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February 11, 2008

***Via Overnight Mail and Electronic Mail***

Bureau of Land Management
Pinedale Field Office
Caleb Hiner, Project Manager
1625 West Pine Street
P.O. Box 768
Pinedale, WY 82941

WYMAIL_PAPA_YRA@blm.gov

Re: Anschutz Pinedale Corporation's Supplemental Comments Regarding the Revised Draft Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project

Dear Mr. Hiner:

G-1 P-2-1 Anschutz Pinedale Corporation (APC) submits the following comments regarding the Revised Draft Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project (PAPA RSDEIS). The PAPA RSDEIS was released for public comment on December 28, 2007. *See* BLM Notice of Availability, 72 Fed. Reg. 73877 (Dec. 28, 2007); EPA NOA, 72 Fed. Reg. 73799, 73800 (Dec. 28, 2007). APC submitted comments on the Draft Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project ("PAPA SDEIS") on March 12, 2007, and June 15, 2007. APC incorporates its previous comments on the PAPA SDEIS herein by this reference. As the BLM is aware, APC has a significant interest in the PAPA because it owns and operates more than 22,000 acres of federal, state and fee oil and gas leases in the boundaries of the Pinedale Anticline Oil and Gas Exploration and Development Project Area (the "Project Area").

## GENERAL COMMENTS

APC strongly supports the BLM's adoption of Alternative D, the Preferred Alternative, as expressed in the PAPA RSDEIS. Alternative D provides an appropriate balance between the need for the operators and the BLM to develop clean burning natural gas resources from the Project Area while minimizing the potential impacts oil and gas development may have upon other resources. Alternative D will foster the production of much needed domestic energy resources, while ensuring that potential impacts to other resources, such as wildlife, are reduced to the extent practicable.

In particular, APC believes the decision to slightly expand the Development Area 1 (DA-1) and Development Area 2 (DA-2) under Alternative D is appropriate given the known oil and gas resources present along the eastern and western boundaries of the so-called Core Area. The minor expansion of the Core Area will allow APC to continue to develop its existing oil and gas leases, without significantly impacting wildlife or other resources. As the BLM is aware APC has agreed to limit its operations to not more than three drilling rigs and three active well pads at any time under Alternative D.

APC is strenuously opposed to the adoption of either Alternative B or Alternative C as presented in the PAPA SDEIS, or Alternative E as presented in the PAPA RSDEIS. These alternatives would significantly limit APC's ability to operate on its leasehold, which is located outside of the proposed Core Development Areas in Alternatives B and C, but would still impose stringent mitigation requirements on APC's operations in the form or air emission restrictions and mandating the installation of a liquids gathering system. Alternative E would improperly delay development in the Project Area, increase the amount of time areas are left un-reclaimed, and potentially increase impacts to wildlife in the area. Only Alternative D meets the Purpose and Need of the proposed action from the perspective of all the operators in the Project Area. APC encourages the BLM to issue the Final Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project (PAPA FSEIS) as soon as possible.

### National Environmental Policy Act Analysis

APC believes the PAPA RSDEIS satisfies the twin purposes of the National Environmental Policy Act of 1969 (NEPA), to consider the potential impacts of a proposed federal action and to inform members of the public of those potential impacts. *See Baltimore Gas & Electric v. Natural Resources Defense Council*, 462 U.S. 87, 97 (1983). As the BLM is aware, NEPA is a procedural statute intended to produce informed decision making by federal agencies. *United States Dep't of Trans. v. Public Citizen*, 541 U.S. 752, 756-57 (2004); *Lee v. United States Air Force*, 354 F.3d 1229, 1237 (10th Cir. 2004). While NEPA mandates that agencies follow specific procedures when reaching decisions that significantly affect the environment, NEPA does not impose any requirement on agencies to reach a particular decision. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350-51 (1989); *Lee*, 354 F.3d at 1237. Moreover, NEPA does not require agencies "to elevate environmental concerns over other

valid concerns." *Lee*, 354 F.3d at 1237. Once the agency adequately identifies and evaluates environmental concerns, "NEPA places no further constraint on agency actions." *Pennaco Energy, Inc. v. United States Dep't of the Interior*, 377 F.3d 1147, 1150 (10th Cir. 2004).

In particular APC applauds the BLM's decision to issue a Revised SDEIS for the Pinedale Anticline Oil and Gas Exploration and Development Project and the BLM's development of Alternative D. As noted above, APC believes only Alternative D finds a reasonable and appropriate balance between the need for the increased production of domestic energy sources and potential impacts to other resources. APC also congratulates the BLM on the significant updates to the PAPA RSDEIS. By providing the public with the most recent information regarding the affected environment and socioeconomic resources, the BLM satisfies NEPA's requirement to disclose the best information available. 40 C.F.R. § 1502.24 (2007). The BLM's revisions to the PAPA SDEIS, in a relatively short period of time, are noteworthy and the BLM should be congratulated.

**Expedite the Record of Decision**

Given the fact that this is the second major EIS prepared for development in the PAPA Project Area, and given the fact the BLM issued both a Draft EIS and a Revised Draft EIS for the Pinedale Anticline Oil and Gas Exploration and Development Project, and finally given the fact that the BLM has already spent over two years studying the impacts of additional development within the PAPA Project Area, APC encourages the BLM to expedite the completion of the Pinedale Anticline Oil and Gas Exploration and Development Project EIS and Record of Decision (ROD). The BLM's Pinedale Field Office and the Wyoming State BLM Office need to make the Pinedale Anticline Oil and Gas Exploration and Development Project EIS a top priority and should utilize any resources necessary to complete the Final EIS and issue the ROD as soon as possible. The sooner the BLM issues the ROD for the Pinedale Anticline Oil and Gas Exploration and Development Project, the sooner additional energy supplies can be provided for the nation, and the sooner the economies of southwest Wyoming will be assured of stable jobs, increased tax revenues, and continued economic success.

APC additionally offers the following specific comments on the PAPA RSDEIS:

## CHAPTER 1 – INTRODUCTION

### Section 1.8 – Purpose and Need

The BLM must significantly revise the Purpose and Need section of the PAPA RSDEIS as expressed on page 1-9. It is crucial for the BLM to clearly define the purpose and need of the EIS because the stated goal or purpose of the project necessarily defines the range of reasonable alternatives. *See City of Carmel-by-the-Sea v. United States Dept. of Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1997). The Council on Environmental Quality (CEQ) regulations implementing NEPA require an agency to "specify the underlying purpose and need to which the agency is responding" in the Purpose and Need section of an EIS. 40 C.F.R. § 1502.16 (2007). The

BLM's NEPA Handbook states that for "externally initiated proposals, the purpose and need reflects what the applicant intends to accomplish by the proposed action, e.g., to transport and sell natural gas to consumers." *See* BLM NEPA Handbook H-1790-1, Chapter V.B.1.e.(1), pg. V-4 (Rel. 1-1547 10/25/88). Where the action subject to NEPA review is triggered by a proposal from a private party, the BLM is required to give "substantial weight to the goals and objectives of that private actor." *Citizens' Comm. to Save Our Canyons v. United States Forest Service*, 297 F.3d 1012, 1030 (10th Cir. 2002); *Fuel Safe Washington v. Federal Energy Regulatory Comm'n.*, 389 F.3d 1313, 1324 (10th Cir. 2004). The BLM's current explanation of the Purpose and Need statement is misleading and inaccurate because it does not accurately reflect the true purpose of the operators' proposal, the development of domestic energy sources as required by their federal oil and gas leases.

The BLM properly expressed the purpose and need of the proposed development operation in the PAPA Project Area in the PAPA SDEIS, and the BLM should redraft the Purpose and Need Statement in the Final EIS for the Pinedale Anticline Oil and Gas Exploration and Development Project. In the PAPA SDEIS the BLM properly recognized:

P-2-2

> The purpose and need of the proposed development is to enable the commercial production of federally owned mineral resources in conformance with the BLM RMP mineral objectives, and to prevent drainage of federal minerals by wells located on adjacent non-federally owned lands. The Operators have valid existing leases and rights to extract natural gas and have proposed to drill an additional 4,399 wells by 2025. . . . The exploration and future development of natural gas resources will help to supply the future domestic energy needs and play an integral part in the nation's energy security. Development of additional natural gas resources in the PAPA is consistent with the Comprehensive National Energy Strategy announced by the U.S. Department of Energy in April 1998, the Energy Policy and Conservation Act (42 United States Code [USC] 6201), and the Energy Policy Act of 2005 (Public Law 109-58).

G-2

*See* PAPA SDEIS, pgs. 1-9 – 1-10. The BLM must correct the Purpose and Need section in the Final EIS to include the above language.

## CHAPTER 2 – PUBLIC PARTICIPATION, EXISTING DEVELOPMENT AND ALTERNATIVES

### Section 2.4.2.1 – Components Common to All Alternatives

The BLM indicates on page 2-19 that the Pinedale Anticline Working Group (PAWG) would continue to be an advisory group to the BLM under all alternatives. The BLM also states that an interagency "Review Team" will review annual development plans submitted by the operators and use adoptive management practices and principles to adjust mitigation measures if necessary. *See* PAPA RSDEIS, pg. 219. APC is not opposed to the creation of an interagency working group, so long as the working group remains exempt from the Federal Advisory

Committee Act (FACA) and so long as the operators are not required to fund the operations of the working group. APC has significant concerns regarding the continuation of the PAWG as currently chartered and implemented given its lack of success over the past several years. Experience has already demonstrated that the PAWG is not functioning effectively, and the BLM should seriously consider whether the PAWG should continue after the adoption of a new ROD for the PAPA Project Area. The annual planning and review meetings performed by the BLM and various State of Wyoming agencies such as the Wyoming Game and Fish Department (WGFD) are more than adequately capable of using adaptive management to monitor operations and respond to potential impacts in the Project Area. *See* PAPA RSDEIS, pg. 2-19. The BLM has not explained or justified why the PAWG should continue. P-2-3 AP-1

The BLM references the 2006 version of the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (the "Gold Book") on page 2-21. As the BLM is aware, the BLM issued a revised version of the Gold Book in 2007. The 2007 revised edition incorporates changes resulting from the new Onshore Order No. 1 released in March of 2007. 72 Fed. Reg. 10308, 10328 (March 7, 2007). The BLM should reference only the most recent version of the Gold Book. P-2-4 G-3

**Section 2.4.2.2 – Alternative A**

The BLM inconsistently refers to the Management Areas established in the PAPA ROD in 2000 by name and number. For example, Map 2.4-2 identifies the Management Areas by name, while the text on page 4-28 refers to Management Areas by number. *See* PAPA RSDEIS pg. 2-27, Map 2.4-2 and pgs. 2-28, 2-30. The BLM should consistently refer to the Management Areas by name <u>and</u> number to avoid potential confusion for the public. P-2-5 G-4

**Section 2.4.2.3 – Alternative B**

APC is strongly opposed to the adoption of Alternative B because it would unfairly advantage other oil and gas operators owning leases in the Core Area by allowing year-round development, while precluding APC from similar benefits. All of APC's leases within the Project Area are located outside the Core Development Areas identified under Alternative B. Alternative B would subject APC to the same mitigation measures as the operators enjoying the substantial benefits of year round development, without providing similar benefits. The BLM must not select Alternative B. P-2-6 AL-1

APC is also opposed to BLM's proposal to only allow exploration activities outside of the Core Development Areas during the first five years after the issuance of the ROD in order to "delineate" the productive zones of the Project Area. *See* PAPA RSDEIS pg. 2-33 (Once the estimated 5-year delineation period is over, all drilling in all seasons would be within the three CDAs.") The BLM cannot unilaterally limit the time a lessee has to develop a lease and, thus, effectively modify the terms of the lease. Federal oil and gas leases are issued with a primary term of ten years, and the BLM cannot modify that aspect of a lease, or deny the right to develop leases already in their extended term by virtue of production. *See Copper Valley Machine* P-2-7 G-5

*Works, Inc. v. Andrus*, 653 F.2d 595, 603-04 (D.C. Cir. 1981) (holding that lessees are entitled to their full lease terms irrespective of whether the prohibitions are by lease or conditions of approval); *Coronado Oil Co.*, 164 IBLA 309, 321 (2005) (noting that federal leases are issued for a period of 10 years). The proposal to limit delineation to a five-year period is inconsistent with the express provisions of APC's leases granting development rights for a full ten years. The BLM may not unilaterally abrogate specific provisions of APC's leases to further a few operators' abilities to develop leases within the Core Area. P-2-7 G-6

The proposal to limit delineation activities to only the first five years after the ROD is issued is also inconsistent with the term and conditions of the Two Buttes Unit Agreement, which was approved by the BLM on July 18, 2005. The Unit Agreement creates certain rights and obligations for APC and the BLM's attempt to preclude development on the flanks of the PAPA after five years under Alternative B is inconsistent with the requirements of the BLM-approved Unit Agreement. P-2-8 G-7

Should the BLM deny or unreasonably delay APC's ability to develop its lease, the BLM's action may constitute a taking in violation of the Fifth Amendment to the Constitution. The Federal Court of Claims has recognized that a temporary taking occurs when the BLM prohibits oil and gas development on a lease for a substantial period of time. *Bass Enterprise Prod. Co. v. United States*, 45 Fed.Cl. 120, 123 (Fed.Cl. 1999). A lessee who can demonstrate a taking of an oil and gas lease is entitled to damages in the fair market rental value of the leasehold. *See Bass Enterprise Prod. Co. v. United States*, 48 Fed.Cl. 621, 625 (Fed.Cl. 2001). If the BLM denies all development opportunities on APC's acreage in order to foster and facilitate development on the other operators' leasehold, APC will be able to demonstrate a temporary taking. *See Bass Enterprise Prod. Co. v. United States*, 45 Fed.Cl. at 123. The BLM must avoid adopting alternatives that would result in the unconstitutional taking of APC's property and contract rights. P-2-9 G-8

**Section 2.4.2.4 – Alternative C**

APC is strongly opposed adoption of Alternative C because it would unfairly advantage other oil and gas operators owning leases in the Core Area by allowing year-round development, while precluding APC from similar benefits. All of APC's leases within the Project Area are located outside the Core Development Areas identified under Alternative C, although it appears APC would be subject to the same mitigation measures as the operators enjoying the substantial benefits of year round development. To the extent they are applicable to Alternative C, APC hereby incorporates its comments regarding Alternative B. The BLM must not select Alternative C. P-2-10 G-9

**Section 2.4.3 – Alternative D (Preferred Alternative)**

APC strongly supports the BLM's adoption of Alternative D as expressed in the PAPA RSDEIS. Alternative D provides an appropriate balance between the need for the operators and the BLM to develop clean burning natural gas resources from the Project Area, while reducing potential impacts to other resources. Alternative D will foster the production of much needed domestic energy resources, while ensuring that potential impacts to other resources, such as wildlife, are reduced to the extent practicable.

**Section 2.4.3.3 – Alternative D Development Areas**

G-10 P-2-11

The BLM must slightly correct its description of APC's development activities on page 2-45 of the PAPA RSDEIS. The BLM states on page 2-45 that "Anschutz agreed to limit development within the Alternative D Core Area to no more than three drilling rigs and three well pads at any given time." *See* PAPA RSDEIS, pg. 2-45. APC agreed to three drilling rigs and not more than three active drilling pads at any one time. APC has agreed to have ongoing drilling activities at only three wells pads at a time, but may have more than three total well pads/locations with production equipment after its active drilling operations in the Project Area are complete. The BLM should correct the language in the PAPA FSEIS and the ROD.

APC is opposed to the BLM's proposal to limit all delineation and development activities in the Stewart Point Area to the first two years after the ROD is issued. *See* PAPA RSDEIS, pg. 2-45 ("Delineation drilling in the Stewart Point area (see Map 2.4-7) would be conducted during the first 2 years following the ROD, while adhering to seasonal restrictions for wildlife.") APC owns leases within the Stewart Point portion of DA-1, and should not be required to conduct all of its "delineation activities within the first two year after the ROD has issued" particularly because APC has agreed to limit its operations to only three active drilling rigs and three pads at a time. *See* PAPA RSDEIS, pg. 2-45. APC would be required to move one of its few drilling rigs within the Project Area into the Stewart Point area almost immediately to begin testing the feasibility of future oil and gas operations in that area. Further, because APC has agreed to only three active well pads within the Project Area it would be significantly prejudiced by the proposed limitation if it is required to commit one of its rigs to the Stewart Point Area. Further, because year-round operations will continue to apply in the area, *See* PAPA RSDEIS, pg. 2-47, APC could be further prejudiced because it would not be allowed to move equipment during the winter restriction period.

P-2-12

The BLM cannot unilaterally limit the time a lessee has to develop a lease and, thus, effectively modify the terms of the lease. Federal oil and gas leases are issued with a primary term of ten years, and the BLM cannot modify that aspect of a lease, or deny the right to develop leases already in their extended term by virtue of production. *See Copper Valley Machine Works, Inc. v. Andrus*, 653 F.2d 595, 603-04 (D.C. Cir. 1981) (holding that lessees are entitled to their full lease terms irrespective of whether the prohibitions are by lease or conditions of approval); *Coronado Oil Co.*, 164 IBLA 309, 321 (2005) (noting that federal leases are issued for a period of 10 years). The proposal to limit delineation to a two-year period is inconsistent

G-11 P-2-12 with the express provisions of APC's leases granting development rights for a full ten years. The BLM may not unilaterally abrogate specific provisions of APC's leases.

P-2-13 G-12 Should the BLM deny or unreasonably delay APC's ability to develop its lease, the BLM's action may constitute a taking in violation of the Fifth Amendment to the Constitution. The Federal Court of Claims has recognized that a temporary taking occurs when the BLM prohibits oil and gas development on a lease for a substantial period of time. *Bass Enterprise Prod. Co. v. United States*, 45 Fed.Cl. 120, 123 (Fed.Cl. 1999). A lessee who can demonstrate a taking of an oil and gas lease is entitled to damages in the fair market rental value of the leasehold. *See Bass Enterprise Prod. Co. v. United States*, 48 Fed.Cl. 621, 625 (Fed.Cl. 2001). If the BLM denies all development opportunities on APC's acreage in order to foster and facilitate development on the other operators' leasehold, APC will be able to demonstrate a temporary taking. *See Bass Enterprise Prod. Co. v. United States*, 45 Fed.Cl. at 123. The BLM must avoid adopting alternatives that would result in the unconstitutional taking of APC's property and contract rights.

**Section 2.4.3.4 – Federal Suspended and Term NSO Leases**

P-2-14 LS-1 The BLM correctly notes that APC voluntarily agreed to suspend over 8,350 acres of its federal leases within the Project Area for a period of five years from the date the ROD for the Pinedale Anticline Oil and Gas Exploration and Development Project is issued. *See* APC's Letter of July 23, 2007. The BLM indicates on page 2-50, however, that the suspended acreage may not, necessarily be released from suspense after the five year period. "After the primary term of 5 years, the need for federal suspended and term NSO leases would be reviewed during the Annual Planning Meeting. A determination on the status of the lease (whether to continue suspension or to resume the lease conditions) would be made by the BLM AO." *See* PAPA RSDEIS, pg. 2-50. This description is not consistent with APC's commitment or expectations. In its letter of July 27, 2007, and its numerous discussions with the BLM, APC made it entirely clear that its leases would, at APC's option, be released from the suspense after five years, and that development on the suspended leases could proceed subject to existing stipulations on the leases. If year-round development was later determined to be warranted on APC's suspended leases, APC would meet with the BLM to discuss the possibility and initiate the preparation of any required analysis and documentation. The BLM must correct the language on page 2-50 of the PAPA RSDEIS to accurate summarize APC's commitment. The current language is not accurate, with respect to APC, and must be removed.

P-2-15 LS-2 The BLM should also disclose the fact that suspension of APC federal leasehold and unit operations may require the consent of APC's partners owning an undivided interest in the acreage subject to suspension. *See* 43 C.F.R. § 3165.1 (2007); BLM Manual, 3160-10.3.31.A.1 (Rel 3-150, 3/13/1987). In the event APC or another operator of the acreage proposed to be placed into suspense for the first five years of development after the ROD for the Pinedale Anticline Oil and Gas Exploration and Development Project is approved, is unable to obtain consent from the all working interest owners, the BLM may not be able to suspend operations in the lands identified on Map 2.4-9.

**Section 2.4.4 – Alternative E**

G-13 P-2-16

APC is strongly opposed to Alternative E and urges the BLM not to select this unreasonable alternative. By allowing only a certain number of well pads within specific management areas at any given time, the BLM will provide certain operators with a significant operational advantage over the other operators in the Project Area. Depending on their lease position, certain operators could have dramatic advantages. The BLM has not indicate how—or if—it will ensure that all of the operators within the Project Area are given a fair and reasonable opportunity to development their leasehold. If the BLM simply uses a "first-come first-served" approach, the BLM will create an unwise and unnecessary rush for development as operators attempt to construct well pads within specific management areas first. Because year-round development will not be allowed, and because operators such as APC attempt to maximize directional drilling from a single pad to the extent possible, well pads will remain in place for long periods of time as the operators are forced to move operations to comply with seasonal stipulations. This is an unwise practice and could lead to substantial delays in APC's ability to develop its leases, and adverse impacts to other resources such as wildlife.

SE-1 P-2-17

APC also opposes Alternative E because it will have significant adverse impacts to the local economy. Because the seasonal stipulations will continue, the region will continue to experience seasonal boom-bust cycles. *See* PAPA RSDEIS, pg. 4-16. The BLM should take efforts to reduce, not encourage these seasonal fluctuations.

**CHAPTER 3 – AFFECTED ENVIRONMENT**

Overall, the analysis of the potentially affected environment contained in the PAPA RSDEIS is thorough and complete. The BLM has provided a detailed and informative description of the existing conditions in the Project Area to inform the public and the agency regarding the existing conditions.

**Section 3.5 – Socioeconomic Resources**

The BLM notes the significant role oil and gas revenue plays in the region's economic well-being, and the fact that oil and gas revenues are expected to grow in the next several years. *See* PAPA RSDEIS, pg. 3-7. "In 2005, oil and gas production and ancillary facilities accounted for 96 percent of the total assessed valuation for Sublette County, 55 percent for Lincoln County, and 61 percent for Sweetwater County (Wyoming Department of Revenue, 2007)." *See* PAPA RSDEIS, pg. 3-7. When selecting an alternative for future operations in the PAPA Project Area, the BLM should ensure that its actions do not, in any way, adversely impact the success of oil and gas development in the region. As the BLM explains on page 3-8, the increased revenues from oil and gas development in the PAPA have supported infrastructure investments in Sublette County including the expansion of the county library, extension and renovation of the courthouse, a new riding area, school remodeling, new baseball fields, new skateboard park, new jail, public landfill, senior center, aquatic center, and public clinic.

The BLM also explains that oil and gas development has contributed to the economic success in the region by providing a very low unemployment rate and higher per capita earnings than the rest of the State. While portions of the United States are currently worried about a recession, the economy of Wyoming and particularly southwest Wyoming is strong because of oil and gas development.

