Books, Inc. Denver, CO, 341 pp.

Translocations have been used successfully to both augment declining GRSG populations and to re-establish historical ones, thanks to refinements in methods as documented in the scientific literature by Thompson et al. (2015[38]), Apa et al. (2017[39]), Duvuvuei et al. (2017[40]), and many others.[41] However, the authors of Oyler-McCance et al. (2022), as well as Cross et al. (2018 and 2023), and Row et al. (2018), appear to be unaware of these papers or otherwise fail to acknowledge the practicality of translocations as a viable sage grouse conservation strategy. Instead, they appear to be in favor of theoretical landscape-level habitat connectivity approaches which may not be compatible with current land uses. We are concerned that the BLM, in this Draft RMPA/EIS, is likewise ignoring the practicality of translocations in favor of theoretical landscape-level habitat connectivity approaches.

The papers by Row et al. (2018) and Cross et al. (2018) also raise significant concerns. These papers utilized different data sets and analytical approaches and those microsatellite data sets and analytical approaches were combined in Cross et al. (2023). Cross et al. (2023) proposed that genetic analyses be combined with analyses of landscape characteristics. These landscape characteristics are barriers or impedances to gene flow from agriculture or conifer woodlands, termed "functional-connectivity models" and offer a new way of potentially prioritizing some landscape-level conservation efforts. While these analyses may point to areas where additional on-the-ground investigations may be useful (i.e., studies of GPS radio tagged individuals and their dispersal or seasonal migration patterns), like the genetic study by Oyler-McCance et al. (2022), they should not be viewed as prescriptive land-use action plans.

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[38] Thompson, T.R., Apa, A.D., Reese, K.P. and Tadvick, K.M. (2015), Captive rearing sage-grouse for augmentation of surrogate wild broods: Evidence for success. Jour. Wild. Mgmt., 79: 998-1013. https://doi.org/10.1002/jwmg.905

[39] Apa, A.D., Thompson, T.R. and Reese, K.P. (2017) Juvenile greater sage-grouse survival, movements, and recruitment in Colorado. Jour. Wild. Mgmt., 81: 652-668. https://doi.org/10.1002/jwmg.21230

[40] Duvuvuei, O.V., Gruber-Hadden, N.W., Messmer, T.A., Guttery, M.R. and Maxfield, B.D. (2017) Contribution of translocated greater sage-grouse to population vital rates. Jour. Wild. Mgmt., 81: 1033-1041. https://doi.org/10.1002/jwmg.21264

[41] Ebenhoch, K., Thornton, D., Shipley, L., Manning, J.A. and White, K. (2019), Effects of post-release movements on survival of translocated sage-grouse. Jour. Wild. Mgmt., 83: 1314-1325. https://doi.org/10.1002/jwmg.21720; Heinrichs, J.A., McKinnon D.T., Aldridge C.L., and Moehrenschlager, A. (2019) Optimizing the use of endangered species in multi-population collection, captive breeding and release programs: Global Ecology and Conservation, v. 17, article e00558, 12 p, https://doi.org/10.1016/j.gecco.2019.e00558; Kohl, M., Chelak, M., and Messmer, T. (2019) Greater Sage-grouse Translocations: The Science Behind Utah's Conservation Policy. Utah State University. Natural Resources Extension, NR/Wildlife/2019-01pr. January 2019; Lazenby, K.D. (2020) North Dakota Greater Sage-Grouse (Centrocercus urophasianus) Recovery Project: Using Translocation to Prevent State-Wide Extirpation and Develop Rangewide Protocols. Utah State University. Graduate Theses and Dissertations. https://digitalcommons.usu.edu/etd/7774; Lazenby KD, Coates PS, O'Neil ST, Kohl MT, Dahlgren DK. Nesting, brood rearing, and summer habitat selection by translocated greater sage-grouse in North Dakota, USA. Ecol Evol. 2021; 11: 2741–2760. https://doi.org/10.1002/ece3.7228; Stoner DC, Messmer TA, Larsen RT, et al. Using satellite-derived estimates of plant phenological rhythms to predict sage-grouse nesting chronology. Ecol Evol. 2020; 10: 11169–11182. https://doi.org/10.1002/ece3.6758; Meyerpeter, M.B., Lazenby, K.D., Coates, P.S., Ricca, M.A., Mathews, S.R., Gardner, S.C., Dahlgren, D.K. and Delehanty, D.J. (2021), Field Methods for Translocating Female Greater Sage-Grouse (Centrocercus urophasianus) with their Broods. Wildl. Soc. Bull., 45: 529-537. https://doi.org/10.1002/wsb.1199; Picardi S, Coates P, Kolar J, O'Neil S, Mathews S, Dahlgren D (2022) Behavioural state-dependent habitat selection and implications for animal translocations. Journal of Applied Ecology. 2022 Feb;59(2):624-35.

In short, the study by Oyler-McCance et al. (2022) assumes that the future of GRSG is dependent upon maintaining or re-establishing genetic connectivity. This assumption is undercut by the fact that no genetic issue has been reported (beyond theoretical concerns). Furthermore, translocations offer an efficient and effective solution in cases where a genetic or demographic problem is identified. Translocations have been used successfully in the management of GRSG and many other species.

The papers by Oyler-McCance et al. (2022), Cross et al. (2018 and 2023), and Row et al. (2018), raise an important question: should management be based on theoretical concerns and maintaining historical patterns of genetic variation from genetic markers that have no demonstrable survival value? Considering the number of demonstrable threats facing GRSG, the Associations believes that management in this RMP should instead be based upon conserving the largest number of birds with the most efficient methods to achieve that goal, as advocated by Doherty et al. (2016).

C. BLM Must Properly Assess Threats to GRSG and GRSG Habitat

i. Oil and gas development is not a primary threat to GRSG or GRSG habitat and is capable of effectively co-existing with the GRSG.

Oil and gas development activities have evolved in ways that limit their impact on species such as the GRSG. This evolution has included the adoption of technologies to make oil and gas production more efficient, which in turn results in minimization of impacts on the environment. Most notably, the industry has adopted widespread use of horizontal drilling techniques, which allow the efficient capture of oil and gas over a broad area using many fewer well pads (and correspondingly fewer roads) than historical vertical well drilling techniques. The use of a single well pad to drill multiple horizontal wells results in substantially reduced surface disturbance and much more localized drilling and well completion operations.[42] Within BLM's own Instruction Manual, the agency recognizes the benefits of directional drilling and the ability to manage operations as a Best Management Practice ("BMP"):

> "The development of directional drilling has allowed oil and gas operators to reach multiple formations and multiple leases from the same well pad, thereby reducing the amount of surface disturbance necessary to develop an oil and gas field relative to the use of traditional vertical wells. At the same time, these

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[42] *See, e.g.*, Garman, *A simulation framework for assessing physical and wildlife impacts of oil and gas development scenarios in Southwestern Wyoming*, Environmental Modeling and Assessment, v. 23, no. 1, p. 39–56 (2017), https://doi.org/10.1007/s10666-017-9559-1 ("Reducing pad numbers with directional-drilling technology reduced surface disturbance area and impacts on spatially extensive habitats (48–96% of study area) such as sagebrush-obligate songbird habitat, elk winter range, and sagebrush core area."); Applegate & Owens, n. 4 supra (surface disturbance reduced 70 %); David H. Applegate & Nicholas Owens, *Oil and Gas Impacts on Wyoming's Sagegrouse: Summarizing the Past and Predicting the Foreseeable Future*, 8 HUMAN–WILDLIFE INTERACTIONS 284, 289–90 (2014), https://www.researchgate.net/publication/267765279_Oil_and_Gas_Impacts_on_Wyoming%27s_Sagegrouse_Summarizing_the_Past_and_Predicting_the_Foreseeable_Future (modern energy production methods and technologies have resulted in a 70% reduction in surface disturbance when compared to historic practices).

> drilling techniques have given rise to many questions about the BLM's obligations and authority with respect to wells and facilities producing Federal minerals from non-Federal locations. The use of directional drilling technology is increasing and considered a Best Management Practice (BMP). The BLM strongly supports this environmental BMP as a means of limiting surface disturbance and overall impacts from oil and gas development."[43]

Other technological developments that have resulted in more efficient drilling include the use of improved drill bits and downhole imaging techniques that allow adjustments in drilling direction in real time. The resulting gains in efficiency minimize the time associated with the activity-intensive phase of well development as well as associated noise.

The evolution in oil and gas operations also includes measures taken by operators specifically to minimize environmental impacts. These measures include a variety of efforts that reduce or mitigate noise, such as steps to minimize the use of diesel engines during well drilling and completion. Additional noise mitigation measures may include the use of enhanced mufflers on engines and acoustically engineered sound barrier blankets and sound walls.

Research provides evidence of the limited impacts of modern oil and gas operations on GRSG. For example, one recent paper analyzing the Parachute-Piceance-Roan GRSG population concluded that there was no "obvious pattern of greater avoidance of wells pads and facilities with more industrial activities."[44] BLM must acknowledge these evolving development approaches and techniques that minimize environmental impacts, while also acknowledging that studies based on historic development approaches (e.g., primary reliance on vertical wells) are outdated and should not be relied on to establish current policies.

Additionally, the life of an oil and gas well is finite, and research has shown that restoration of well pads is possible. For example, a study of efforts to restore sagebrush habitat in the Piceance Basin after disturbances associated with oil and gas development concluded that "Restoring oil and gas disturbances to fully functional, diverse plant communities for wildlife habitat in northwestern Colorado is possible."[45] In fact, recent research has shown that restored well pad sites can provide better GRSG habitat than pre-existing conditions. Thus, GRSG and oil and gas development can co-exist and there is no basis for the application of widespread surface use restrictions to oil and gas development.

ii. *BLM must also accurately assess other threats and steps to minimize those threats.*

a. Climate Change: BLM cannot base its assessment on worst-case assumptions.

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[43] BLM, *Directional Drilling into Federal Mineral Estate from Well Pads on Non-Federal Locations*; Permanent Instruction Memorandum No. 2018-014 – June 12, 2018, https://www.blm.gov/policy/pim-2018-014.

[44] Walker, BL, *Resource selection by greater sage-grouse varies by season and infrastructure type in a Colorado oil and gas field,* Ecosphere (2022 May);13(5):e4018.

[45] Johnston, *Piceance Basin Restoration For Wildlife,* Colorado Parks and Wildlife Technical Report No. 57 (2020), CPW-R-T-57-20, ISSN 0084-8883.

A key focus of the Draft RMPA/EIS is the potential impact of climate change on GRSG. The Associations support the use of the best available science when evaluating threats to GRSG. However, the Draft RMPA/EIS heavily relies on numerous studies that fail to meet that standard. Reliance on scientific papers based on extreme, worst-case climate scenarios does not constitute use of best available science by BLM. NEPA does not require a "worst case analysis."[46] Not only is a worst-case climate scenario not legally required, it is not always an appropriate research method, as it may "distort[] the decisionmaking process by overemphasizing highly speculative harms."[47]

Doherty et al. (2022[48]), Rigge et al. (2021[49]), and Palmquist et al. (2021[50]) all predict changes in sagebrush and sage grouse populations as a result of long-term climate change. BLM fails to acknowledge that all three papers rely on a scientifically discredited RCP8.5 (also referred to as SSP5-8.5) worst-case climate scenario (with no CO2 emission reductions whatsoever) and that this scenario is no longer considered likely by the International Panel on Climate Change (IPCC) in their *IPCC Sixth Assessment Report, Working Group 1: The Physical Science Basis* (IPCC 2022[51]) as well as others (Hausfather and Peters 2020[52]; Burgess et al. 2022[53]).

The significance of this error of omission in the RMP is two-fold. First, although both Rigge et al. (2021) and Palmquist et al. (2021) include the RCP4.5 scenario in their analyses, in presenting their results graphically they focus only on the RCP8.5 scenario and emphasize the dire predictions based on its unlikely worst-case scenario in their results and discussion sections. Second, the analyses and results of Doherty et al. (2022) are based entirely on the RCP8.5 scenario results of Palmquist et al. (2021), thus completely biasing their predictions on sagebrush cover that GRSG depend upon. Under NEPA, BLM cannot rely on results and presentation of information that promotes worst case scenarios in its decision making. The failure of BLM to acknowledge these biases undermines its scientific rationale for its rangewide RMP for GRSG.

b. BLM cannot ignore the influence of regional climatic variations on GRSG populations.

