
A REPORT ON THE

Economic Impact to Wyoming's Economy From A Potential Listing of the Sage Grouse

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INTRODUCTION

On September 22, 2015 the United States Fish and Wildlife Service (FWS) announced that due to “unprecedented, landscape-scale conservation efforts across the western United States” the Greater sage-grouse (sage grouse) would not be listed as a threatened or endangered species under the Endangered Species Act (ESA).¹ The FWS reached this decision after evaluating the species’ population status in response to a settlement agreement requiring the agency to either list the sage-grouse as threatened or endangered under the ESA, or to remove its precarious designation as a candidate species (warranted but precluded by higher priority listing actions).

The implementation of voluntary conservation efforts to protect the sage-grouse and its habitat, spanned across public and private land in 11 western states and was described by the FWS as the “the largest land conservation effort in the U.S. history.”² Conservation efforts were undertaken by Federal agencies, states, and countless public and private partners. While these voluntary conservation efforts themselves have had an economic impact on western state’s economies, a far greater economic impact would have resulted if sage-grouse had been listed as a threatened or endangered species under the ESA.

The economic impact associated with a listing of the sage-grouse would have been acutely felt in Wyoming, where 68% of the total surface area of the state is considered to be within the range of the species. Had the sage-grouse been listed as threatened or endangered, the restrictions contained within the ESA prohibiting harm to the species, which includes impactful habitat modifications, would have had a significant impact on Wyoming’s economy due to a loss in development opportunities in the energy and agricultural sectors.

1 Department of the Interior, Office of the Secretary, *Historic Conservation Campaign Protects Greater Sage-Grouse* (Sept. 9, 2015).

2 *Id.*

This report, after providing background information on the sage-grouse and its management, includes an analysis of the economic impact of sage-grouse conservation measures in Wyoming, and attempts to predict the economic impact of sage-grouse listing as threatened or endangered. The economic impact analysis considers the following standpoints: 1) a baseline analysis of the projected economic importance of commodity production from all sage-grouse habitat in Wyoming; 2) projected reductions in commodity production in Wyoming associated with recently released BLM and USFS land use plan amendments for sage-grouse including the 9-Plan Sage-Grouse Amendment EIS, the Lander RMP, the Bighorn Basin RMP, and the Buffalo RMP; and 3) an attempt to estimate the potential reduction in commodity production in Wyoming associated with a listing of sage-grouse as a threaten or endangered species under the ESA.



GREATER SAGE-GROUSE

Greater sage-grouse are a sagebrush obligate species, thus sage-grouse distribution is strongly correlated with the distribution of sagebrush habitats. Optimal habitat conditions for the species includes sagebrush mosaics characterized by varying sagebrush height for canopy cover and to ensure for a diverse understory.³ During the spring and summer, sage-grouse will primarily eat insects and forbs. In the fall, the sage-grouse diet shifts to sagebrush, with both juvenile and adult sage-grouse consuming leaves from a variety of sagebrush species.

Adult male sage-grouse gather together during the spring breeding season, gathering on areas known as ‘leks’ in order to perform courtship displays for adult females. Leks can be formed opportunistically at any appropriate site within, or adjacent to, nesting habitat.⁴ Sage-grouse generally favor lek habitat including some of all of the following characteristics: areas of bare soil, short-grass steppe, windswept ridges, exposed knolls, or other relatively open sites.⁵

Populations of sage-grouse migrate between seasonal ranges. Migration can occur between winter and summer breeding areas, between breeding, summer and winter areas, or no migration can occur at all between stages and habitat areas. Migration distances vary depending on locations and seasonal habitats.

3 Connolly, J.W., Reese, K.P., and M.A. Schroeder, *Monitoring of Greater Sage-grouse Habitats and Populations*, University of Idaho, College of Natural Resources Experiment Station, Station Bulletin 80, 8, 13 (2003).

4 Connolly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun, *Guidelines to Manage Sage Grouse Populations and Their Habitats*. Wildlife Society Bulletin, 28(4), 967-985, 970 (2000).

5 See Connolly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver, *Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats*, Western Association of Fish and Wildlife Agencies, 3-7, (2004) (unpublished report).

POPULATION TRENDS

Current sage-grouse habitat covers 165 million acres across 11 Western States, including: California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, Utah, South Dakota, Washington and Wyoming. The federal government manages 64 % of the sage-grouse habitat, primarily through the BLM and the USFS, while the remaining habitat occurs on private land (31%) and state land (5%).⁶ Wyoming, with 43 million acres of occupied sage-grouse habitat, representing 68% of the total surface area of the state, contains more sage-grouse habitat than any other state.

While population declines are hard to estimate, it is believed that sage-grouse populations have declined 45-80% since the 1800's⁷ and today occupy only 56% of their historic range.⁸ The primary cause of the decline of sage-grouse is the loss and fragmentation of sagebrush from multiple threats.⁹ Those threats include: direct conversion, urbanization, infrastructure such as roads and powerlines, wildfire, invasive plants, grazing and energy development.¹⁰ Further impacting its decline, sage-grouse have a high fidelity to seasonal habitats including breeding, nesting, brood rearing and wintering areas, and rarely adapt to new habitats once existing habitat is disturbed thus limiting their adaptability.¹¹

PETITIONED FOR LISTING UNDER THE ENDANGERED SPECIES ACT AND JUDICIAL CHALLENGES

As a result of population declines and loss of habitat, the sage-grouse has been petitioned for listing under the ESA numerous times. This section discusses those petitions as well as litigation addressing those petitions and the decline of sage-grouse populations generally.

ESA PETITIONS TO LIST THE SAGE-GROUSE UNDER THE ESA

On January 24, 2002, the Institute for Wildlife Protection petitioned to have the Western sub-species of the sage-grouse listed as endangered.¹² As a result of the petition, the FWS initiated a 90-day review. At the conclusion of its review, the FWS determined that the information presented in the petition to list was not substantial, and therefore the agency denied the petition.¹³

On July 2, 2002, the FWS received a new petition from Craig C. Dremann requesting that the agency list the sage-grouse as endangered across its entire range.¹⁴ The FWS received an additional petition from the Institute for Wildlife Protection on March 24, 2003, requesting the same thing.¹⁵ On December 29, 2003, FWS received a third petition from the American Lands Alliance and 20 additional conservation organizations also requesting that the FWS list the sage-grouse as threatened or endangered range-wide.¹⁶ On April 21, 2004, FWS announced in its 90-day finding that these petitions, taken collectively, presented substantial

6 U.S. Fish and Wildlife Service, *The Greater Sage-grouse: Facts, Figures and Discussion* (July 15, 2015).

7 Connelly, J.W., and Braun C.E., *Long-Term Changes in Sage Grouse *Centrocercus Urophasianus* Populations in Western North American*, *Wildlife Biology* 3:229-234 (1997).

8 Schroeder, M.A., et. al., *Distribution of Sage Grouse in North America*, *The Condor* 106:363-367, 369 (2004).

9 *Endangered and Threatened Wildlife and Plants; 12 Month-Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered*, 75 Fed. Reg. 13909, 13924 (March 23, 2010) (to be codified at 50 CFR Part 17).

10 *Id.*

11 *Id.* at 13928.

12 *Endangered and Threatened Wildlife and Plants; 90-day Finding on a Petition to List the Western Sage Grouse*, 68 Fed. Reg. 6500, 6501 (Feb. 7, 2003).

13 *Id.* at 6500.

14 *Endangered and Threatened Wildlife and Plants; 90-day Finding for a Petition to List the Greater Sage-Grouse as Threatened or Endangered*, 69 Fed. Reg. 21484, 214485 (April 21, 2004).

15 *Id.*

16 *Id.*

information indicating listing the sage-grouse under the ESA may be warranted.¹⁷ In accordance with section 4(b)(3)(A) of the ESA, the FWS then completed a 12-month status review. On January 12, 2005 the FWS completed its 12-month finding and announced its determination that listing the sage-grouse as threatened or endangered range-wide was not warranted.¹⁸

JUDICIAL REVIEW OF THE FWS'S 2005 DECISION

In response to the FWS's 2005 decision not to list the sage-grouse as a threatened or endangered species, Idaho-based environmental group Western Watersheds Project (WWP) filed a complaint in the U.S. Federal District Court of Idaho on July 14, 2006.¹⁹ In the complaint WWP alleged that the FWS's 2005 12-month finding was incorrect and arbitrary and requested the decision be remanded to the FWS for an additional review.²⁰

On December 4, 2007, U.S. Federal District Court of Idaho Judge B. Lynn Winmill ruled in favor of WWP.²¹ After reviewing the FWS's 2005 decision, Judge Winmill determined there to be three flaws with the FWS decision-making process: (1) that while the FWS consulted with experts, the agency excluded those experts from the listing decision; (2) that the FWS created no detailed record of the experts' opinions; and (3) that the FWS ignored the portion of the experts' opinions that were preserved on the record.²² In addition to finding flaws in the decision-making process, Judge Winmill also found that the FWS's decision lacked a coherent analysis of the deterioration of the sage-grouse's habitat and the regulatory mechanisms designed to protect the species.²³ Further, he also found that the FWS's decision was tainted by conduct of FWS executive official, Julie MacDonald, a Deputy Assistant Secretary, who had a well-documented history of intervening in the listing process to ensure that the "best science" supported a decision not to list the species.²⁴ Judge Winmill granted WWP's motion for summary judgment, reversed the FWS's decision, and remanded the decision to the agency for further consideration.²⁵

FWS'S 2010 WARRANTED BUT PRECLUDED DECISION

In compliance with Judge Winmill's decision, on February 26, 2008 the FWS published a notice to initiate a new status review for the sage-grouse.²⁶ In March of 2010, the FWS issued its decision.²⁷ In its decision, the FWS designated the sage-grouse as a candidate species under the ESA.²⁸ Candidate species are species that the FWS determines are warranted for listing under the ESA, but are precluded by higher priority species. When the FWS makes a candidate decision it assigns the species a listing priority number (LPN) ranging from 1 to 12 depending upon the threats the species faces with an LPN of 1 being the top listing priority. The FWS assigned the Sage-Grouse an LPN of 8, finding the threats to the species to be moderate and not of a magnitude that required that the species be immediately listed as threatened or endangered.²⁹ The primary threats identified

17 *Id.*

18 Endangered and Threatened Wildlife and Plants; 12-month Finding for Petitions to List the Greater Sage-grouse as Threatened or Endangered, 70 Fed. Reg. 2244 (Jan. 12, 2005) (to be codified at 50 CFR Part 117).