**Section 3.9.2 – Visual Resource Management System**

V-1 P-2-18

The BLM indicates on page 3-50 that the currently imposed visual resource management (VRM) restrictions are "subject to change under the forthcoming [Pinedale] RMP [resource management plan] ROD." *See* PAPA RSDEIS, pg. 2-50. The BLM must be aware that cannot attempt to impose the new VRM objective on operations on existing leases. The IBLA has clearly recognized that BLM cannot impose visual resource objectives inconsistent with lease rights, and that BLM must consider the impacts of oil and gas operations and existing leases when developing VRM objectives during the planning process. *See Southern Utah Wilderness Alliance, et al.*, 144 IBLA 70, 84-88 (1998). The BLM cannot impose VRM objectives without considering existing leases and ongoing oil and gas operations.

P-2-19 V-2

Where the BLM has issued oil and gas leases, it has made the decision to allow the surface disturbance and facilities that accompany oil and gas development. 43 C.F.R. § 3101.1-2. The BLM cannot later attempt to impose a restriction that is inconsistent with existing lease rights, or the BLM's previous management decision. The Interior Board of Land Appeals (IBLA) has addressed a similar situation in past cases. In *Southern Utah Wilderness Alliance,* 144 IBLA 70 (1998) ("SUWA") a resource management plan designated certain land as VRM Class II. The BLM had leased the same lands for oil and gas development. The IBLA found this improper, and it criticized the San Juan, Utah Resource Area for applying VRM Class II to lands where it had approved oil and gas leases. It stated that where the BLM has made the decision to issue oil and gas leases, the BLM should not put the same lands in VRM Class II because it is "inherently contradictory" and creates a "conflict." *Southern Utah Wilderness Alliance,* 144 IBLA at 87. The IBLA stated that the VRM classifications should not have been set at VRM Class II but that in the RMP "the VRM classification should have expressly been adjusted to at least VRM Class III." *Southern Utah Wilderness Alliance,* 144 IBLA at 85. The BLM must revise and clarify the statement on page 3-50 in light of the limitations on the BLM's authority to modify VRM restrictions.

**Section 3.11 – Air Quality**

P-2-20

The BLM properly indicates that "[v]isibility in the PAPA air quality modeling domain is considered very good, with an average SVR [standard visual range] of over 93.2 miles (Malm 2000)." *See* PAPA SDEIS, pg. 3-66. Figures 3.11-1, 3.11-2, and 3.11-3 demonstrate that visibility in the region is improving, despite increased oil and gas development. Data from the IMPROVE site in the Bridger Wilderness Area demonstrates that visibility on the 20% cleanest days and 20% middle days has generally improved since the early 1990s and is, in fact, near record high levels. *See* PAPA RSDEIS, pg. 3-66. The IMPROVE monitoring data indicates

dramatic improvements in visibility on the cleanest and middle days in the last 2-3 years despite increased oil and gas development in the Pinedale Resource Areas. *See* PAPA RSDEIS, pgs. 3-66 – 3-68. Information from the recently released Kemmerer RMP/DEIS similarly confirms that visibility in the area is generally improving. *See* Kemmerer RMP/DEIS, pgs. 3-5 – 3-7. The analysis in the recently released Draft EIS for the Eagle Prospect Exploratory Wells Project, jointly prepared by the BLM and Forest Service, affirmatively states that visibility in Bridger Wilderness has improved since 1989. *See* Eagle Prospect DEIS, pg. 3-11 (Trend analysis shows that general visibility in the Bridger Wilderness has improved since 1989 (VIEWS 2006b)."). Given the fact visibility in the area is generally improving, the BLM should not attempt to impose unreasonable air quality mitigation requirements. P-2-20 AQ-1

When describing atmospheric deposition on page 3-68 of the PAPA RSDEIS, the BLM states that the "USFS has indicated that the current green line values are set too high and do not protect ecosystems from nitrogen and sulfur deposition." The BLM credits for this statement a single Forest Service employee. *See* PAPA RSDEIS, pg. 3-68. The BLM should not reference unsubstantiated statements such as in this in the PAPA RSDEIS. APC is not aware, of a Forest Service proposal or rulemaking to modify or change the Level of Concern for deposition. Until such time as the Forest Service formally modifies the Level of Concern, the above statement is misleading and must be removed. P-2-21 AQ-2

**Section 3.11.2 – Impacts to Air Quality from Existing Wellfield Activities**

The BLM's modeling of the potential air quality impacts for 2005 demonstrates the overly conservative nature of BLM's air quality modeling, particularly with respect to visibility impacts. Contrary to the actual IMPROVE visibility monitoring data discussed above, the BLM's conservative modeling for 2005 demonstrates the potential for 45 days of 1 deciview impairment at Bridger Wilderness Area. *See* PAPA RSDEIS, pg. 3-73, Table 3.11-6. Although APC understands the analysis is not directly comparable, the modeling data is sharply contradicted by the 2005 IMPROVE monitoring data that demonstrates improved visibility at Bridger Wilderness Area. The BLM should clearly explain that the apparent discrepancy between the 2005 modeling results and the actual monitoring data is likely a result of the conservative nature of the BLM's modeling. The BLM at least partially recognized the conservative nature of its modeling on pages 36 and 37 of the PAPA Air Quality Technical Support Document (AQTSD) for the PAPA RSDEIS, the BLM never fully explains the conservative nature of its modeling or the fact that models cannot conclusively predict impacts. The BLM should more thoroughly disclose the conservative nature of its analysis in the PAPA SFEIS and its role in the NEPA process. As conservative as it was, the BLM's modeling for 2005, which was based on actual emissions data, indicates compliance with all NAAQS/WAAQS. *See* PAPA RSDEIS, pg 3-73; PAPA RSDEIS, AQTSD, pg. 46, Appendix E. P-2-22 AQ-3 AQ-4

**Section 3.16.1.5 – Watershed Modeling**

The BLM's analysis on page 3-92 indicates that there is negligible sediment transport off slopes in the PAPA Project Area and relatively insignificant sediment discharge from steep P-2-23

SW-1 P-2-23 slopes in the Project Area even when modeling assumes no sediment control measures. When actual sediment control measures are utilized, as required by the Wyoming Department of Environmental Quality, even less impacts can be expected. The BLM should not attempt to impose unreasonable sediment control measures on oil and gas operations in the Project Area.

**Section 3.21.1.1 – Threatened and Endangered Species and Special Status Species**

TE-1 P-2-24 Because of the timing restrictions the BLM and the United States Fish and Wildlife Service (USFWS) will enforce around raptor nests and Bald eagle winter roosting habitat, *see, e.g.,* PAPA RSDEIS, pgs. 4-134, the BLM must include maps of known raptor nest locations and proposed bald eagle roosting habitat in the Final EIS in order for the operators to assess what impacts such restrictions will have on their operations.

TE-2 P-2-25 The BLM recognizes that the Bald eagle was delisted on August 8, 2007, but that the species is still protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. *See* PAPA RSDEIS, pg. 3-110. The USFWS has proposed a draft rule that would provide a means to obtain permits to take eagles for certain activities despite the provisions of the Bald and Golden Eagle Protection Act. *See* 72 Fed. Reg. Fed. Reg. 31,141, 31,141 (June 5, 2007). Under the proposed rule, the USFWS would authorize take "for the protection of other interests in any particular locality" if "such permits are consistent with the preservation of the bald and golden eagle, and the take is associated with, and not the purpose of, the activity, and cannot practicably be avoided." *See id.* at 31, 153 (proposed to amend 50 C.F.R. § 22.26). The BLM should ensure itself sufficient flexibility to comply with the USFWS's new regulations when they are finalized.

TE-3 P-2-26 Further, the BLM must recognize that existing regulations do allow an inactive golden eagle nest to be taken under limited circumstances, with the approval of a permit from the USFWS. 50 C.F.R. § 22.25. Specifically, the USFWS will allow an inactive nest to be taken to promote oil and gas development, however, the applicant must demonstrate that the overall population will not be impacted and comply with certain mitigation measures. *Id.*; *see also* 50 C.F.R. § 22.3 (defining resource development or recovery operations).

TE-4 P-2-27 Finally, the BLM should recognize that the Migratory Bird Treat Act (MBTA), does not, necessarily prohibit or preclude oil and gas operations the way the Bald and Golden Eagle Protection Act might. The MBTA prohibits the pursuit, hunt, take, capture, killing, selling, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except as authorized under a valid permit. 16 U.S.C. §§ 703(a), 704 (2006). Unlike the definition of "take" under the Bald and Golden Eagle Protection Act, the USFWS has narrowly defined "take" to mean "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." *See* 50 C.F.R. §§ 10.12, 21.3 (2006).

P-2-28 Because of this narrow definition of "take," habitat modification or degradation due to oil and gas operations would not result in a "take" prohibited by the MBTA and its implementing regulations. The federal courts have held that the MBTA does not prohibit or criminalize habitat

TE-5 P-2-28 modification or degradation. *See Newton County Wildlife Ass'n v. United States Forest Serv.*, 113 F.3d 110, 115 (8th Cir. 1997) (holding sale of timber in migratory bird habitat was not "take" under MBTA because it did not directly result in death of bird); *accord Seattle Audubon Soc'y v. Evans*, 952 F.2d 297, 302 (9th Cir. 1991); *Mahler v. United States Forest Serv.*, 927 F. Supp. 1559, 1579 (S.D. Ind. 1996). Under this case law, oil and gas development that would modify or degrade migratory bird habitat will not result in a "take" under the MBTA. The BLM must amend the language in the PAPA RSDEIS to comply with these laws, regulations and past court decisions. The BLM should specifically allow itself sufficient flexibility to manage oil and gas development in accordance with the USFWS's regulations and procedures.

**Section 3.21.1.2 – Sensitive Species in the PAPA**

TE-6 P-2-29 The BLM's Manual allows State Directors to identify sensitive wildlife species. *See* BLM Manual 6840.06(E) (Rel. 6-121, 1/19/01). The BLM identifies several BLM Wyoming Sensitive Species that occur within the Project area including the pygmy rabbit, ferruginous hawk, long-billed curlew, burrowing owl, sage thrasher, loggerhead shrike, Brewer's sparrow, sage sparrow, and the white-tailed prairie dog. *See* PAPA RSDEIS, pgs. 3-114 – 3-115. Sensitive species are identified by the BLM to ensure actions on BLM administered lands do not contribute to the need to list species under the ESA. *See* BLM Manual 6840.06(E) (Rel. 6-121, 1/19/01). The BLM manual requires the agency to assess "the distribution, population dynamics, current threats, abundance, and habitat needs" of sensitive species in the Project Area. BLM Manual 6840.06(C)(1) (Rel. 6-121, 1/19/01). The BLM has not complied with its obligations under the BLM Manual because it has not provided, or at least not incorporated into the PAPA RSDEIS, sufficient information regarding BLM Wyoming Sensitive Species. To the extent possible, the BLM should include more detailed information regarding the distribution, threats, abundance, and habitat needs of BLM Wyoming Sensitive Species found within the Project Area.

TE-7 P-2-30 The BLM should specifically include maps of known habitat for species such as white-tailed prairie dogs and pygmy rabbits, and known nesting locations for ferruginous hawks and burrowing owls. The operators in the Project Area have been assisting the BLM with wildlife monitoring for over seven years, and there is significant information available regarding BLM Wyoming Sensitive Species. Recent challenges to oil and gas development project in Wyoming, including challenges to the Jonah Infill Drilling Project and the Atlantic Rim Natural Gas Field Development Project have suggested the BLM is not complying with its Sensitive Species Policy, and the BLM should take extra effort to ensure its compliance with the BLM Manual is properly documented.

TE-8 P-2-31 Because the BLM, and other agencies such as the USFWS, may impose or enforce specific timing restrictions and other conditions of approval near raptor nests and white-tailed prairie dog habitat, the BLM must include maps of know raptor nest locations and occupied prairie dog complexes so that the operators can assess what impacts such restrictions many have on their operations.

**Section 3.22 – Wildlife and Aquatic Resources**

W-1 P-2-32 W-2

The BLM references a study by Berger, *et al.,* throughout the PAPA RSDEIS that suggests oil and gas development is adversely impacting pronghorn in the PAPA Project Area. *See* PAPA RSDEIS, pgs. 3-121 – 3-122, 4-149. The assumptions in the 2006 Berger report do not appear to be justified as supplemental by other information in the EIS, or even Berger's 2007 report. The BLM should not reference the seemingly inaccurate conclusions in the 2006 report suggesting oil and gas activities are impacting pronghorn for several reasons. First, on page 3-121 the BLM indicates that the pronghorn fawn production rate of the Northern Sublette Herd exceeded that of the entire Sublette Herd, despite ongoing and even increased oil and gas development in the Northern Sublette Herd area. *See* PAPA RSDEIS, pg. 3-121. The information on pages 3-120 and 3-121 also demonstrates that the population of the Sublette Herd is higher than at any point in time since 1999. This data strongly suggests the conclusions drawn by Berger in his report in 2006–that pronghorn may be adversely impacted by oil and gas development–are suspect, if not completely erroneous.

W-3 P-2-33

Second, BLM does not emphasize the more important conclusions from the Berger study that no significant differences were detected among pronghorn populations exposed to oil and gas development near PAPA and Jonah Field for such important viability factors as overall survivability, body mass, stress hormones (glucocorticosteroids), disease antibodies, and vitamins and minerals. *See* Berger, pgs. 16, 19, 22, 31, 35, 45. Further, the fact that the pronghorn populations studied by Berger did not utilize habitat within the Jonah Field during 2006 does not demonstrate that pronghorn will generally avoid oil and gas development. The Berger study notes that few, if any, of the study population were captured and tagged within the Jonah Field and also determined that that antelope populations in the area demonstrate "remarkable fidelity" to the areas in which they were captured. The studied populations may simply not have ever utilized the relatively mediocre habitat within Jonah Field. *See* JIDP FEIS, pg. 3-55 (indicating Jonah Field does not contain any crucial winter range or crucial winter/yearlong range for antelope). Additionally, the Berger study notes that some pronghorn antelope spend extensive time within developed fields and "adjust their patterns of activity to capitalize on areas adjacent to pads when traffic volume and other human disturbances were diminished, such as occurs at night," a phenomenon which can readily be observed in Jonah Field. Berger (2006), pg. 35. Moreover, many species such as pronghorn antelope and mule deer have been found to habituate to increased traffic so long as the movement remains predictable. *See* Reeve, A.F. 1984. *Environmental Influences on Male Pronghorn Home Range and Pronghorn Behavior*. Ph.D. Dissertation; Irby, L.R. *et al.*, 1984; "Management of Mule Deer in Relation to Oil and Gas Development in Montana's Overthrust Belt" *Proceedings III: Issues and Technology in the Management of Impacted Wildlife.*

W-4 P-2-34

Third, BLM fails to emphasize the fact that Berger's assumptions regarding pronghorn avoiding oil and gas development were not verified because tagged antelope extensively utilized habitat within Jonah Field during 2007. *See* Berger, 2007, pg. 25 (showing no avoidance of areas of high development in the Jonah Field). The 2007 Berger study itself contradicts the

W-5 P-2-34 assumptions drawn in the 2006 report. Overall, the Berger reports demonstrate that oil and gas development does not adversely impact pronghorn in the Sublette Herd, a fact easily verified by the significant increases in pronghorn populations in the period since oil and gas development began in the PAPA Project Area and Jonah Field. Populations within the area are at all time highs, with the population of Overall Sublette Herd over 60,000, and the population of the Northern Sublette Herd nearly 29,000. *See* PAPA RSDEIS, pgs. 3-120 – 3-121. The assumptions in the 2006 Berger report appear to be inaccurate.

**Section 3.22.1.1 – Upland Game Birds**

W-6 P-2-35 W-7 The BLM indicates that "casual observations" of sage-grouse has declined in recent years. *See* PAPA RSDEIS, pg 3-129. The BLM has not explained how the "casual observation" took place, or even if the "casual observation," are accurate. Data presented in the original PAPA SDEIS demonstrated a significant increase in the sage grouse populations in and near the PAPA Project Area. According to the information presented in Figure 3.22-2 of the original draft EIS, it appears sage-grouse populations on the Mesa and in the vicinity of the PAPA are at all time highs. *See* PAPA SDEIS, pg. 3-117. The dramatic increase in the sage-grouse population since 2003, a time period that has included significant increases in oil and gas development in the PAPA, may indicate that oil and gas development is not adversely impacting sage-grouse to the extent previously disclosed, that BLM's mitigation measures and management directives are effective, or that the slight decrease in sage-grouse populations in the early part of this decade was actually caused by factors other than oil and gas development (namely drought). The BLM noted in the PAPA SDEIS that "[a]verage male attendance did <u>increase</u> overall on the Mesa, in the PAPA, and off the PAPA during 2005 and 2006." *See* PAPA SDEIS, pg. 3-117. Strangely, this positive data was completely excluded from the PAPA RSDEIS released in December of 2007. Instead, the BLM provides data suggesting harvest of sage-grouse in the area have declined. *See* PAPA RSDEIS, pg. 3-131, Figure 3.22-2. The BLM has not explained why harvest data is a more accurate representation of sage grouse populations in the vicinity of the PAPA Project area than the actual population counts prepared by the WGFD. The BLM must remove the misleading information regarding harvest success rates and replace it with the information and data contained in the original PAPA SDEIS.

W-8 P-2-36 A recently released study by Renee Taylor and Dr. Larry Hayden-Wing regarding the impacts of oil and gas development on sage-grouse in Wyoming indicates that sage-grouse leks in the PAPA Project Area continue to be occupied even when impacted by the natural gas development occurring in the area. *See* Taylor, Hayden-Wing, *et al.*, *Greater Sage-Grouse Populations and Energy Development in Wyoming*, pg. 27 (APC Attachment 1). The Taylor and Hayden-Wing report further demonstrates that sage-grouse populations in the area increased between 2004 and 2006 to record levels. *See* Taylor, Hayden-Wing, *et al.*, *Greater Sage-Grouse Populations and Energy Development in Wyoming*, pg. 27. The Mesa, East Fork, and Speedway complexes all saw increased male attendance between 2004 and 2006. *See* Taylor, Hayden-Wing, *et al.*, *Greater Sage-Grouse Populations and Energy Development in Wyoming*, pgs. 27 - 31. The overall trend for sage-grouse attendance at leks in the Project Area appears to be

W-8 P-2-36 W-9 increasing. *See* Taylor, Hayden-Wing, *et al.*, *Greater Sage-Grouse Populations and Energy Development in Wyoming*, pgs. 30 – 31. In fact, the number of cumulative males has significantly increased since 2005, a period that also saw increased oil and gas development in the Project Area. *See* Taylor, Hayden-Wing, *et al.*, *Greater Sage-Grouse Populations and Energy Development in Wyoming*, pg. 30. The BLM should include this analysis in the Final EIS. Information released from the WGFD in March of 2007 also noted that while there have been historic declines in sage-grouse populations, there have been mid-term and short-term increases in populations. *See* Tom Christiansen, Brief Status of Sage-grouse Population Trends and Conservation Planning in Wyoming as of March 16, 2007, and 2007 Sage-grouse Hunting Season Proposal. *See* APC Attachment 2. Cooperative efforts between the BLM, State of Wyoming, and many others are working and should be allowed to continue. The BLM should revise and update the analysis regarding sage-grouse populations in the Final EIS.

W-10 P-2-37 The BLM also fails to note the significance of two new active leks in the vicinity of the PAPA, suggesting populations of sage-grouse are effectively utilizing habitat outside areas potentially disturbed by oil and gas operations. The BLM should revise section 3.22.1.2 of the PAPA SDEIS to more accurately reflect the current trends and protections available for sage-grouse in the Pinedale Field Office.

W-11 P-2-38 W-12 In recent months several organizations opposed to oil and gas developments, and even certain BLM Field Offices, have placed undue reliance on the Holloran (2005) study regarding the potential impacts of natural gas development activities on sage-grouse. In discussing the Holloran study, and any potential conclusions derived therefrom, the BLM should specifically disclose the fact that BLM purposefully waived the seasonal and timing stipulations normally associated with sage-grouse leks and specifically allowed the Operators to drill near an active lek during the strutting season in order to assess the potential impacts. The conclusion in the Holloran study that existing stipulations are not adequate therefore appears unfounded and outdated. A recent study prepared by Renee Taylor and Dr. Larry Hayden-Wing confirms that some of Holloran's conclusions are not entirely supported by his data for several reasons. First, Holloran's study was based on a study of two leks where the BLM's normal timing and spatial restrictions for sage-grouse were not applied. Second, Mr. Holloran's data from 2004 was obtained during a state-wide decline in sage-grouse attributable to drought and other factors. Recent data from the BLM and WGFD demonstrate a recent increase in sage-grouse populations state-wide and particularly in the vicinity of the Jonah and Pinedale Anticline Fields, the area Mr. Holloran conducted his study. *See,* Taylor, Hayden-Wing, *et al.*, *Greater Sage-Grouse Populations and Energy Development in Wyoming*, pgs. 25 – 31. Moreover, even prior to the release of the Holloran study, the BLM issued new policies increasing protections for sage-grouse. The new protections include new surface use restrictions, timing limitations, and additional surveys prior to operations in sage-grouse habitat. *See* Wyoming Instruction Memorandum 2004-057 (August 16, 2004). APC understands the BLM is currently in the process of revising this Instruction Memorandum. The BLM must consider this information when preparing the Final EIS and should not rely upon the Holloran study.

## CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

The PAPA RSDEIS adequately discloses the potential environmental impacts associated with infill drilling development within the Project Area and informs the public of the potential consequences of the BLM's authorization. The PAPA RSDEIS provides sufficient information and a reasonable range of alternatives for the BLM to make an informed and reasoned decision regarding the Pinedale Anticline Oil and Gas Exploration and Development Project.

### Section 4.3 – Socioeconomic Resources

SE-2 P-2-39

The BLM's analysis again demonstrates the significant positive socioeconomic impacts oil and gas development have in southwest Wyoming. Over 94% of *ad valorem* taxes collected in Sublette County in 2005 came from oil and gas production and development. *See* PAPA RSDEIS, pg. 4-16. The BLM's analysis also demonstrates that local governments receive approximately $42,000 per year for each federal oil and gas well drilled within the PAPA. *See* PAPA RSDEIS, pg. 4-16. The BLM must ensure that the significant, positive impacts of oil and gas development in the Southwest Wyoming are allowed to continue.

### Section 4.7 – Visual Resources

V-3 P-2-40

The BLM must revise the statement on page 4-56 suggesting that wellfield development may exceed BLM's VRM III management objectives. All of the BLM's management actions must conform to the Pinedale Resource Management Plan. 43 C.F.R. § 1610.5-3(a) (2007). Further, the majority of operations will be conducted on areas with Class IV VRM restrictions, which allow a significant degree of visual modification. The majority of APC's operations will take place on leases with a VRM IV designation. Finally, development in the concentrated development areas using directional drilling techniques will significantly reduce potential visual impacts.

### Section 4.8 – Cultural Resources

C-1 P-2-41

The BLM indicates on page 4-64 that "alternative methods of resource protection could be researched and implemented" for winter mitigation. *See* PAPA RSDEIS, pg. 4-64. The BLM should clearly define potential winter mitigation measures, and ensure that such measures are reasonable and consistent with existing lease rights.