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46 *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 356 (1989).

47 *See id.* at 334; Maine Lobstermen's Ass'n v. NMFS

48 Doherty K, Theobald DM, Bradford JB, Wiechman LA, Bedrosian G, Boyd CS, Cahill M, Coates PS, Creutzburg MK, Crist MR, Finn SP, Kumar AV, Littlefield CE, Maestas JD, Prentice KL, Prochazka BG, Remington TE, Sparklin WD, Tull JC, Wurtzebach Z, Zeller KA (2022) A sagebrush conservation design to proactively restore America's sagebrush biome: U.S. Geological Survey Open-File Report 2022–1081, 38 p., https://doi.org/10.3133/ofr20221081.

49 Rigge M, Shi H, Postma K. (2021) Projected change in rangeland fractional component cover across the sagebrush biome under climate change through 2085. Ecosphere 12(6):e03538.10.1002/ecs2.3538

50 Palmquist KA, Schlaepfer DR, Renne RR, Torbit SC, Doherty KE, Remington TE, Watson G, Bradford JB, Lauenroth WK. (2021) Divergent climate change effects on widespread dryland plant communities driven by climatic and ecohydrological gradients. Glob Chang Biol. 2021 Oct;27(20):5169-5185. doi: 10.1111/gcb.15776. Epub 2021 Jul 26. PMID: 34189797.

51 IPCC (2022) IPCC Sixth Assessment Report, Working Group 1: The Physical Science Basis. https://www.ipcc.ch/report/ar6/wg1/chapter/chapter-1/.

52 Hausfather Z, Peters GP (2020) Emissions – the 'business as usual' story is misleading. Nature 577, 618-620. doi: https://doi.org/10.1038/d41586-020-00177-3.

53 Burgess MG, Pielke R Jr, Ritchie J. (2022) Catastrophic climate risks should be neither understated nor overstated. Proc Natl Acad Sci U S A. 2022 Oct 18;119(42):e2214347119. doi: 10.1073/pnas.2214347119.

The RMP (and the USGS science that the RMP relies upon) also ignored a substantial body of scientific literature on regional climatic variation (interannual variation in regional weather patterns) as a predictor of GRSG population fluctuations and trends. It is well documented in the scientific literature that annual fluctuations in sea surface temperatures in the North Pacific Ocean drive multi-year variations in temperature and precipitation patterns in western North America. The Pacific Decadal Oscillation (PDO, https://www.ncei.noaa.gov/access/monitoring/pdo/) is an index of the sea surface temperature variation in the North Pacific Ocean that has a significant influence on temperature and precipitation patterns. This regional climatic variation (i.e. periodic fluctuations in large-scale weather patterns) in turn affect marine and terrestrial plant and animal population cycles, and contributes to phenomena such as summer heat and fire frequency in the western United States. Large-scale climate indices, such as the PDO, often outperform local temperature and precipitation data in predicting population dynamics and ecological processes (Stenseth et al. 2002[54]; Hallett et al. 2004[55]).

Multiple authors have reported that GRSG populations experience cyclic fluctuations, and that these population dynamics are linked to patterns of temperature and precipitation (the PDO) which affect reproduction and survival. However, notably absent in the Draft RMPA/EIS is any mention of key papers such as Gibson et al. (2017[56]), Coates et al. (2018[57]), Mathews et al. (2018[58]), and more than a dozen others.[59] Likewise lacking is any discussion of the authors' findings and their significance in understanding the drivers of GRSG population fluctuations, trends, and modeling. The relationship between climatic variation on population dynamics of GRSG is not surprising as there is a long and ecologically important history of studies examining the influence of climatic variation on the cyclic population dynamics of other members of the grouse family, including black grouse, ptarmigans, and prairie chickens. BLM failed to acknowledge these papers when developing the Draft RMPA/EIS, as did USGS when developing the science that the RMP relies upon.[60]

[54] Stenseth NC, Mysterud A, Ottersen G, Hurrell JW, Chan K-S, Lima M (2002) Ecological effects of climate fluctuations. Science 297(5585):1292–1296 DOI 10.1126/science.1071281.

[55] Hallett TB, Coulson T, Pilkington JG, Clutton-Brock TH, Pemberton JM, Grenfell BT (2004) Why large-scale climate indices seem to predict ecological processes better than local weather. Nature 430(6995):71–75 DOI 10.1038/nature02708.

[56] Gibson et al. (2017) Weather, habitat composition, and female behavior interact to modify offspring survival in greater sage-grouse: Ecological Applications, v. 27, no. 1, p. 168–181. https://pubmed.ncbi.nlm.nih.gov/28052504

[57] Coates et al. (2018) The relative importance of intrinsic and extrinsic drivers to population growth vary among local populations of greater sage-grouse: an integrated population modeling approach: AUK, v. 135, no. 2, p. 240-261.

[58] Mathews et al. (2018) An integrated population model for greater sage-grouse (Centrocercus urophasianus) in the bi-state distinct population segment, California and Nevada, 2003-17: US Geological Survey Open-File Report 2018-1177, 89 p., https://doi.org/10.3133/ofr20181177

[59] Ramey et al. (2018) Local and population-level responses of greater sage-grouse to oil and gas development and climatic variation in Wyoming: PEERJ, v. 2018, no. 6, p. e5417, https://doi.org/10.7717/peerj.5417; Lundblad CG, Hagen CA, Donnelly JP, Vold ST, Moser AM, Espinosa SP (2022) Sensitivity to weather drives Great Basin mesic resources and Greater Sage-Grouse productivity. Ecological Indicators. 2022 Sep 1;142:109231.

[60] Moran PAP (1952) The statistical analysis of game-bird records. Journal of Animal Ecology 21(1):154 DOI 10.2307/1915; Moran PAP. 1954. The statistical analysis of game-bird records. II. Journal of Animal Ecology 23(1):35 DOI 10.2307/1659; Ranta E, Lindstrom J, Linden H (1995) Synchrony in tetraonid population dynamics. Journal of Animal Ecology 64(6):767–776 DOI 10.2307/5855; Lindström J, Ranta E, Lindén H, Lindstrom J, Linden H (1996) Large-scale synchrony in the dynamics of capercaillie, black grouse and hazel grouse populations in Finland. Oikos 76(2):221 DOI 10.2307/3546193; Cattadori IM, Haydon DT, Hudson PJ. 2005. Parasites and climate synchronize red grouse populations. Nature 433(7027):737–741 DOI 10.1038/nature03276; Ludwig GX, Alatalo RV, Helle P, Linden

The significance of the aforementioned papers to the conservation of sage grouse, and to the RMP amendments in particular, are threefold:

First, state and federal agencies need to account for the predictable responses of GRSG populations[61] to regional climatic fluctuations and *their magnitude* when managing GRSG in an adaptive management framework. This is essential to understanding and accounting for the primary extrinsic factors that drive population trends, and for predicting trends in productivity, recruitment, and adult survivorship prior to the next year's lek count data. This is important in anticipating potential population management needs rather than reacting to population declines as they occur (i.e., through the "Targeted Annual Warning System" or "TAWS").

Second, adaptive management policies based on TAWS population "triggers", where additional restrictions are implemented, will be flawed unless the magnitude of effects of the PDO (and in some cases, ENSO) are taken into account so that variations in the magnitude of population responses to these natural fluctuations are not misinterpreted. Ideally, such triggers should be defined as the percent divergence from the expected carrying capacity, with the carrying capacity tracking the regional climate.

Third, the current GRSG population cycle indicates that it was at a naturally occurring low ebb/nadir when the last data were collected and used for estimating long term population trends by USGS staff (Coates et al. 2021[62]). Ending data collection during such an ebb/nadir can give a false perception of continuing decline, especially for decision makers unfamiliar with species having cyclic population trends.

The Draft RMPA/EIS also ignores a body of scientific literature on adaptation to climate change which should be incorporated into its adaptive management approach. A paper by Provencher et al. (2021[63]) properly takes into account adaptation to long-term climate change through high resolution (local) vegetation modeling and forecasting the effects of different

H, Lindstrom J, Siitari H (2006) Short-and long-term population dynamical consequences of asymmetric climate change in black grouse. Proceedings of the Royal Society B: Biological Sciences 273(1597):2009–2016 DOI 10.1098/rspb.2006.3538; Kvasnes MAJ, Storaas T, Pedersen HC, Bjørk S, Nilsen EB (2010) Spatial dynamics of Norwegian tetraonid populations. Ecological Research 25(2):367–374. DOI 10.1007/s11284-009-0665-7; Selås V, Sonerud GA, Framstad E, Kålås JA, Kobro S, Pedersen HB, Spidsø TK, Wiig O. 2011. Climate change in Norway: warm summers limit grouse reproduction. Population Ecology 53(2):361–371 DOI 10.1007/s10144-010-0255-0; Viterbi R, Imperio S, Alpe D, Bosser-peverelli V, Provenzale A. 2015. Climatic control and population dynamics of black grouse (Tetrao tetrix) in the Western Italian Alps: population dynamics of alpine black grouse. Journal of Wildlife Management 79(1):156– 166 DOI 10.1002/jwmg.810; Ross BE, Haukos D, Hagen C, Pitman J. 2016. The relative contribution of climate to changes in lesser prairie-chicken abundance. Ecosphere 7(6):e01323 DOI 10.1002/ecs2.1323; Hagen CA, Garton EO, Beauprez G, Cooper BS, Fricke KA, Simpson B. 2017. Lesser prairie-chicken population forecasts and extinction risks: an evaluation 5 years post– catastrophic drought. Wildlife Society Bulletin 41(4):624–638. DOI: 10.1002/wsb.836.

[61] By populations, we are referring to a more biologically meaningful, higher-level grouping of sage grouse leks than the currently proposed level 2 "neighborhood clusters."

[62] Coates et al. (2021) Range-wide greater sage-grouse hierarchical monitoring framework—Implications for defining population boundaries, trend estimation, and a targeted annual warning system: U.S. Geological Survey Open-File Report 2020–1154, 243 p., https://doi.org/10.3133/ofr20201154.

[63] Provencher et al. (2021) Landscape Conservation Forecasting for Data-Poor at-Risk Species on Western Public Lands, United States. Climate 2021,9,79. https://doi.org/10.3390/ cli9050079

management scenarios. The authors utilized The Nature Conservancy's Landscape Conservation Forecasting (LCF) method, which combines vegetation layers obtained from remote sensing with STSMs to compare the effects of alternative management or climate scenarios on vegetation condition and other metrics. Based on their analyses, the authors predict that "[e]xtensive restoration is predicted to accomplish management goals for ecological systems and for GSG [GRSG] regardless of future climate." The significance of this paper is that it demonstrates that it is possible to mitigate effects of climate change on habitat, which opens substantial new opportunities for mitigation and conservation offsets. Similarly, Creutzburg et al. (2015[64]) utilized spatial data to develop a proactive strategy for management of invasive annual grasses at landscape scales across jurisdictional boundaries. The authors, "evaluated varying scenarios of future climate and management, and their implications for rangeland condition and habitat quality." The authors concluded that climate change may have both positive and negative implications for maintaining sage-grouse habitat. And finally, Adler et al. (2021[65]) present a thorough treatment of climate change adaptation strategies that can be expected to benefit sage grouse, yet there is no mention of these strategies in the Draft RMPA/EIS.

c. Predation: Mitigating the impact of raven predation on GRSG will require a comprehensive, multi-agency approach.

There is an abundance of scientific evidence that ravens are a "hyperpredator" that can negatively impact the demography of GRSG populations. The Draft RMPA/EIS admits as much but its proposed management does not begin to deal adequately with this threat. The Draft RMPA/EIS is focused almost entirely on the minimization of perching opportunities in GRSG habitat, and maintaining vegetation height (e.g. "Manage habitats to maintain, and as needed, restore healthy native vegetation conditions to minimize occurrence and effectiveness of predators, especially with respect to providing adequate sagebrush, other shrub, and herbaceous vegetation cover on the landscape.") Simply put, the BLM's attempt to include predator management in the alternatives in this RMP, does not go far enough and needs to be strengthened in terms of detail, scale, need for interagency cooperation and citing support from the recent scientific literature on the subject.