19 Complaint at 1, *Western Watersheds Project v. Fish and Wildlife Service*, 535 F.Supp.2d 1173 (D. Idaho 2007) (No. 06CV00277).

20 *Id.*

21 *Western Watersheds Project*, 535 F.Supp.2d at 1189.

22 *Id.* at 1175.

23 *Id.* at 1187.

24 *Id.* at 1188-1189.

25 *Id.* at 1189.

26 Endangered and Threatened Wildlife and Plants; Initiation of Status Review for the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered, 73 Fed. Reg. 10218 (Feb. 26, 2008).

27 Endangered and Threatened Wildlife and Plants; 12-Month Findings for Petitions to List the Greater Sage Grouse (*Centrocercus urophasianus*) as Threatened or Endangered, 75 Fed. Reg. 13910 (March 23, 2010) (to be codified at 17 CFR Part 17).

28 *Id.*

29 *Id.* at 14008.

by the FWS in its decision included: the present or threatened destruction, modification, or curtailment of its habitat, and the inadequacy of existing regulatory mechanisms to address such threats.³⁰

A species designated as a candidate species receives no statutory protection under the ESA, instead states maintain management authority of the candidate species and work in collaboration with the FWS to conserve the species. Wyoming's efforts to conserve the sage-grouse are listed in greater in a following section.

JUDICIAL REVIEW OF THE BLM'S RMPs WITHIN THE SAGE-GROUSE'S RANGE

Subsequent to the FWS's candidate decision, WWP filed a separate complaint before Judge Winmill in the Idaho Federal District Court.³¹ In this complaint, WWP challenged the Bureau of Land Management's (BLM) approval of all Resource Management Plans (RMPs) within the range of the sage-grouse (which included 18 RMPs in Idaho, Montana, Utah, California, Nevada, and Wyoming).³² In its complaint, WWP alleged that each of the challenged RMPs failed to adequately consider the environmental impacts of grazing and energy development on the sage grouse.³³ In order to streamline the voluminous case, WWP and the BLM proposed a case management plan under which the parties would focus on two "test case" RMPs, the Craters of the Moon RMP and the Pinedale RMP, rather than addressing the entire 18 RMPs in the case briefing.

In a decision reached on November 20, 2012, Judge Winmill found both test case RMPs to be inadequate.³⁴ He found that the Craters of the Moon RMP failed to adequately address the best science and the agency's own policies designed to protect that habitat and failed to consider a no-grazing alternative or any alternative that would have reduced grazing levels.³⁵ Judge Winmill also found the Pinedale RMP inadequate because it failed to include the identification of grazing impacts to the sage-grouse, failed to analyze the cumulative impacts due to energy development, and failed to address available sage-grouse assessments and plans.³⁶ Additionally, Judge Winmill found that both the Craters of the Moon and the Pinedale RMP violated FLPMA by disregarding its own Special Status Species Policy and National Sage-Grouse Habitat Conservation Strategy.³⁷

After initially finding for WWP, Judge Winmill held an evidentiary hearing in which both parties discussed remedies to address these failures.³⁸ The remedies sought by WWP included stipulations to prevent grazing and further oil and gas development until the revisions to the RMP could be completed.³⁹ The remedy Judge Winmill ultimately granted was to remanded the case to the BLM, without vacating the RMPs (and therefore allowing grazing and oil and gas development to proceed), in order to correct the deficiencies in those RMPs.⁴⁰

As a result of Judge Winmill's decision, the BLM not only revised the Craters of the Moon RMP and the Pinedale Anticline, but all of the RMP's within the range of the sage grouse. The revisions on all of the RMPs within the range of the sage-grouse were completed in the summer of 2015. Wyoming's RMP revisions, entitled the Wyoming Greater Sage-Grouse Land Use Plan Amendment, are discussed in a subsequent section.

30 *Id.* at 13962, 13982.

31 Amended Complaint at 1, *W. Watersheds Project v. Kempthorne*, No. 08-0516-E-BLW, 2009 WL 1299626 (D. Idaho May 7, 2009).

32 *Id.*

33 *Id.* at 3, 10.

34 *W. Watersheds Project v. Salazar*, No. 4:08-CV-516-BLW, 2011 WL 4526746, at 18 (D. Idaho Sept. 28, 2011).

35 *Id.* at 15.

36 *Id.* at 16-17.

37 *Id.* at 18.

38 *Western Watersheds Project v. Salazar*, No. 4:08-CV-516-BLW, 2012 WL 5880658 (D. Idaho Nov. 20, 2012).

39 *Id.* at 2.

40 *Id.* at 10.

FWS'S 2015 NOT WARRANTED DECISION

In 2011, the FWS entered into a negotiated settlement agreement with the environmental group, WildEarth Guardians.⁴¹ WildEarth Guardians had challenged the FWS's ESA listing program and its failure to take timely action on its backlog of candidate species.⁴² As part of the settlement agreement, the FWS agreed to conduct an additional 12-month finding, reviewing the status of the sage-grouse.⁴³ The settlement further stipulated that the FWS could not decide to maintain the sage-grouse as a candidate species, instead the FWS had to make a decision to either list the species as threatened or endangered, or find that a listing was not warranted.⁴⁴ In exchange, WildEarth Guardians agreed not to sue the FWS on allegedly untimely petition findings or to challenge the FWS's progress on listing candidate species during the six-year term of the agreement (through March 31, 2017).⁴⁵

In compliance with the settlement agreement, the FWS initiated a new 12-month review of the sage-grouse and on September 22, 2015 issued a new decision determining that the primary threats to the sage-grouse had been ameliorated by conservation efforts implemented by Federal, State and private landowners, and therefore a listing of the species was no longer warranted, therefore removing it from the candidate species list.⁴⁶

In its September 2015 decision, the FWS stated that since its 2010 warranted but precluded decision, "regulatory mechanisms provided by Federal and three State plans reduce threats on approximately 90 percent of the breeding habitat across the species' range."⁴⁷ Wyoming was among the three states to have completed a sage-grouse conservation plan, and was in fact the first state to do so. Wyoming's sage-grouse conservation plan is discussed below.

41 *Endangered Species Act Section 4 Deadline Litig.*, Misc. Action No. 10-377 (EGS), MDL Docket No. 2165 (D. D.C. 2011).

42 *Id.* at 1-2.

43 *Id.* at 17.

44 *Id.*

45 *Id.* at 2.

46 Endangered and Threatened Wildlife and Plants; 12-Month Finding on Petition to List Greater Sage-Grouse (*Centrocercus urophasianus*) as an Endangered or Threatened Species, 80 Fed. Reg. 59858 (October 2, 2015) (to be codified at 50 CFR 17) (an earlier copy of the proposed rule was released on Sept. 22, 2015).

47 *Id.*



WYOMING'S SAGE-GROUSE CORE AREA STRATEGY

In response to concerns arising from the potential listing of the sage-grouse as an endangered species, in July 2007 then Wyoming Governor Dave Freudenthal created the Wyoming Sage-Grouse Implementation Team (SGIT). The SGIT, comprised of diverse stakeholders, was tasked with developing a state regulatory mechanism that would enhance and preserve the habitat, breeding grounds, and winter range of sage-grouse in Wyoming while allowing energy, and other, developments to continue.⁴⁸ Federal agency experts from the USFWS, BLM and USFS were also involved in the SGIT as ex-officio members.

The SGIT developed the “Core Area Strategy” for sage-grouse conservation in Wyoming. Under this strategy, geographic areas in Wyoming containing core population of sage-grouse were identified and designated as “Core Areas” and within these areas conservation of the species was to be the top priority. SGIT’s Core Area strategy was adopted and implemented by Governor Freudenthal through his 2008 Executive Order for Greater Sage-Grouse (EO 2008-2).⁴⁹ That executive order was later amended by Governor Freudenthal, adopted by the current Governor of Wyoming, Governor Matthew Mead, and later amended by Governor Mead.⁵⁰

In support of Wyoming’s Greater Sage-Grouse Core Area Strategy, on December 29, 2009, the Wyoming BLM State Office issued the Greater Sage-Grouse Conservation Policy Instruction Memorandum (IM), WY IM 2010-012.⁵¹ The IM formally

48 Audubon Rockies, *Wyoming’s Sage-Grouse Conservation Strategy* (July 2014), http://energy.gov/sites/prod/files/2014/08/f18/g_rutledge_statement_qcr_cheyenne.pdf.

49 Wyoming Executive Order 2008-2, *Greater Sage-Grouse Core Area Protection* (August 1, 2008).

50 Wyoming Executive Order 2010-4, *Greater Sage-Grouse Core Area Protection* (August 18, 2010); Wyoming Executive Order 2011-5, *Greater Sage-Grouse Core Area Protection* (June, 2, 2011); Wyoming Executive Order 2013-3, *Greater Sage-Grouse Core Area –Grazing Adjustments* (April 5, 2013); Wyoming Executive Order 2015-4, *Greater Sage-Grouse Core Area Protection* (July 29, 2015).