C-2 P-2-42

Notably, the BLM's analysis predicts for more negative impacts to cultural resources from development under Alternative E than Alternative D. *See* PAPA RSDEIS, pg 4-67. The BLM should adopt Alternative D.

**Section 4.9 – Air Quality**

AQ-5 P-2-43 The BLM properly recognizes on pages 4-70 and 4-71 that the WDEQ with oversight from the Environmental Protection Agency, has authority over air quality in Wyoming. Nonetheless, the BLM suggests that it cannot authorize activities that do not conform to applicable local, state, tribal, and federal air quality laws. While the BLM's statement may be partially accurate, the BLM cannot use its overly conservative air quality modeling and analysis to suggest, in any way, that its activities may not comply with the Clean Air Act (CAA) or Wyoming's air quality rules and regulations. The BLM's analysis required by NEPA can only be used to satisfy the requirements of NEPA, mainly public disclosure and informed agency decisionmaking. BLM's analysis does not demonstrate what will happen with the surety necessary to predict future compliance with air quality laws and regulations. The BLM must substantially revise the statement on page 4-71 that suggest the BLM's conservative air quality modeling can be used to demonstrate future compliance, or noncompliance with air quality laws and regulations. The WDEQ and the EPA will implement and impose air emission regulations on stationary and mobile sources in accordance with each agency's authority. If a potential WAAQS or NAAQS standard is ever demonstrated to be violated based on actual emissions data, not the BLM's conservative modeling, the WDEQ will take the appropriate action to ensure compliance.

AQ-6 P-2-44 Importantly, the BLM's modeling demonstrates continued compliance with all Wyoming Ambient Air Quality Standards (WAAQS), National Ambient Air Quality Standards (NAAQS), and Prevention of Significant Deterioration (PSD) Increments. Given the BLM's lack of authority over air emissions in Wyoming, and given the fact the BLM's admittedly conservative modeling demonstrates compliance with the WAAQS, NAAQS, and PSD Increments under the Proposed Action and the various alternatives, the BLM should not attempt to impose overly prescriptive or unnecessary air quality mitigation techniques or conditions of approval on operations in the PAPA Project Area.

AQ-7 P-2-45 APC is concerned with the unnecessary air quality mitigation measures described in Section 4.9.3.5 of the PAPA RSDEIS. The language of the RSDEIS, coupled with the fact that the BLM's extensive air quality modeling in the PAPA RSDEIS demonstrates continued compliance with all NAAQS/WAAQS, suggest that the BLM intends to reduce potential visibility impacts through the proposed mitigation. Because actual visibility monitoring proves that visibility has remained relatively constant over the past several years and has recently improved despite increased oil and gas activity, the BLM is improperly allowing overly conservative models to influence its management decisions.

P-2-46 Not only are the proposed mitigation measures unnecessary, they raise serious legal and regulatory concerns. The BLM lacks authority to regulate both air emissions and potential visibility impacts. The IBLA has made clear that in Wyoming, the Wyoming Department of Environmental Quality and the EPA are solely charged with ensuring compliance with federal and state air quality standards. *See Wyoming Outdoor Council, et al.*, IBLA No. 2006-155, at 12 (June 28, 2006). This decision is particularly compelling because it relates to natural gas

operations within the Pinedale Resource Area, and specifically operations on the adjacent Jonah Field. Similarly, in the PAPA SDEIS and in other contexts, the BLM has recognized that it has very little authority to regulate air emissions. *See* PAPA RSDEIS, pg. 4-71. The BLM previously recognized its inability to mandate air quality mitigation in the Record of Decision for the Continental Divide/Wamsutter II Natural Gas Project, pg.15 ("BLM cannot implement specific air quality mitigations *since it has no authority to do so*.") (emphasis added). The BLM has equally limited authority to regulate potential visibility impacts. The CAA restricts a federal land manager's authority to a secondary role in the regulation of visibility within designated Class I areas. 42 U.S.C. §§ 7475(d)(2)(B), 42 U.S.C. § 7491. In contrast, the CAA vests the WDEQ with the regulation of potential impacts to visibility, and authority over air quality in general. 42 U.S.C. § 7407(a). Therefore, the BLM has no authority over air quality, and cannot impose emissions restrictions, either directly or indirectly, on natural gas operations in southwest Wyoming, particularly if the overall goal is to reduce potential visibility impacts. P-2-46 AQ-8

In light of these limitations, the BLM must significantly revise, if not delete entirely, the proposed mitigation strategy described in Section 4.9.3.5. of the PAPA DEIS. Wyoming's continued compliance with all NAAQS/WAAQS and its progressive and comprehensive air quality regulatory program demonstrates that WDEQ is fulfilling its responsibility to protect air quality in Wyoming. BLM should not attempt to illegally regulate air emissions in derogation of WDEQ's authority. P-2-47 AQ-9

In addition to objecting to the general mitigation strategy proposed in the PAPA RSDEIS, APC is particularly concerned with the BLM's illegal attempt to cap potential emissions associated with additional development in the PAPA by requiring reductions in visibility impacts. The Phase I Mitigation described in Alternative D requires the operators in PAPA to reduce project induced visibility impairment to 2005 levels and Phase II would require an 80% reduction in drilling emissions and such other measures to reduce potential modified visibility impacts and Bidper Wilderness Areas to 0 days. *See* PAPA RSDEIS, pg. 4-84. By requiring the operators to demonstrate, through modeling, reduced visibility impacts associated with significant emission reductions, the BLM is effectively imposing a project-wide air emissions cap. The BLM lacks the authority to impose an emissions cap, as it recognized ten years ago in a series of appeals regarding the oil and gas development in the Moxa Arch and Fontenelle project areas. *See* Amended ROD for the Fontenelle Natural Gas Infill Drilling Project, pg. I-14 (explaining it "would be fundamentally inappropriate for BLM to impose a 'cap' on emissions . . . because the authority and mandate for regulating emissions rests with the State [of Wyoming] through an EPA approved State Implementation Plan."). The BLM must eliminate this *de facto* emissions CAP in the PAPA ROD, in deference to the WDEQ's authority over air emissions in Wyoming. P-2-48 AQ-10

The BLM's *de facto* emissions cap is particularly troubling because the BLM admitted emissions from compression are already at BACT levels—meaning that further reductions are not technically feasible. *See* PAPA SDEIS, pg. 4-74. The BLM lacks the authority to impose mitigation measures on oil and gas leases that are not technically or economically feasible. *See* P-2-49

AQ-11 P-2-49 *Conner v. Burford*, 84 F.2d 1441, 1449-50 (9th Cir. 1988); 43 C.F.R. § 3101.1-2 (2006) (BLM can impose only "reasonable mitigation measures . . . to minimize adverse impacts . . . to the extent consistent with lease rights granted"). In the PAPA RSDEIS, the BLM does not indicate whether the emission reductions described in Alternative D of the EIS are possible, much less technologically and economically feasible.

AQ-12 P-2-50 Furthermore, APC objects to BLM's attempt to require operators to demonstrate annually through modeling that their plan to further reduce visibility impairment at the Bridger Wilderness Area is effective. *See* PAPA RSDEIS, pg. 4-86. The use of modeling is not appropriate when actual monitoring data is available to demonstrate compliance with the BLM's goal of reduced visibility impacts. Significant additional monitoring data for southwest Wyoming is already becoming available thanks to a cooperative effort by WDEQ and oil and gas operators in southwest Wyoming to purchase and install new monitoring equipment across the region. Relying upon models known to be overly conservative may be appropriate to accomplish NEPA's disclosure requirements, but is not appropriate to ensure regulatory compliance with BLM's visibility goals. *See State of Ohio v. EPA*, 784 F.2d 224, 230 (6th Cir. 1986) (holding that it is arbitrary and capricious for an agency to use models to set emission limits unless they are checked against real world data). The BLM must delete the requirement to demonstrate compliance through annual modeling.

**Section 4.15.3.6 – Soil Resources (Alternative E)**

The BLM accurately recognizes that the potential impacts to soil resources will be far more significant under Alternative E than Alternative D because operators will be required to leave pads un-reclaimed seasonally when stipulations prevent year-round drilling operations. Alternative D allows operators to maximize interim reclamation and should be adopted by the BLM.

**Section 4.16.5 – Vegetation Resources Additional Mitigation Opportunities**

M-1 P-2-51 The BLM's proposed mitigation measures requiring offsite mitigation are inconsistent with BLM policy. The BLM cannot require offsite mitigation, it must be entirely voluntary. *See* BLM Instruction Memorandum 2005-069 (Feb. 1, 2005); Wyoming Instruction Memorandum WY-96-21 (Dec. 14, 1995).

**Section 4.17.5 Grazing Resources Additional Mitigation Opportunities**

P-2-52 Both of the proposed additional mitigation measures discussed on page 4-125 are beyond the BLM's authority to require. First, the BLM cannot impose a no surface occupancy restriction on a lease without such a stipulations on the lease. Once the BLM has issued a federal oil and gas lease without a no surface occupancy stipulation (NSO), and in the absence of a nondiscretionary statutory prohibition against development, the BLM cannot completely deny development on the leasehold, nor impose mitigation measures inconsistent with the BLM's authority under 43 C.F.R. § 3101.1-2. *See, e.g., National Wildlife Federation, et al.*, 150 IBLA

385, 403 (1999). Only Congress has the right to completely prohibit development once a lease has been issued. *Western Colorado Congress,* 130 IBLA 244, 248 (1994). Further, the BLM cannot modify APC's valid and existing rights. Courts have recognized that once the BLM has issued an oil and gas lease conveying the right to access and develop the leasehold, the BLM cannot later impose unreasonable mitigation measures that take away those rights. *See Conner v. Burford*, 84 F.2d 1441, 1449-50 (9th Cir. 1988); 43 C.F.R. § 3101.1-2 (2006) (BLM can impose only "reasonable mitigation measures . . . to minimize adverse impacts . . . to the extent consistent with lease rights granted"). The BLM cannot impose mitigation measures inconsistent with APC's existing lease rights. P-2-52 M-2

Second, the BLM cannot require offsite mitigation measures, they must be entirely voluntary. *See* BLM Instruction Memorandum 2005-069 (Feb. 1, 2005); Wyoming Instruction Memorandum WY-96-21 (Dec. 14, 1995). P-2-53 M-3

**Section 4.19.3.1 – Threatened and Endangered Species and Special Status Species**

The BLM indicates on page 4-135 – 4-136 that oil and gas development under all of the alternatives will have some impact on BLM Wyoming Sensitive Species. *See* PAPA RSDEIS, pgs. 4-135 – 4-136. The BLM includes specific information regarding the potential impacts development under each of the alternatives may have upon BLM Wyoming Sensitive Species. The BLM does not, however, include a specific statement or finding that the approval of the Pinedale Anticline Oil and Gas Exploration and Development Project will not contribute to the need to list a BLM Wyoming Species under the ESA. *See* BLM Manual 6840.06(E) (Rel. 6-121, 1/19/01). The BLM should clearly include this determination in the Final EIS. P-2-54 TE-9

**Section 4.20 – Wildlife and Aquatic Resources**

In Section 4.20.3.1 the BLM references revised criteria advanced by the WGFD entitled *Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats – Version 2.0. See* PAPA RSDEIS, pg. 4-148. The WGFD has not officially adopted the 2007 version of the *Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats* document referenced by the BLM, although the document was released to certain parties for review. The 2004 version of the *Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats* is the only document that has been officially adopted by the Wyoming Game and Fish Commission. The BLM should delete the reference to the 2007 preliminary draft version. P-2-55 W-13

The BLM should delete any references to the Naugle and Walker studies on pages 4-152 and 4-153 of the PAPA RSDEIS, or at least include information regarding the limitations and criticisms of those studies in other recently issued reports. A recently released study by Renee Taylor and Dr. Larry Hayden-Wing regarding the impacts of oil and gas development on sage-grouse in Wyoming call into question many of the assumptions and findings of the Naugle and Walker reports. *See* Taylor, Hayden-Wing, *et al.*, *Greater Sage-Grouse Populations and Energy* P-2-56 W-14

W-14 P-2-56

*Development in Wyoming*. The BLM should review and incorporate the findings of the Taylor and Hayden-Wing report into the PAPA RSDEIS.

The BLM properly notes the significant benefits to wildlife that would occur under Alternative D as a result of operators' agreement to primarily utilize directional drilling within the core development areas and their offer to place in suspense leases covering almost 50,000 acres. *See* PAPA RSDEIS, pgs.. 4-160 – 4-161. Wildlife will additionally benefit from the concentrated development and interim reclamation proposed under Alternative D. The BLM should adopt Alternative D.

**APPENDIX 8D – RECLAMATION PLAN**

P-2-57 LS-3

The BLM indicates on in appendix 8D that "suspended and term NSO leases would be considered for release when habitat function is demonstrably restored in the Alternative D Core Area." *See* PAPA RSDEIS, pg. 8D-5. The BLM further states that it will "confer with WGFD prior to releasing the federal suspended and term NSO leases in the flanks." *See* PAPA RSDEIS, pg. 8D-5. This description is not consistent with APC's commitment or expectations. In its letter of July 27, 2007, and its numerous discussions with the BLM, APC made it entirely clear that its leases would be released from the suspense after five years, and that development on the suspended leases could proceed subject to the stipulations on the leases. If year-round development was later determined to be warranted on APC's suspended leases, APC would meet with the BLM to discuss the possibility and initiate the preparation of any required analysis and documentation. The BLM does not, however, retain the authority to keep leases under suspense after the five year period without the express approval of APC. The BLM must correct the language on page 8D-5 of the PAPA RSDEIS to accurate summarize APC's proposal to the BLM. The current language is not accurate, with respect to APC, and must be removed.

**AIR QUALITY TECHNICAL SUPPORT DOCUMENT APPENDIX H – CAMX MODELING**

APC notes that the BLM's air quality photochemical modeling using the Comprehensive Air Quality Modeling with extensions (CAMx) indicates that the approval of the Pinedale Anticline Oil and Gas Exploration and Development Project is not likely to cause a violation of either the 8-hour ozone WAAQS or NAAQS. Using two separate modeling approaches the BLM's analysis indicates the maximum 8-hour ozone concentration are projected to be below the 8-hour ozone NAAQS. *See* AQTSD, Appendix H, pg. H-37. The BLM's modeling also confirms that the majority of potential ozone impacts within the region are not associated with oil and gas development, but with the major metropolitan areas in Salt Lake City, Utah and Denver, Colorado. *See* AQTSD, Appendix H, pg. H-33.

**CONCLUSION**

Thank you in advance for considering APC's comments on the revised Draft Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project. APC encourages the BLM to adopt Alternative D, the Preferred Alternative, and to issue a Final EIS and ROD for the revised Draft Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project as soon as possible.

Very truly yours,

Anschutz Pinedale Corporation

Keith Bonati
Senior Landman

Enclosures

# Brief Status of Sage-grouse Population Trends and Conservation Planning in Wyoming as of March 16, 2007

Tom Christiansen – Sage-Grouse Program Coordinator
Wyoming Game and Fish Department

Sage-grouse populations have declined in Wyoming and across the West over the last half-century. Figure 1 illustrates this decline as measured by the average number of males documented on sage-grouse leks in Wyoming from 1960-2006. Over the last decade however, the average size of leks has increased (Figure 2) reflecting a generally increasing population. The same is true for the most recent three-year period (Figure 3). Thus, there have been long-term declines but mid- and short-term increases in sage-grouse populations in Wyoming.

These trends are valid at the statewide scale. Trends are more varied at the local scale. Sub-populations more heavily influenced by anthropogenic impacts (sub-divisions, intensive energy development, large-scale conversion of habitat from sagebrush to grassland or agriculture, Interstate highways, etc.) have experienced declining populations or extirpation.

Figure 1.

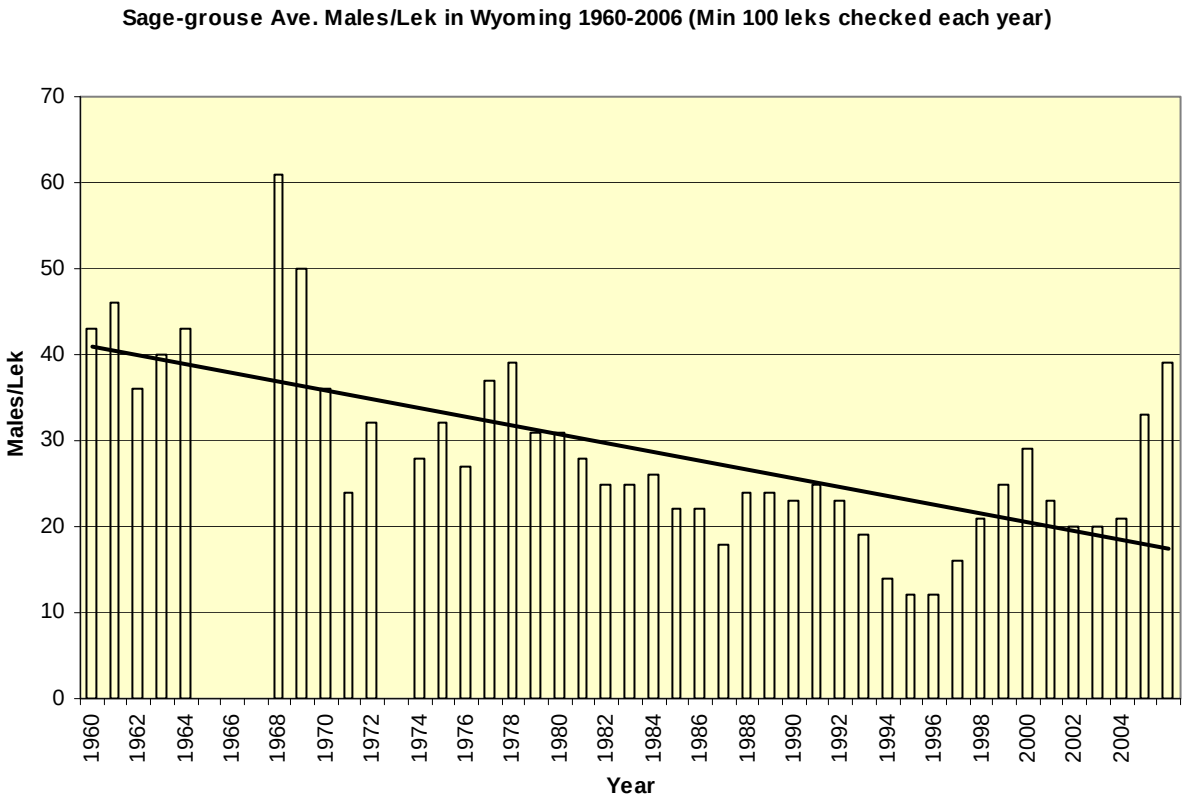


Figure 2.

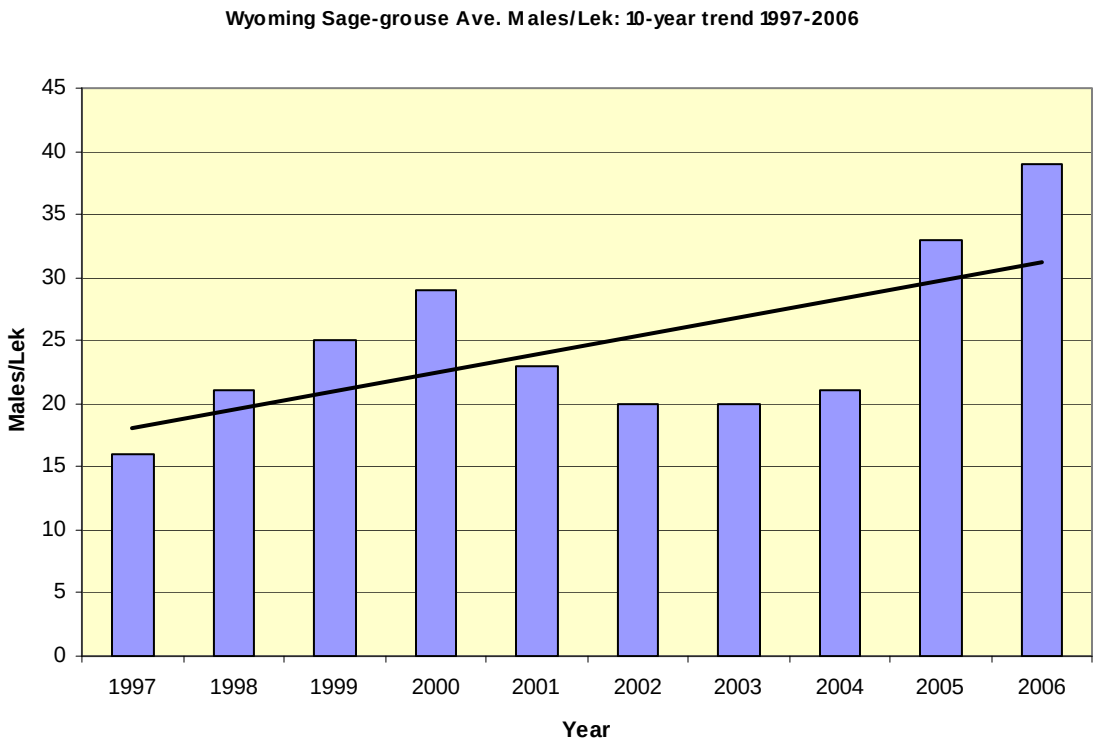
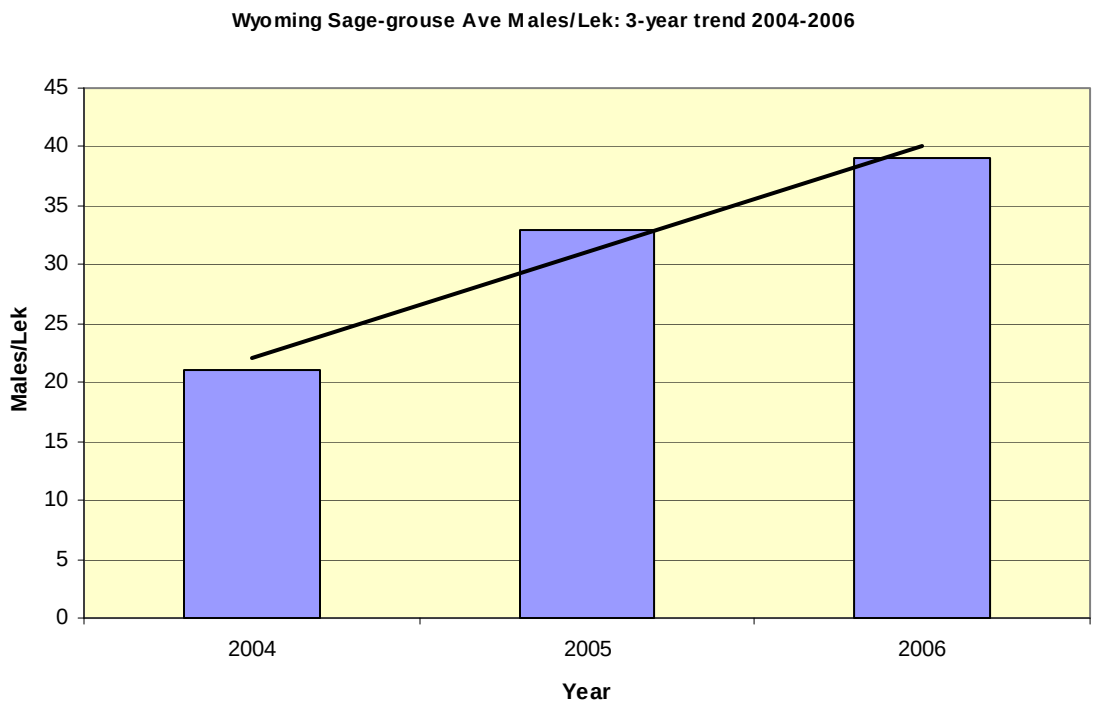



Figure 3.