In large measure, this deficiency in the Draft RMPA/EIS appears to be due to BLM's reliance on outdated information (the NTT and COT reports) and failure to acknowledge a large body of relevant scientific literature on this threat and how to effectively manage it, including

[64] Creutzburg et al. (2015) Climate change and land management impact rangeland condition and sage-grouse habitat in southeastern Oregon: AIMS Environmental Science, v. 2, no. 2, p. 203–236. http://www.aimspress.com/article/id/50

[65] Adler et al. (2021) Climate Adaptation. in: Remington, T.E., Deibert, P.A., Hanser, S.E., Davis, D.M., Robb, L.A., and Welty, J.L., 2021, Sagebrush conservation strategy—Challenges to sagebrush conservation: U.S. Geological Survey Open-File Report 2020–1125, 327 p., https://doi.org/10.3133/ofr20201125.

papers by Harju et al. (2016[66]), O'Neil et al. (2018[67]), Brockman et al. 2(019[68]), and numerous others.[69] These papers, in addition to the papers by Coates et al. (2016[70], 2020[71]) cited in the Drat RMPA/EIS, collectively describe: the extent of the raven predation problem on GRSG eggs and chicks based on best available scientific data from contemporary research; the landscape-level extent of the problem; how ravens have learned to exploit human food subsidies as well as perching and nesting opportunities; why short-term approaches to raven population control typically fail; and science-based solutions to comprehensively mitigate raven impacts on GRSG and other sensitive species.

We also note that the Draft RMPA/EIS makes a reference to a paper by Dettenmaier et al. (2021): "Where ravens have been documented as a concern (e.g., densities greater than 0.4 ravens/km^2; Coates et al., 2022, the BLM supports implementation of the strategy outlined by Dettenmaier et al. (2021) and adopted by the U.S. Fish and Wildlife Service (2023)." However, the RMP provides no detail as to what this strategy entails, its prioritization for adaptive management by the BLM in this RMP, or how it would be implemented across the range of GRSG in this RMP. This paper, along with those cited above are critical to the BLM's development of a comprehensive, science-based strategy on the raven predation problem.

The lack of a comprehensive strategy to manage the threat of raven predation is a significant issue for the RMP because expanding raven populations (and human food subsidies to them) constitute a direct threat to productivity and recruitment of young GRSG into the adult breeding population. Therefore, the inadequacy of the BLM's response to this threat in this RMP

[66] Harju et al. (2018) Common raven movement and space use: influence of anthropogenic subsidies within greater sage-grouse nesting habitat: Ecosphere, v. 9, no. 7, article e02348, 16 p, https://doi.org/10.1002/ecs2.2348.

[67] O'Neil et al. (2018) Broad-scale occurrence of a subsidized avian predator—reducing impacts of ravens on sage-grouse and other sensitive prey: Journal of Applied Ecology, v. 55, no. 6, p. 2641-2652., https://doi.org/10.1111/1365-2664.13249.

[68] Brockman et al. (2019) Anthropogenic subsidies affect common raven nesting, space-use, and movement. In Gallagher, G. R. & Armstrong, J. B. (Eds.), The Eighteenth Wildlife Damage Management Conference (pp. 7). Mount Berry, GA: Berry College. https://digitalcommons.usu.edu/wdmconference/2019/all2019/5/.

[69] Peebles and Spencer (2020) Common Ravens. Wildlife Damage Management Technical Series. 24. https://digitalcommons.unl.edu/nwrcwdmts/24; Harju et al. (2021) Isotopic analysis reveals landscape patterns in the diet of a subsidized predator, the common raven. Ecol Solut Evid. 2021;2:e12100. DOI: 10.1002/2688-8319.12100; Rivera-Milán FF, Coates PS, Cupples JB, Green M, Devers PK (2022) Evaluating common raven take for greater sage-grouse in Oregon's Baker County Priority Conservation Area and Great Basin Region. Human–Wildlife Interactions. 2022;15(3):24; Ocañas AR, Danoff-Burg JA, Mulroe K, Walton SR. (2022) Addressing the raven food subsidy challenge by engaging restaurants to close their dumpsters. Zoo Biology. 2022 Apr 27; Harju SM, Coates PS, Dettenmaier SJ, Dinkins JB, Jackson PJ, Chenaille MP (2022) Estimating trends of common raven populations in North America, 1966–2018. Human–Wildlife Interactions. 2022;15(3):5; Sanchez CA (2022) Oiling Common Raven Eggs as a Conservation Management Action (Doctoral dissertation, Idaho State University); Duerr AE, Bloom PH, Ross K, Miller TA, Braham MA, Fesnock AL, Katzner (2022) Influence of anthropogenic subsidies on movements of common ravens. Human–Wildlife Interactions. 2022;15(3):9; Marzluff JM, Loretto M-C, Ho CK, Coleman GW, Restani M (2021) Thinking like a raven: restoring integrity, stability, and beauty to western ecosystems. Human–Wildlife Interactions 15(3):Early Online, Winter 2021. digitalcommons.usu.edu/hwi; Delehanty DJ (2022) Raven control from a conservation biology perspective. Human–Wildlife Interactions. 2022;15(3):23.

[70] Coates et al. (2016) Landscape characteristics and livestock presence influence common ravens—Relevance to greater sage-grouse conservation: Ecosphere, v. 7, no. 2, article e01203, 20 p., https://doi.org/10.1002/ecs2.1203.

[71] Coates et al. (2020) Broad-scale impacts of an invasive native predator on a sensitive native prey species within the shifting avian community of the North American Great Basin. Biological Conservation 243 (2020) 108409

will likely lead to population dclines over substantial portions of the GRSG range, which in turn will likely result in the imposition of additional land use restrictions that will be of little to no value in mitigating this threat. For these reasons, we urge the BLM to put the mitigation of raven predation on GRSG front and center in its adaptive management in this RMP. By setting this as a priority in the RMP, BLM will also signal the need to cooperatively and comprehensively manage this issue with states, local governments, and other federal agencies. It will also provide further opportunities for industry members to undertake meaningful mitigation efforts. Such a comprehensive strategy has been resoundingly echoed in the recent scientific literature (cited above). It is also a strategy that will benefit other native species affected by raven predation on nests and/or young.

D. BLM's Proposed Approach to Adaptive Management is Not Sufficiently Developed and Should Not Be Used as a Decision-Making Tool

The Targeted Annual Warning System (TAWS) described in reports by Coates et al. appears to provide a potentially objective alternative to the use of arbitrary, population "triggers" for implementing additional conservation measures for the GRSG,[72] appearing to be a step in the right direction for monitoring and adaptive management of GRSG populations. Additional work is still needed in these areas to better understand and implement proper conservation measures. As currently proposed, TAWS is a work-in-progress that will require additional refinement in methodology and greater transparency in data, rationale, and methodologies before BLM should consider using TAWS as a basis for management decisions.

As discussed further in Appendix A, there are significant issues with TAWS that should preclude its current use as a regulatory decision-making tool. The TAWS approach ignores prevalent data, relies upon problematic assumptions and non-transparent methodologies, and lacks an effective process for addressing false alarms. As an initial matter, TAWS lacks a probabilistic assessment as to how reliable each "watch" or "warning" assignment is. Such an assessment would allow managers, decision makers, and the public to evaluate the confidence of those assignments. Second, TAWS currently has a two-year lag time between data being reduced and results being analyzed. In order to be a potentially useful adaptive management tool, TAWS instead needs annual analyses of results with the most current and complete data.

TAWS also relies upon problematic "neighborhood clusters" and "climate clusters," and improperly relies upon leks in assessing GRSG population levels. Radio tracking and genetic data show that both male and female GRSG move among leks or disperse to increase mating opportunities in response to local environmental conditions, disturbance, and density dependence. Thus, a decline at one or even a handful of leks is not necessarily an indication that the surrounding GRSG population has declined, as assumed by Coates et al. (2021, 2022). Inadequate sample sizes (*i.e.*, too few leks) inevitably lead to erroneous conclusions regarding neighborhood cluster trends. Additionally, the more subdivided the range of a species is, the more threatened these smaller

[72] Coates, P. S., Prochazka, B. G., et al. (2021) Range-wide greater sage- grouse hierarchical monitoring framework—Implications for defining population boundaries, trend estimation, and a targeted annual warning system. U.S. Geological Survey, Open-File Report 2020–1154, 243 p., https://doi.org/10.3133/ofr20201154, ("Coates et al. (2021)"); Coates, P.S., Prochazka, B.G., et al. (2022) Range-wide population trend analysis for greater sage-grouse (*Centrocercus urophasianus*) - Updated 1960–2021: Data Report 1165, 16 p., https://doi.org/10.3133/dr1165. ("Coates et al. (2022)"). (Collectively, "Coates et al. (2021, 2022)).

subunits may appear to be, even though the much larger population is stable. Ultimately, the conflation between leks and neighborhood clusters with populations leads to misleading conclusions and has problematic implications for how the GRSG could be managed in the future.[73]

Coates et al. (2021, 2022) also disregards a substantial amount of prevalent research. The neighborhood clusters and climate clusters based on desktop GIS analyses are inconsistent with recent genetic data and analyses. Because genetic data carry the signal of historic and current genetic and demographic connectivity among sage grouse, across the scale of individuals, leks, and populations range-wide, it is arguably more biologically relevant than desktop GIS analyses, which are two-dimensional abstractions based on map distances among leks, heavily reliant on assumptions, and whose results are conjectures about what GRSG population connectivity might be. Testing the conjectures (neighborhood and climate clusters in Coates et al. 2021, 2022 and O'Donnell et al. 2022b[74]) against genetic data reveals that they are lacking empirical support and that the TAWS clustering of leks need to be revised accordingly or scrapped altogether.[75]

In addition, the TAWS approach ignores movement data from nine months of the year, as well as genetic data on long-distance migration and dispersal, both of which undermine the notion that the TAWS neighborhood clusters are closed populations.[76] Such data demonstrate that movements occur among leks, subpopulations and populations, there is a consistent lack of genetic structure among local leks and clusters of leks, and the GRSG attending leks are typically genetically unrelated. TAWS also disregards a body of research identifying the shortcomings of using precipitation as a proxy for climate variation when utilizing a cluster algorithm to delineate climate clusters.[77] Although it is impossible for us to confirm this due to a lack of transparency (discussed further below), the Associations also believe it is likely that TAWS excludes data from recently discovered leks and leks that are reoccupied during population increases.[78]

Moreover, the TAWS approach fails to take account of oscillations in the population trends data. TAWS can produce different results regarding population trends based on the number of time periods (*i.e.*, oscillations) used in the analysis.[79] Neighborhood clusters may have a positive trend where 1 or 3 oscillations are used, while the same clusters may show a negative trend where 2, 4,

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[73] *See* Appendix A at 33.

[74] O'Donnell, M. S., Edmunds, D. R., Aldridge, C. L., Heinrichs, J. A., Monroe, A. P., Coates, P. S., Prochazka, B. G., Hanser, S. E., & Wiechman, L. A. (2022b) Defining biologically relevant and hierarchically nested population units to inform wildlife management. Ecology and Evolution, 12, e9565. https://doi.org/10.1002/ece3.9565.

[75] *See* Appendix A at 33-5.