51 Wyoming BLM Instruction Memorandum No. WY-2012-012: *Greater Sage-Grouse Habitat Management Policy on Wyoming BLM Administered Public Lands including the Federal Mineral Estate* (December 29, 2009).

recognized the Wyoming’s authority to establish “core areas” for population management and directed all Wyoming BLM field offices to manage sage-grouse habitat consistent with Wyoming’s Core Area Strategy. A year later on December 22, 2011 the Washington BLM office issued IM No. 2012-043, Greater Sage-Grouse Interim Management Policies and Procedures.⁵² This national IM provided conservation policies and procedures specific to individual types of BLM authorizations to all Field Office’s in order to ensure protection of Greater Sage-Grouse.⁵³ Wyoming BLM field offices were specifically exempted from compliance with the nationwide IM because of the existence of the Core Area Strategy, and the Wyoming BLM’s IM 2010-012.⁵⁴

52 BLM National Instructional Memorandum No. 2012-043, Greater Sage-Grouse Interim Management Policies and Procedures (Dec. 22, 2011)

53 *Id.*

54 *Id.*



AMENDMENT OF BLM'S RMPs TO ADDRESS SAGE-GROUSE

Consistent with Judge Winmill's order in *Western Watersheds Project v. Salazar*, the BLM completed an effort to amend the RMPs throughout the range of the sage-grouse to ensure the plans adequately address the needs of the species. In Wyoming, the BLM's amendment, entitled the "Wyoming Greater Sage-Grouse Land Use Plan Amendment" also known as the "9-Plan", was prepared by the BLM and Forest Service and includes amendments to six BLM RMPs and three Forest Service Land Management Plans.⁵⁵ The 9-Plan covers 15.8 million acres of BLM and National Forest System federal surface/federal mineral estate lands and an additional 6.5 million acres of non-federal surface/federal mineral estate lands.⁵⁶

The 9-Plan considered five alternatives for managing sage-grouse habitat on approximately 16 million acres of BLM-administered subsurface federal mineral estate. Each of the five alternatives addressed major planning issues, including energy and minerals, land and realty (rights of way), wildfire, vegetation management, livestock grazing, recreation, travel management, and socio-economic impacts. A summary of the alternatives is as follows:

ALTERNATIVE **A**

As the No Action Alternative, this alternative is a continuation of the current management practices, and use of public lands and resources would continue to be managed under the current amended forms of BLM and Forest Service LUPs.

55 Wyoming Bureau of Land Management, *The Wyoming Greater Sage-Grouse Proposed Land Use Plan Amendment and Final Environmental Impact Statement*, BLM/WY/PL-15/015+1610 (May 2015) (hereinafter "9 Plan"). Amendments to current BLM plans include those from the Casper, Kemmerer, Newcastle, Pinedale, Rawlins, and Rock Spring Resource Management Plans (RMPs). Amendments to current Forest Service plans include those from the Bridger-Teton National Forest (BTNF), Medicine Bow National Forest (BMNF), and Thunder Basin National Grassland (TBNG) Land and Resource Management Plans (LRMPs).

56 *Id.* Executive Summary, ES-3.

ALTERNATIVE
B

The agencies based the management actions contained within this alternative on recommendations from the Sage-Grouse National Technical Team's (NTT) report, *A Report on National Greater Sage-Grouse Conservation Measures*.

ALTERNATIVE
C

The agencies based recommended management actions contained within this alternative on actions submitted by conservation/environmental stakeholder groups during the public scoping process. This alternative is the most restrictive.

ALTERNATIVE
D

The agencies based recommended management actions contained within this alternative on actions submitted during the scoping period and input from Cooperating Agencies involved in the development of alternatives. The emphasis of this alternative, developed from the ideas and proposals taken from the scoping process, provides opportunities to use and develop the planning area while providing protection of the sage-grouse habitat.

ALTERNATIVE
E

As the Proposed Alternative, the management approach emphasized within this alternative focuses on management of sage-grouse seasonal habitats as well as maintaining habitat connectivity to support population objectives provided by the Wyoming Game and Fish Department.⁵⁷

While the 9-Plan does for the most part adopt the Wyoming Core Area Strategy, it uses different terminology. Instead of designating habitat as “Core Area” or “Non-Core Area” like the Wyoming Core Area Strategy, the BLM and Forest Service created two protective land use allocation categories: Priority Habitat Management Areas (PHMAs) and General Management Habitat Areas (GMHAs).⁵⁸ PHMAs, consisting of 4.89 million acres, represent those lands identified by the BLM and Forest Service as having the highest value to maintain sustainable sage-grouse populations.⁵⁹ The GMHAs, consisting of 5.95 million acres, consists of lands that require some special management to sustain sage-grouse populations.⁶⁰

The 9-Plan also identifies specific Sagebrush Focal Areas (SFAs), delineating approximately 1.2 million acres into a subset of the PHMA.⁶¹ SFAs represent the BLM and Forest Service’s work toward operationalizing the concept of sage-grouse “stronghold” areas first identified in a FWS memorandum to the BLM and Forest Service, *Greater Sage-Grouse: Additional Recommendations to Refine Land Use Allocations in Highly Important Landscapes*.⁶² The concept of “strongholds” for sage-grouse centers on the recognition that these specific areas have been noted and referenced as having the highest densities of sage-grouse and other criteria important to the persistence of the species.⁶³

The BLM completed its analysis and issued a Record of Decision (ROD) for the 9-Plan, signed by BLM Director Neil Kornze, on September 18, 2015.⁶⁴ Because the ROD was signed by the BLM Director, its appeal could be filed directly in federal district court without first having to appeal to the Interior Board of Land Appeals, and numerous appeals have been filed.

57 See *id* Chapter 2 – Alternatives.

58 *Id* Executive Summary, ES-1.

59 *Id* at ES-4.

60 *Id*.

61 *Id*.

62 Fish and Wildlife Service, *Memorandum: Greater Sage-Grouse: Additional Recommendations to Refine Land Use Allocations in Highly Important Landscapes* (October 27, 2014).

63 *9-Plan*, Executive Summary, ES-4.

64 *Id*, Record of Decision, 2.



CONSERVATION INVESTMENTS

In addition to spurring the development of state sage-grouse conservation strategies, the FWS’s 2010 “warranted but precluded” decision spurred investments in conservation efforts to protect the bird’s native range in order to avoid federal intervention. Wyoming and the other affected Western states, along with the Federal government, have engaged in an unprecedented level of spending and collaborative engagements to improve sage-grouse habitat and protect the species.

STATE OF WYOMING’S SAGE-GROUSE EXPENDITURES

Since 2006, the State of Wyoming has allocated more than \$50 million to conservation of sage-grouse through habitat improvements, conservation easements, research funding and professional services.⁶⁵ The state has also approved funding for over 70 conservation easements totaling \$100 million in long-term sage-grouse habitat conservation efforts.⁶⁶ Most recently, the Wyoming Legislature allocated \$2,000,000 to fund additional research on sage-grouse.⁶⁷

FEDERAL GOVERNMENT’S SAGE-GROUSE EXPENDITURES

The Federal government has also been active in approving, implementing and funding sage-grouse conservation efforts. Notably, the National Resource Conservation Service (NRCS) has invested nearly \$300 million in sage-grouse conservation efforts, which have been matched with over \$125 million from partners and landowners on sage-grouse conservation projects on over 4 million

65 Western Governor’s Association, *Sage-Grouse Conservation Inventory* (March 2014).

66 *Id.* at 10.

67 *Id.* at 5.

acres of land.⁶⁸ The Forest Service, BLM and FWS have also made significant investments for the conservation of sage-grouse through their creation and revision of conservation and land use planning documents, and the implementation of on the ground efforts to conserve sage-grouse habitat and populations.⁶⁹

68 *Id.*

69 *Id.*



CONGRESSIONAL SAGE-GROUSE ATTENTION

The United States Congress has taken the initiative to address sage-grouse management with a variety of proposed bills beginning in the early 2000's. These bills have advanced everything from plans allowing special restoration programs that improve sage-grouse habitat to forcing federal agency assistance in developing state management plans for sage-grouse. To date, only one bill, a rider attached to the 2015 Appropriations Act, has been successful passing into public law.

SAGE-GROUSE APPROPRIATIONS RIDER

The “Consolidated and Further Continuing Appropriations Act, 2015” (H.R. 83), included a rider that restricted the FWS from using allocated funding to “issue or even write” rules regarding sage-grouse. This bill was signed into law in December 2014 (Public Law No: 113-235). When it was initially signed into law, some suggested that the Act required a yearlong delay in any sage-grouse listing decision. However, the Department of the Interior (DOI) interpreted the rider as only prohibiting the FWS from writing or issuing rules, such as finalizing the anticipated 4(d) rule for the Gunnison sage-grouse.⁷⁰ The FWS interpreted the rider as having “no effect on ongoing efforts to develop and implement federal and state plans that conserve sagebrush habitat or to complete the requisite analysis for potential rulemaking.”⁷¹

Regardless of this rider's effect, the fact that Congress has chosen to disregard its usual deference to agency rulemaking processes in order to address sage-grouse management shows that this is a unique, far reaching problem. The implications of the recent budget rider's passage through the legislature may signal Congress' intent not to shy away from using their funding power to slow

70 U.S. Fish and Wildlife Service, Statement by Interior Secretary Sally Jewell on the Sage-Grouse Rider in the FY15 Omnibus Bill, (Dec. 17, 2014).