The mid- and short-term trends in statewide populations are largely weather related. In the late 1990s, and again in 2004 and 2005, timely precipitation resulted in improved habitat

conditions allowing greater numbers of sage-grouse to hatch and survive. Drought conditions from 2000-2003 caused lower grouse survival leading to population declines. Weather and sage-grouse chick production data from 2006 suggest the average number of males observed on leks will decline in the spring of 2007 as drought conditions returned and chick survival decreased substantially in most areas of the state.

A statistically valid method for estimating sage-grouse population size does not exist. Monitoring population trends via annual lek counts and surveys is the accepted method for sage-grouse population monitoring at this time. Chapter 6 of The Conservation Assessment for Greater Sage-grouse and Sagebrush Habitats (Connelly et al. 2004) contains a more detailed discussion of long-term population trends in Wyoming.

The status of conservation planning for sage-grouse in Wyoming is outlined in Table 1. The Wyoming Greater Sage-Grouse Conservation Plan was completed in 2003. Eight local planning areas were established in 2004. One local plan was finalized in 2006. One additional plan was completed in early 2007. The remaining six plans are in the last stages of preparation and will be complete in the summer of 2007.

Table 1. Status of local sage-grouse conservation planning efforts as of March 16, 2007.

| **Local Working Group** | **Plan Status** |
|---|---|
| Northeast Wyoming | Complete – August 2006 |
| Bates Hole – Shirley Basin | Complete – January 2007 |
| Upper Green River Basin | Public comment complete – preparing Final<br>Completion anticipated prior to July 2007 |
| South-Central Wyoming | Draft plan to public in April 2007<br>Completion anticipated prior to July 2007 |
| Big Horn Basin | Draft plan to public in April 2007<br>Completion anticipated prior to July 2007 |
| Southwest Wyoming | Draft near completion<br>Completion anticipated prior to August 2007 |
| Wind River/Sweetwater River | Draft near completion<br>Completion anticipated prior to August 2007 |
| Upper Snake River Basin | Draft near completion<br>Completion anticipated prior to August 2007 |

Local Working Groups also implemented 20 sage-grouse conservation projects in 2005-2006 utilizing approximately $425,000 of a supplemental budget appropriation from the State of Wyoming. The LWGs are currently evaluating and/or implementing over 30 additional projects that will utilize another $1 million appropriation prior to the end of 2008. Projects include habitat treatments/restoration, improved range management infrastructure and grazing management plans, applied research, inventories, monitoring and public outreach.

-GF-

**2007 sage-grouse hunting season proposal:**

The WGF recommends the 2007 sage-grouse hunting season be September 20 – October 10 with a 2 bird daily bag limit (4 in possession) in most of the state. This recommendation results in 20-day season rather than the 11-day season offered in 2006. The bag limit is not recommended for change. The WGF also recommends closing the Hat Six and adjacent areas near Casper, Douglas and Lusk. This closure will add to those lands previously closed in southeast and northwest Wyoming.

**Abbreviated rationale**:

Sage-grouse populations have declined in Wyoming and across the West over the last half-century. Over the last decade however, the average size of leks has increased in Wyoming reflecting a generally increasing population. The same is true for the most recent three-year period. Thus, there have been long-term declines but mid- and short-term increases in sage-grouse populations in Wyoming.

These trends are valid at the statewide scale. Trends are more varied at the local scale. Sub-populations more heavily influenced by anthropogenic impacts (sub-divisions, intensive energy development, large-scale conversion of habitat from sagebrush to grassland or agriculture, Interstate highways, etc.) have experienced declining populations or extirpation.

Sage-grouse are a relatively long-lived species where survival outweighs reproductive output. This strategy is contrary to most upland and small game species long life and survival are sacrificed for high reproductive output. Sage-grouse demonstrate high over-winter survival which limits the applicability of the concept of compensatory mortality. Therefore, the biology of sage-grouse suggests conservative harvest management practices be implemented relative to species such as pheasants or partridges.

Sage-grouse management guidelines and Wyoming's state and local conservation planning efforts have recommended management practices that recognize these concepts. The WGF supports these guidelines and recommendations as reflected in the hunting season proposals.

The Wyoming Greater Sage-Grouse Conservation Plan (2003) was prepared by a citizen group that included representatives of the oil and gas industry. The plan's top three recommended management practices (RMPs) for hunting are:

1) In stable to increasing populations (based on lek count information) maintain a 2 to 4 week hunting season with a 3-bird bag limit beginning no earlier than September 15.
2) If populations are declining (for 3 or more consecutive years based on lek count information) implement more conservative regulations that might include: reduced bag limits, adjusted season dates, limited quota seasons or closed seasons.

3) Populations should not be hunted where less that 300 birds comprise the breeding populations. (i.e. less than 100 males are counted on leks)

The 2007 proposal is well within these recommendations and could in fact be justifiably criticized for not proposing a 3-bird daily bag. Continuing with the 2-bird bag in 2007 was based on the anticipated effects that deepening drought might have on chick production.

The recommendation to close the Hat Six and adjacent areas near Casper, Douglas and Lusk is a direct implementation of the State Plan's hunting RMP #3 that calls for not hunting sub-populations that do not exceed 300 birds (100 males counted on leks).

Based on recent research results (Holloran 2005, Naugle 2006) we could justify recommending more conservative hunting seasons in northeast Wyoming than the other open areas in the state. However, because hunter access is highly restricted in northeast Wyoming due to the lack of public lands, harvest in that area is minimal – a de facto more conservative hunting season that does not require additional regulation at this time. As development expands in Pinedale and Rawlins it is entirely likely hunting seasons will need to be made more conservative in those areas at some point in the future. Such regulation will not become necessary if the stipulations/mitigation/conservation plans/etc. succeed.

**Other sage-grouse hunting issues:**

- The U.S. Fish & Wildlife Service has stated that the Wyoming hunting season is not an issue from an Endangered Species Act standpoint. Recent comments from the USFWS (2007) on the Bates Hole – Shirley Basin Sage-grouse Conservation Plan did not include any criticism of the hunting practices recommended in that plan (which are consistent with the State Plan). The USFWS 12-month finding on sage-grouse (2005) states their expert panel "did not identify hunting as a primary threat factor for the greater sage-grouse." This panel ranked hunting 17 out of 19 threats considered. Most Wyoming local sage-grouse working groups have similarly ranked this issue. These rankings apply to current management strategies. Unregulated/market hunting undoubtedly contributed to sage-grouse declines at the turn of the 20$^{th}$ century.

# GREATER SAGE-GROUSE POPULATIONS AND ENERGY DEVELOPMENT IN WYOMING

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## SYNOPSIS

Understanding how energy development affects greater sage-grouse populations is a management priority in Wyoming. There is broad interest in determining whether viable sage grouse populations and energy development can coexist and, if so, under what specific conditions. Some biologists have contended that oil and gas development at a density of more than one well per square mile will cause the extirpation of local sage-grouse populations, and that the standard protective stipulations applied by the Bureau of Land Management (BLM) on energy development activities are insufficient for maintaining viable populations in development areas. This has prompted State and Federal land and wildlife management agencies to apply significantly more stringent restrictions on energy development activities in sage-grouse habitat. We examined sage-grouse populations in several oil and gas fields in Wyoming to characterize population trends and to better understand the specific development scenarios under which impacts to sage-grouse populations are observed. We used publicly available databases from the Wyoming Game and Fish Department (WGFD) and the Wyoming Oil and Gas Conservation Commission (WOGCC).

We analyzed six oil and gas development areas with various degrees and ages of activity to determine population trends relative to the timing and intensity of oil and gas development in those areas. We compared these trends to trends in an area in which oil and gas activity is minimal and to trends state-wide.

The results show that: 1) sage-grouse population trends are consistent among populations regardless of the scope or age of the energy development field, and that population trends in the six development areas mirror trends state-wide; 2) application of the BLM standard sage-grouse stipulations appears to be effective in reducing the impact of oil and gas development on male-lek attendance; 3) male-lek attendance in areas that are not impacted by oil and gas development is generally better than in areas that are impacted (see below for definitions of impacted versus non-impacted leks); 4) displacement from impacted leks to non-impacted leks may be occurring; research is needed to assess displacement and its implications for developing conservation strategies; 5) lek abandonment was most often associated with two conditions including high density well development at forty acre spacing (sixteen wells per square mile) and, regardless of well spacing, when development activity occurred within the quarter mile lek buffer; 6) extirpation of sage-grouse populations has not occurred in any of the study areas; and 7) like many wildlife populations, long-term fluctuations in sage-grouse population trends in Wyoming likely reflect long-term processes such as precipitation regimes rather than energy development activity; however, energy development can exacerbate fluctuations in sage-grouse population trends over the short-term.

## BACKGROUND

Energy development can negatively impact greater sage-grouse populations through direct loss of habitat, habitat fragmentation due to road and pipeline construction, overhead electric lines, noise interference with courtship behaviors and brood rearing, and support of predator populations through augmentation of food sources and perch sites. (Doherty et al. 20XX, Lyon

2000, Holloran 2005, Kaiser 2006, Walker et al. 20XX). In Wyoming there is broad interest in maintaining viable sage-grouse populations while assuring productive oil and gas fields. Some research has suggested that extirpation of sage-grouse populations is imminent in areas affected by oil and gas development, and that BLM stipulations are ineffective in conserving populations (Aldridge 2005, Doherty et al. 20XX, Holloran and Anderson 2006, Walker et al. 20XX).

Clearly, no wildlife population can persist if habitat is altered to an extent that exceeds the capacity of individuals to adapt. But critical questions remain about whether viable sage-grouse populations and energy development can coexist and, if so, at what thresholds would development exceed the capacity for population persistence. Further, the assertion that BLM stipulations have limited conservation value is premised on the notion that any impact to sage-grouse is evidence that the stipulations are ineffective.

The Council for Environmental Quality (CEQ) regulations (2007) state there are various expectations of applied mitigation measures; these are avoidance of impact and reduction of impact. The Bureau of Land Management spatial and temporal stipulations for greater sage-grouse are intended to reduce the impact of the activity, not to eliminate impacts altogether; this clarification is found in the CEQ National Environmental Policy Act (NEPA) regulations at 40 CFR 1508.20,mitigation may include one or more of the following:

> *(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.."*

The objective of this report is to characterize sage-grouse population trends in Wyoming qualitatively in an effort to advance our understanding of whether there may be conditions of development under which the coexistence of viable sage-grouse populations and productive oil and gas fields would be feasible.

## METHODS

*DATABASES* – We used publicly available databases in the analysis. Sage-grouse observation and location data were from the Wyoming Game and Fish Department (WGFD 2006), and spatial and temporal information on oil and gas development was from the Wyoming Oil and Gas Conservation Commission database (WOGCC 2006).

After assessing the WGFD and WOGCC data we developed criteria for including leks or wells in the analysis that were intended to facilitate reliable interpretation of the results:

- in many cases leks appear in the WGFD database even though there are no records of sage-grouse having been observed on them; we included only those leks at which sage-grouse have been observed
- among leks at which sage-grouse have been observed, we retained for the analysis only those for which sage-grouse were observed during the period 1980 to 2006.
- we considered cells in the WGFD database containing the number zero to represent a lek count that was conducted but for which no male was observed. This is a highly conservative measure; it is known that zeros in the database may also indicate that the lek count did not occur (i.e., zero was used as a placeholder; T. Christensen, WGFD, 2006, pers. com).
- we limited inclusion of wells in the analysis to those actually drilled through 2006; we excluded those with pending or expired permits.

*LEK DEFINITIONS* - We classified leks into five types and made qualitative comparisons among them. The metric used in the comparisons was the WGFD "average peak males in attendance".

- *Impacted leks* are those with more than 10 wells drilled within a two mile radius (slightly less than 1 well per square mile). Ten wells within the two mile radius corresponds with the condition identified by Holloran (2005) and Doherty et al. (20XX) as the maximum level of development that would allow the continued occupation of the area by sage-grouse,
- *Non-impacted leks* are those leks with 10 or fewer wells drilled within the two mile radius ( i.e. those identified by previous authors as outside of development)
- *Field leks* are the combination of impacted and non-impacted leks in each study area,
- *Area leks* are all leks within the Game and Fish management area(s) surrounding and including the study area, and
- *State leks* are all leks known within the State of Wyoming and represent the statewide population.

In addition to examining individual leks, we examined impacted and non-impacted lek complexes in each study area. We used total males observed as the metric in this analysis. Population trends using average males or total males followed similar patterns. Lek complex definitions generally follow the WGFD nomenclature.

*STUDY AREAS* – We selected study areas that were representative of the variation that characterizes energy development in Wyoming. These areas differed in terms of the longevity of development, density and intensity of development, and production type (e.g., oil, gas or coal bed natural gas). Six development areas and a "control" area were selected (Figure 1):

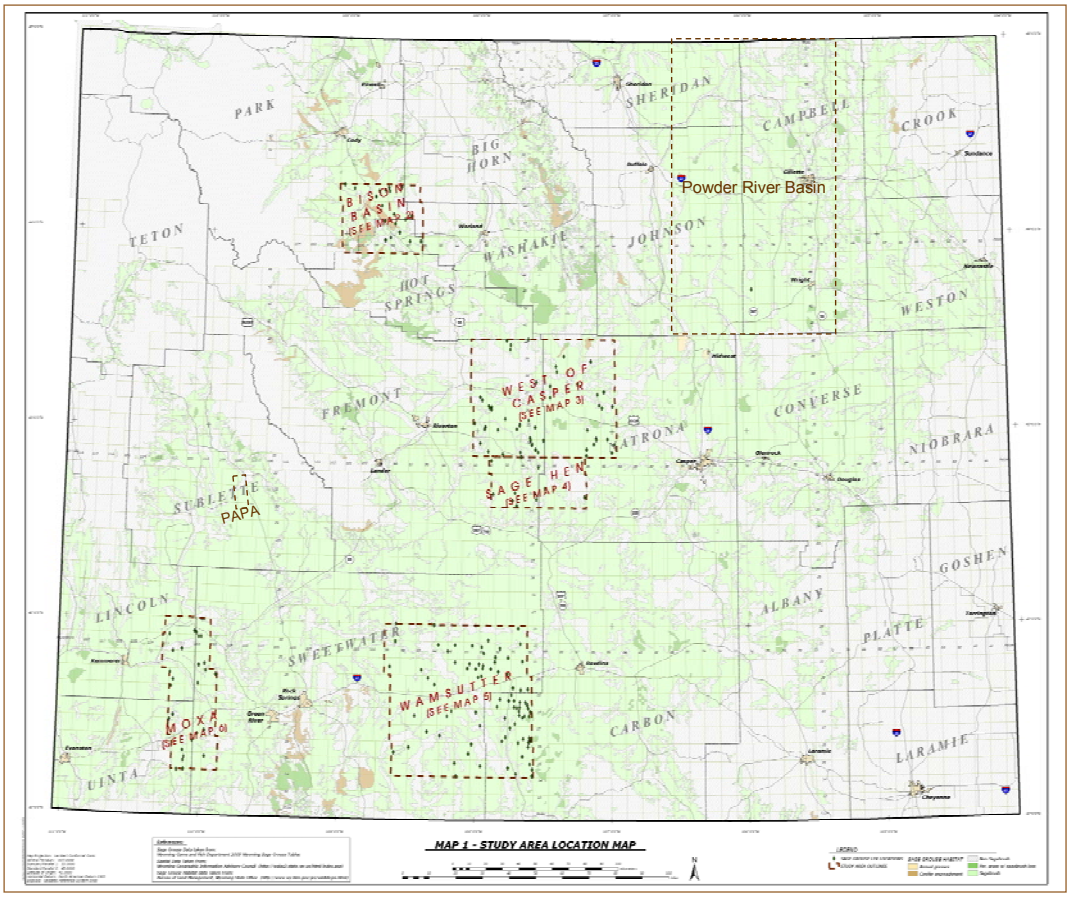
- *Powder River Basin (PRB)*: Coalbed natural gas (CBNG) is in development and production stages throughout a large geographic area.
- *West of Casper:* This area includes a wide variety of field development areas.
- *Sagehen Creek:* This is the study "control" area; few oil wells (~60) have been drilled in the area making it a reasonable site for comparisons.
- *Wamsutter:* Initial development in the area began circa 1946 with renewed interest in the late 1970's.
- *Moxa Arch:* Development of the Moxa Arch natural gas field also began circa 1946 with renewed interest beginning around 1980.
- *Pinedale Anticline Participating Area (PAPA):* This area has been the focus of significant interest since development was renewed in 1998.
- *Bison Basin:* This is an old oil field area located northwest Wyoming.

*VEGETATION BASE MAPS* – We used the BLM sagebrush habitat map (BLM 2006) to characterize vegetation types in each study area except for PRB. In PRB, we used the Wyoming GAP analysis vegetation map (WY GAP 2006), given the extent of private land in PRB and the consequent lack of ground truthing in this area, the GAP data probably were more accurate than the BLM data.

*LEK MAP SYMBOLS* – We based lek map symbols on male attendance during the period 2004 through 2006. We used this three year period to reflect efforts by WGFD to survey each lek at least once every three years. The lek characteristics are illustrated on the maps as follows:

- The lek center is indicated by a ¼ mile radius circle illustrating the BLM lek buffer (breeding habitat) avoidance requirement.
- The size of the colored dot within the lek center indicates the relative size of the lek in terms of the peak male-lek attendance.
- A green dot in the lek center indicates that no sage-grouse was observed on the lek.
- An open circle in the lek center indicates that no count or survey was conducted.

**Figure 1** - Statewide over view map of study areas




A 2-mile radius circle around the lek center represents the area of greatest concern for the protection of nesting and early brood rearing habitats as managed by the BLM through the use of seasonal (temporal) timing restrictions on surface disturbing activities.

*WELL SYMBOLS* - Well symbols are as follows:

- Black dots represent active wells,
- Grey dots represent plugged and abandoned wells,
- Well symbols in PRB are different; red dots indicate wells drilled on the federal mineral estate and blue dots indicate wells on state or private minerals (non-federal).

*DATA SUITE COMPARISONS* – We conducted the following qualitative analyses for each study area:

1. We determined average peak male lek attendance for each year using only those leks counted in that year; therefore, the sample size changed annually.
2. We made comparisons of average male-lek attendance among the following lek classifications: impacted, non-impacted, the defined study area, the affected WGFD management areas, and the State.
3. We did not make comparisons among study areas (i.e. PRB impacted leks are not compared to PAPA impacted leks) because each area differs in vegetation, topography, and

precipitation regimes, as well as in the density of residential housing. Livestock grazing, recreation, and hunting are generally consistent in all areas.

4. We also provide observations on the impact of the density of well development within the two mile radius of a lek.
5. In addition to evaluating individual leks, we examined impacted and non-impacted lek complexes to better understand the threshold at which development appears to negatively impact leks or lek complexes.

## RESULTS AND DISCUSSION

### *POWDER RIVER BASIN (PRB)*

Coal bed natural gas (CBNG) development in the PRB began in the early 1990's with significant development starting in 1997. Currently, CBNG is in the production stage in the eastern and central portions of the Basin with development occurring in the western portion. The CBNG activity occurs throughout a large geographic area; the largest coal producing basin in the United States. Early in the development of the PRB portions of the east side of the basin were drilled on 40-acre spacing (16 wells per square mile); subsequently, the majority of the basin has been drilled on 80-acre spacing, or 8 wells per square mile. By the end of 2006 there were approximately 25,000 wells drilled and producing gas. The size of the geologic structure and the intensity of activity make this a unique development area. Our analysis of the PRB included 195 impacted and 94 non-impacted leks; there are 493 leks in the northeast Wyoming management area. The study area is illustrated in Figure 2 .

The PRB, unlike most of the state of Wyoming and the other study areas included in this paper, is comprised primarily of private land (86%) underlain by federal minerals (63%). This land and mineral ownership pattern (commonly referred to as "split estate") leads to the inconsistent application of the standard BLM protective stipulations for greater sage-grouse. Early in the development of the PRB CBNG field, BLM underwent an extended period of field development planning, as required by NEPA. This long period of analysis prohibited development on federal minerals which resulted in the disproportional development of private and State of Wyoming owned minerals where wildlife protection stipulations are not applied. This early drilling activity was performed primarily on 40-acre spacing and occurred on the eastern edge of the Basin. Figure 2 also illustrates clearly that leks imbedded in CBNG development areas continue to be active even after upwards of ten years of gas development activity in the PRB.

As seen in Figure 3, declines in average male-lek attendance occurred in the PRB from 1989 to 1995 and from 2000 to 2002. These population declines are also observed range-wide (Figure 4; Connelly et al. 2004). It appears that the population in the PRB has not recovered fully from the population crash of 1989 to 1995 but that population growth, as indicated by male lek attendance, is occurring.