[76] *See* Appendix A at 3; Bush, K. (2009) Genetic diversity and paternity analysis of endangered Canadian Greater Sage-Grouse (*Centrocercus urophasianus*). Ph.D. dissertation, University of Alberta, Edmonton, Alberta, Canada; Bush, K.L., Aldridge, C.L., Carpenter, J.E., et al. (2010) Birds of a feather do not always lek together: genetic diversity and kinship structure of greater sage-grouse (Centrocercus urophasianus) in Alberta. The Auk 127(2):343−353; Bush, K.L., Dyte, C.K., Moynahan, B.J., Aldridge, C.L., Sauls, H.S., Battazzo, A.M., Walker, B.L., Doherty, K.E., Tack, J., Carlson, J., Eslinger, D., Nicholson, J., Boyce, M.S., Naugle, D.E., Paszkowski, C.A., and Coltman, D.W. (2011) Population structure and genetic diversity of greater sage-grouse (*Centrocercus urophasianus*) in fragmented landscapes at the northern edge of their range. Conservation Genetics. 12:527–542; Tack, J.D., Naugle, D.E., Carlson, J.C., and Fargey, P.J. (2012) Greater Sage-Grouse *Centrocercus urophasianus* migration links the USA and Canada: A biological basis for international prairie conservation. Oryx 46:64–68.

[77] *See* Appendix A at 41.

[78] *See* Appendix A at 40.

[79] *See* Appendix A at 36.

5, or 6 oscillations are used to calculate population trends.[80] Such a variance highlights further methodological flaws underlying the TAWS approach.

Likewise, the TAWS approach carries a significant likelihood of false alarms, which will lead to uncertainty and delays. There are numerous examples found in Coates et al. (2021) of warnings being applied by the TAWS to neighborhood clusters that otherwise showed an increasing population trend.[81] Issues associated with false alarms will be compounded by one of the key features of TAWS, i.e., the causal factor analysis. As proposed, if a warning is triggered, further activity in the affected area may be shut down until a causal factor analysis is completed. However, BLM has failed to demonstrate that it will be able to complete causal factor analyses in response to such false alarms in a timely fashion. Furthermore, there is a low likelihood that causal factors can be determined with any degree of certainty due to the inherent complexity of ecosystems and the limited area and low number of leks in neighborhood clusters. As a result, TAWS will become a vehicle for imposing a freeze on development.

Although agencies receive a certain amount of deference for the modeling they select, such discretion is not unlimited.[82] An agency's selection of modeling should fit the circumstances to which it applies, and if there is no rational relationship between the model and the circumstances, the agency's use of the model is arbitrary and capricious.[83] Due to the lack of data availability concerning population trends and lek counts, it is impossible to confirm that BLM's reliance on the modeling underlying TAWS is not arbitrary and capricious. BLM needs to provide additional information on the data and modeling underlying its Draft RMPA/EIS because the Bureau is required to "adequately explain the reasons for its policy choice" and cannot do so without providing more information.[84]

Overall, the TAWS needs substantial overhaul, greater transparency in methods and data utilized, and a fully independent vetting prior to being considered as a basis for any land management decisions. Due to all of the issues identified above, the use of TAWS at this point should be nothing more than advisory in nature.

VI. BLM Should Defer to the States on Compensatory Mitigation

The Associations recognize that mitigation, including compensatory mitigation, can play an important role in GRSG mitigation. However, BLM must recognize the limits on its authority to require compensatory mitigation.

A number of states include compensatory mitigation as part of their programs for conserving GRSG. For example, the State of Wyoming has a detailed compensatory mitigation program for GRSG that includes a debit and credit system (including both conservation and

[80] *Id.*
[81] *See* Appendix A at 37-40.
[82] *See Chem. Mfrs. Ass'n v. E.P.A.*, 28 F.3d 1259, 1265 (D.C. Cir. 1994) ("judicial deference to the agency's modeling cannot be utterly boundless").
[83] *See id.*; *see also Edison Elec. Inst. v. U.S. E.P.A.*, 2 F.3d 438 (D.C. Cir. 1993) (speculative factual assertions are insufficient to demonstrate a rational relationship between an agency's selection of modeling and a specific application of such modeling).
[84] *See Small Refiner Lead Phase-Down Task Force v. U.S.E.P.A.*, 705 F.2d 506, 536 (D.C. Cir. 1983)

restoration credits) that tailors the compensatory mitigation required to the nature and location of the impact.[85] These state compensatory mitigation programs are founded in state authority. The Associations' members have worked with state authorities to implement these compensatory mitigation requirements.

However, BLM's authority to impose compensatory mitigation requirements does not stand on similarly solid legal ground. FLPMA does not expressly authorize BLM to impose compensatory mitigation requirements on users of public lands. FLPMA's statutory silence on compensatory measures stands in stark contrast to other environmental law provisions. For example, EPA and the U.S. Army Corps of Engineers have promulgated compensatory mitigation requirements for Clean Water Act (CWA) Section 404 permits.[86] These agencies' authority to require compensatory mitigation has effectively been ratified by Congress pursuant to Section 314 of the National Defense Authorization Act (NDAA) for Fiscal Year 2004.[87] In addition, the U.S. Fish and Wildlife Service (FWS) requires mitigation measures pursuant to permits for incidental take of endangered and threatened species under Section 10 of the ESA in accordance with the provisions of the Act.[88]

Unlike the implementing regulations of these environmental laws, BLM has not identified a source of authority in FLPMA or the MLA authorizing the Bureau to impose compensatory mitigation requirements aside from its own Mitigation Handbook. And without any express statutory basis, BLM's proposed compensatory mitigation approaches would be unlawful because the agency "literally has no power to act."[89]

In light of the above, the Associations believe that the appropriate approach is for BLM to defer to the states on compensatory mitigation and make any compensatory mitigation beyond state requirements voluntary. Such an approach would make use of state expertise regarding GRSG conservation while avoiding questions regarding the extent of BLM statutory authority.

VII. BLM Must Be Transparent and Make All Science on Which it Bases its Analysis Available to the Public

A. The Draft RMPA/EIS Lacks a Supporting Scientific Record Along with an Explanation as to How It Aligns with Existing Law

In addition to the legal flaws discussed above, the Draft RMPA/EIS lacks meaningful discussion of the scientific basis of the Bureau's proposed approach and how it harmonizes with

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[85] *See* State of Wyoming EO2019-3 (*Greater Sage Grouse Core Area Protection*), Appendix F.

[86] *See* 40 C.F.R. pt. 230 ("Compensatory Mitigation for Losses of Aquatic Resources").

[87] Pub. L. No. 108-136, § 314(b), 117 Stat. 1392, 1431 (2003) ("establishing performance standards and criteria for the use, consistent with section 404 of [the CWA], of on-site, off-site, and in-lieu fee mitigation and mitigation banking as compensation for lost wetlands functions in permits issued by the Secretary of the Army under such section").

[88] 16 U.S.C. § 1539(a)(2)(A)(ii) (permit applicant must identify steps to minimize and mitigate the impacts of a taking).

[89] *See FEC v. Cruz*, 142 S. Ct. 1638, 1649 (2022) (quoting *La. Pub. Serv. Comm'n v. FCC*, 476 U.S. 355, 374 (1986)); *see also Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, 223 (2009) (discussing how "statutory silence, when viewed in context, is best interpreted as *limiting* agency discretion" (emphasis added)); *Buffington v. McDonough*, 143 S. Ct. 14, 19 (2022) (Gorsuch, J., dissenting from denial of certiorari) ("A rule requiring us to suppose statutory silences and ambiguities are both always intentional and always created by Congress to favor the government over its citizens . . . is neither traditional nor a reasonable way to read laws. It is a fiction through and through.").

existing law. The Administrative Procedure Act prohibits arbitrary and capricious rulemaking,[90] and requires agencies to provide a reasoned explanation and to consider important aspects of a problem.[91] In its current form, the Draft RMPA/EIS fails to provide meaningful discussion of scientific record support for its provided alternatives.

In the Draft RMPA/EIS, BLM represents that several of the Alternatives will incorporate new information and science that have become available since it previously undertook amendments to the GRSG conservation provisions of its RMPs,"[92] and use the "best available science".[93] But nothing in the Draft RMPA/EIS or the Draft RMPA/EIS notice indicates that the Bureau has grappled with identifying the "best available science" for assessing land use in this particular context, where the Multiple Use Framework governs. No part of the Draft RMPA/EIS nor the Draft RMPA/EIS notice describes in detail BLM's methodology in designing the Alternatives or why the TAWS approach is scientifically acceptable in light of legal and regulatory requirements.

The Information Quality Act directed the White House Office of Budget and Management (OMB) to issue government-wide guidelines "for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by federal agencies," and further required each agency to issue their own information quality guidelines following OMB guidance.[94] In its own information quality guidelines, BLM acknowledges the importance of data transparency, "recogniz[ing] that influential information should be subject to a high degree of transparency about data and methods to facilitate the reproducibility of such information by qualified third parties and to an acceptable degree of precision."[95] The Draft RMPA/EIS falls short of these data quality requirements.

B. Data Underlying TAWS and Genetic Data Should Be Made Public

The Draft RMPA/EIS also suffers from the fact that BLM has not made key data underlying its proposed approach publicly available. For example, the data and computer code underlying TAWS have not been made public. Government researchers and their collaborators have access to the data and code, yet independent researchers and affected parties do not. Reproducing the results in Coates et al. (2021, 2022), which details the TAWS, is not possible because the rangewide lek count data used in those papers (including O'Donnell et al. 2019) are held by the Western Association of Fish and Wildlife Agencies (WAFWA). WAFWA is a 501c3, which gathers and compiles lek location and count data from states but those data are not public and WAFWA is not subject to FOIA because it is a private charity. Therefore, independent review and analysis of those data is not possible. It is also not possible to obtain lek location and count data from certain states, such as Colorado, due to a state statute preventing such data collected on private land from being released without permission of the landowner. Repeatability and scientific integrity cannot be achieved until the lek count data are made available to other researchers. The lack of data

[90] 5 U.S.C. § 706(2)(A).
[91] *See FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515–16 (2009).
[92] 89 Fed. Reg. at 18,965.
[93] *See e.g.*, Draft RMPA/EIS at 2-26, -156, -169, -170.
[94] Public Law No. 106-554 ("Information Quality Act").
[95] BLM, Information Quality Guidelines, p.8 (https://www.blm.gov/sites/default/files/documents/files/BLM_Info_Qual_Guidelines.pdf).

availability essentially renders the results of Coates et al. (2021, 2022) as equivalent to a "black box model" (i.e. a model whose inputs and inner workings are opaque or not readily interpretable), which contravenes the principles laid out in BLM's Information Quality Guidelines.[96]

Genetic data (*i.e.*, individual microsatellite genotypes and their locations) are likewise not public, precluding any independent analysis of data used in justifying nodes of connectivity among populations/ACECs.

VIII. The Alternatives Being Considered by BLM Have Significant Flaws

BLM has identified six alternative approaches for management of GRSG habitat that it is considering incorporating into RMPs. While the Associations find merit in various aspects of some of the alternative approaches, many aspects of these alternatives are problematic and should be reconsidered and revised before the Bureau adopts any alternative.

A. Alternative 6 – BLM Has Not Established a Basis for Designating 11 Million Acres as ACECs

The principal feature of Alternative 6 is that it would include the designation of 11,139,472 acres of PHMA as ACECs. However, as discussed in API's recent comments on BLM's process for identifying areas for potential designation as ACECs, the Draft RMPA/EIS does not establish a basis for designating any of the 11 million acres as ACECs. The Bureau's existing regulations require that, to be eligible for designation as an ACEC, an area must have (i) relevance, such as a fish or wildlife resource, and (ii) importance, i.e., substantial significance.[97] Appendix 5 states that the areas considered for designation meet both of these criteria because they contain habitat that is valuable for all GRSG life stages, including lekking, brood-rearing and winter range.[98]

However, as BLM recognizes in Appendix 5, in order to qualify as an ACEC, an area of relevance and importance must also require special management.[99] This requirement – long described in BLM's ACEC Manual – has now been codified through the Bureau's recent revisions to its ACEC regulations as part of the Public Lands Rule.[100] The preamble to the Public Lands Rule emphasizes that special management attention must be necessary for the protection of the values in question, not just beneficial.[101] "Special management attention" means management prescriptions that protect and prevent irreparable damage to the relevant and important values of the area that would not be prescribed if the relevant and important values are not necessary.[102] "Irreparable damage" is defined as harm to a resource that substantially diminishes the relevance or importance of the resource in such a way that recovery of the resource to the extent necessary to restore its prior relevance or importance is *impossible*.[103]

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[96] *See* Appendix A at 40.
[97] 43 C.F.R. § 1610.7-2(a).
[98] App. 5 at 5-3.
[99] *Id*.
[100] 43 C.F.R. § 1610.7-2(d).
[101] Prepublication Public Lands Rule at 92. ("The final element of the standard for ACEC designation means more than finding special management attention will benefit the identified values; rather, it requires a finding that special management is necessary for their stewardship.")
[102] 43 C.F.R. § 1610.7-2(d)(3).
[103] 43 C.F.R. § 1610.7-2(d)(3)(ii).