71 *Id.*

or stop future sage-grouse management recommendations from various federal agencies. Whether Congress has signaled intent to defund the implementation of a future sage-grouse listing recommendation remains unclear.



ECONOMIC IMPACT OF SAGE-GROUSE MANAGEMENT IN WYOMING

Sage-grouse habitat occupies a broad swath of the surface area in Wyoming. As shown in Table 1, there is a total of 43.0 million acres of occupied habitat in Wyoming including 15.3 million acres of core/priority habitat. Occupied sage-grouse habitat represents 68 percent of the total surface area in the state (62.8 million acres) with core/priority habitat representing 24 percent. The land ownership of sage-grouse habitat in the state is divided among a number of owners including federal management agencies, the Bureau of Indian Affairs, the State of Wyoming, and private landowners.

For occupied habitat, 47 percent is in private ownership, 42 percent is managed by the BLM and the USFS, 7 percent is owned/managed by the State of Wyoming, and 5 percent by other entities. Due to the presence of split estates, 60 percent of the occupied sage-grouse habitat in Wyoming lays over the federal mineral estate with the rest (40 percent) overlying state and private minerals.

In terms of core/priority habitat, 52 percent is managed by the BLM and USFS, 37 percent is in private ownership, 7 percent is in state ownership, and 4 percent is owned by other entities. As a result of split estates, 69 percent of the core/priority habitat lies over the federal mineral estate with the rest (31 percent) overlying state and private minerals.

Due to the large surface area occupied by sage-grouse in Wyoming, the management of sage-grouse habitat could potentially have a significant economic impact on the State of Wyoming in terms of reductions in commodity production caused by management actions intended to protect the species' habitat. This section of the report summarizes the economic impacts of sage-grouse management in Wyoming from three standpoints: 1) a baseline analysis of the projected economic importance of commodity production from all sage-grouse habitat in Wyoming; 2) projected reductions in commodity production in Wyoming associated with recently released BLM and USFS land use plan amendments for sage-grouse including the 9-Plan Sage-Grouse Amendment EIS, the Lander RMP, the Bighorn Basin RMP, and the Buffalo RMP; and 3) an attempt to estimate the potential

reduction in commodity production in Wyoming associated with a listing of sage-grouse as a threaten or endangered species under the ESA.

Due to the diversity in land ownership of sage-grouse habitat in Wyoming, it was not possible obtain estimates of future commodity production information to estimate the economic impact for each type of land ownership. Instead annual per acre economic impact estimates were developed based on the economic analysis conducted for the 9-Plan (Appendix Table 1). These estimates were then applied to the larger sage-grouse habitat acreages in Wyoming. The 9-Plan analysis was used because: 1) it is a large planning area representing 62 percent of the total surface area in the state (38.8 million acres); 2) the planning area includes a broad spectrum of the state ranging from the northeastern corner of the state to the southwestern corner of the state and from the northwestern corner of the state to the southeastern corner of the state; 3) the analysis was based on a large area of habitat, 10.8 million acres of surface and 16.9 million acres of mineral estate sage-grouse habitat; 4) the analysis focused exclusively on sage-grouse management; and 5) the analysis was based on the federal management agencies' best estimates of future commodity production on sage-grouse habitat. One limitation of the 9-Plan analysis was that it only considered the potential economic impacts for oil and gas, livestock grazing, and wind generation. Mining and recreation were not considered although there could potentially be economic impacts to both. For more information in the 9-Plan economic analysis see Taylor & Foulke (2015)⁷².

BASELINE ANALYSIS (2013-2020)

Table 2 illustrates the baseline projected economic contribution of commodity production on sage-grouse habitat to the Wyoming economy if there were no additional sage-grouse related management requirements. Under this analysis the management restrictions contained in the Wyoming Core Area Strategy and 9-Plan would not apply.

In order to derive the projected economic impacts, the annual per acre economic impact estimates developed from the 9-Plan (the second column of Table 2) were multiplied by the total acres of habitat in the state regardless of ownership (the third column of Table 2) to estimate the total economic impact (the fourth column of Table 2). For oil and gas and livestock grazing, the total sage-grouse habitat of 43.0 million acres was used for the baseline analysis. For wind development, only the 27.0 million acres of total sage-grouse habitat in the 9-Plan planning area was used for the baseline analysis. The acreage used for wind development assumes wind projects would primarily occur in the southern part of the state within the 9-Plan planning area with only limited wind development occurring in the northern part of the state outside the 9-Plan planning area.

The direct economic impact estimates in Table 2 represents the projected value of production for oil and gas, livestock grazing, and wind generation located on sage-grouse habitat in Wyoming. For oil and gas development and wind development the direct economic impact estimates represents regional expenditures to develop these resources. The annual direct economic impact for commodity production from sage-grouse habitat is estimated to be \$18.4 billion. This represents 22 percent of the total economic output for the entire Wyoming economy (\$84.2 billion – IMPLAN 2013).

The total economic impact estimates in Table 2 represents the projected direct economic impact, discussed above, plus secondary economic impacts associated with businesses that provide support to the economic sectors generating the direct impact and the household expenditure of workers employed in either the direct or secondary sectors. The annual total economic impact for commodity production on sage-grouse habitat is estimated to be \$23.0 billion. This represents 27 percent of the total economic output for the entire Wyoming economy (\$84.2 billion – IMPLAN 2013).

The total employment estimates in Table 2 represent the projected total (direct plus secondary) employment generated by commodity production on sage-grouse habitat in Wyoming. The total employment is estimated to be 86,465 jobs per year. This represents 22

72 See David T. Taylor and Thomas Foulke, *Economic Impacts of Sage Grouse Management in Wyoming: The 9-Plan*, Western Regional Science Association's 55th Annual Meeting (February, 2016).

percent of the total employment for the entire Wyoming economy (395,312 – BEA 2013). The total labor earnings estimates in Table 2 represent the projected total (direct plus secondary) labor earnings resulting from the employment generated by commodity production on sage-grouse habitat in Wyoming. Total labor earnings are estimated to be \$5.6 billion per year. This represents 27 percent of the total labor earnings for the entire Wyoming economy (\$20.7 billion – BEA 2013). Average earnings per job for this type of employment was \$64,673 which was 23 percent above the overall average for Wyoming (\$52,420 – BEA 2013).

The estimated state and local government revenues in Table 2 represent the projected direct government revenues from major sources for oil and gas production, wind development, and wind generation from sage-grouse habitat in Wyoming. The direct state and local revenues is estimated to be \$1.3 billion per year. This represents 11 percent of total state and local government revenue for the entire state (\$11.7 billion – WDA 2013).

CURRENT ACTION ANALYSIS

Table 3 summarizes the projected economic impacts of reductions in commodity production associated with the Wyoming Core Area Strategy and the recently released federal land use plan amendments in Wyoming for sage-grouse including the, the 9-Plan Sage-Grouse RMP Amendments, the Lander RMP, the Bighorn Basin RMP, and the Buffalo RMP. In order to derive the projected economic impacts from reductions in output associated with federal sage-grouse amendments, it was first necessary to estimate the baseline impacts as if there were no Core Area Strategy and no federal sage-grouse amendment. As in the previous sections, this baseline was estimated using the annual per acre economic impact estimates developed from the 9-Plan analysis (the second column of Table 3). In this case, however, the per acre estimates were multiplied by total acres of BLM and USFS sage-grouse habitat plus the acres of private and state habitat that were in the Core/Priority areas (the third column in Table 3) rather than total acres of sage-grouse habitat. The reduced acres of habitat were used because it was felt that this would be more representative of the commodity production affected by the federal sage-grouse amendments and the Wyoming Core Area Strategy. In terms of surface area, the affected habitat represented 24.7 million acres (18.0 million acres of USFS & BLM plus 5.6 million acres of private land, plus 1.1 million acres of state land – see Table 1). For the mineral estate, the affected habitat represented 30.8 million acres (26.0 million acres of USFS & BLM land, plus 4.8 million acres of state & private land– see Table 1). For wind development, similar to the analysis in the previous section, only the affected acres of habitat in the 9-Plan (15.9 million acres) were included in the analysis. The baseline economic impact estimates were \$13.7 billion in direct economic impact, \$16.4 billion dollars of total economic impact, 61,037 total jobs, \$4.0 billion in total labor earnings, and \$1.0 billion in selected state and local government revenue per year (the fourth column in Table 3).

To estimate the economic impacts of reductions in commodity production associated with Core Area Strategy and the federal sage-grouse amendments, the percent reductions estimated for the 9-Plan's Preferred Alternative were applied to the current action analysis baseline estimates discussed above. The 9-Plan reductions estimates were used for both federal land and private and state land because it was assumed the management restrictions contained in the 9-Plan Preferred Alternative were sufficiently similar to management restrictions contained in the Wyoming Core Area Strategy. Under the Preferred Alternative (Alternative E) in the 9-Plan, the direct impacts of oil and gas drilling declined by 8 percent, oil and gas production declined by 3 percent, livestock grazing declined 0 percent, and wind development and generation declined by 90 percent (the fifth column in Table 3). Similar reductions were estimated for total economic impact, total employment, total labor earnings, and state and local government revenue. In addition to the loss of jobs, income, and government revenue, the large decrease in wind generation (90 percent) under the Preferred Alternative may be an important aspect of the federal sage-grouse amendments given the significant role that renewable energy sources are expected to play in enabling states to reach the CO₂ reduction levels specified in the EPA's recently released Clean Power Plan.

Based on the percent reduction estimates from the 9-Plan and the total acres of USFS & BLM habitat plus the acres of state and private Core/Priority habitat, it is estimated that the federal sage-grouse amendments and the Core Area Strategy would reduce

direct economic impacts by -\$792.7 million, total economic impacts by -\$1.0 billion, employment by -5,495 jobs, labor earnings by -\$345.8 million, and state and local government revenue by -\$56.3 million per year.