**Figure 2:** Powder River Basin study area

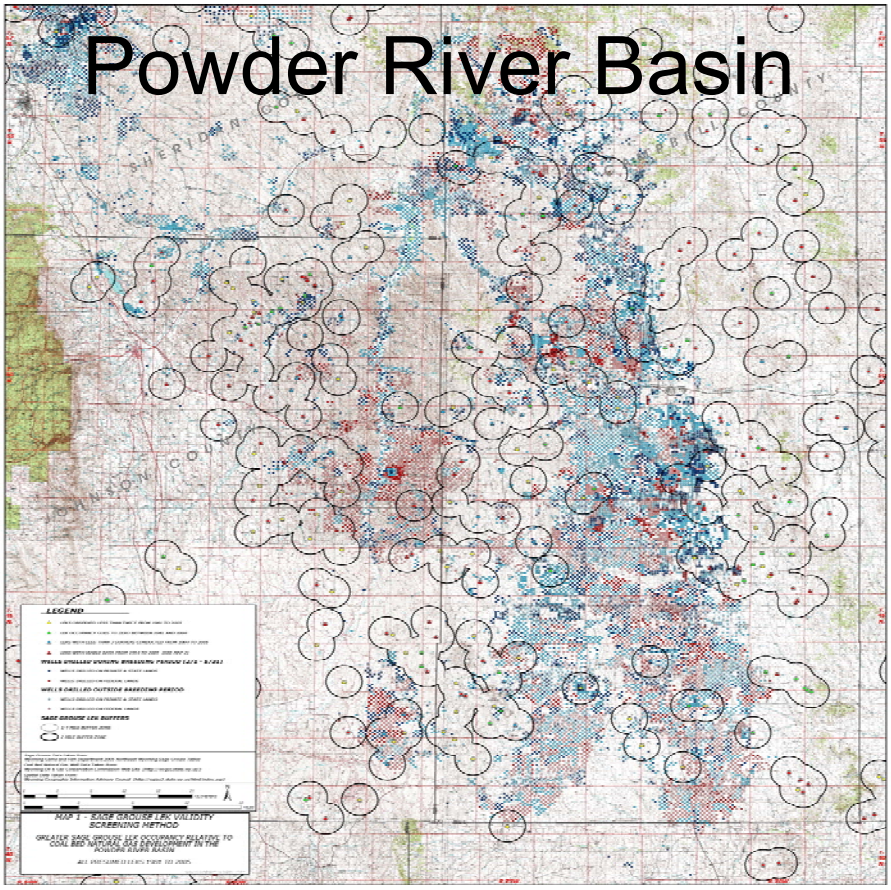


**Figure 3:** Average male-lek attendance in the PRB 1980 to 2006

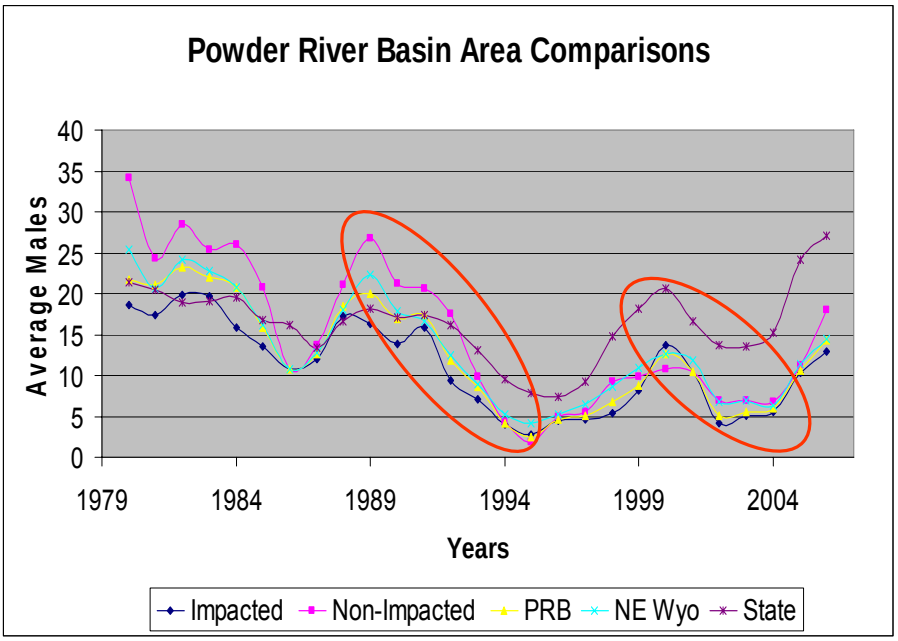



**Figure 4:** Connelly et al. 2004 Range-wide change in population index

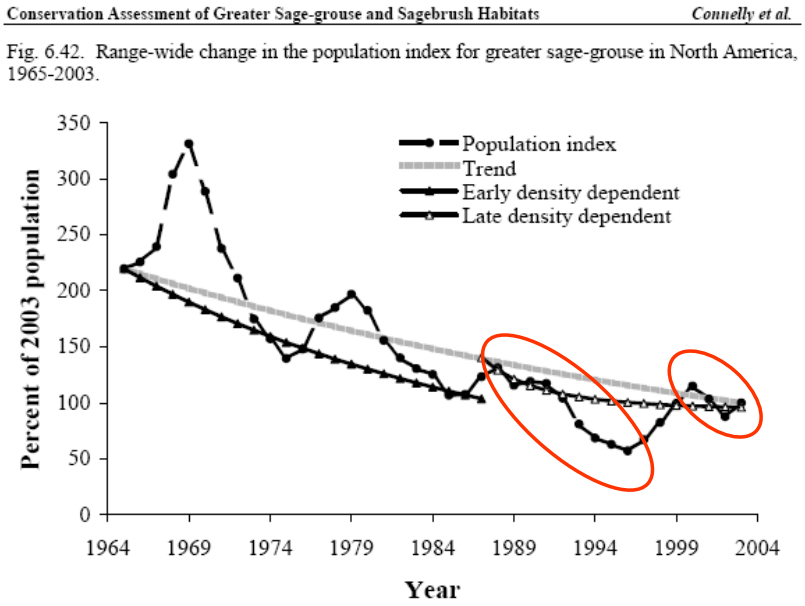


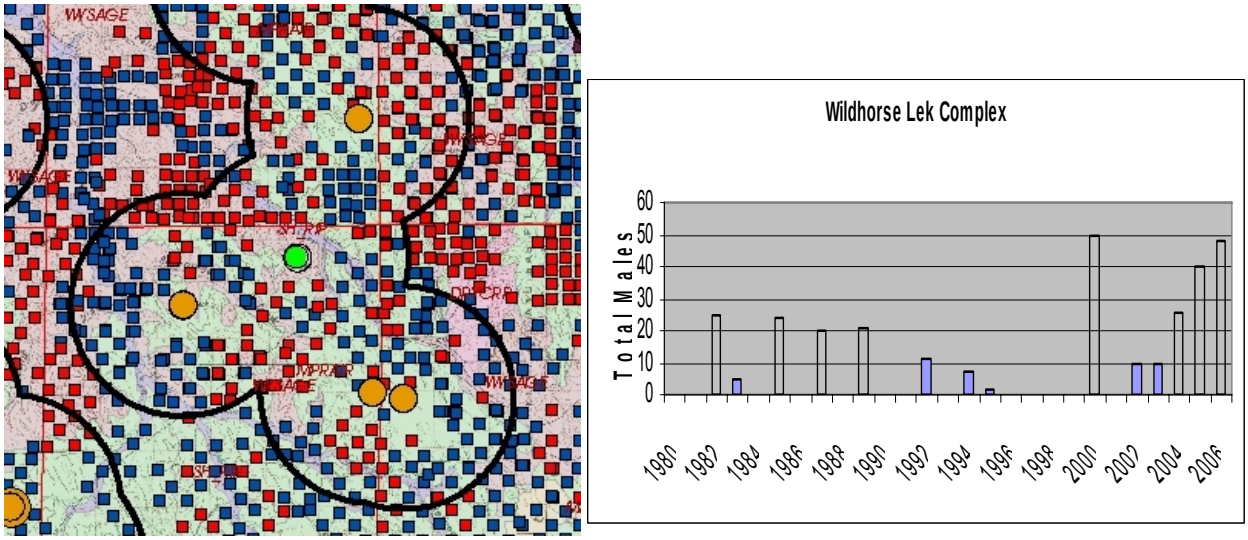
Figure 3 shows that impacted leks continue to be attended by male grouse in the PRB. The differential between impacted and non-impacted in male lek attendance is slightly larger in 2006 (1.9 males) than was evident before CBNG development began in 1997 (0.6 males), however both groups of leks continue to follow the same growth trends as seen for the state wide population.

For purposes of the analysis, determining the response of greater sage-grouse to energy development in the PRB, we investigated the status of the 89 leks in the WGFD data base currently identified as inactive. Sixty six of these leks became inactive during the 1989-1995 decline; that is, before significant CBNG development began in 1997. Twenty three of the 89 currently inactive leks in the PRB became inactive after the 1989-1995 decline; these leks might shed light on impacts of energy development. Of these 23 leks, 5 were eliminated by surface coal mining activity, 13 were impacted by CBNG development and 5 had no readily discernible impacting agent. Of the 13 leks impacted by CBNG, 9 were developed on 40-acre spacing, with as many as 200 wells drilled within the two mile standard stipulation radius, in addition to development activity within the BLM ¼ mile radius lek buffer. It is likely due to the private and state mineral ownership that the protective stipulations were not applied. It appears that this level of habitat modification from energy development exceeded the tolerance of sage-grouse and may have caused lek abandonment. In contrast, lek attendance in PRB was maintained, albeit at reduced numbers, under conditions in which wells were drilled on 80-acre spacing, 100 or fewer wells were drilled within the 2 mile radius, and development activity did not occur within ¼ mile of the lek.

We examined six lek complexes in a variety of development scenarios in the PRB CBNG field to better understand the impacts of 40- vs. 80-acre spacing; these complexes are discussed below.

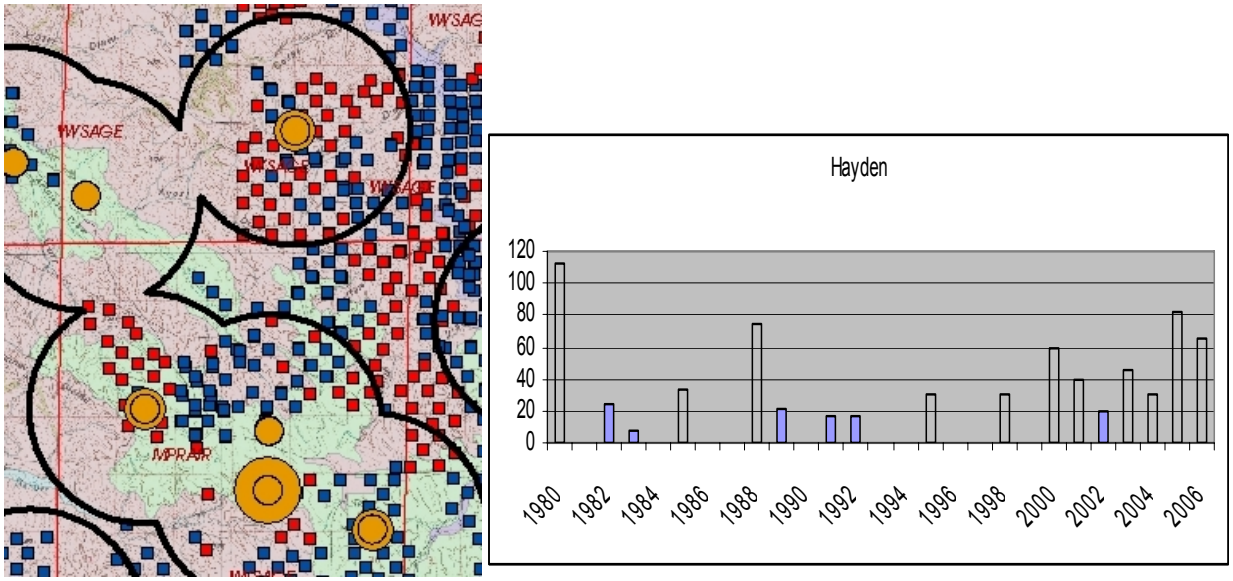
WILDHORSE COMPLEX - Since the year 2000, over 700 wells have been drilled on 40- and 80-acre spacing in the area surrounding the Wildhorse complex (Figure 5). As can be seen in the accompanying graph, the complex leks continue to be attended each spring, with the numbers of males observed increasing since 2002. Over 100 wells have been drilled within the two mile radius of each of the leks in the complex but the leks continue to be active.

**Figure 5:** Wildhorse complex



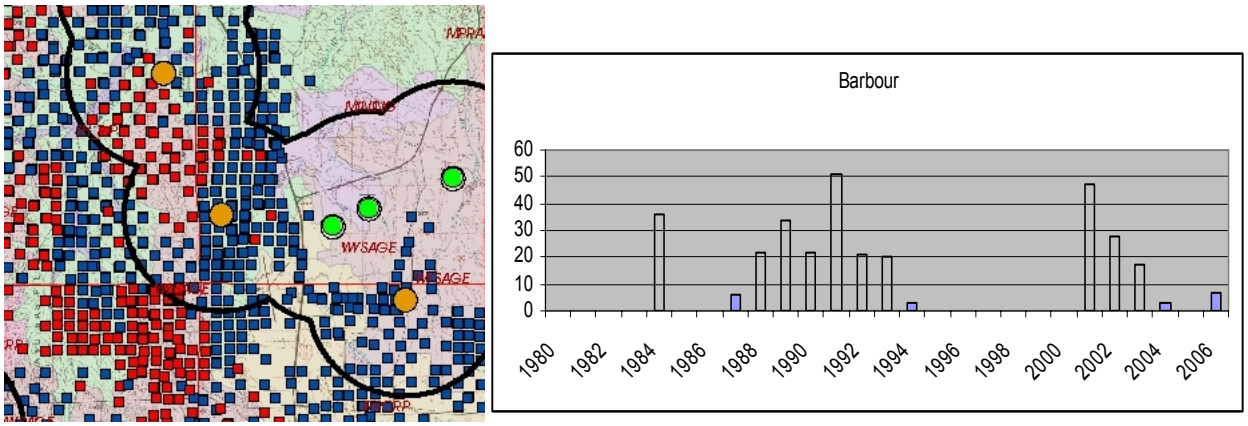
HAYDEN COMPLEX - The Hayden complex (Figure 6) lies west of the Wildhorse complex and is surrounded by CBNG development drilled primarily on 80-acre spacing. Development and production in this area has been ongoing since 1999 with over 200 wells drilled in the township. Again, the complex leks are active and male attendance has increased since 2002.

**Figure 6:** Hayden complex detail



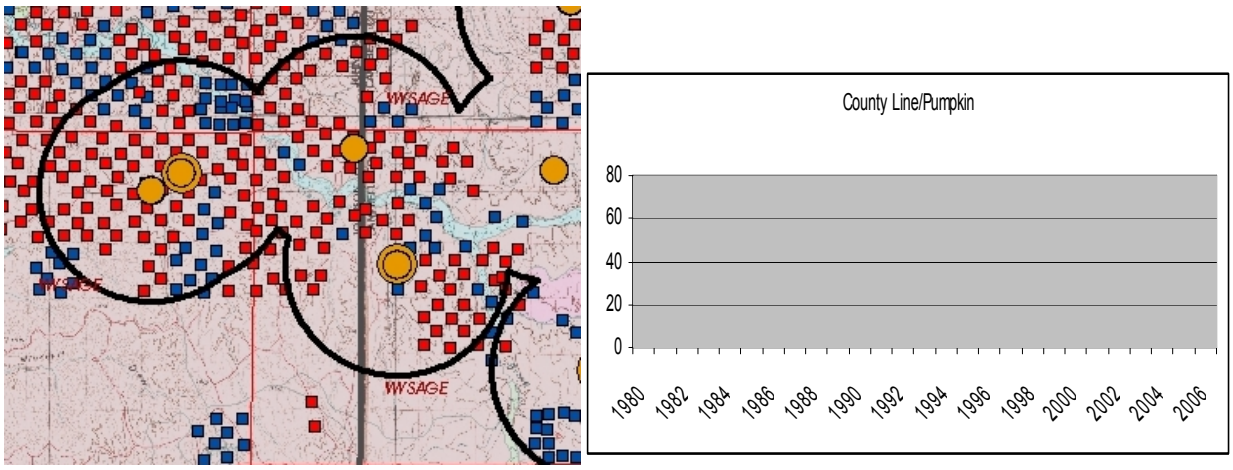

BARBOUR COMPLEX - The Barbour complex (Figure 7) is located on the eastern edge of the CBNG area of the PRB. This area was drilled primarily on 40-acre spacing beginning in 1999. Almost 600 wells have been drilled and are producing gas in the township surrounding this complex. The abandoned leks (green dots) to the east were destroyed by surface coal mining activity. The leks within the CBNG development areas continue to attract males but at very low numbers.

**Figure 7:** Barbour complex detail



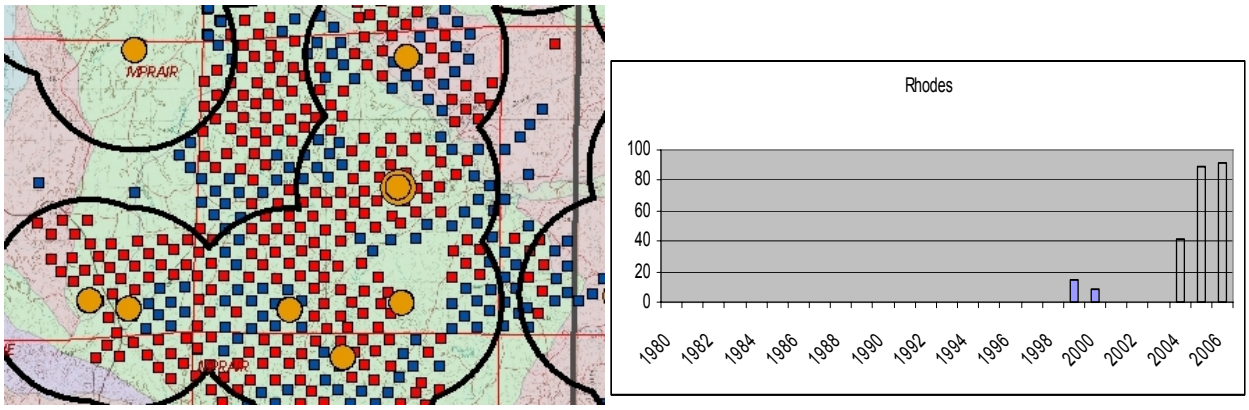
COUNTY LINE/PUMPKIN COMPLEX - The County Line/Pumpkin complex (Figure 8) is located in the south-central portion of the PRB. This area has been producing since 2004 although some initial exploratory work occurred as early as 2000. Approximately 240 wells have been drilled in the two townships surrounding this complex. Data are limited for this area because these leks were generally unknown before development began. Male attendance is currently robust.

**Figure 8:** County Line/Pumpkin complex detail



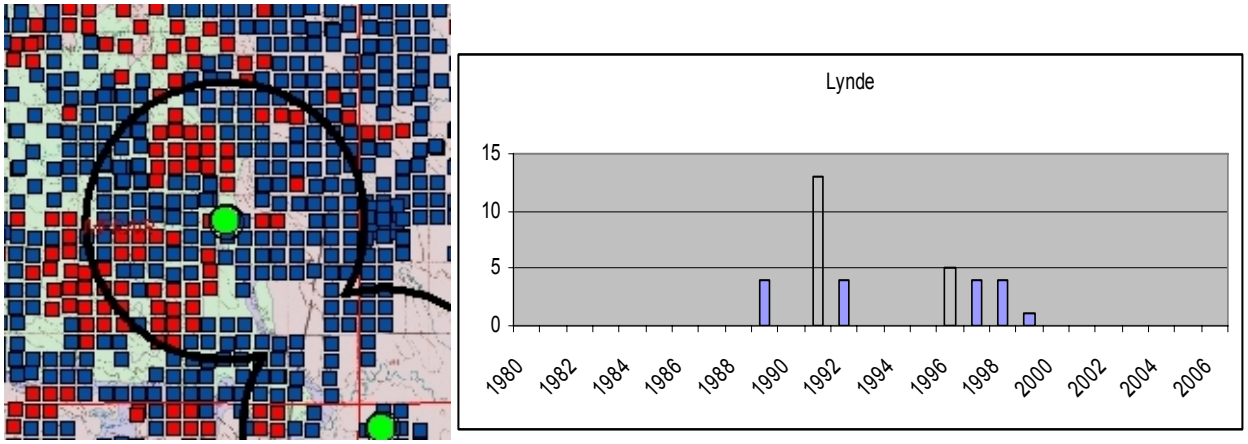

RHODES COMPLEX - The Rhodes complex (Figure 9) is located in what is currently the southwestern edge of CBNG development in the PRB. The complex is surrounded by approximately 300 CBNG wells drilled since 2004. In 1999 one lek in the area was surveyed; in 2006 seven leks were counted. In the three years since development began male attendance has increased. An important consideration is whether this increase simply reflects increased survey effort. Alternatively the increase could reflect improving habitat conditions from increased precipitation in the area over the same period of time.

**Figure 9:** Rhodes complex detail



LYNDE LEK - The Lynde lek (Figure10) is located on the eastern edge of the CBNG field in the PRB. CBNG development in the PRB began in this area in 1997 with approximately 480 wells drilled in the township surrounding the lek. This area was drilled on 40 acre spacing, averaging 13 wells per square mile. Wells in this portion of the field are now being plugged and abandoned with many more abandonments planned as the gas resource in this area is depleted. The Lynde lek became inactive in 2000; three years after intensive, high density development began.

**Figure 10:** Lynde lek detail



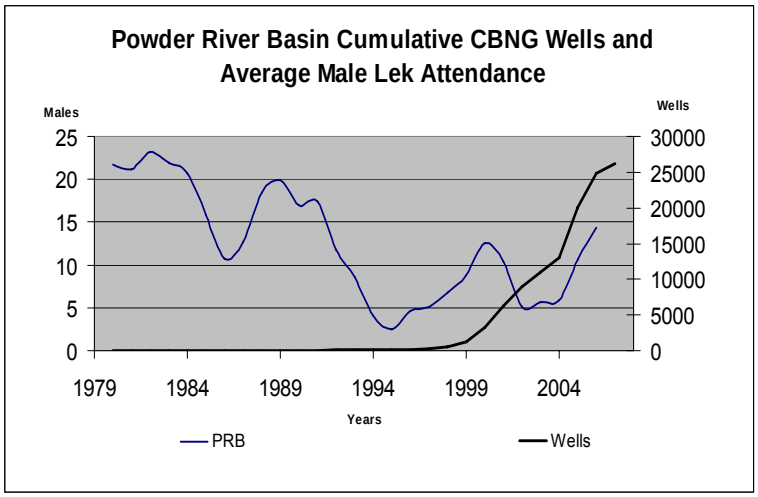

SUMMARY OF PRB FINDINGS - The Hayden and Wildhorse complexes demonstrate the continuation of male-lek attendance in areas of 80-acre spacing even after seven to eight years of development and gas production activity. The Lynde lek and Barbour complex analyses demonstrate that leks become inactive when surrounded by hundreds of wells drilled on 40-acre spacing. After three to four years of 80-acre development activity, the Rhodes and County Line/Pumpkin lek complexes show continuing growth of male attendance as opposed to the declines demonstrated by the leks impacted by 40-acre development. These findings suggest that lek abandonment is related to intensive development on 40-acre spacing whereas "buffered" leks surrounded by 80 acre development continue to be attended by males. Data from the Wildhorse and Hayden lek complexes show that 80-acre well spacing has not caused reduced male lek attendance over time and suggest that well spacing in an important component of development scenarios that could be managed to facilitate persistence of leks and local populations. Overall, trends in the PRB population call into question any assertion that lek abandonment and local extirpation are imminent consequences of energy development, and suggest that the relationship between development and population persistence is more complex than previous research has indicated.

Figures 3, 4 and 11 illustrate the following:

- The population decline of 1989 to 1995 occurred before the onset of CBNG development rendering any conclusion that this decline was a direct consequence of CBNG unsupported.
- Population declines from 2000 to 2002 are consistent with those seen state and range wide.
- The sage-grouse population in the PRB exhibits an increasing trend that is consistent with trends statewide

The PRB represents an important population in terms of sage-grouse conservation range-wide. However, this population accounts for less than 10% of sage-grouse in the state of Wyoming. Given differences in habitat and development conditions throughout the state, any contention that a single population such as PRB has a disproportionate influence on population trends state- or range-wide would be unsupported. Recent data (Thiele 2007) show that average male lek attendance in Northeast Wyoming was 18.8 males or 0.5 males per lek lower than the 2006 average. Of 517 leks surveyed, 38 or 7% were found to be inactive. Twenty newly identified leks were documented in the spring of 2007.