Appendix 5 describes BLM's process of assessing relevance and importance range-wide, the result of which was the identification of over 11 million acres of sage grouse habitat as having relevance and importance. Nothing in the Draft RMPA/EIS explains how the proposed ACECs *need* special management attention. In fact, under Alternatives 3 and 6, all 11 million-plus acres identified would be designated as ACECs, representing a judgement by BLM that every acre determined to be relevant and important needs special management attention.

Appendix 5 does not explain the basis for this conclusion. It is certainly not the case that special management is necessary to address impacts associated with oil and gas development. As discussed above, oil and gas development has evolved in ways that limit the impact of development activities on species such as the GRSG. This evolution has included the adoption of technologies to make oil and gas production more efficient, which in turn results in minimization of impacts on the environment.

In light of this evolution, oil and gas development would not be expected to harm GRSG habitat in such a way that recovery of the resource to the extent necessary to restore its prior relevance or importance is *impossible*. The life of an oil and gas well is finite, and research has shown that restoration of well pads is possible. In fact, recent research has shown that restored well pad sites can provide better GRSG habitat than pre-existing conditions. Thus, GRSG and oil and gas development can co-exist and there is no need to exclude all oil and gas development from over 11 million acres of GRSG habitat.

In addition, the foundation established by BLM for its assessment of potential ACECs is itself flawed. As described in Appendix 5, the Bureau's process began with a range-wide preliminary analysis based on a review of a series of "spatial layers," which consists of a group of eight papers identified in the Appendix. However, several of these papers are characterized by significant limitations that call into question their suitability as a basis for a regulatory review that could result in millions of acres being placed off-limits to various forms of productive use. For example, one of the "layers" is a 2022 paper by Oyler-McCance *et al*. regarding strategies for characterizing genetic structure in wide ranging, continuously distributed species such as the GRSG.[104] Their analysis is based on selectively-neutral genetic markers (microsatellites) that occupy non-transcribed sections of DNA between functional genes, and therefore have no role in GRSG survival, are not subject to natural selection, nor are of adaptive importance. Moreover, the authors do not address the impact on their analysis of the translocation of thousands of GRSG in Wyoming, Utah and Idaho. These same concerns apply to another "layer," i.e., the 2018 paper by Cross *et al*.[105]

Another of the "layers" is a 2021 paper by Rigge *et al*. regarding projected impacts on sagebrush habitat as a result of climate change.[106] This paper modeled potential future land cover, including sagebrush, based on two CO_2 emission scenarios, i.e., RCP 4.5 and RCP 8.5. However, in presenting their results, the authors focus on the RCP 8.5 scenario, which constitutes a worst-

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[104] Oyler-McCance, SJ et al., *New strategies for characterizing genetic structure in wide-ranging, continuously distributed species: A Greater Sage-grouse case study,* Plos one (2022 Sept. 13); 17(9):e0274189.

[105] Cross et al., *The genetic network of greater sage-grouse: Rangewide identification of keystone hubs of connectivity.*

[106] Rigge, M., et al., *Projected change in rangeland fractional component cover across the sagebrush biome under climate change through 2085,* Ecosphere 12(6):e03538.10.1002/ecs2.3538

case analysis.[107] This unrealistic, worst-case scenario is misleading because it "paints a dystopian future that is fossil-fuel intensive and excludes any climate mitigation policies, leading to nearly 5 °C of warming by the end of the century."[108] Moreover, if this scenario were to occur, it would be characterized by substantially increased CO_2 levels that would actually promote plant growth, a phenomenon the authors acknowledge but do not take into account in their modelling, thereby enhancing its unrealistic, "worst case" nature. Thus, many of the "layers" that serve as the basis for BLM's analysis include significant flaws, compromising the entire analysis.

In short, BLM has not established a basis for the adoption of Alternative 6. At the same time, BLM's selection of Alternative 5 as the preferred alternative reflects a judgment by the Bureau that the designation of 11 million acres of ACECs is not necessary to conserve GRSG. The Associations concur with this judgment.

B. Alternative 4 – BLM Must Address New Science in a Balanced Way

The key feature of Alternative 4 is that it would adjust GRSG management areas based on "new science." However, some of the "new science" papers on which BLM relies are subject to significant limitations while the Bureau ignores other recent papers that are not consistent with the approaches BLM advocates.

The significant limitations and drawbacks to the Bureau's approach to "new science" are discussed above in Section V. They include the following:

- Reliance on papers that use genetics to identify habitat/connectivity needs;
- Failure to acknowledge recent research that demonstrates the limited impacts of modern oil and gas development techniques on GRSG and GRSG habitat and the improvement in GRSG habitat that can result from restoration of sites of oil and gas infrastructure;
- Reliance on papers addressing the impact of climate change on GRSG that use worst-case assumptions;
- Failure to acknowledge the effect of the Pacific Decadal Oscillation on regional climate conditions and its resulting impact on GRSG population fluctuations; and

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[107] Pielke Jr,, JR, *How Climate Scenarios Lost Touch With Reality: A failure of self-correction in science has compromised climate science's ability to provide plausible views of our collective future*, Issues in Science and Technology, vol. 37, no. 4, p. 74-83 (2021) ("RCP8.5—the most commonly used RCP scenario and the one said to best represent what the world would look like if no climate policies were enacted—represents not just an implausible future in 2100, but a present that already deviates significantly from reality").

[108] Hausfather Z, Peters, GP, *Emissions – the 'business as usual' story is misleading*, Nature, p. 618-620 (2020), https://doi.org/10.1038/d41586-020-00177-3; Pielke Jr, et al., *Plausible 2005–2050 emissions scenarios project between 2 °C and 3 °C of warming by 2100*, Environmental Research Letters 17 024027 (2022), https://iopscience.iop.org/article/10.1088/1748-9326/ac4ebf/meta#erlac4ebfs5 ("the likelihood of high emissions scenarios such as RCP8.5 or SSP5-8.5 is considered low" (citations omitted)).

- Failure to acknowledge the role played by raven predation GRSG eggs and chicks and the importance of addressing this threat.

The combined effect of these issues and others on the delineation of management areas has the potential to be significant. As a result, BLM must reassess the identification of management areas as described under Alternative 4 as well as the management measures applied to those areas.

C. Alternative 3 – There Is No Basis for Designating All Habitat as Priority Habitat

Alternative 3 gives rise to the same concerns as Alternative 4 with respect to the influence of BLM's approach to "new science" on the identification of GRSG management areas. These concerns would be heightened under Alternative 3, which would include even more expansive habitat management areas than Alternative 4. Moreover, Alternative 3 compounds these concerns by treating all identified management areas as priority habitat management areas in order to provide the greatest measures to protect and preserve GRSG and its habitat among the alternatives. In addition, under Alternative 3, all management areas would be closed to new fluid mineral leasing. As a result, the adoption of Alternative 3 would result in over 69 million acres being declared off-limits to new oil and gas leasing.

There is no basis for such widespread restrictions. To the extent the expansiveness of the HMAs under Alternative 3 is due to the application of a flawed approach to "new science," that identification is called into question by the issues discussed above in connection with Alternative 4.

More importantly, there is no valid basis for treating all HMAs as PHMAs and closing all areas to fluid mineral leasing. As discussed in Section V above, the manner in which oil and gas development would be pursued under any new lease – particularly the use of horizontal drilling to minimize the number of well pads and associated roads and other infrastructure needed to support well pad construction, drilling, completion and production – would minimize any impacts on GRSG and sagebrush habitat. Impacts are typically further minimized through scheduling of clearing, drilling and completion activities outside of sensitive periods for GRSG. Through the use of such measures, oil and gas development can coexist with GRSG populations and even improve GRSG habitat over time.

Moreover, the approach reflected in Alternative 3 would assume that all GRSG habitat is of high conservation value, even if it is low value habitat or previously degraded in some fashion. Such an approach would ignore on-the-ground realities. Indeed, BLM recognizes that HMAs may include areas that do not even qualify as habitat.[109] This approach would also be inconsistent with the multiple-use framework, which contemplates making accommodations among uses of public lands where such accommodations are practicable. Such coexistence is clearly possible with GRSG and oil and gas development. As a result, BLM should reject Alternative 3.

[109] Draft RMPA/EIS at 2-19.

D. Alternative 5 – The TAWS System Should Not Guide Adaptive Management

The Associations believe that there are a number of aspects of Alternative 5 that are worthy of inclusion in any alternative adopted by BLM. Among other things, under Alternative 5, an effort would be made to balance GRSG conservation with public land uses. This approach is consistent with the FLPMA multiple use framework under which BLM operates.

In addition, Alternative 5 would give a greater role to state agencies in establishing and implementing management measures for GRSG habitat. For example, if state governments updated their GRSG management area boundaries under their respective state plans, BLM would consider those boundaries in establishing its own management areas. This approach is appropriate given that the states have primary responsibility for managing GRSG populations and have amassed considerable expertise in conserving those populations within their borders in light of the conditions found in each state.

At the same time, Alternative 5 includes features that are problematic. The Associations' principal concern with Alternative 5 relates to its approach to adaptive management, which is based on the TAWS system. As discussed in Section V above and in Appendix A, TAWS is not well-developed enough and has not been sufficiently vetted to play such a prominent role in a regulatory framework. The way in which BLM has proposed to use TAWS is based on assumptions about the timely collection of new GRSG population data and the ability to conclude a causal factor analysis in a timely manner that are quite unrealistic. Moreover, the basic framework of TAWS as it currently exists is based on categorizations – neighborhood clusters and climate clusters – that need further vetting because they do not represent closed populations and are not supported by recent data. As a result, TAWS may trigger false alarms that will lead to inconclusive, drawn-out causal factor analyses, with activities in the affected areas unnecessarily shut down in the interim. Thus, while TAWS results could be used in an advisory fashion, BLM should not rely on the system to dictate adaptive management.

E. Alternative 2 Includes Elements That Remain Worthy of Consideration

While it is the subject of ongoing litigation, Alternative 2 nevertheless includes many elements that remain worthy of BLM's consideration as it decides how to manage GRSG habitat. In particular, Alternative 2 relies to a greater extent on state programs and allows for more diversity among the programs applicable to various states that reflect conditions within those states. This flexibility is entirely appropriate in light of the statutory mandates under which BLM operates.

FLPMA specifically requires that land use plans "***shall*** be consistent with State and local plans to the maximum extent consistent with Federal law." 43 U.S.C. § 1712(c)(9) (emphasis added); 43 C.F.R. § 1610.3-2.[110] As discussed above, the overarching federal law applicable to BLM land management is found in FLPMA, which directs the Bureau to manage federal land under a framework of multiple use and sustained yield. There is nothing inherent in this framework that suggests that BLM should not work with state agencies that have relevant expertise in

[110] NEPA itself requires that federal agencies responsible for preparing NEPA analyses and documentation, including BLM, do so "in cooperation with State and local governments" and "use all practical means" to do so. 42 U.S.C. §§ 4331(a) & 4332(2); 40 C.F.R. §§ 1501.6 & 1508.5.

managing resources for which the states have trust responsibilities.[111] The court in the pending litigation recognized that seeking to better align its RMPs with plans developed by the states was well within BLM's discretion.[112] The Bureau should continue its efforts to coordinate its RMPs with state plans.

IX. Conclusion

The Associations respectfully requests that BLM substantially modifies its selected Alternative to address these comments. The Associations urge BLM to focus its efforts on ensuring productive use of public lands consistent with the existing Multiple Use Framework and in a manner that places all sources of energy production on a level playing field.