ESA LISTING ANALYSIS

Although there appears to a great deal of uncertainty regarding the implications of a sage-grouse listing, this section of the report attempts to look at some possible scenarios of the potential reduction in commodity production from sage-grouse habitat in Wyoming if sage-grouse were to be listed as threatened or endangered under the ESA. Two scenarios are considered in the analysis: one based on the percent reductions for the 9-Plan's Preferred Alternative (Alternative E); the other scenario is based on the percent reductions for the 9-Plan's Citizens Alternative (Alternative C). The Citizens Alternative was the most restrictive of alternatives considered in the 9-Plan. It was hoped that considering these two alternatives might provide a range of values that the impacts of a listing for sage-grouse might fall into. In this analysis it is assumed that listing would mean restrictions on all sage-grouse habitat in Wyoming regardless of ownership and without distinction between core/priority and non-core/general habitat. Said another way, it was assumed that if the sage-grouse were listed under the ESA, the management restrictions to protect the sage-grouse would be applied in all sage-grouse general habitat, not just in core/priority habitat.

Table 4 summarizes the projected economic impacts of reductions in commodity production associated with a sage-grouse listing under both scenarios. The second column of Table 4 is the baseline economic impact estimate for commodity production for all sage-grouse habitat from Table 1. The third column of Table 4 shows the percent reduction estimates for the 9-Plan's Preferred Alternative applied to all sage-grouse habitat in Wyoming. These are the same reductions used in the current action analysis, except that they are now being applied to the total, or all sage-grouse general habitat in the state. The economic impact estimates for the Preferred Alternative reductions were \$1.1 billion in direct economic impact, \$1.5 billion dollars of total economic impact, 8,019 total jobs, \$500.6 million in total labor earnings, and \$96.1 million in state and local government revenue per year (the fourth column in Table 4).

The fifth column of Table 4 shows the percent reduction estimates for the 9-Plan's Citizen Alternative applied statewide. Under the Citizen's Alternative in the 9-Plan, the direct impacts of oil and gas drilling declined by 25 percent, oil and gas production declined by 18 percent, livestock grazing declined 43 percent, and wind development and generation declined by 90 percent. Similar reductions were estimated for total economic impact, total employment, total labor earnings, and selected state and local government revenue. Using these projections, the economic impact estimates for the Citizens Alternative reductions were \$4.1 billion in direct economic impact, \$5.4 billion dollars of total economic impact, 24,307 total jobs, \$1.5 billion in total labor earnings, and \$287.5 million in state and local government revenue per year (the sixth column in Table 4).

SUMMARY AND CONCLUSIONS

Commodity production from sage-grouse habitat is economically important to Wyoming (Table 5). The baseline economic impact estimates for all sage-grouse habitat in Wyoming (second column of Table 5) indicates that the annual direct economic impact for commodity production from sage-grouse habitat is estimated to be \$18.4 billion, which represents 22 percent of the total economic output for the entire Wyoming economy (\$84.2 billion – IMPLAN 2013). The annual total economic impact for commodity production on sage-grouse habitat is estimated to be \$23.0 billion, which represents 27 percent of the total economic output for the entire Wyoming economy (\$84.2 billion – IMPLAN 2013). The total employment is estimated to be 86,465 jobs per year, which represents 22 percent of the total employment for the entire Wyoming economy (395,312 – BEA 2013). Total labor earnings are estimated to be \$5.6 billion per year, which represents 27 percent of the total labor earnings for the entire Wyoming economy (\$20.7 billion – BEA 2013). Average earnings per job for this employment was \$64,673 which was 23 percent above the overall

average for Wyoming (\$52,420 – BEA 2013). State and local government revenues are estimated to be \$1.3 billion per year, which represents 11 percent of total state and local government revenue for the entire state (\$11.7 billion – WDA 2013).

Due to its economic importance, the potential reduction in commodity production on sage-grouse habitat from sage-grouse management has serious economic implications for Wyoming. Based on the Core Area Strategy and the recently released federal land use plan sage-grouse amendments it is estimated that the direct economic impact from commodity production, statewide, will decrease by \$792.7 million, total economic impact will decrease by \$1.0 billion, total employment will decrease by 5,495 jobs, total labor earnings will decrease by \$345.9 million, and state/local government revenue will decrease by \$56.3 million per year (the third column in Table 5).

The potential reduction in commodity production from a sage-grouse listing has more serious economic implications for Wyoming. Based on the range in percent reductions from Alternative E and Alternative C in the 9-Plan applied statewide to all sage-grouse habitat, it is estimated that the direct economic impact from commodity production could decrease by \$1.1 billion to \$4.1 billion, total economic impact could decrease by \$1.5 billion to \$5.4 billion, total employment could decrease by 8,019 to 24,307 jobs, total labor earnings could decrease by \$500.6 million to \$1.5 billion, and state/local government revenue could decrease by \$96.1 million to \$287.5 million per year (the fourth and fifth column in Table 5).

Both of the above scenarios represent a significant loss the Wyoming economy. During the last recession Wyoming's economy lost 15,817 jobs between 2008 and 2010 (BEA, 2015). Since then Wyoming's employment has increase by 13,701 jobs from 2010 to 2013. If the federal sage-grouse amendments had been in place during this time period and other economic factors had remained constant it is estimated that Wyoming employment would have decreased by 2,784 jobs. If a sage-grouse listing had been in place during this time period and other economic factors had remained constant it is estimated that Wyoming employment would have decreased by 10,356 to 59,220 jobs.

TABLE 1. LAND OWNERSHIP OF WYOMING SAGE-GROUSE HABITAT

Surface Ownership	Core v.3 Acres	Occupied Habitat Acres	Core v.3 Percent	Occupied Habitat Percent
National Park Service	44,815	57,735	0.3%	0.1%
National Grasslands	90,950	242,347	0.6%	0.6%
Bankhead Jones	125,831	310,903	0.8%	0.7%
Bureau of Indian Affairs	292,374	1,202,374	1.9%	2.8%
Bureau of Reclamation	158,204	477,878	1.0%	1.1%
State	1,096,499	2,863,707	7.2%	6.7%
Private	5,583,678	20,166,621	36.6%	46.8%
Fish & Wildlife Service	10,702	44,354	0.1%	0.1%
Water	60,345	189,666	0.4%	0.4%
Bureau of Land Management	7,764,010	17,022,762	50.9%	39.6%
Forest Service	37,878	413,697	0.2%	1.0%
Department of Defense	0	18,322	0.0%	0.0%
Total	15,265,380	42,983,782	100.0%	100.0%
USFS & BLM	8,018,669	17,989,709	52.5%	41.9%
Private	5,583,678	20,166,621	36.6%	46.9%
State	1,096,499	2,863,707	7.2%	6.7%
Other	566,534	1,963,745	3.7%	4.6%
Total	15,265,380	42,983,782	100.0%	100.0%
Federal Minerals	10,475,937	26,003,585	68.6%	60.5%
State & Private Minerals	4,789,443	16,980,197	31.4%	39.5%
Total Minerals	15,265,380	42,983,782	100.0%	100.0%

Source: Wyoming Game & Fish Department

TABLE 2. BASELINE ECONOMIC IMPACT ESTIMATES FOR WYOMING SAGE GROUSE HABITAT

Economic Impact	Annual Impact Per Acre (1)	Total Habitat Acres (2)	Total Economic Impact
Direct Economic Impact			
Oil & Gas Well Drilling	\$197.02	42,983,782	\$8,468,827,078
Oil & Gas Production	\$222.70	42,983,782	\$9,572,601,908
Livestock Grazing	\$4.48	42,983,782	\$192,433,824
Wind Development (3)	\$5.66	27,046,280	\$153,011,405
Wind Generation(3)	\$0.78	27,046,280	\$21,023,458
Total Direct Impact	\$430.64		\$18,407,897,674
Total Economic Impact			
Oil & Gas Well Drilling	\$267.19	42,983,782	\$11,484,995,776
Oil & Gas Production	\$252.37	42,983,782	\$10,847,944,085
Livestock Grazing	\$9.28	42,983,782	\$398,905,383
Wind Development (3)	\$8.04	27,046,280	\$217,565,198
Wind Generation(3)	\$1.04	27,046,280	\$28,234,952
Total Impact	\$537.94		\$22,977,645,393
Total Employment			
Oil & Gas Well Drilling	0.001629	42,983,782	70,013
Oil & Gas Production	0.000230	42,983,782	9,894
Livestock Grazing	0.000103	42,983,782	4,410
Wind Development (3)	0.000068	27,046,280	1,840
Wind Generation(3)	0.000011	27,046,280	308
Total Job-Years	0.002041		86,465
Total Labor Earnings			
Oil & Gas Well Drilling	\$107.68	42,983,782	\$4,628,398,210
Oil & Gas Production	\$16.79	42,983,782	\$721,511,761
Livestock Grazing	\$3.06	42,983,782	\$131,470,290
Wind Development (3)	\$3.49	27,046,280	\$94,457,899
Wind Generation(3)	\$0.59	27,046,280	\$16,067,205
Total Labor Earnings	\$131.61		\$5,591,905,366
Selected State and Local Government Revenue			
Oil & Gas FMR (4)	\$13.59	26,003,585	\$353,380,547
Oil & Gas Ad Valorem	\$10.77	42,983,782	\$463,037,459
Oil & Gas Severance	\$10.35	42,983,782	\$445,090,543
Wind S&U Tax (3)	\$1.05	42,983,782	\$45,062,335
Wind Development (3)	\$0.02	27,046,280	\$452,678
Wind Generation(3)	\$0.53	27,046,280	\$14,314,849
Total S& L Govt Revenue	\$36.31	36,389,203	\$1,321,338,411