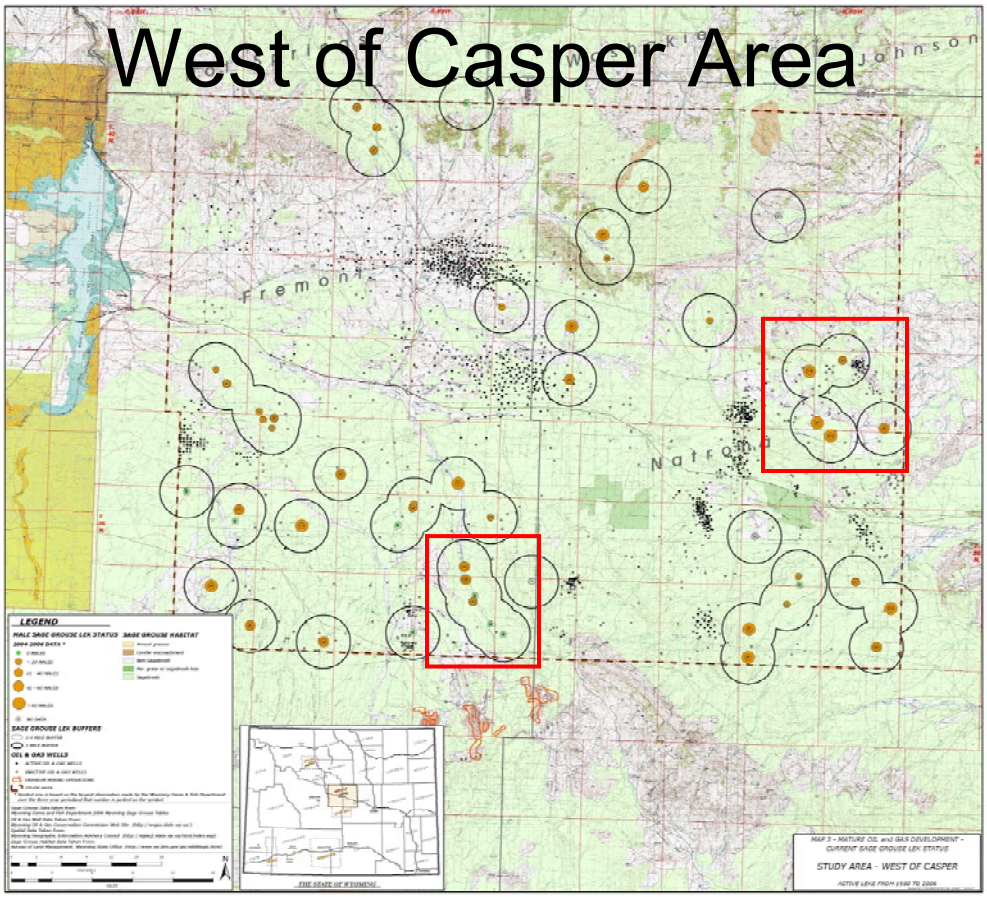
**Figure 11:** Average male-lek attendance contrasted with the cumulative number of CBNG wells drilled in the PRB




*WEST OF CASPER*

As illustrated in Figure 12, the area west of the City of Casper includes a number of field development areas, all relatively small in size, the largest encompassing a few townships. There is some gas, some oil, and fields range from almost 100 years of age to currently in development. Spacing is highly variable. The lek complexes in this analysis are indicated on the map by the red boxes. Our analysis of this area included 6 impacted and 48 non-impacted leks out of the 224 leks identified in the WGFD management area.

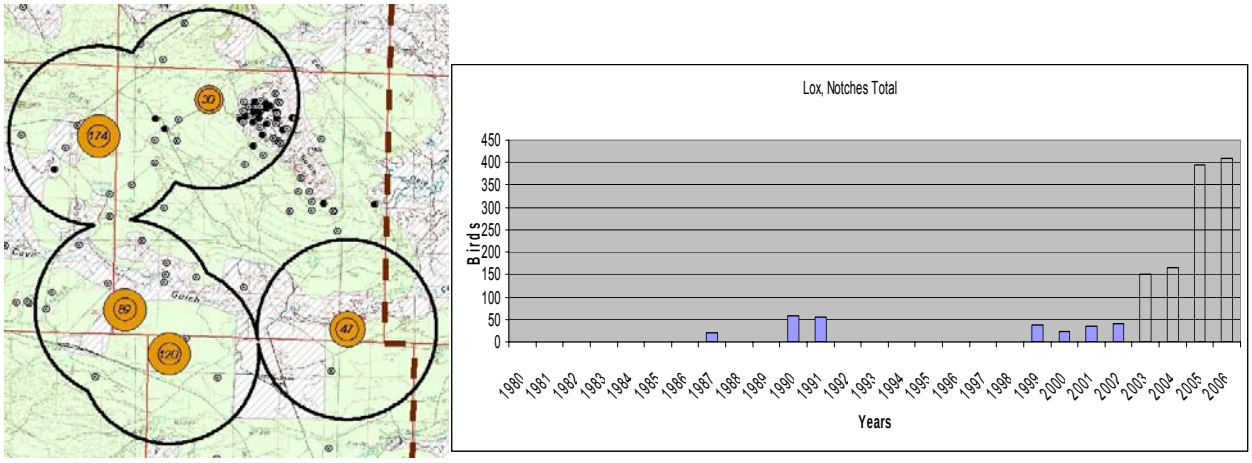
**Figure 12:** Leks locations and oil and gas development west of Casper




The area west of Casper is popular with sage-grouse hunters because there are many large leks (<75 males in attendance) which translates into excellent hunter success. A close evaluation of the two indicated lek complexes offers an appreciation for the population of grouse in the area.

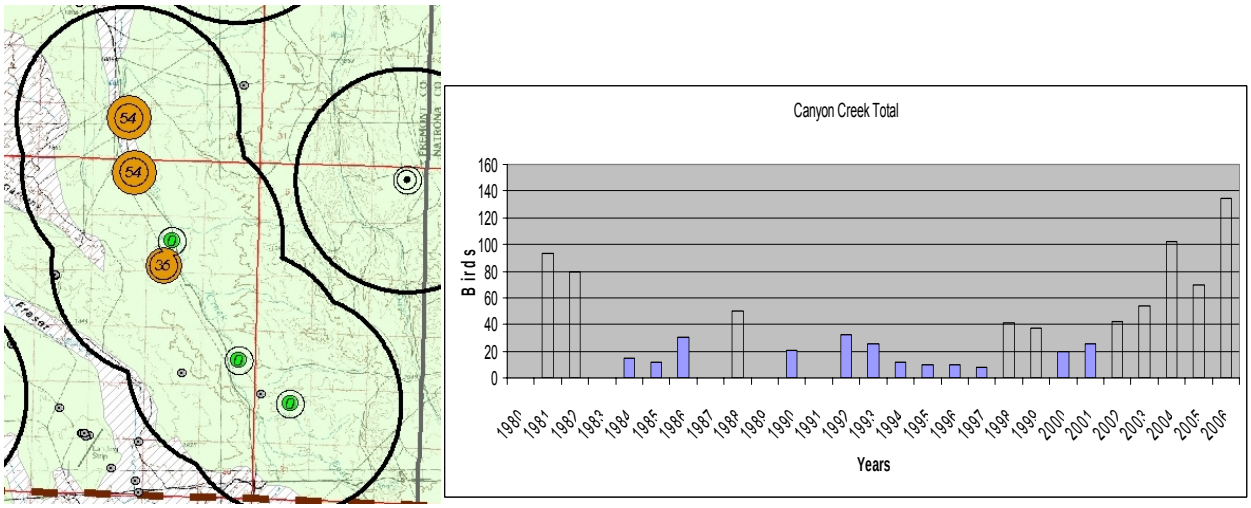
LOX NOTCHES COMPLEX - The Lox Notches complex (Figure 13) is located in the north eastern portion of the study area and is the location of the Notches oil field which has been producing oil since 1917 and pre-dates WOGCC spacing regulations. Steady growth in male-lek attendance from 1999 to current is seen.

**Figure 13:** Lox Notches lek complex




CANYON CREEK COMPLEX - The Canyon Creek complex (Figure 14) is located in the south central portion of the study area, the leks are scattered along a county road in eastern Fremont County and are just north of the Gas Hills uranium district. Three wells have been drilled and plugged in the area surrounded by the two-mile lek buffer of this complex. This non-impacted complex has seen a pattern of growth similar to the impacted Lox Notches complex.

**Figure 14:** Canyon Creek lek complex



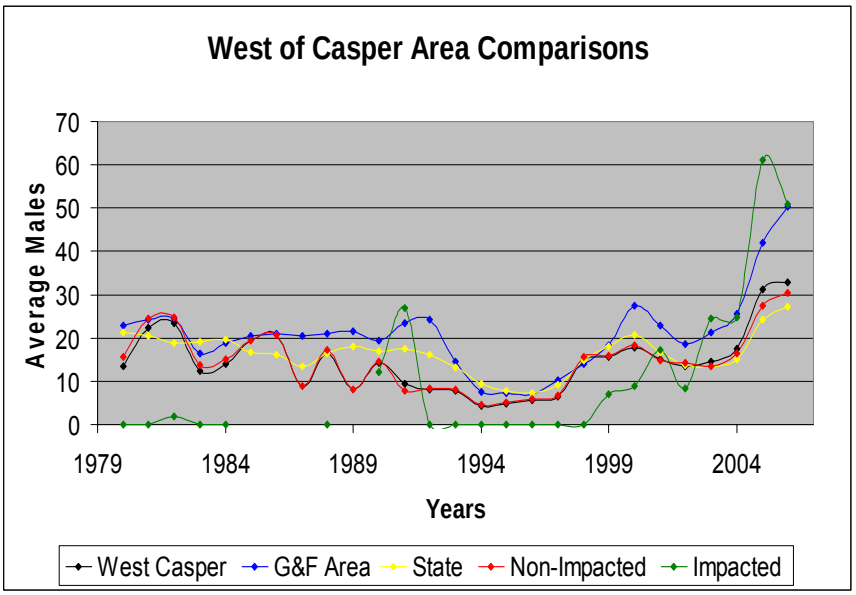

SUMMARY OF WEST OF CASPER FINDINGS - Analysis of the eight currently inactive leks in the West of Casper study area show the following:

- Seven have little or no energy development activity within the 2 mile radius,
- Seven are located immediately adjacent to county roads,
- One appears to have been drilled on or is located on a well site.
- Only one of the eight inactive leks has producing and plugged wells within the two mile radius.

The 2 leks in the study area with more than 10 wells drilled within the 2 mile radius continue to be active and show stable and increasing male-lek attendance.

Figure 15 supports these observations and illustrates that despite almost 1400 wells being drilled in the study area, male-lek attendance is increasing and impacted leks have increased the most in recent years.

**Figure 15:** West of Casper lek comparisons

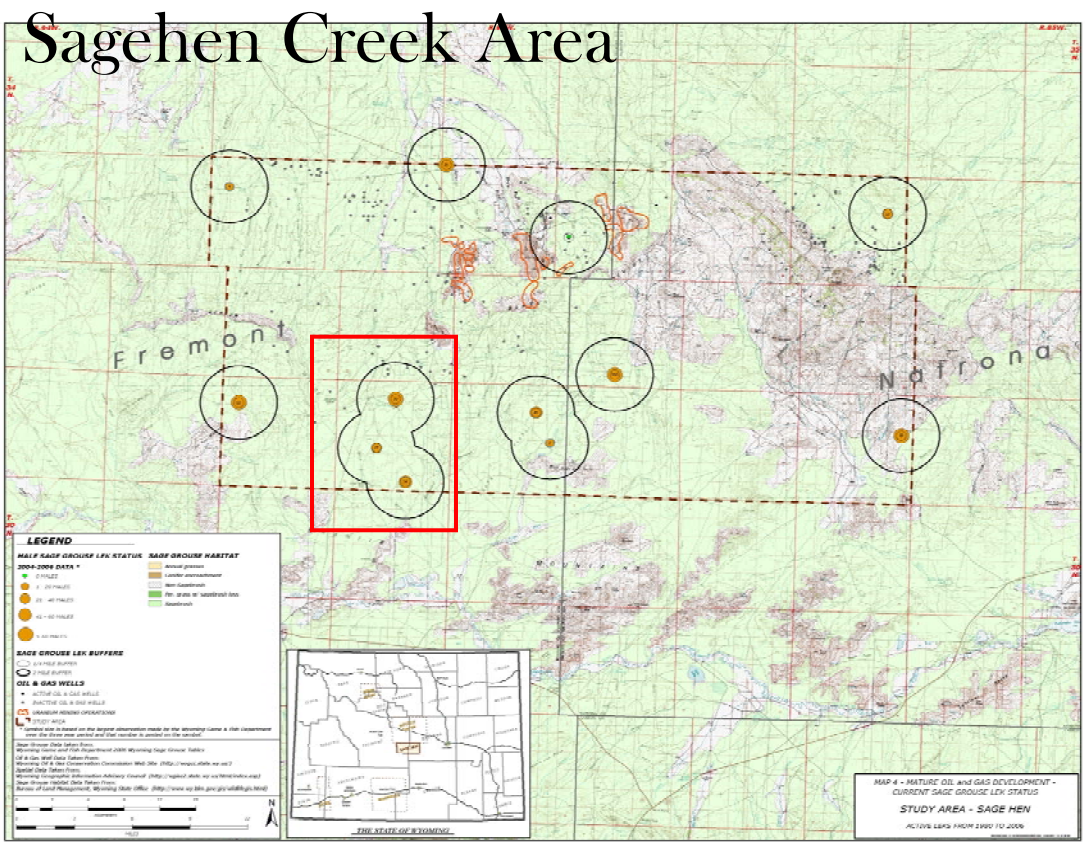


*SAGEHEN CREEK*

For purposes of this study Sagehen Creek represents the “control” area; few oil wells (~60) have been drilled in the area, most of which have been plugged and abandoned. As seen on Figure 16, the area has been impacted by the development of three major uranium mines (red polygons) all of which have been abandoned and reclaimed. Otherwise the area contains no towns and has extremely limited human habitation. Sagehen Creek is historically popular with sage-grouse hunters as it is known for excellent grouse productivity. Our analysis of this area included 12 leks, one of which was impacted by energy development; the WGFD management area includes 191 leks.

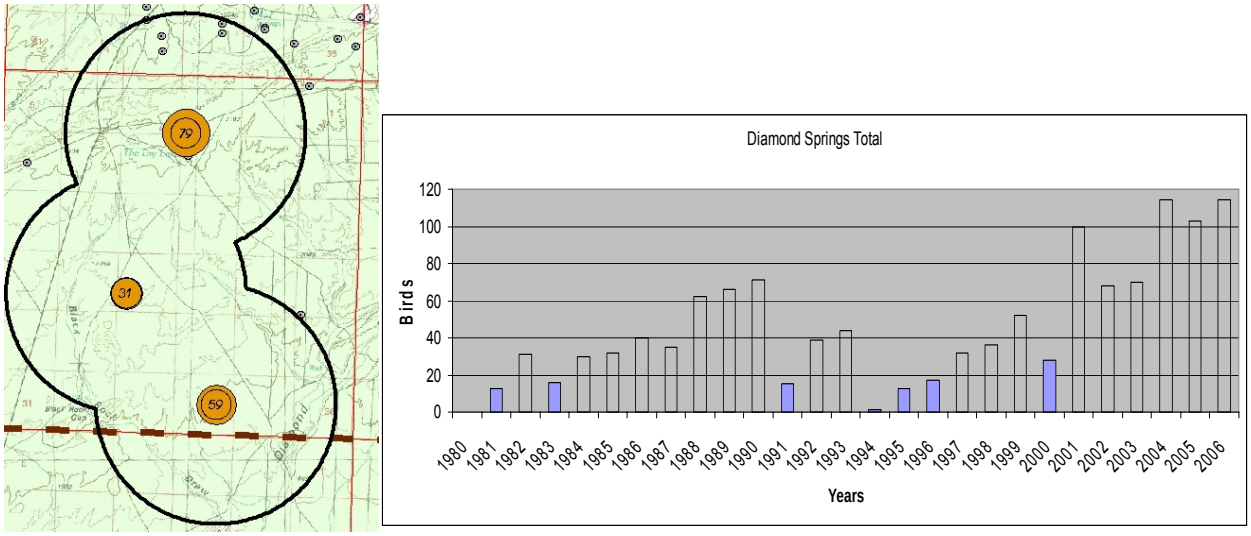
One lek in the area is currently inactive and is located between two reclaimed uranium mines. Reclamation activity in the area has been ongoing for many years and is now complete.

**Figure 16:** Sagehen Creek study area



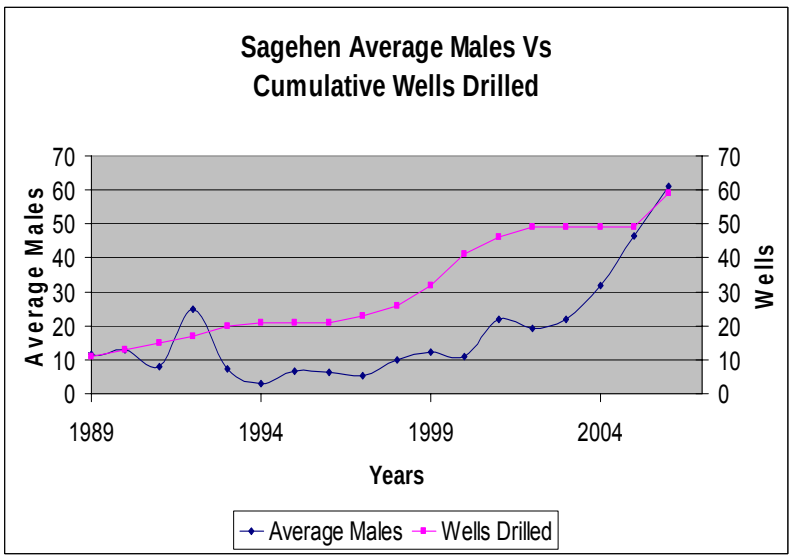
DIAMOND SPRINGS COMPLEX - The Diamond Springs lek complex (Figure 17) graph clearly illustrates the population decline of 1990 to 1994 and the growth of the population subsequent to that event, as does Figure 18 (average male-lek attendance for the entire area).

**Figure 17:** Diamond Springs Lek Complex




SUMMARY OF SAGEHEN CREEK FINDINGS - Figure 18 demonstrates the population of Sagehen Creek, using average male-lek attendance as a surrogate, has increased steadily since 1995. Sagehen Creek represents not only the "control" for this study but also an area perceived to represent extremely high quality sage-grouse habitat. No other area or sub-population analyzed shows such strong population growth.

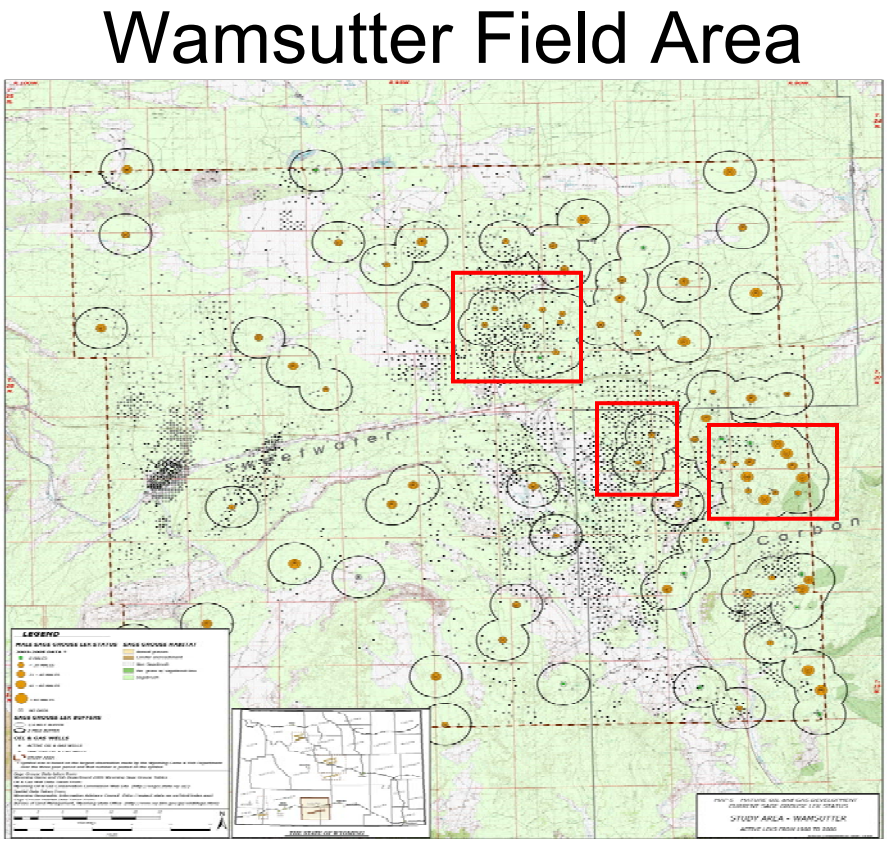
**Figure 18**: Sagehen Creek male-lek attendance and cumulative wells drilled



*WAMSUTTER*

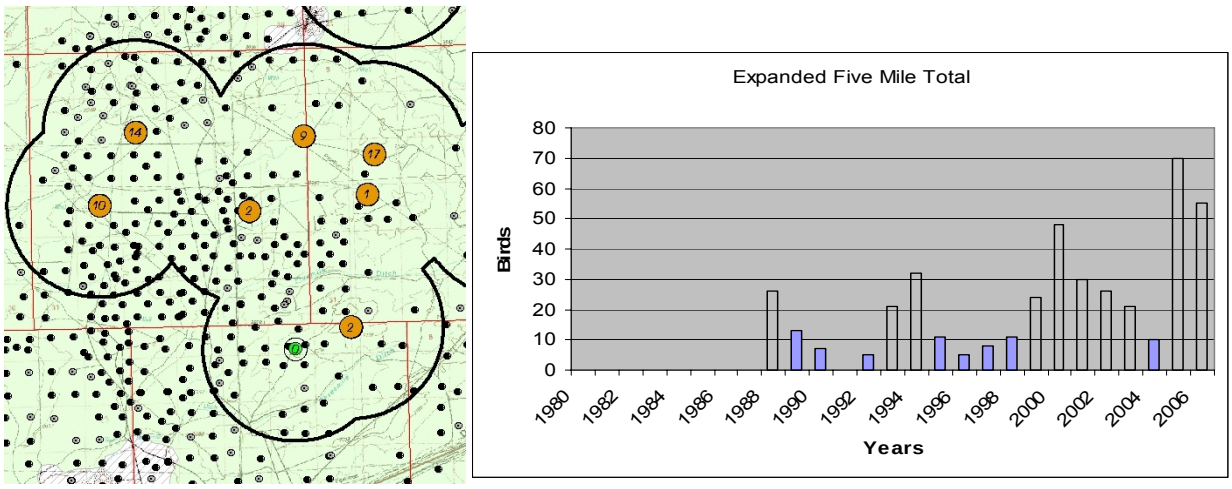
Limited development in the Wamsutter area of south-central Wyoming began in the 1940's. In the late 1970's development was re-initiated at a higher intensity. Development, gas production, and infill drilling have taken place in the area for the last thirty years. NEPA documents for the project (BLM 2000) indicate approved well spacing between 1 and 8 wells per section depending on the character of the gas reservoir being developed. The May 2000 NEPA analysis and Record of Decision completed for the Wamsutter field required the development and implementation of a sage-grouse impact mitigation plan. Additional NEPA environmental impact analysis is currently in progress, the proponent-suggested alternative proposes additional infill drilling to occur primarily from existing well pads. Figure 19 illustrates the location of the existing wells and sage-grouse leks within the study area as well as three lek complexes that are discussed in greater detail. Our analysis of the Wamsutter area included 47 impacted and 38 non-impacted leks; the WDGF management area includes 503 leks.