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[111] FWS also has expertise with respect to GRSG conservation. However, state wildlife agencies continue to play a central role in GRSG conservation.

[112] *Western Watersheds Project v. Schneider*, No. 1:16-cv-83 (D. Idaho Oct. 16, 2019), at 11.

APPENDIX A

A Detailed Assessment of the Targeted Annual Warning System

Summary:

The Targeted Annual Warning System (TAWS) described by Coates et al. (2021, 2022) and Prochazka et al. (2023), appears to provide a potentially objective alternative to the use of arbitrary, population "triggers" for implementing additional conservation measures for Greater sage-grouse (GRSG). However, as currently proposed (Coates et al. 2021, 2022), TAWS is a work-in-progress that will require additional refinement in methodology and greater transparency in data, rationale, and methodologies.

Utilizing a clustering algorithm to group leks based on 2-dimensional graph distance developed by O'Donnell et al. (2019, 2022a, 2022b[113]), the authors subdivided the range of GRSG into 485 "neighborhood clusters," and 6 "climate clusters." Then they modeled trends at three scales: lek, neighborhood cluster, and climate clusters in order to produce "watches" and "warnings" of potential population declines, or "no watch or warning." Watches and warnings were assigned based on comparisons of the rate of decrease of leks and neighborhood clusters relative to the climate clusters they are found in, as described by (Coates et al. 2021):

> …we developed two categories for multi-year signaling events referred to as 'watches' and 'warnings.' We assigned watches to populations that had slow signals [of decline compared to climate clusters] over 2 consecutive years. We assigned warnings to populations that had slow signals [of decline compared to climate clusters] in 3 out of 4 consecutive years or fast signals [of decline] in 2 out of 3 consecutive years. Watches may identify the need for intensive monitoring whereas warnings may identify the need for management intervention aimed at stabilizing populations.

The authors described the potential utility of their TAWS system as follows:

> Findings herein fill a prominent information gap to help inform current assessments of sage-grouse population trends at nested spatial and temporal scales for the Western Association of Fish and Wildlife Agencies. This study also highlights a 'targeted annual warning system' (TAWS) solution for managers that could be used to identify where and when management action is likely to benefit declining populations of sage-grouse at the appropriate spatial scale. The TAWS could potentially be modified to evaluate effectiveness of conservation efforts. Findings are also intended to provide timely scientific information for state and federal land use plans and conservation credit systems.

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[113] For the rationale of Coates et al. (2021) used to define and choose cluster Level 2 for neighborhood clusters and Level 13 for climate clusters, one must refer to O'Donnell et al. 2022a and 2022b (*Defining fine-scaled population structure among continuously distributed populations* and *Defining biologically relevant and hierarchically nested population units to inform wildlife management*). Although published after Coates et al. (2021), those papers describe the method and rationale developed for and used in Coates et al. (2021). Importantly, O'Donnell et al. (2022b) presented clustering results graphically, with each of the 13 different cluster levels, from the fine-scale Level 1 (with 650 "subpopulations") to coarse-scale Level 13 (climate clusters, with 6 "populations") (see figures 4 to 6 in O'Donnell et al. 2022b).

Coates et al. (2021, Appendix 1) define neighborhood clusters as follows:

> Refers specifically to cluster scale 2 of the graph-based clustering algorithm process, the smallest scale to represent a closed population unit minimizing births, deaths, immigration, and emigration. This cluster represents local aggregations of leks and contrasts population trends at scales conducive to management action.

Coates et al. (2021, Appendix 1) define climate clusters as follows:

> Refers specifically to cluster scale 13 of the graph-based clustering algorithm process, whereby population dynamics are likely driven by larger scale variations, such as climate, that affect fluctuations in population abundance that reflect periods of oscillation of sage-grouse and are likely less manageable by direct intervention.

Issues of Significance that preclude use of TAWS as a regulatory decision-making tool:

While Coates et al. (2021, 2022) appears to be a step in the right direction for monitoring and adaptive management of GRSG populations, it is not the silver bullet that it appears to be. The reasons why are detailed below.

1) No probabilistic assessment of confidence in watches or warnings.

As an initial matter, the TAWS needs to incorporate a probabilistic assessment as to how reliable each "watch" or "warning" assignment is.

Significance: Such an assessment would allow managers, decision makers and the public to evaluate the confidence of those assignments, as opposed to assignments being made with an unknown level of confidence (i.e., like those produced from a "black box" analysis).

2) Time lag between annual census data and TAWS results: currently two years and counting.

For TAWS to be a potentially useful adaptive management tool, analyses need to be run annually with the most current and complete data. The original Coates et al. (2021) paper used data gathered through 2019, an updated version (Coates et al. 2022) was released with additional data from 2020 and 2021, and a modified methodology. However, since 2021, numerous populations in core areas have increased, consistent with a natural population cycle following a low ebb in 2019-2020. As of October 2023, there had not been an update using 2022 or 2023 lek count data.

Significance: The current one to two-year lag between data produced and analysis of results raises the question of whether results can ever be produced in a timely manner to be useful to GRSG management.

3) Leks, and so-called "neighborhood clusters" and "climate clusters" are not equivalent to closed populations, as assumed by Coates et al. (2021).

Leks are specific locations where sage grouse traditionally congregate to mate in the spring. Radio tracking and genetic data show that male and female GRSG use of leks is dynamic, and GRSG will move among leks or disperse to increase mating opportunities, in response to local environmental conditions, disturbance and density dependence. Therefore, a decline at one or a handful of leks is not necessarily an indication that the surrounding *population* has declined, as assumed by Coates et al. (2021, 2022).

The 483 local, ***Neighborhood clusters*** and 6 ***Climate Clusters*** evaluated by Coates et al. (2021, 2022) are statistical artifacts of the clustering method and simplifying assumptions used; they are not equivalent to any previously described GRSG populations or subpopulations, nor state-level sage grouse management units.

Significance: Contrary to decades of GRSG literature and basic population biology, Coates et al. (2021, 2022) conflated leks and neighborhood clusters with *populations*, which are at very different scales. This is not simply an issue of semantics; it has implications for how GRSG could be managed in the future. First, inadequate sample sizes (too few leks) will inevitably lead to erroneous conclusions regarding neighborhood cluster trends, resulting in wasted conservation effort and unnecessary regulation. Second, the more subdivided the range of a species is, the more threatened these smaller subunits may appear to be, even though the much larger population is stable. Third, Coates et al. (2021, 2022) ignore decades of data, including recent genetic data, that demonstrate long-distance movements (i.e., movements of 60 – 300 km) by GRSG during dispersal beyond natal leks and during seasonal migrations, and genetic data that reveal low levels of population structure. Those studies include but are not limited to: Patterson 1952; Connelly and Markam 1983; Lyon 2000; Bush et al. 2009, 2010, 2011; Tack et al. 2011; Smith 2012; Reinhart et al. 2013; Fedy et al. 2012; Cross et al. 2017, 2023; and Oyler-McCance et al. 2022. By ignoring this body of literature, Coates et al. (2021, 2022) and O'Donnell et al. (2022b) create a misleading impression that their neighborhood clusters are effectively "closed populations" with little or no emigration or immigration.

4) Neighborhood clusters and Climate Clusters are not congruent with recent genetic data used to define populations and subpopulations of GRSG.

The neighborhood clusters and climate clusters described by Coates et al. (2021, 2022) and O'Donnell et al. (2022b) on the basis of GIS analyses are inconsistent with recent genetic data and analyses published by Oyler-McCance et al. (2022). That study recognized no more than 8 populations of GRSG (including Washington and Bi-State DPS, Figure 3, below) and just 12 subpopulations (Figure 4, below). More specifically, the boundaries of the neighborhood and climate clusters are not congruent with the population and subpopulation groupings based on genetic data. For example,

- Coates et al.'s (2021, 2022) climate cluster "D" extends across northeastern Utah, Northwestern Colorado, the eastern half of Wyoming, western North Dakota, and the greater part of Montana (see below), whereas Oyler-McCance et al. (2022) recognized only four populations across a similar area but those ranges collectively extend well beyond climate cluster "D" and into other climate clusters.

- Similarly, climate cluster "E" in northeastern California, Oregon, Nevada, Idaho, and southwestern Montana overlaps parts of four populations recognized by Oyler-McCance et al. (2022) that also extend into climate clusters "D" and "F."
- Climate cluster "F" overlaps parts of three of Oyler-McCance (2022) populations.
- Climate cluster "C" comprises a small number of leks in the Jackson Hole, Wyoming area whose genetic affinities are equivocal, as they share characteristics of surrounding areas.
- Other, higher cluster levels (see Figures 4,5, and 6 from O'Donnell et al. 2022b), including clusters 11 and 12, show similar discontinuities with populations and subpopulations recognized by Oyler-McCance et al. (2022) on the basis of genetic data.
- Inexplicably, Coates et al.'s (2021, 2022) and O'Donnell et al. (2022b) designate the California-Nevada Bi-state population, Washington state, and Jackson Hole as separate climate clusters on the basis of previously published genetic data but make no mention of the Oyler-McCance et al. (2022) results, despite all working at the same agency (USGS) and having coauthored papers together. The fact that the research and results by Oyler-McCance et al. (2022) was ignored by Coates et al. (2021, 2022), as well as by the authors of a recently published paper on TAWS, Prochazka et al. (2023), indicates a bias to ignore other science that does not agree with their model and to treat neighborhood clusters as if they were populations.
- The ad-hoc rationale used by Coates et al. (2021, 2022) and O'Donnell et al. (2022b) to designate a group of 17 leks in the Jackson Hole area as a separate climate cluster on the basis of isolation is in error. That is because both Coates et al.'s (2021, 2022) papers erroneously cited Oyler-McCance et al. (2005) as genetic data showing isolation of the Jackson Hole population, despite the fact that Oyler-McCance et al. (2005) never sampled the Jackson Hole area (see Figure 5 of Oyler-McCance et al. 2005 for absence of sampling of Jackson Hole area).

  Furthermore, this Jackson/Gros Ventre area is separated from the Pinedale to the south by a distance of less than 15km, which is not a barrier to GRSG movement. That conclusion is borne out in population pairwise F_{ST} values in Table 2 of Schulwitz et al. (2014). Those reveal a low level of differentiation, and therefore, a high gene flow (i.e. $F_{ST} = 0.073$[114]) between Jackson Hole and North Pinedale to the south, resulting from gene flow or retention of ancestral genetic variation among populations. In fact, the genetic structuring between the Jackson and Gros Ventre areas was higher (0.083), which means there was less gene flow between them than between Jackson Hole and Pinedale, despite Jackson and Gros Ventre being in the same Level 13 climate cluster.

[114] F_{ST} values are a measure of genetic differentiation among populations which can range between zero (no isolation) to 1.0 (complete isolation).

Oyler-McCance et al. (2022) populations. Coates et al. (2021, 2022) climate clusters.