(1) Based on 9-Plan Analysis; (2) For Wind only habitat in the 9-Plan was included; (3) Average of Low and High Wind Development Scenarios in 9-Plan; (4) Only applies to federal mineral production

TABLE 3. ECONOMIC IMPACT ESTIMATES FOR WYOMING WITH FEDERAL SAGE-GROUSE AMENDMENTS

Economic Impact	Impact Per Acre (1)	Habitat Acres (2)	Economic Impact	Preferred Alternative	Amendments Reductions
Direct Economic Impact					
Oil & Gas Well Drilling	\$197.02	30,793,028	\$6,066,958,681	-7.9%	-\$476,766,574
Oil & Gas Production	\$222.70	30,793,028	\$6,857,688,757	-3.3%	-\$224,025,632
Livestock Grazing	\$4.48	24,669,886	\$110,444,458	0.0%	\$0
Wind Development (3)	\$5.66	15,880,750	\$89,843,626	-89.9%	-\$80,782,474
Wind Generation (3)	\$0.78	15,880,750	\$12,344,333	-89.9%	-\$11,099,349
Total Direct Impact	\$430.64		\$13,137,279,856		-\$792,674,029
Total Economic Impact					
Oil & Gas Well Drilling	\$267.19	30,793,028	\$8,227,703,103	-8.1%	-\$666,645,782
Oil & Gas Production	\$252.37	30,793,028	\$7,771,327,473	-3.3%	-\$257,685,253
Livestock Grazing	\$9.28	24,669,886	\$228,945,659	0.0%	\$0
Wind Development (3)	\$8.04	15,880,750	\$127,747,643	-89.9%	-\$114,863,693
Wind Generation (3)	\$1.04	15,880,750	\$16,578,702	-89.9%	-\$14,906,662
Total Impact	\$537.94		\$16,372,302,579		-\$1,054,101,390
Total Employment					
Oil & Gas Well Drilling	0.001629	30,793,028	50,156	-8.1%	-4,057
Oil & Gas Production	0.000230	30,793,028	7,088	-4.3%	-304
Livestock Grazing	0.000103	24,669,886	2,531	0.0%	0
Wind Development (3)	0.000068	15,880,750	1,080	-89.9%	-971
Wind Generation (3)	0.000011	15,880,750	181	-89.9%	-163
Total Job-Years	0.002041		61,037		-5,495
Total Labor Earnings					
Oil & Gas Well Drilling	\$107.68	30,793,028	\$3,315,724,886	-8.0%	-\$265,235,375
Oil & Gas Production	\$16.79	30,793,028	\$516,881,736	-4.3%	-\$22,231,521
Livestock Grazing	\$3.06	24,669,886	\$75,455,368	0.0%	\$0
Wind Development (3)	\$3.49	15,880,750	\$55,462,795	-89.9%	-\$49,869,111
Wind Generation (3)	\$0.59	15,880,750	\$9,434,172	-89.9%	-\$8,482,692
Total Labor Earnings	\$131.61		\$3,972,958,957		-\$345,818,699
Selected State and Local Government Revenue					
Oil & Gas FMR (4)	\$13.59	26,003,585	\$353,380,547	-3.3%	-\$11,537,440
Oil & Gas Ad Valorem	\$10.77	30,793,028	\$331,714,074	-3.4%	-\$11,277,964
Oil & Gas Severance	\$10.35	30,793,028	\$318,857,134	-3.4%	-\$10,739,945
Wind S&U Tax*	\$1.05	15,880,750	\$16,648,690	-89.9%	-\$14,969,592
Wind Development (3)	\$0.02	15,880,750	\$265,799	-89.9%	-\$238,992
Wind Generation (3)	\$0.53	15,880,750	\$8,405,242	-89.9%	-\$7,557,534
Total S&L Govt Revenue	\$36.31		\$1,029,271,486		-\$56,321,466

(1) Based on 9-Plan Analysis; (2) BLM & Forest Service Habitat + Private/State Core; (3) Average of Low and High Wind Development Scenarios in 9-Plan; (4) Only applies to federal mineral production

TABLE 4. ECONOMIC IMPACT ESTIMATES FOR WYOMING SAGE GROUSE HABITAT WITH SAGE-GROUSE LISTING

Economic Impact	Total Sage Grouse Economic Impact	Reduction Preferred Alternative 9-Plan	Reduction From Listing Preferred Alternative	Reduction Citizens Alternative 9-Plan AlterAlternative	Reduction From Listing Citizens Alternative
Direct Economic Impact					
Oil & Gas Well Drilling	\$8,468,827,078	-7.9%	-\$665,515,275	-25.2%	-\$2,137,402,069
Oil & Gas Production	\$9,572,601,908	-3.3%	-\$312,715,882	-18.3%	-\$1,751,358,210
Livestock Grazing	\$192,433,824	0.0%	\$0	-43.1%	-\$83,031,830
Wind Development	\$153,011,405	-89.9%	-\$137,579,486	-89.9%	-\$137,579,486
Wind Generation	\$21,023,458	-89.9%	-\$18,903,144	-89.9%	-\$18,903,144
Total Direct Impact	\$18,407,897,674		-\$1,134,713,786		-\$4,128,274,738
Total Economic Impact					
Oil & Gas Well Drilling	\$11,484,995,776	-8.1%	-\$930,566,392	-25.9%	-\$2,979,147,154
Oil & Gas Production	\$10,847,944,085	-3.3%	-\$359,701,123	-18.5%	-\$2,009,208,422
Livestock Grazing	\$398,905,383	0.0%	\$0	-43.3%	-\$172,840,679
Wind Development	\$217,565,198	-89.9%	-\$195,622,725	-89.9%	-\$195,622,725
Wind Generation	\$28,234,952	-89.9%	-\$25,387,324	-89.9%	-\$25,387,324
Total Impact	\$22,977,645,393		-\$1,511,277,564		-\$5,382,206,305
Total Employment					
Oil & Gas Well Drilling	70,013	-8.1%	-5,663	-26.1%	-18,294
Oil & Gas Production	9,894	-4.3%	-425	-22.0%	-2,172
Livestock Grazing	4,410	0.0%	0	-43.3%	-1,909
Wind Development	1,840	-89.9%	-1,654	-89.9%	-1,654
Wind Generation	308	-89.9%	-277	-89.9%	-277
Total Job-Years	86,465		-8,019		-24,307
Total Labor Earnings					
Oil & Gas Well Drilling	\$4,628,398,210	-8.0%	-\$370,240,287	-25.7%	-\$1,188,361,677
Oil & Gas Production	\$721,511,761	-4.3%	-\$31,032,831	-21.7%	-\$156,664,743
Livestock Grazing	\$131,470,290	0.0%	\$0	-43.3%	-\$56,897,214
Wind Development	\$94,457,899	-89.9%	-\$84,931,376	-89.9%	-\$84,931,376
Wind Generation	\$16,067,205	-89.9%	-\$14,446,752	-89.9%	-\$14,446,752
Total Labor Earnings	\$5,591,905,366		-\$500,651,246		-\$1,501,301,762
Selected State and Local Government Revenue					
Oil & Gas FMR	\$353,380,547	-3.3%	-\$11,537,440	-18.2%	-\$64,323,537
Oil & Gas Ad Valorem	\$463,037,459	-3.4%	-\$15,742,834	-18.7%	-\$86,573,154
Oil & Gas Severance	\$445,090,543	-3.4%	-\$14,991,818	-18.6%	-\$82,793,142
Wind S&U Tax	\$45,062,335	-89.9%	-\$40,517,587	-89.9%	-\$40,517,587
Wind Development	\$452,678	-89.9%	-\$407,023	-89.9%	-\$407,023
Wind Generation	\$14,314,849	-89.9%	-\$12,871,129	-89.9%	-\$12,871,129
Total S&L Govt Revenue	\$1,321,338,411		-\$96,067,831		-\$287,485,572

(1) Based on 9-Plan Analysis; (2) BLM & Forest Service Habitat + Private/State Core; (3) Average of Low and High Wind Development Scenarios in 9-Plan; (4) Only applies to federal mineral production

TABLE 5. SUMMARY OF ECONOMIC IMPACT ESTIMATES FOR WYOMING SAGE GROUSE HABITAT

Economic Impact	Total Sage Grouse Economic Impact	Reduction Current Actions	Reduction Listing Preferred Alternative	Reduction Listing Citizens Alternative
Direct Economic Impact	\$18,407,897,674	-\$792,674,029	-\$1,134,713,786	-\$4,128,274,738
Total Economic Impact	\$22,977,645,393	-\$1,054,101,390	-\$1,511,277,564	-\$5,382,206,305
Total Employment	86,465	-5,495	-8,019	-24,307
Total Labor Earnings	\$5,591,905,366	-\$345,818,699	-\$500,651,246	-\$1,501,301,762
S/L Government Revenue	\$1,321,338,411	-\$56,321,466	-\$96,067,831	-\$287,485,572



ECONOMIC IMPACT OF SAGE-GROUSE MANAGEMENT ON LIVESTOCK GRAZING IN WYOMING

Substantial amounts of livestock grazing occur on federal sage-grouse habitat in Wyoming. The 9-Plan estimates that under the No Action Alternative (Alternative A) 7.5 million AUMs of grazing would occur on Federal sage-grouse habitat within the planning unit between 2013 and 2020. The 9-Plan indicates that livestock grazing guidelines under the sage-grouse amendments are more restrictive than current directions. The potential impacts on grazing could include modification of grazing strategies or rotation schedules, changes to the season of use, changes to kind and class of livestock, closure of a portion of an allotment, or reduction in livestock numbers. The 9-Plan also indicates that implementation of this management direction could result in the reduction of AUMs on some allotments.