**Figure 19**: Wamsutter study area



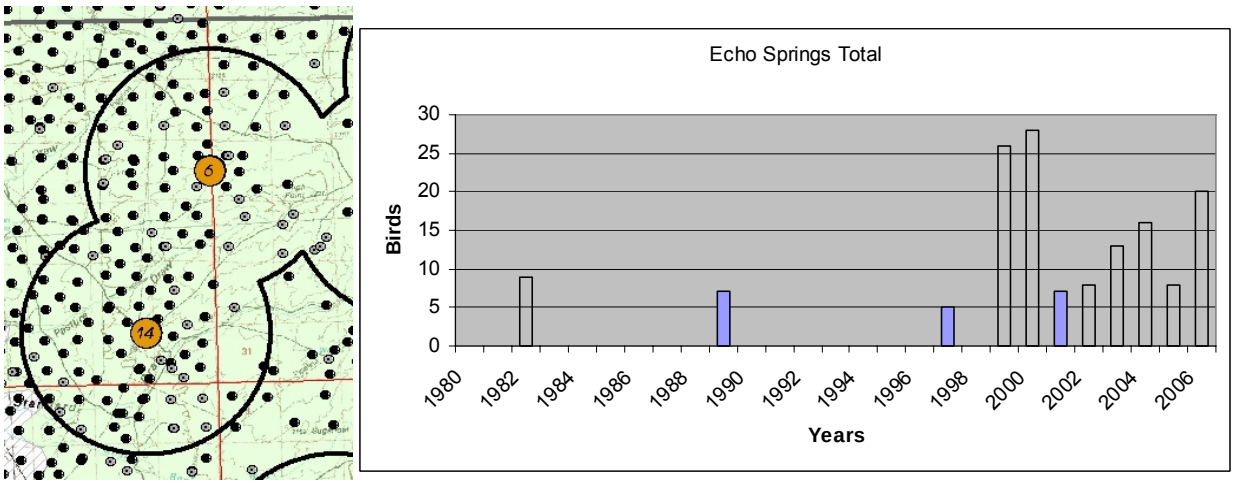
EXPANDED FIVE MILE COMPLEX - The Expanded Five Mile complex (Figure 20) represents an area of continued development and production from 1978 to 2006. Two hundred thirty one wells have been drilled in the townships surrounding the leks in the Expanded Five Mile complex. These wells were drilled on 80 acre spacing which represents 8 wells per square mile. While data on these leks are limited before 1989, they show a steady increase over time interspersed with moderate declines.

**Figure 20:** Expanded Five Mile complex detail



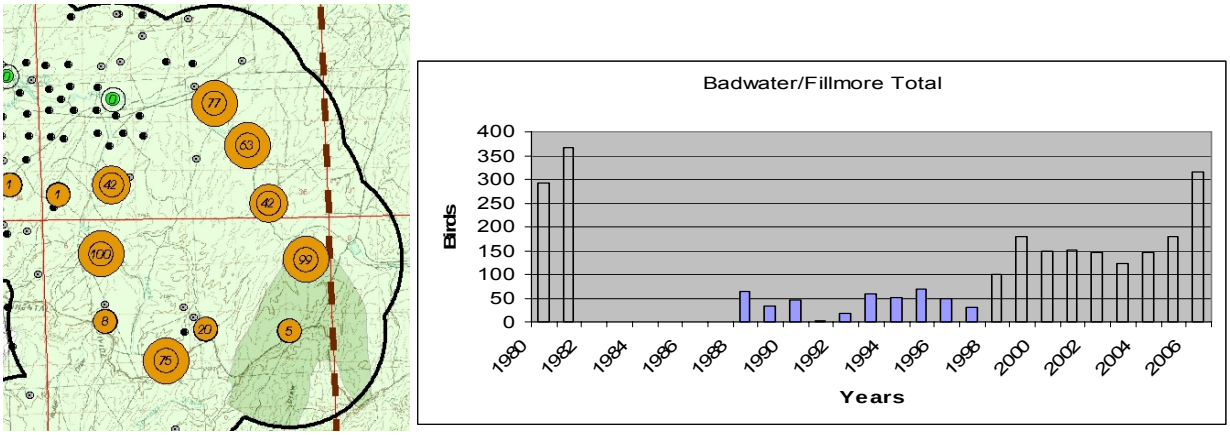

ECHO SPRINGS COMPLEX - The Echo Springs complex (Figure 21) also represents an area of continued development and production from 1978 to 2006 with 8 wells drilled per section. Approximately 250 wells have been drilled in this township since 1979 with activity continuing into 2006, some of the wells have been plugged but most are still producing gas. The graph indicates that even with the large number of wells drilled within the two mile radius of the leks within the complex the number of males in attendance shows a pattern of recent increase and long term stability.

**Figure 21:** Echo Springs complex detail



BADWATER/FILLMORE COMPLEX - We combined the Badwater/Fillmore complexes (Figure 22) due to the amount of overlap between the 2 mile lek radii. There are eleven leks within the two townships that encompass the complex; approximately 40 wells have been drilled within the area since late 1960's. In 1981 367 males were counted in this non-impacted lek complex while 316 were counted in 2006.

**Figure 22:** Badwater/Fillmore complex detail

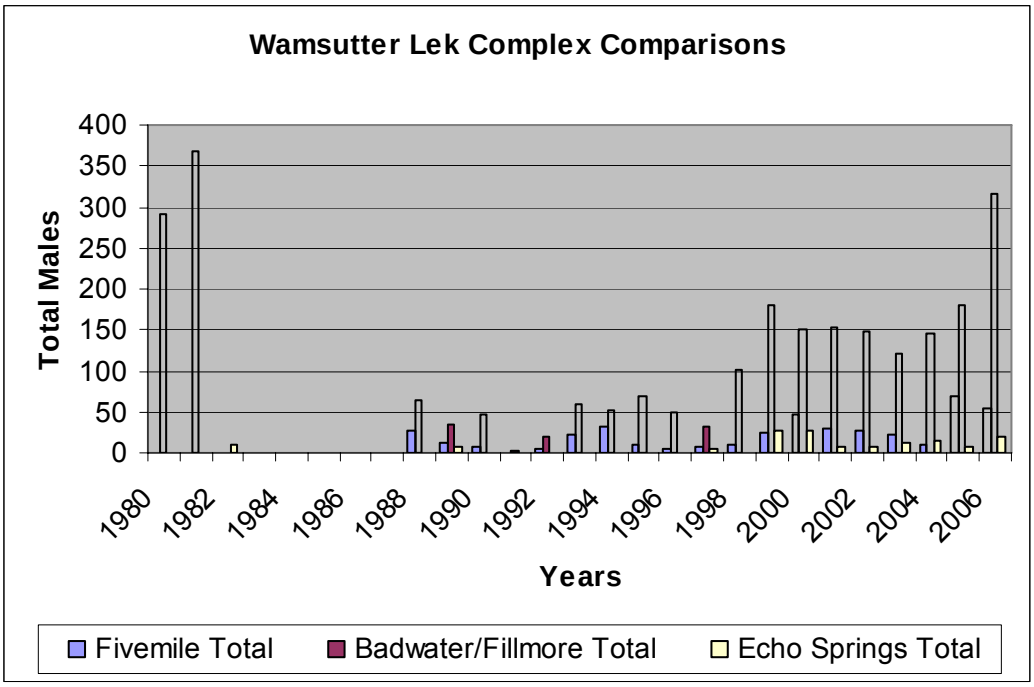



SUMMARY OF WAMSUTTER FINDINGS - Among these complexes we see similar trends of higher numbers of males in attendance in the 1980s than seen in the 1990s with an increase in males occurring again in the 2000s. The periods of decline seen in 1990, 1996 and 2002 at the Badwater/Fillmore complex are similar to those seen for the Expanded Five Mile complex. These are the same trends that are seen state-wide and may be more closely aligned with climatic influences such as precipitation than with energy development activity.

Does the Wamsutter study area map (Figure 19) suggest displacement of sage-grouse from impacted to non-impacted leks as illustrated by the size of the lek dot? Large lek indicators are generally located on the periphery of the field while smaller lek indicators are found within the field. An observation of displacement would be consistent with the findings of Kaiser (2006). In the Pinedale Anticline field Kaiser (2006) found displacement of young males from the development areas and overall low rates of mortality. While the displacement hypothesis would require research, the observable trends show long term stability with cyclical variation over time. It is not unreasonable to hypothesize that these fluctuations reflect the combined influences of several factors including development and precipitation. It is clear that after 30 years of development and production activity (10 generations of grouse), male sage-grouse continue to attend leks imbedded in the Wamsutter natural gas field. It can be assumed that males would not continue this activity if females were absent, or if suitable nesting and early brood rearing habitats were not available.

When we compare the lek complexes on the same graph (Figure 23) we see, as we do in Figure 24, the differential between impacted and non-impacted lek attendance was in place before development at Wamsutter began. The Badwater/Fillmore lek complex has traditionally had greater male attendance than either the Echo Springs or Five Mile complexes. This differential is also illustrated in Figure 25.

**Figure 23:** Wamsutter lek complex comparisons




In Figure 24, we included data starting in 1980 in an effort to view grouse response to activity in the early days of field development. This effort, though highly erratic before 1985, illustrates consistent trends in sage-grouse populations regardless of the influence of energy development activity. The field wide population (black line), based on average male-lek attendance, in 2006 is comparable to that seen in 1985.

**Figure 24:** Wamsutter area male-lek attendance comparisons

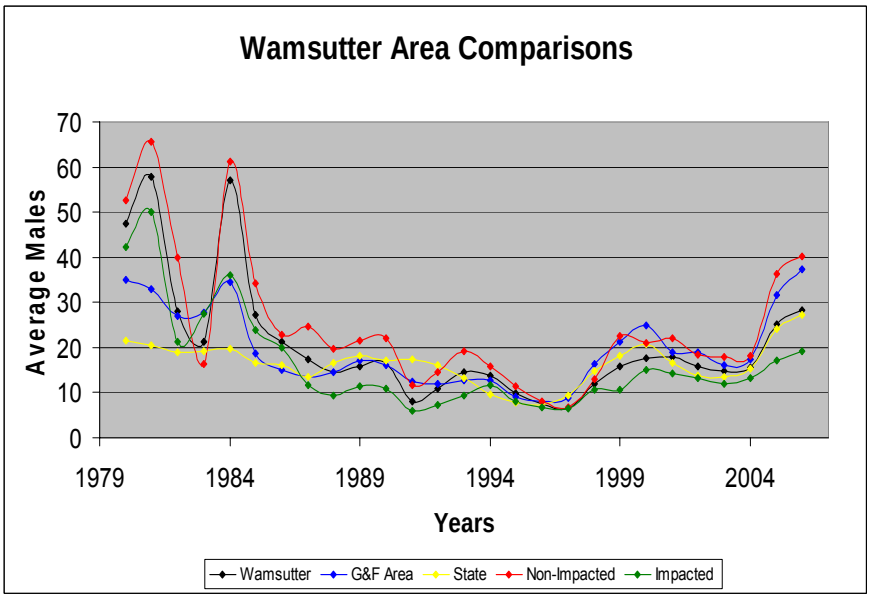
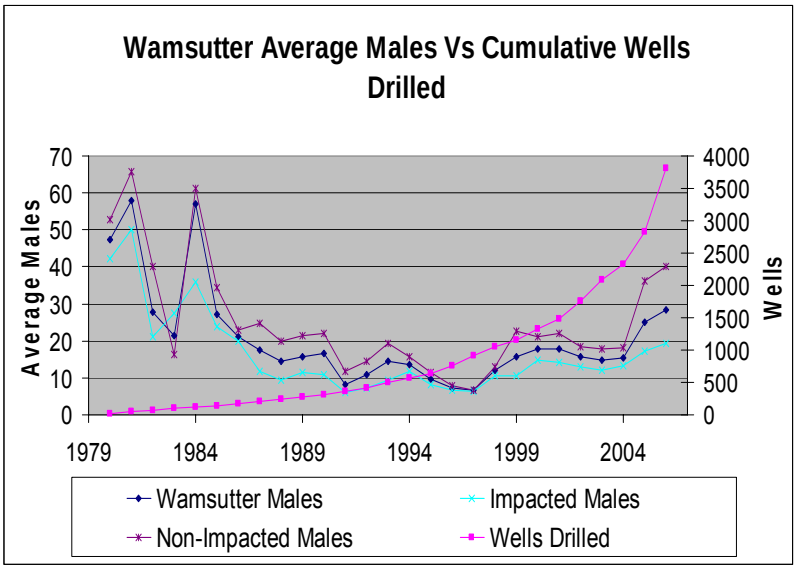


Figure 25 also shows that the suite of leks identified as impacted and non-impacted, based on 2006 well data, have had differential male-lek attendance dating back to the beginning of field development. The differential stays consistent with impacted leks having approximately 50% of the average male-lek attendance of non-impacted leks. It is this differential that raises questions about displacement and about the influences of habitat quality and lek survey protocols. Since 1980, approximately 3800 wells have been drilled in the Wamsutter natural gas field.

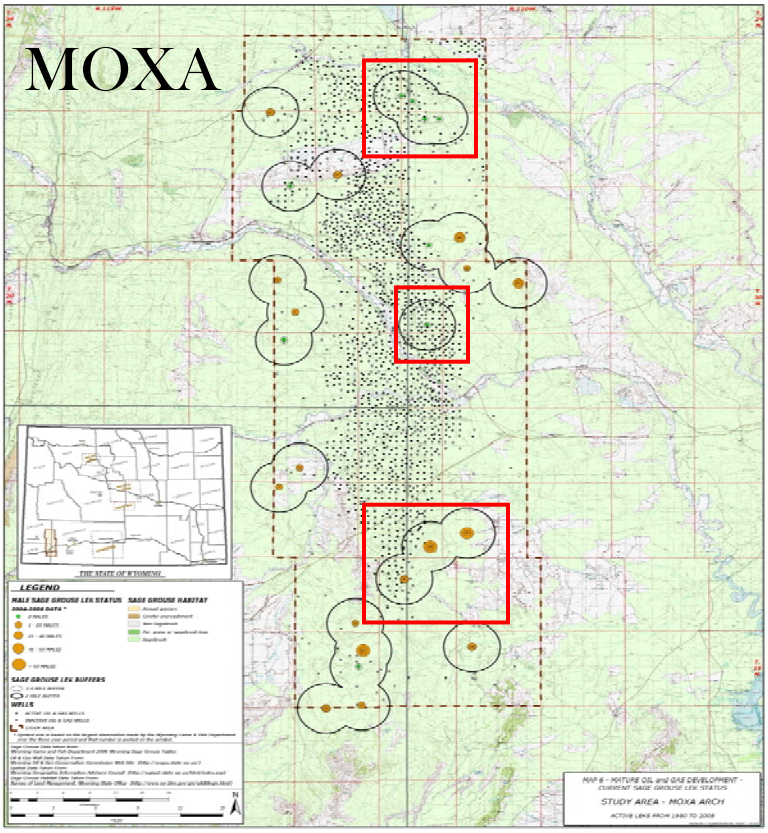
**Figure 25:** Wamsutter lek comparisons and wells drilled




*MOXA ARCH (MOXA)*

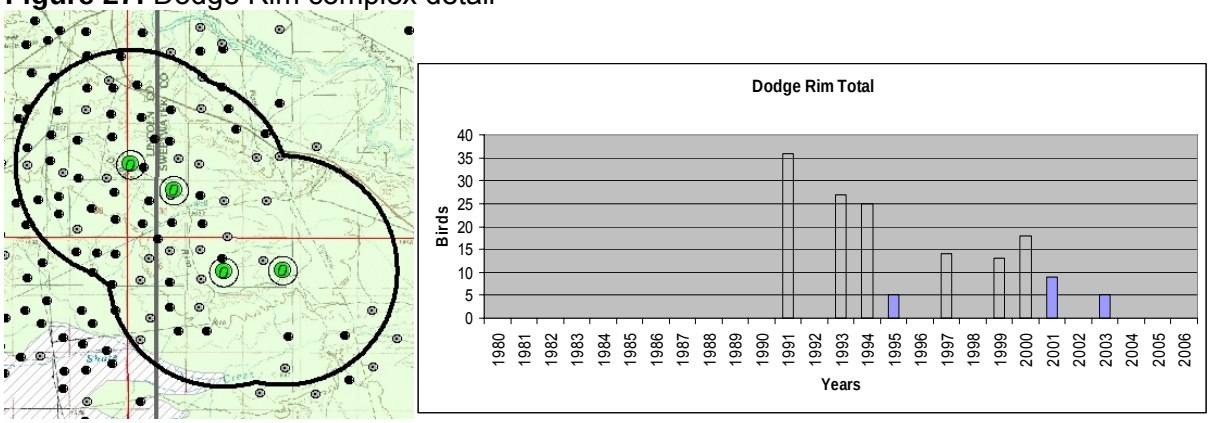
As with Wamsutter, development of the Moxa Arch natural gas field began circa 1980, Figure 26. This field was permitted at 80-acre spacing with some areas being drilled on 160's (4 wells per square mile). Development in Moxa is concentrated on a very well defined geologic structure. Infill development continues today with additional NEPA analysis currently underway. Unlike Wamsutter, Moxa did not have a large number of leks within the field development area before development. We see from Figure 26 that leks imbedded within the development area have significantly lower male-lek attendance when compared to non-impacted leks; in some cases lek abandonment has occurred. The WGFD management areas surrounding Moxa contain 241 leks; our analysis of the study area included 11 impacted and 15 non-impacted leks.

**Figure 26:** Moxa Arch natural gas field



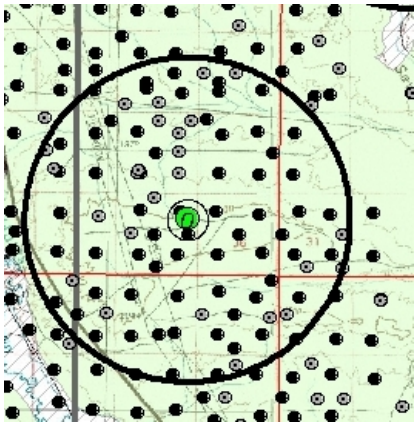

DODGE RIM COMPLEX - The Dodge Rim lek complex (Figure 27) is the northern most lek complex in the Moxa field. Approximately 250 wells have been drilled in the area surrounding this complex. Consistent lek surveys indicate the leks have become inactive since 2003. Three of the four inactive leks in the complex have wells drilled on or immediately adjacent to them. The fourth lek has a well drilled immediately outside the ¼ mile lek buffer. Information found in Holloran (2005) indicates noise and direction of the prevailing wind, in addition to road traffic are factors impacting sage-grouse lek attendance. Moreover, these findings have implications for the importance of stringent application of the BLM sage-grouse stipulations, specifically the ¼ mile lek buffer. The Dodge Rim complex might represent a good example of the conservation benefit of the BLM stipulations.

**Figure 27:** Dodge Rim complex detail



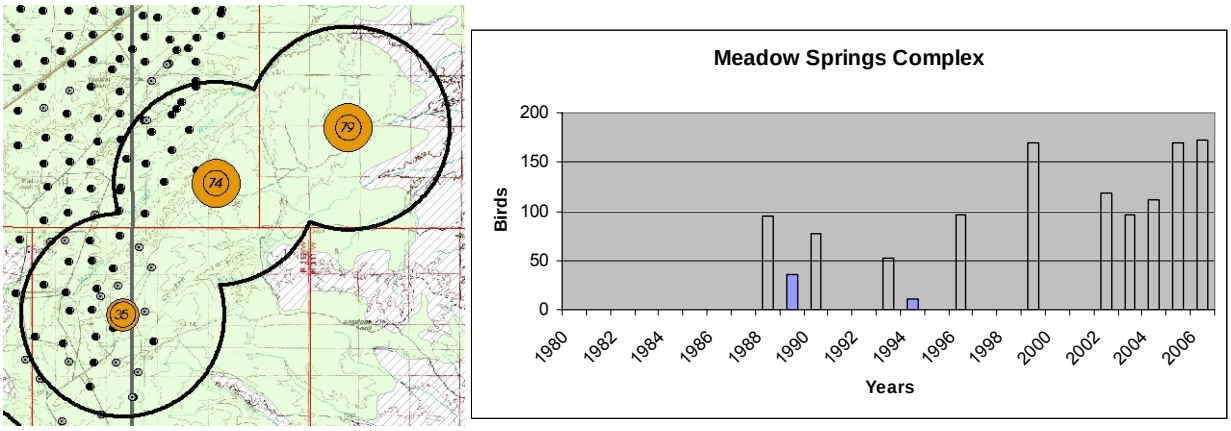
SEVEN MILE GULCH LEK - Seven Mile Gulch lek (Figure 28), located in the middle of the analysis area, appears to have been abandoned. Data are poor for this lek with only two surveys having been conducted, but this lek is heavily impacted by 80-acre spacing and the ¼ mile lek buffer has been directly impacted by two wells.

**Figure 28:** Seven Mile Gulch lek detail



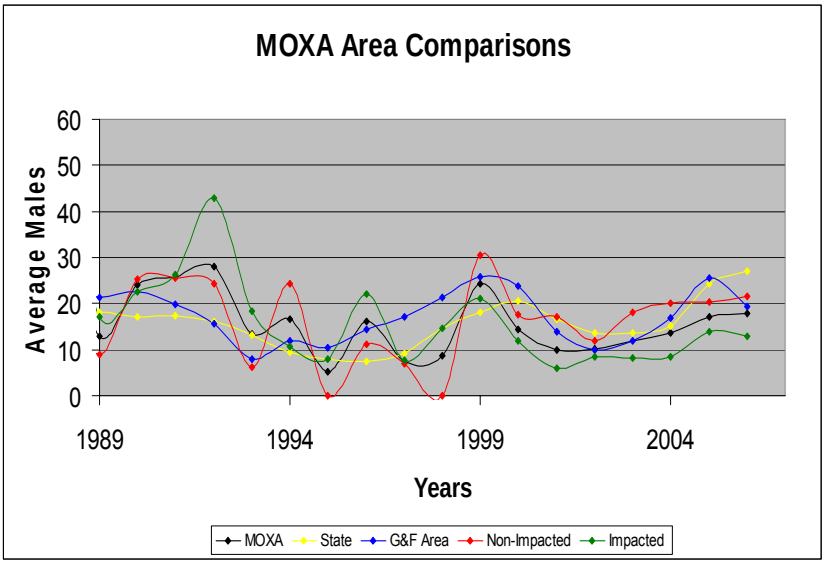
MEADOW SPRINGS COMPLEX - Only 43 wells have been drilled in the area west of the Meadow Springs complex (Figure 29), these wells are generally drilled on 160 acre spacing and none of the lek buffers are impacted by development. The leks continue to be active with attendance increasing over time.