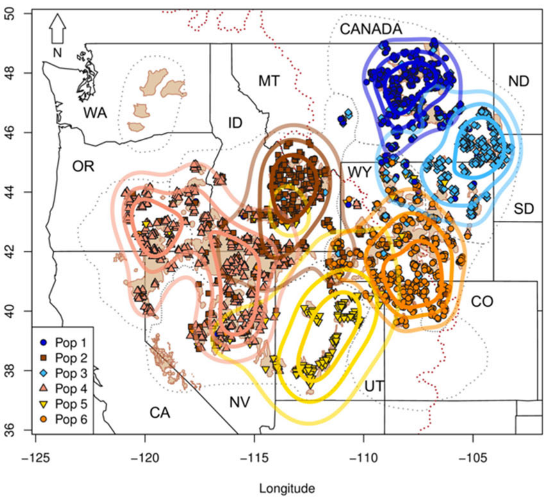

Fig 3. Boundaries of Greater Sage-grouse subpopulation centers at *K* = 6 from a STRUCTURE analysis using a 25% (darkest polygon), 50% (medium polygon), and 75% (lightest polygon) kernel density estimate to determine genetically distinct groups. The six different colors represent the six clusters identified in the STRUCTURE analysis. The dotted red line represents the Continental Divide. Tan polygons represent Priority Areas for Conservation and dotted black lines represent the seven sage-grouse management zones (MZ). State names are represented by the following abbreviations California (CA), Colorado (CO), Idaho (ID), Montana (MT), Nevada (NV), North Dakota (ND), Oregon (OR), South Dakota (SD), Utah (UT), Washington (WA), and Wyoming (WY).

https://doi.org/10.1371/journal.pone.0274189.g003

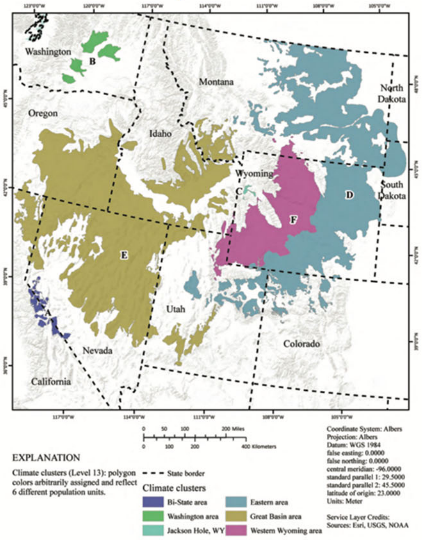

Figure 7. Greater sage-grouse (*Centrocercus urophasianus*) hierarchical population monitoring framework for climate clusters (level 13) in the western United States. A = Bi-State area, B = Washington area, C = Jackson Hole, Wyoming, area, D = eastern area, E = Great Basin area, F = western Wyoming area. Map image is the intellectual property of Esri and is used herein under license.
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Significance: This raises the question: which method is more biologically relevant for defining populations for trend analyses? Genetic data carries the signal of historic and current genetic and demographic connectivity among sage grouse, across the scale of individuals, leks, and populations range-wide. Therefore, it is arguably more biologically relevant than desktop GIS analyses, which are two-dimensional abstractions based on map distances among leks, heavily reliant on assumptions, and whose results are conjectures about what GRSG population connectivity *might* be. Testing the conjectures (neighborhood and climate clusters in Coates et al. 2021, 2022 and O'Donnell et al. 2022b) against genetic data reveals that they are lacking empirical support and that the TAWS clustering of leks need to be revised accordingly (or scrapped).

5) Movement data from nine months of the year as well as genetic data showing long-distance dispersal among leks was excluded.

The sage grouse movement data used in Coates et al. (2021, 2022) and O'Donnell et al. (2022b) only included data from VHF and GPS tracking devices from March 1–May 31. Data from the other nine months of the year were excluded from analyses, as well as long-distance migration and dispersal data from feather and blood samples (Bush et al. 2009, 2010, 2011; Tack et al. 2011).

Significance: The authors provide no proof that sage grouse only disperse from March 1 to May 31. Moreover, the genetic data demonstrate that: 1) movements occur among leks, subpopulations, and populations; 2) there is a consistent lack of genetic structure among local leks and clusters of leks; and 3) that sage grouse attending leks are, with few exceptions, genetically unrelated as per Bush et al. (2010, *Birds of a feather do not lek together*). By ignoring the above data and other research, Coates et al. (2021, 2022) and O'Donnell et al. (2022b) attempted to justify that their neighborhood clusters of GRSG are closed populations, which they are clearly not.

6) Neighborhood cluster trends can be different depending upon the time period used in the analysis.

The Coates et al. (2021, 2022) TAWS approach can produce different results regarding population trends (average annual rate of change lambda $\hat{\lambda}$) depending upon the number of oscillations (time periods) used in an analysis. For example, Figure 3 from Coates et al. (2022, below) shows neighborhood clusters in Wyoming and Montana as having generally positive rates of increase (as indicated by blue, teal, and green colors) when 1 or 3 oscillations were used to calculate trends, whereas a decreasing trend (indicated by yellow, orange, and red colors) was produced when the analysis used data from 2, 4, 5, or 6 oscillations.

Similar differences can be seen in range-wide results for neighborhood clusters and climate clusters, depending upon the number of oscillations used in the analysis. The fact that results varied depending upon the number of oscillations used is a significant problem because it underscores the arbitrary nature of the results produced by Coates et al. (2021). This same issue is also apparent in Coates et al. (2022), that used updated data from 2020 and 2021 (Figure 2 and 3 for climate cluster and neighborhood clusters respectively).

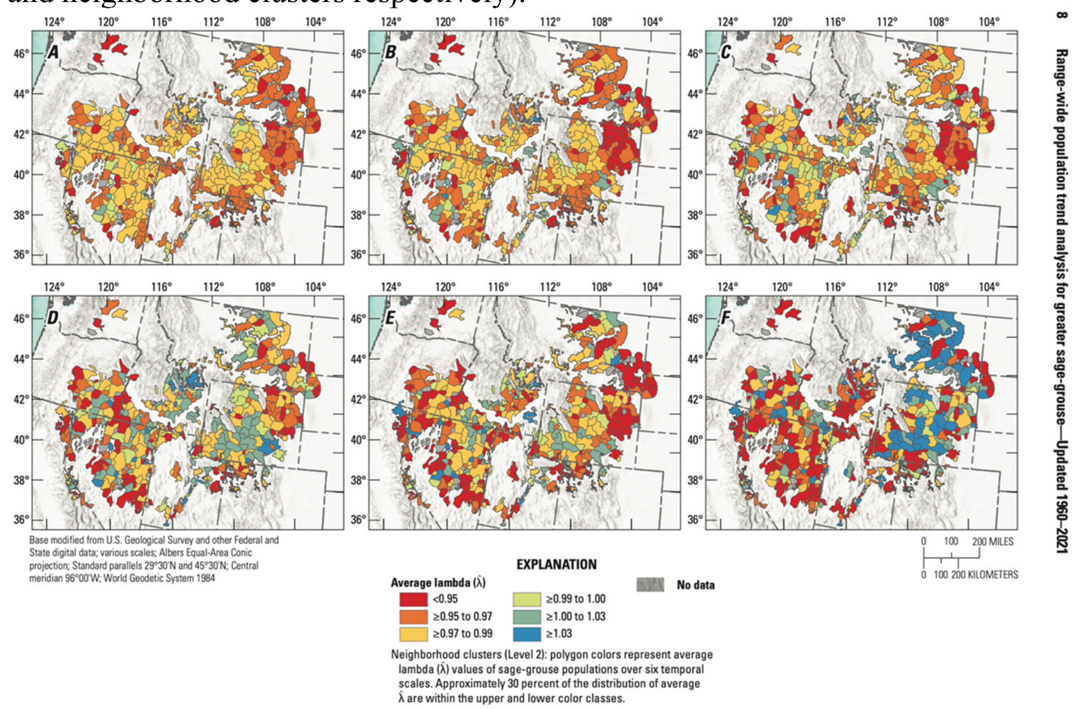

Figure 3. Range-wide spatial estimates of average annual rate of change ($\hat{\lambda}$) in abundance of greater sage-grouse (*Centrocercus urophasianus*) across six temporal scales based on periods of oscillation: *A*, Long (six periods); *B*, Medium/long (five periods); *C*, Medium (four periods); *D*, Short/medium (three periods); *E*, Short (two periods); and *F*, Recent (one period) for each neighborhood cluster. Map image is the intellectual property of Esri and is used herein under license. Copyright© 2020 Esri and its licensors. All rights reserved. Abbreviations: <, less than; ≥, greater than or equal to.

Figure 3 (above) is from Coates et al. (2022). Note that trends are different (positive or negative) depending upon the number of population oscillations used in the analysis.

7) False alarms: Warnings were assigned by the TAWS to neighborhood clusters that otherwise have shown positive recent population trends.

Numerous examples may be found in Coates et al. (2021) of warnings being applied by the TAWS to neighborhood clusters that otherwise showed an increasing population trend. An example of these can be seen by comparing warnings designated in Figure 4.50 of Coates et al. (2021) with population trend data in Table 4.14 of Coates et al. (2021) from Wyoming. (For clarity, these are identified in the figure and table below.) Wyoming was chosen for this comparison because it contains the highest densities and number of sage grouse of any state or province.

Significance: These apparent false alarms are problematic because it means that warnings can be erroneously issued based on the short time period that is used to signal a decline, compared to a full population cycle (oscillation) between nadirs. Warnings can be triggered by as short as 2 out of 3 consecutive years for “fast signals” of decline, or watches from 3 out of 4 consecutive years for “slow signals” of decline, when populations are declining in synchrony towards the low ebb (nadir) of their natural population cycle. However, those watches and warnings will be erroneous (like false alarms) when neighborhood clusters are actually increasing over the full population cycle between nadirs (a period between nadirs is referred to as an oscillation), an average of 9.4 years according to Coates et al. (2021). Additionally, warnings largely disappear during the upward trend following a nadir. Therefore, the criteria used in designating watches and warnings is in obvious need of rethinking and revision to prevent the waste of valuable public and private conservation efforts, as well as unnecessary regulation triggered by erroneous warnings.

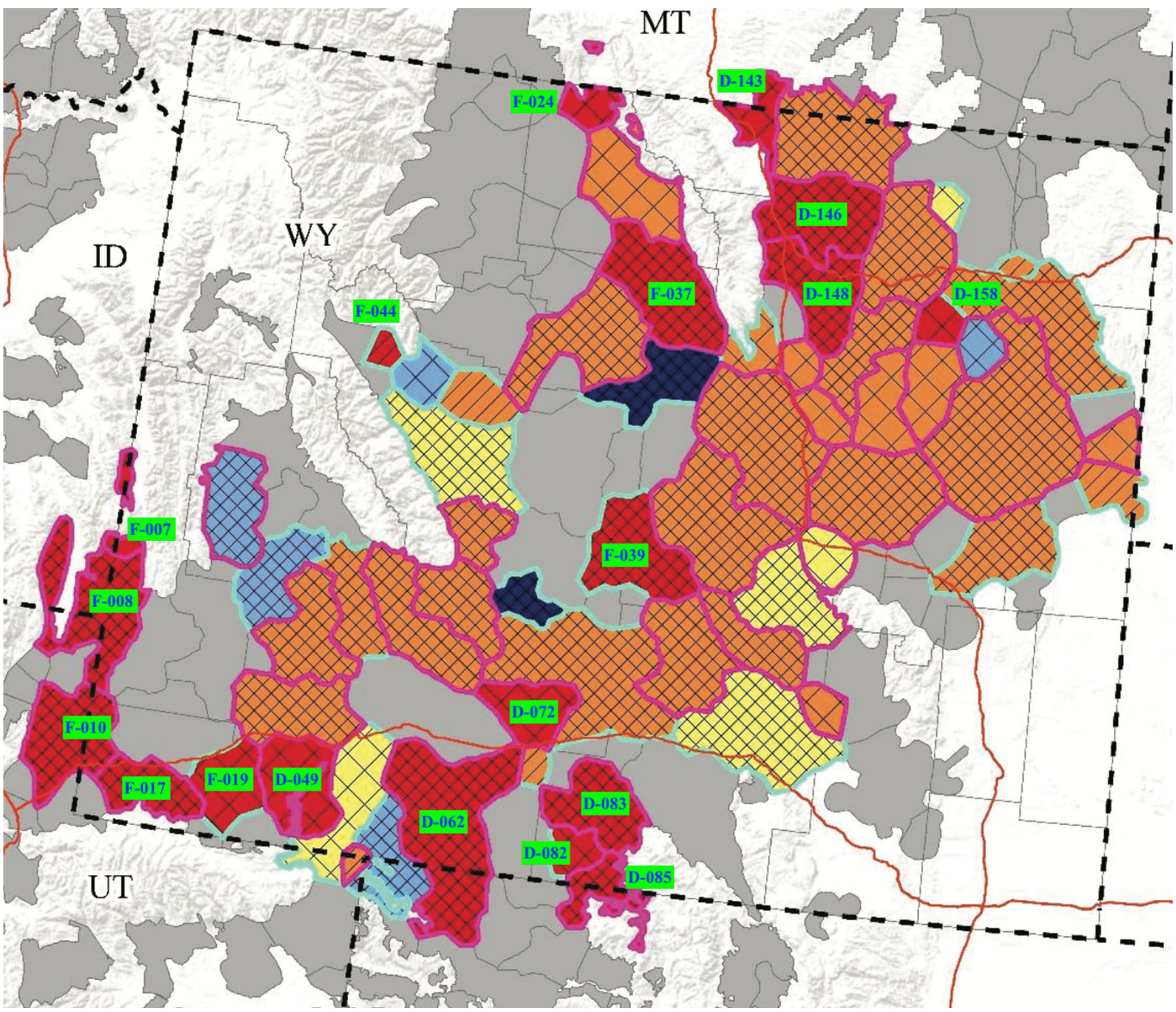

Figure 1. As shown in the figure above, watches and warnings of neighborhood clusters in Wyoming from 1990-2019 (with neighborhood cluster identifiers added to Figure 4.50 of Coates et al. 2021). Recent warnings (2015-2019, p 29) are in dark red with green labels. The numbered green labels identify neighborhood clusters listed in Table 4.14 of Coates et al. (2021).