Despite the potential for reduction in livestock grazing, the economic impact estimates for livestock grazing for three of the alternatives (Alternatives B, D, and E) in the Plan are unchanged from the No Action Alternative (Alternative A). Only Alternative C (the Citizens Alternative), which would prohibit livestock grazing within core/priority sage-grouse habitat, has predicts a reduction from the economic impacts estimated under Alternative A (-43 percent). The 9-Plan indicates that the reason for no changes from Alternative A for across the other alternatives is that differences in management actions affecting livestock grazing cannot be quantified.

A recent publication from the University of Wyoming (Torell et al, 2014) may provide some insights into the economic impacts of altering grazing policies on federal land to protect sage-grouse that can be used to predict economic impacts across 9-Plan range of alternatives⁷³. The Torell publication estimates the economic impacts of eliminating federal land spring grazing, fall

73 L. Allen Torell et al., *Ranch-Level Economic Impact Analysis for Public Lands: A Guide to Methods, Issues and Applications*, Journal of Rangeland Applications Vol. 1 2014, ISSN: 2331-5512, 1-14 (2014).

grazing, and spring and fall grazing as well as across the board reductions on ranch profitability based on four ranch-level computer models for ranches in Idaho, Nevada, Oregon, and Wyoming⁷⁴. In addition to providing information about the impacts of sage-grouse management on ranch profitability, this information also serves as a basis for estimating the state-level economic impact on the Wyoming economy due to reduced livestock production in the state.

RANCH-LEVEL ECONOMIC IMPACTS

Table 6 summarizes the potential annual ranch-level economic impact estimates from altering grazing policies on federal land to protect sage-grouse in Wyoming. In order to estimate the economic impact for the entire state, the 7.5 million AUM projection from the 9-Plan was scaled up to 12.5 million AUMs based on the ratio of total acres of federal sage-grouse habitat in Wyoming to the acres of federal sage-grouse habitat in the 9-Plan. On an annual basis the 12.5 million AUMs of grazing for the eight years between 2013 and 2020 represents 1.6 million AUMs per year. The second column of Table 6 illustrates the annual baseline ranch-level economic impact of livestock grazing on federal sage-grouse habitat in Wyoming. Torell et al estimate that the net income for the ranching operations per BLM AUM averages \$26.62 per year for season long permit use. They also estimate that the capitalized value of the grazing permit based on the annual net income stream of \$26.62 over 40 years discounted at 7 percent is \$296.00 per BLM AUM. Applying these values to the 1.6 million AUMs of grazing on federal sage-grouse habitat results in a projected net ranch income estimate of \$41.5 million state-wide and a projected grazing permit value of \$461.3 million for the grazing baseline.

The third column of Table 6 illustrates the annual ranch-level economic loss resulting from elimination of grazing on core/priority sage-grouse habitat in Wyoming. This is consistent with Alternative C in the 9-Plan. Based on the percent of sage-grouse habitat that is core/priority, elimination of livestock grazing on core/priority habitat would reduce grazing by -694,657 AUMs which represents a 45 percent reduction from the baseline. Torell et al estimate that a reduction of this magnitude would result in a loss of \$15.71 in net ranch income per BLM AUM removed. They also estimate that the capitalized value of the grazing permit would be reduced by \$187.44 per BLM AUM removed. Applying these values to the -694,657 reduction in federal AUMs results in a projected loss in net ranch income of \$10.9 million and a projected loss in the grazing permit values of \$130.2 million statewide from the grazing baseline.

The 9-Plan Preferred Alternative (Alternative E) does not propose elimination of livestock grazing from core/priority habitat. However, other reductions such as a reduction in spring grazing and/or fall grazing, such as a reduction in a month of spring or fall grazing to protect sage-grouse, could be a possibility. The fourth column of Table 6 illustrates the annual ranch-level economic loss resulting from elimination of one month of spring grazing. Torell et al estimate that elimination of one month of spring grazing would result in an 18 percent decline in BLM grazing. An 18 percent reduction in grazing on core/priority sage-grouse habitat in Wyoming would represent a -123,649 AUM decrease in federal grazing or an 8 percent reduction from the baseline. Torell et al estimate that the loss of one month of spring grazing would result in a loss of \$27.94 in net ranch income per BLM AUM removed. They also estimate that the capitalized value of the grazing permit would be reduced by \$271.00 per BLM AUM removed. Applying these values to the -123,649 reduction in federal AUMs results in a projected loss in net ranch income of \$3.4 million and a projected loss in the grazing permit values of \$33.5 million from the baseline.

The fifth column of Table 6 illustrates the annual ranch-level economic loss resulting from elimination of one month of fall grazing. Torell et al estimate that elimination of one month of fall grazing would result in an 18 percent decline in BLM grazing. An 18 percent reduction in grazing on core/priority sage-grouse habitat in Wyoming would represent a -125,038 AUM decrease in federal grazing or an 8 percent reduction from the baseline. Torell et al estimate that the loss of one month of fall grazing would result in a loss of \$22.34 in net ranch income per BLM AUM removed. They also estimate that the capitalized value of the grazing permit would be reduced by \$262.00 per BLM AUM removed. Applying these values to the -125,038 reduction in

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Id.

federal AUMs results in a projected loss in net ranch income of \$2.8 million and a projected loss in the grazing permit values of \$32.8 million from the baseline.

The sixth column of Table 6 illustrates the annual ranch-level economic loss resulting from elimination of both one month of spring and one month of fall grazing. Torell et al estimate that elimination of one month of spring grazing and one month of fall grazing would result in a 36 percent decline in BLM grazing. A 36 percent reduction in grazing on Core Sage-Grouse habitat in Wyoming would represent a -249,382 AUM decrease in federal grazing or a 16 percent reduction from the baseline. Torell et al estimate that the loss of one month of spring grazing and one month of fall grazing would result in a loss of \$25.74 in net ranch income per BLM AUM removed. They also estimate that the capitalized value of the grazing permit would be reduced by \$312.00 per BLM AUM removed. Applying these values to the -249,382 reduction in federal AUMs results in a projected loss in net ranch income of \$6.4 million and a projected loss in the grazing permit values of \$77.8 million from the baseline.

STATE-LEVEL ECONOMIC IMPACTS

Table 7 summarizes the potential state-level economic impact estimates from altering grazing policies on federal land to protect sage-grouse in Wyoming over an eight-year time period, 2013 to 2020. This time period is consistent with the economic analysis prepared for the 9-Plan. The second column of Table 7 illustrates the economic impact of one AUM of livestock grazing on the Wyoming economy. These per AUM estimates differ from those estimated in the 9-Plan in that they are adjusted to account for seasonal dependency. Seasonal dependency results from the lack of flexibility in seasonal forage availability for different forage source. As a result, optimal uses of other forage resources are impacted when federal AUMs are not available. Previous research has found that decreases in ranch profitability from reductions in federal grazing are greater than the just the loss federal grazing by itself. Based on Torell et al, the per AUM economic impact adjustment to account for seasonal dependency used for this analysis was a reduction of 1.55 total AUMs per each AUM reduction in federal grazing.

The adjusted per AUM economic impact estimates indicate that the value of production from one AUM of federal grazing is \$80.10 per year. If secondary impacts are considered, the total economic impact from one AUM of federal grazing is \$166.05 per year. The total employment generated by the economic activity associated with one AUM of federal grazing is .001836 jobs or one job for each 545 AUMs of grazing. The total labor earnings associate with the .001836 jobs is \$54.73 or \$29,809 per job.

The third column of Table 7 illustrates the projected baseline state-level economic impact of livestock grazing on federal sage-grouse habitat in Wyoming. These projections were estimated by multiplying per AUM economic impact estimates in column two by 12.5 million in projected AUMs of livestock grazing on federal sage-grouse habitat in Wyoming from 2013 to 2020. The baseline economic impact is estimated to be \$998.6 million in direct economic impacts, \$2.1 billion in total economic impact, 22,886 job-years of total employment, and \$682.3 million in total labor earnings.

The fourth column of Table 7 illustrates the state-level economic loss resulting from elimination of grazing on core/priority sage-grouse habitat in Wyoming. Based on the percent of sage-grouse habitat that is core/priority, it is estimated that elimination of livestock grazing on core/priority habitat would reduce grazing by 5.6 million AUMs from 2013 to 2020 which represents a 45 percent reduction from the baseline. The economic loss from no livestock grazing on core/priority habitat is estimated to be -\$445.1 million in direct economic impacts, -\$922.8 million in total economic impact, -10,201 job-years of total employment, and -\$304.1 million in total labor earnings.

The fifth column of Table 7 illustrates the state-level economic loss resulting from elimination of one month of spring grazing. Torell et al estimate that elimination of one month of spring grazing would result in an 18 percent decline in BLM grazing. An 18 percent reduction in grazing on core/priority sage-grouse habitat in Wyoming would represent a -989,192 AUM decrease in federal grazing between 2013 and 2020 or an 8 percent reduction from the baseline. The economic loss from elimination of one

month of spring grazing on core/priority habitat is estimated to be -\$79.2 million in direct economic impacts, -\$164.2 million in total economic impact, -1,816 job-years of total employment, and -\$54.1 million in total labor earnings.

The sixth column of Table 7 illustrates the state-level economic loss resulting from elimination of one month of fall grazing. Torell et al estimate that elimination of one month of fall grazing would result in an 18 percent decline in BLM grazing. An 18 percent reduction in grazing on core/priority sage-grouse habitat in Wyoming would represent a 1.0 million AUM decrease in federal grazing between 2013 and 2020 or an 8 percent reduction from the baseline. The economic loss from elimination of one month of spring grazing on core/priority habitat is estimated to be -\$80.1 million in direct economic impacts, -\$166.1 million in total economic impact, -1,836 job-years of total employment, and -\$54.7 million in total labor earnings.