Excerpts from Table 4.14 of Coates et al. (2021) (listed below in Table 1) provide a comparison between warnings issued for Wyoming neighborhood clusters from 2015 to 2019 and estimated population trends for each neighborhood cluster that was issued a warning during that time period. Note that five neighborhood clusters that were issued warnings actually had a positive average population growth during that same period (>1.0). Such a discrepancies raise questions of validity of TAWS warnings and the subsequent application of TAWS to GRSG adaptive management.

Additionally, we note how adding two additional years of data (2020 and 2021) resulted in all but two warnings being reversed. Such a shifting of TAWS warnings between "on" and "off," with no attempt by the TAWS proponents to determine what caused any of those changes, further underscores our concern that this method is not ready to be used in decision making (or results in the restriction of permits or activities while a causal factor analysis is being completed).

We further note that in the Coates et al. (2022) report, only neighborhood clusters D-072 and F-049 retained warnings when analyses were updated with 2020 and 2021 data by Coates et al. (2022). However, it appears from Figure 6 that nine other neighborhood clusters were assigned warnings in Wyoming. Regrettably, Tables 3 and 4 from that report provide no useful information to further evaluate how quickly or arbitrarily neighborhood cluster status can change in either direction without any change in management, especially while the population experiences post-nadir growth.

The fact that neither of the Coates et al. (2021) or (2022) reports contained any detailed annual TAWS information on which neighborhood clusters were issued a watch, warning, or no watch/warning, means that no independent vetting of the method is possible in order to uncover related methodological problems.

We have not yet explored similar issues with the issuance of watches or warnings to neighborhood clusters (or leks) in other states, but reserve the right to do so. The substantive problem with issuing watches and warnings for individual leks is that lek counts can vary both within and between years due to movements of birds among leks in response to environmental factors independent of neighborhood or population size, or land use activities (i.e., presence of predators, wildfire, or flooding).

Table 1. Average annual rate of recent population change, average trend, and TAWS warning status for Wyoming neighborhood clusters in 2019. Neighborhood clusters with positive average trends or having a positive trend value for their 95% upper confidence interval are highlighted in yellow.

Neighborhood Cluster	Average annual rate of population change from most recent population cycle (from Table 4.14 of Coates et al. 2021)	Average trend	TAWS status, from Coates et al. (2021) for years 2015 to 2019	2020-2021 TAWS status, from Coates et al. (2022)
D-062	0.994 (0.964-1.035)	-	Warning	No Watch or Warning
D-072	1.210 (1.162-1.265)	+	Warning	Warning
D-082	0.864 (0.828-0.946)	-	Warning	No Watch or Warning
D-083	0.889 (0.868-0.910)	-	Warning	No Watch or Warning
D-085	0.831 (0.797-0.871)	-	Warning	No Watch or Warning
D-143	0.966 (0.885-1.070)	-	Warning	No Watch or Warning
D-146	1.069 (1.028-1.111)	+	Warning	No Watch or Warning
D-148	0.992 (0.959-1.027)	-	Warning	No Watch or Warning
D-158	0.880 (0.774-0.978)	-	Warning	No Watch or Warning
F-007	0.898 (0.825-0.971)	-	Warning	No Watch or Warning
F-008	0.899 (0.868-0.929)	-	Warning	No Watch or Warning
F-019	1.052 (1.012-1.094)	+	Warning	No Watch or Warning
F-024	1.023 (0.938-1.116)	+	Warning	No Watch or Warning
F-037	1.025 (0.991-1.062)	+	Warning	No Watch or Warning
F-044	0.909 (0.828-0.987)	-	Warning	No Watch or Warning
F-049	0.926 (0.897-0.955)	-	Warning	Warning

8) The results of Coates et al. (2021, 2022) are not reproducible because the raw and final lek count and location data used are not public or available for independent analysis.

Reproducing the results in Coates et al. (2021, 2022) is not possible because the range-wide lek location and lek count data used in those papers (including O'Donnell et al. 2019) are not publicly available.

It is also not possible to obtain the lek location and count data from some states, such as Colorado, because a state statute prevents Colorado Parks and Wildlife (CPW) from releasing wildlife location data collected on private land without the permission of the landowner. Additionally,

CPW considers such data gathered by that agency to be proprietary and asserts that its research staff retain the "right" to publish on those data before it can be provided to the public.
Coates et al. (2021) developed open-source software for standardizing and compiling the sage-grouse lek count databases across states, to allow for "repeatable results that can better support scientific integrity." Indeed, Coates et al. (2021) considered the lek count database to be "a major step forward for studies making use of range-wide lek count data." However, repeatability and scientific integrity will not be achieved until the lek count database is made available to other, independent researchers.
Significance: Even in states where data are available for research, such as Wyoming, it is not possible to access the final data set that had been used in Coates et al. (2021, 2022). This data had been edited down using various "rules" in an attempt to produce a lek count data set that was more consistently gathered, as well as ad hoc adjustments to identifying population nadirs in individual neighborhood and climate clusters that were not documented. This lack of data availability essentially renders the results of Coates et al. (2021, 2022) as equivalent to a "black box model" (i.e., a model whose inputs and inner workings are opaque or not readily interpretable).

9) It is possible that trend estimates are biased downwards due to excluding data from recently discovered leks and leks that are reoccupied during population increases.

We strongly suspect but cannot yet confirm (due to raw and/or final data sets not being public), that the rule that excludes leks with less than five years of consecutive count data could exclude recently discovered leks and leks that are reoccupied during the uptick in population density during the increasing portion of population cycles, thus biasing trend estimates downwards.

10) Climate clusters were delineated based on the clustering algorithm and were not based on any uniform response of GRSG populations to regional climate.

Level 13 clusters being termed "climate clusters" is a misnomer because the authors provide only a weak analysis to suggest that their map distance-based clustering algorithms have produced a cluster level (Level 13) where sage grouse neighborhood clusters within would respond similarly to regional patterns of precipitation.

It also appears that precipitation was used as a proxy for climate variation by Coates et al. (2021) despite its known shortcomings and because they chose to ignore a large body of scientific research, spanning decades, involving sage grouse and many other species. As summarized succinctly by McClure et al. (2012):

> Among the best measures of changes in global climate patterns are the oceanic oscillations, which are deviations from average oceanic temperatures. In North America, oceanic oscillations that have been linked to changes in the breeding success and distribution of landbirds include the El Niño Southern Oscillation (ENSO, e.g. Sillett et al. 2000), North Atlantic Oscillation (NAO, e.g.,Nott et al. 2002; Anders and Post 2006), and the Pacific Decadal Oscillation (PDO, Mantua and Hare 2002). Oscillations in the Pacific Ocean serve as indices that summarize very large-scale climate patterns associated with sea surface temperatures over the southern and central Pacific, which often have a great impact on heat and precipitation load transfers over North America. The PDO describes a pattern of oceanic temperature variation over 20- to 30-year periods, and these long-term fluctuations

> in ocean temperature affect the climate across much of the northern portion of North America. The PDO has been shown to affect plant phenology and spring flooding in western North America (Cayan et al. 2001), as well as biomass and community structure of marine ecosystems along the Pacific coast of North America (Hare and Mantua 2000). Landbirds also are affected; Ballard et al. (2003) found that capture rates of passerines at a site in California were correlated with the PDO. Because the PDO affects both insect abundance (Kiffney et al. 2002;Vandenbosch 2003;Thomson 2009) and the timing of spring events (Cayan et al. 2001), the PDO may especially affect migratory or insectivorous bird species. Fluctuations in songbird abundances in North America may therefore best be understood within the context of the PDO (Ballard et al. 2003).

A more recent paper focusing specifically on GRSG trends in Wyoming (but also ignored by Coates et al. (2021, 2022)) identified the importance of the PDO and why it outperforms precipitation as a proxy variable for regional climatic variation (Ramey et al. 2018):

> Previous studies of the effect of climatic variation on sage-grouse have used local temperature and precipitation data with mixed results (Blomberg et al., 2012, 2014, 2017; Green, Aldridge & O'Donnell, 2016; Coates et al., 2016; Gibson et al., 2017). However, large-scale climate indices often outperform local data in predicting population dynamics and ecological process (Stenseth et al., 2002; Hallett et al., 2004). The Pacific Decadal Oscillation (PDO), which is derived from the large-scale spatial pattern of sea surface temperature in the North Pacific Ocean (Mantua et al., 1997), is potentially the most important climatic process influencing the sagebrush biome (Neilson et al., 2005). Consequently, the PDO index was chosen as the climate indicator.

Significance: Omission of this body of research, as well as others, in the development, justification, and refinement of TAWS underscores a systematic confirmation bias by the USGS to ignore data and science that does not support their products. It also underscores bias at the BLM to promote the use of biased products as a basis of land management in the current Draft RMPA/EIS.

Conclusion and recommendations regarding TAWS:

The TAWS, with its 483 different neighborhood clusters and 6 climate clusters, adds an additional and methodologically problematic land management category of unproven utility to an already crowded and overlapping field of administrative and land management designations specifically for GRSG. These include: Priority Habitat Management Areas (PHMA), General Habitat Management Areas (GHMA), Habitat Management Areas (HMAs), Core Areas, Connectivity Habitat, Priority Areas for Conservation (PACs), and so on.

The invited reviewers listed in acknowledgements, technical team members and internal USGS peer reviewers of Coates et al. (2021, 2022) did not appear to have identified many of the problems described above. These should have been identified and rectified prior to a public release and certainly before the BLM considers TAWS being used as a basis for management decisions, as the authors propose.

The TAWS is in need of substantial overhaul, greater transparency in methods and data utilized, and a fully independent vetting prior to being considered as a basis for any land management decisions. Due to all of the issues identified above, the use of TAWS at this point should be nothing more than advisory in nature.

The BLM has not demonstrated that TAWS can be effectively implemented as part of the adaptive management in this Draft RMPA/EIS. More specifically, in the Draft RMPA/EIS:

- The BLM has not provided any specific rationale as to why the proposed TAWS is superior, or even equivalent to, approaches used by states for tracking GRSG population trends.

- The BLM provides no internal decision-making process for concluding a Causal Factor Analysis when there is disagreement among team members.

- The BLM does not provide methodologies or other proof that it can conduct Causal Factor Analysis that reaches a definite conclusion. Moreover, due to the small number of leks in many neighborhood clusters, it is doubtful that there will be sufficient statistical power to determine which factors had contributed to a warning.

- The BLM has not provided a realistic timeline: from completion of lek count data by all states to completion of Causal Factor Analysis for any single neighborhood cluster. As a practical matter, due to the fact that several climate clusters span multiple states, no TAWS analysis can be conducted until data from all states has been collected, vetted and curated by each state, and subsequently reported to the USGS for TAWS analysis.

- The BLM provides no evidence that either it or states have sufficient resources and staff to address multiple simultaneous warnings by conducting multiple Causal Factor Analyses within a reasonable time frame.

- The BLM provides no cost estimate or assurance of funding for TAWS analyses and Causal Factor Analyses.

In practical terms, BLM has failed to demonstrate that it, and the USGS, are capable of implementing TAWS.

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