The seventh column of Table 7 illustrates the state-level economic loss resulting from elimination of one month of spring and one month of fall grazing. Torell et al estimate that elimination of one month of spring and one month of fall grazing would result in a 36 percent decline in BLM grazing. A 36 percent reduction in grazing on core/priority sage-grouse habitat in Wyoming would represent a 2.0 million AUM decrease in federal grazing between 2013 and 2020 or a 16 percent reduction from the baseline. The economic loss from elimination of one month of spring grazing on core/priority habitat is estimated to be -\$159.8 million in direct economic impacts, -\$331.3 million in total economic impact, -3,662 job-years of total employment, and -\$109.2 million in total labor earnings.

SUMMARY AND CONCLUSIONS

Livestock grazing on federal sage-grouse habitat is economically important to Wyoming. From a ranch-level perspective, this grazing represents \$41.5 million in net ranch income per year with a capitalized grazing permit value of \$461.3 million. From a state-level perspective, this grazing represents \$998.7 million in direct economic impacts, \$2.1 billion in total economic impacts, 22,886 job-years of total employment, and \$682.3 million in total labor earnings over an eight-year period from 2013 to 2020.

Due to its importance, reductions in livestock grazing on federal sage-grouse habitat would have serious implications for Wyoming's economy. For example, the elimination of livestock grazing on core federal sage-grouse habitat in Wyoming would reduce livestock grazing by an estimated -5.6 million AUMs between 2013 and 2020. From a ranch-level perspective, this reduction would decrease net ranch income by -\$10.9 million per year and the capitalized grazing permit value by -\$130.2 million. From a state-level perspective, this reduction would result in an estimated economic loss of -\$445.1 million in direct economic impacts, -\$922.8 million in total economic impacts, -10,201 jobs-years of total employment, and -\$304.1 million in total labor earnings.

Alternatively, if spring grazing on federal sage-grouse habitat in Wyoming was reduced by one month it is estimated that livestock grazing would be decrease by -989,192 AUMs between 2013 and 2020. From a ranch-level perspective, this reduction would decrease net ranch income by -\$3.4 million per year and the capitalized grazing permit value by -\$33.5 million. From a state-level perspective, this reduction would result in an estimated economic loss of -\$79.2 million in direct economic impacts, -\$164.2 million in total economic impacts, -1,816 jobs-years of total employment, and -\$54.1 million in total labor earnings.

Similarly, if fall grazing on federal sage-grouse habitat in Wyoming was reduced by one month it is estimated that livestock grazing would be decrease by -1.0 AUMs between 2013 and 2020. From a ranch-level perspective, this reduction would decrease net ranch income by -\$2.8 million per year and the capitalized grazing permit value by -\$32.8 million. From a state-level perspective, this reduction would result in an estimated economic loss of -\$80.1 million in direct economic impacts, -\$166.1 million in total economic impacts, -1,836 jobs-years of total employment, and -\$54.7 million in total labor earnings.

Finally, if both spring grazing and fall grazing on federal sage-grouse habitat in Wyoming was both reduced by one month it is estimated that livestock grazing would be decrease by -2.0 AUMs between 2013 and 2020. From a ranch-level perspective, this reduction would decrease net ranch income by -\$6.4 million per year and the capitalized grazing permit value by -\$77.8 million. From a state-level perspective, this reduction would result in an estimated economic loss of -\$159.8 million in direct economic impacts, -\$331.3 million in total economic impacts, -3,662 jobs-years of total employment, and -\$109.2 million in total labor earnings.

These impact estimates are based on current actions associated with altering grazing policies on federal land to protect the sage-grouse. The great unknown is what would be the economic impacts on livestock grazing if the sage-grouse was listed.

TABLE 6. RANCH-LEVEL ECONOMIC IMPACT ESTIMATES FROM WYOMING SAGE-GROUSE MANAGEMENT

Ranch-Level Impacts	Annual Federal Habitat Baseline (1)	Annual Economic Loss No Grazing Core (2)	Annual Economic Loss Spring Grazing Core (3)	Annual Economic Loss Fall Grazing Core (3)	Annual Economic Loss Spring and Fall Grazing Core (3)
AUMs	1,558,448	-694,657	-123,649	-125,038	-249,382
Percent Reduction	0.0%	-44.6%	-7.9%	-8.0%	-16.0%
Net Income Per BLM AUM (3)	\$26.62	\$15.71	\$27.94	\$22.34	\$25.74
Grazing Permit Value Per BLM AUM (4)	\$296.00	\$187.44	\$271.00	\$262.00	\$312.00
Net Ranch Income	\$41,485,885	-\$10,913,063	-\$3,454,752	-\$2,793,355	-\$6,419,090
Grazing Permit Value	\$461,300,603	-\$130,206,521	-\$33,508,868	-\$32,760,027	-\$77,807,149

(1) Estimated from 9-Plan

(2) Based on 44.6% of total habitat acres being core

(3) From Torell, et al

(4) Torell et al - Net Ranch Income over 40 years discounted at 7 percent

TABLE 7. STATE-LEVEL ECONOMIC IMPACT ESTIMATES FROM WYOMING SAGE-GROUSE MANAGEMENT

State-Level Impacts	Per AUM (2)	2013-2020 Federal Sage-Grouse Baseline (2)	2013-2020 Economic Loss No Grazing Core (3)	2013-2020 Economic Loss Spring Grazing Core (4)	2013-2020 Economic Loss Fall Grazing Core (4)	2013-2020 Economic Loss Spring and Fall Grazing Core (4)
AUMs	1	12,467,584	-5,557,257	-989,192	-1,000,306	-1,995,055
Percent Reduction		0.0%	-44.6%	-7.9%	-8.0%	-16.0%
Direct Economic Impact	\$80.10	\$998,671,393	-\$445,144,240	-\$79,235,675	-\$80,125,963	-\$159,806,782
Total Economic Impact (1)	\$166.05	\$2,070,194,236	-\$922,761,026	-\$164,251,463	-\$166,096,985	-\$331,271,208
Total Employment (1)	0.001836	22,886	-10,201	-1,816	-1,836	-3,662
Total Labor Earnings (1)	\$54.73	\$682,289,708	-\$304,121,391	-\$54,133,608	-\$54,741,850	-\$109,179,579

APPENDIX TABLE 1. PER ACRE ECONOMIC IMPACT ESTIMATES FOR WYOMING SAGE GROUSE HABITAT

Economic Impact	9-Plan Alternative A	9-Plan Habitat Acres	Total Impact Per Acre (2)	Annual Impact Per Acre
Direct Economic Impact				
Oil & Gas Well Drilling	\$26,603,285,224	16,878,220	\$1,576.19	\$197.02
Oil & Gas Production	\$30,070,593,782	16,878,220	\$1,781.62	\$222.70
Livestock Grazing	\$388,458,279	10,846,200	\$35.82	\$4.48
Wind Development (1)	\$490,889,631	10,846,200	\$45.26	\$5.66
Wind Generation (1)	\$67,447,245	10,846,200	\$6.22	\$0.78
Total Direct Impact	\$57,620,674,161		\$3,445.10	\$430.64
Total Economic Impact				
Oil & Gas Well Drilling	\$36,078,032,484	16,878,220	\$2,137.55	\$267.19
Oil & Gas Production	\$34,076,850,066	16,878,220	\$2,018.98	\$252.37
Livestock Grazing	\$805,253,956	10,846,200	\$74.24	\$9.28
Wind Development*	\$697,990,452	10,846,200	\$64.35	\$8.04
Wind Generation*	\$90,583,084	10,846,200	\$8.35	\$1.04
Total Impact	\$71,748,710,041		\$4,303.48	\$537.94
Total Employment				
Oil & Gas Well Drilling	219,933	16,878,220	0.013031	0.001629
Oil & Gas Production	31,080	16,878,220	0.001841	0.000230
Livestock Grazing	8,902	10,846,200	0.000821	0.000103
Wind Development (1)	5,903	10,846,200	0.000544	0.000068
Wind Generation (1)	989	10,846,200	0.000091	0.000011
Total Job-Years	266,807		0.016328	0.002041
Total Labor Earnings				
Oil & Gas Well Drilling	\$14,539,274,043	16,878,220	\$861.42	\$107.68
Oil & Gas Production	\$2,266,498,419	16,878,220	\$134.29	\$16.79
Livestock Grazing	\$265,393,689	10,846,200	\$24.47	\$3.06
Wind Development (1)	\$303,038,869	10,846,200	\$27.94	\$3.49
Wind Generation (1)	\$51,546,644	10,846,200	\$4.75	\$0.59
Total Labor Earnings	\$17,425,751,664		\$1,052.87	\$131.61
Selected State and Local Government Revenue				
Oil & Gas FMR	\$1,834,957,637	16,878,220	\$108.72	\$13.59
Oil & Gas Ad Valorem	\$1,454,548,248	16,878,220	\$86.18	\$10.77
Oil & Gas Severance	\$1,398,171,265	16,878,220	\$82.84	\$10.35
Wind S&U Tax*	\$141,555,157	16,878,220	\$8.39	\$1.05
Wind Development (1)	\$2,259,949	16,878,220	\$0.13	\$0.02
Wind Generation (1)	\$71,465,404	16,878,220	\$4.23	\$0.53
Total S&L Govt Revenue	\$4,902,957,660		\$290.49	\$36.31

(1) Average of Low and High Wind Development Scenarios

(2) 2013-2020



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