**Figure 29:** Meadow Springs complex detail




SUMMARY OF MOXA ARCH FINDINGS - As seen in Figure 30**,** Moxa lek counts and surveys were erratic before 1999. While development appears to have significantly impacted individual leks within heavily developed areas of the field, the Moxa Arch sage-grouse population remains steady after more than 30 years of development and 1700 producing wells.

**Figure 30:** Moxa area lek comparisons




*PINEDALE (PAPA)*

The Pinedale Anticline natural gas field (Pinedale Anticline Project Area or PAPA) is currently in an intense drilling phase. Gas was initially discovered in this area in 1939 but not in quantities that justified additional development. Renewed interest in the area in 1997 was spurred by the prolific Jonah Gas Field, immediately to the south. The PAPA is a unique geologic feature that contains a number of tight natural gas formations. Development of this area must take place on close spacing to accomplish efficient recovery of the gas resource. A desire to minimize environmental impacts has spurred the development of new drilling and reservoir stimulation techniques. The successful use of directional drilling has made multiple well-pad drilling in the area possible with upwards of 30 wells per pad being proposed.

Concern about the impacts of high-density, high-intensity development on wildlife has prompted the initiation of ongoing research in the area (Lyon 2000, Holloran 2005, Kaiser 2006). Because nearly the entire PAPA overlies federal minerals, the opportunity to study sage-grouse under strict BLM control was afforded.

As a result of issues identified in Lyon (2000), the BLM Pinedale Field Office, industry partners, and the University of Wyoming initiated cooperative research on the effectiveness of the BLM standard sage-grouse stipulations. To test the effectiveness of the stipulations, BLM manipulated the impacts of gas development as follows:

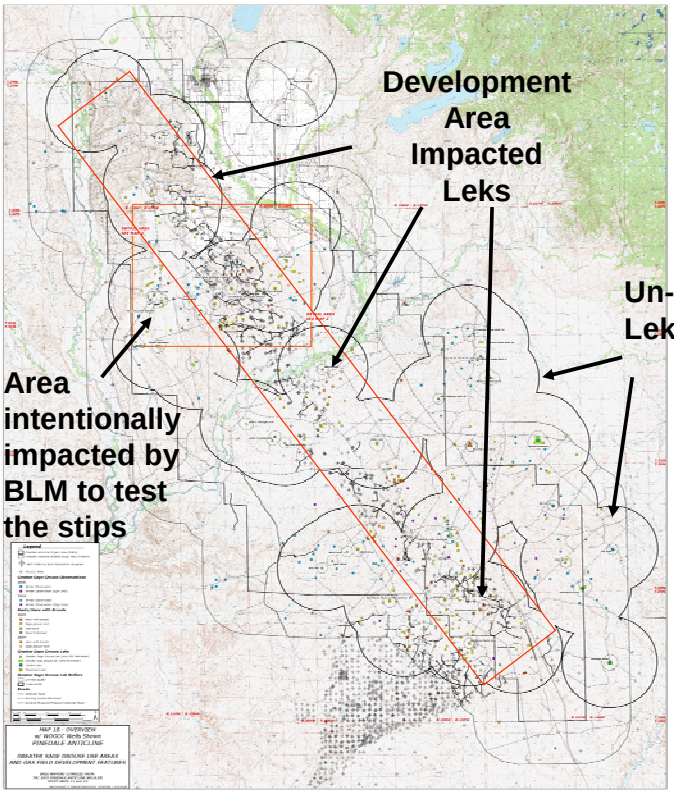
- Two leks (Lovatt Draw Reservoir and Mesa Springs in the Mesa complex) were provided no protection from year round development activity,
- Leks in the remainder of the field were protected through the stringent application of the standard protective stipulations, and
- Leks located outside the study area were not impacted by gas development activity and served as the control.

The intent of the study was to determine the effectiveness of the stipulations in an applied setting.

The base map used in Figure 31 is taken directly from the TRC Mariah (2006) wildlife report which is provided annually to the BLM by the PAPA operators. The red rectangle represents the 4 mile wide swath along crest of the Pinedale Mesa that we analyzed as the impacted development area. The leks intentionally impacted by BLM are located within the smaller red rectangle indicated on the map. In this smaller area the standard sage-grouse stipulations were waived, providing no spatial or temporal protection to these leks for a period of two years. Other leks within the developed area were protected by the stringent application of the stipulations. The leks impacted by vacating the stipulations were abandoned in a few years (Holloran 2005); the other leks, those protected by the application of the stipulations, continue to have males in attendance. This experiment provided evidence that the stipulations appear to be effective in reducing the impact of development on sage-grouse. On the PAPA maps well locations are identified by circles with crosses through them (A). The Upper Green management area contains 124 leks; 21 were included in our analysis as impacted and 32 as non-impacted leks.

**Figure 31:** Pinedale Anticline field development area

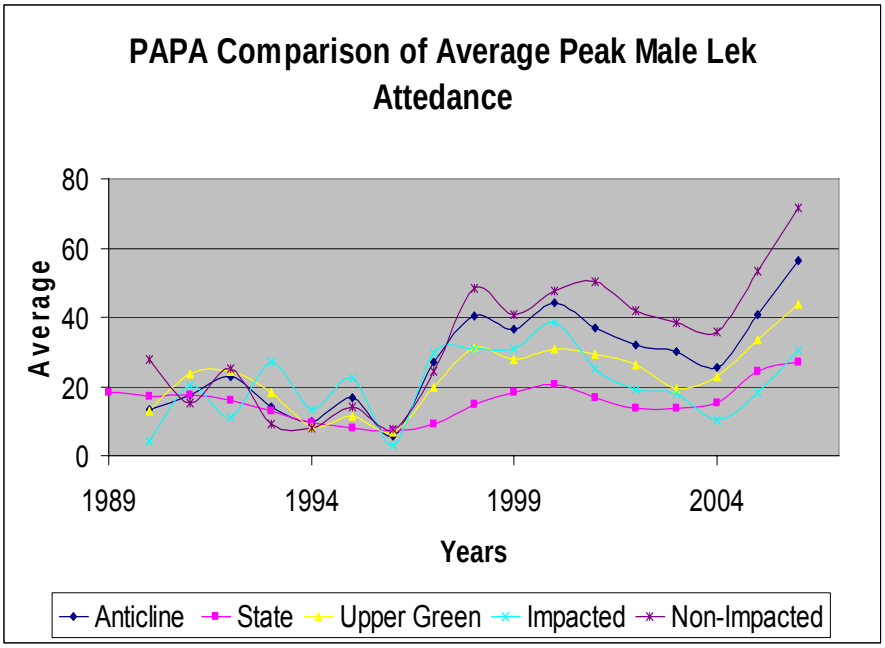
PAPA Field Development Area




The "impacted" leks in this analysis include those leks intentionally impacted by BLM. Holloran (2005) used these BLM-impacted leks, which ultimately became inactive during the course of his study, in deriving model-based estimates of population persistence. The exercise predicted localized extirpation of leks impacted by gas development at densities greater than 1 well per square mile. This work was completed in 2004 in the wake of a general state-wide decline. As

illustrated in Figure 32, predictions made at that time indicated extirpation of grouse was inevitable, not only for the development area but throughout the Upper Green. Since 2004 populations have increased. Given the long-term population fluctuations that sage-grouse exhibit range-wide, the results of any short-term modeling exercise must be interpreted with due circumspection.

**Figure 32:** Pinedale Anticline average male-lek attendance comparisons

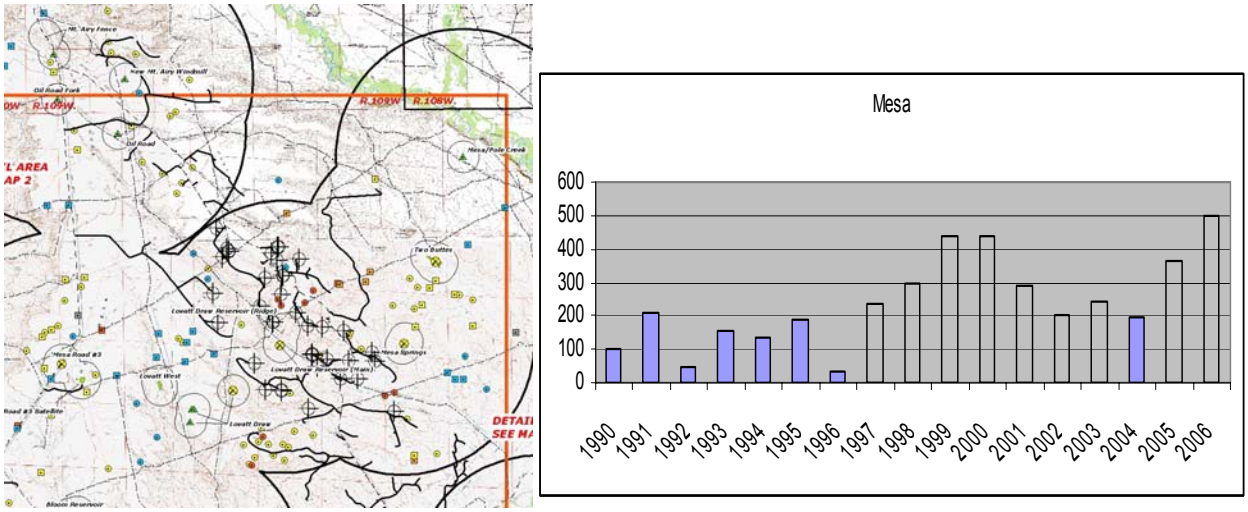



The WGFD data base contains limited data for the area before 1998, since that time lek counts have been consistently conducted with additional leks being identified annually.

The analysis of lek complexes in the area demonstrates that leks continue to be occupied even when impacted by the intensive natural gas development. The following analysis looks closely at three impacted and two non-impacted complexes.

MESA COMPLEX - The Mesa complex (Figure 33) includes the leks purposely impacted by the BLM to benefit the Holloran (2005) study of the effectiveness of the BLM standard sage-grouse stipulations. The BLM impacted leks (Lovatt Draw Reservoir and Mesa Spring) were further impacted by the activity taking place in Section 16, located immediately to the north. No stipulations or conditions of approval are placed on state mineral leases resulting in continued year round development activity. The Cat, Cora and Mesa/Pole Cat leks were removed from the analysis of this complex because they are un-impacted by gas development activity. This complex has been impacted by intensive year-round gas development operations since 1998 and remains active.

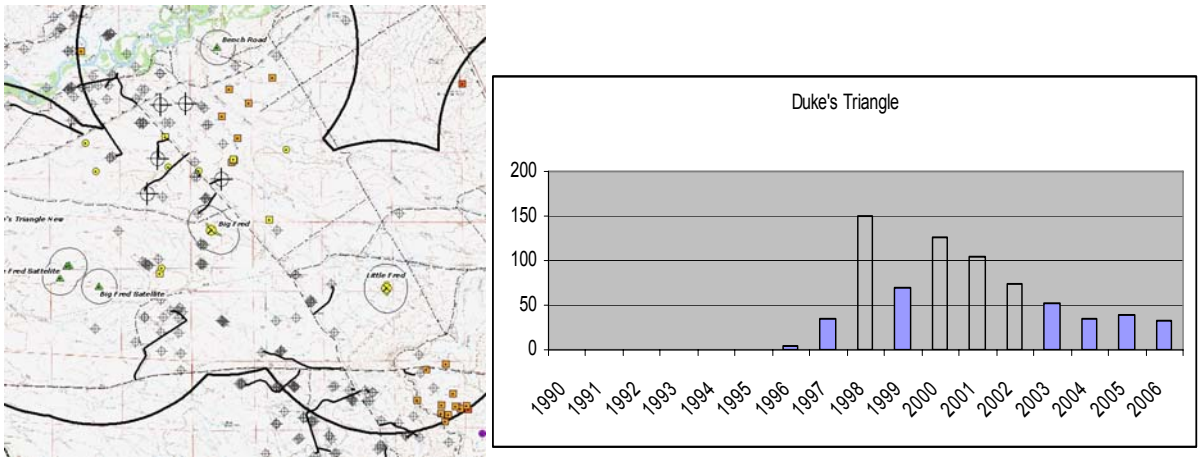
**Figure 33:** Mesa complex detail




DUKE'S TRIANGLE COMPLEX - The Duke's Triangle complex (Figure 34) consists of six leks, of which only two are regularly attended. Of the two significant leks in the complex, one (Big Fred) has declined steadily over the last five years. Development activity has occurred around these leks since 1998.

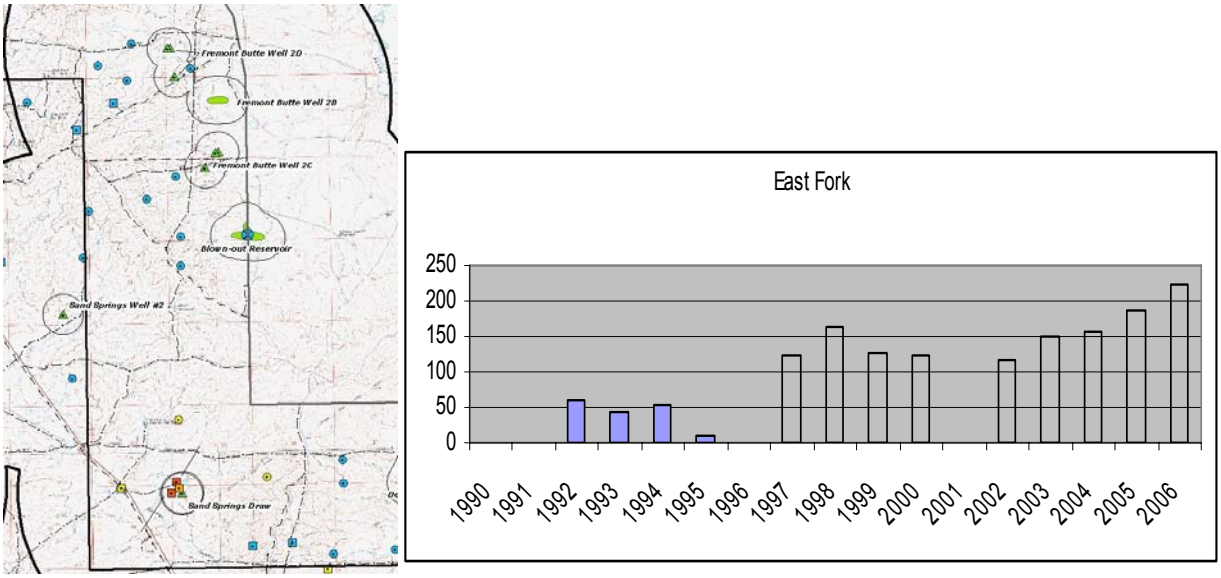
Big Fred is located approximately one mile northeast, directly down wind, of Section 36, a section of state owned minerals. State leases (Sections 16 and 36) are not encumbered by spatial and temporal stipulations and conditions of approval as are federal wells. Activity on federal leases on the Pinedale Mesa is generally shut down through the winter for the protection of crucial mule deer and antelope winter range, followed by the sage-grouse breeding and nesting/brood rearing period of March 1 to July 15. During this period of extremely limited activity on federal leases, drilling and completion activity continues on state leased areas. The Big Fred lek has been impacted by development activity throughout the breeding and brood rearing season since 2001 with increased activity levels from 2004 through 2006, a similar situation as was seen relative to the Mesa Springs and Lovatt Draw Reservoir leks.

**Figure 34:** Duke's Triangle complex detail



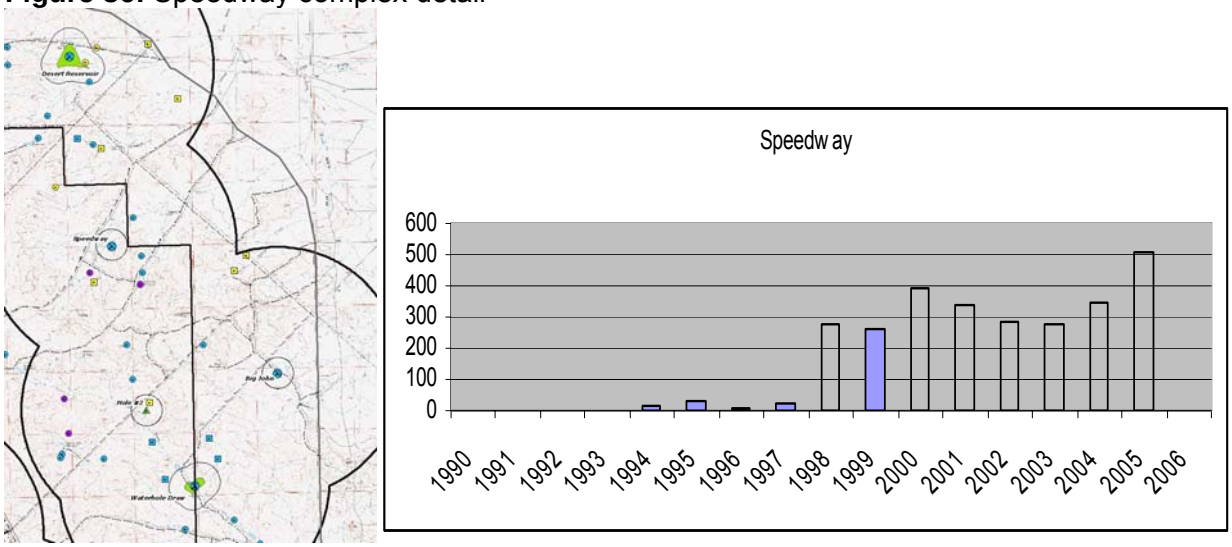
EAST FORK COMPLEX - The East Fork complex (Figure 35) is located east of the PAPA and is not impacted by gas development activity and shows generally the same trends as the impacted Mesa complex.

**Figure 35:** East Fork complex detail



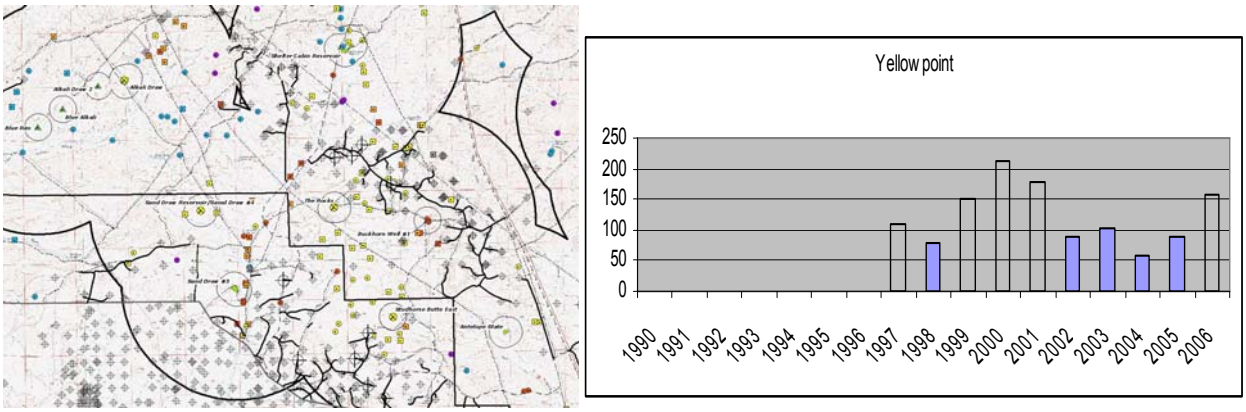

SPEEDWAY COMPLEX - The Speedway lek complex (Figure 36) is located to the south and east of the PAPA. As with the East Fork complex this group of leks is not impacted by gas development activity and trends are similar to the Mesa and East Fork complexes.

**Figure 36:** Speedway complex detail



YELLOWPOINT COMPLEX - The Yellowpoint complex (Figure 37) located at the south end of the PAPA geologic structure is impacted by that development activity as well as that which is occurring in the Jonah Field located southwest of the complex. Despite this level of development activity the Yellowpoint complex continues to be attended and trends are comparable to Mesa and the two non-impacted complexes.

**Figure 37:** Yellowpoint complex detail




SUMMARY OF PINEDALE ANTICLINE FINDINGS - A comparison of all five complexes (Figure 38) indicates that, with the exception of Duke's Triangle, the population trend for sage-grouse in the area of the Pinedale Anticline is similar regardless of the influence of natural gas development.

**Figure 38:** PAPA lek complex comparison

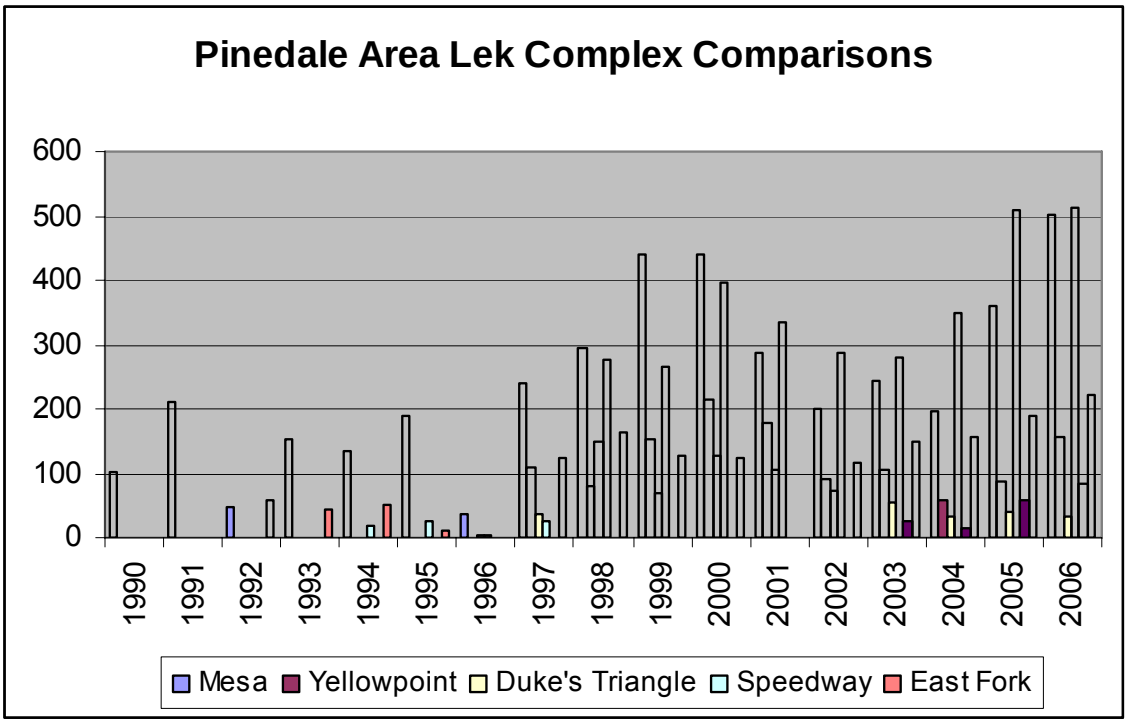
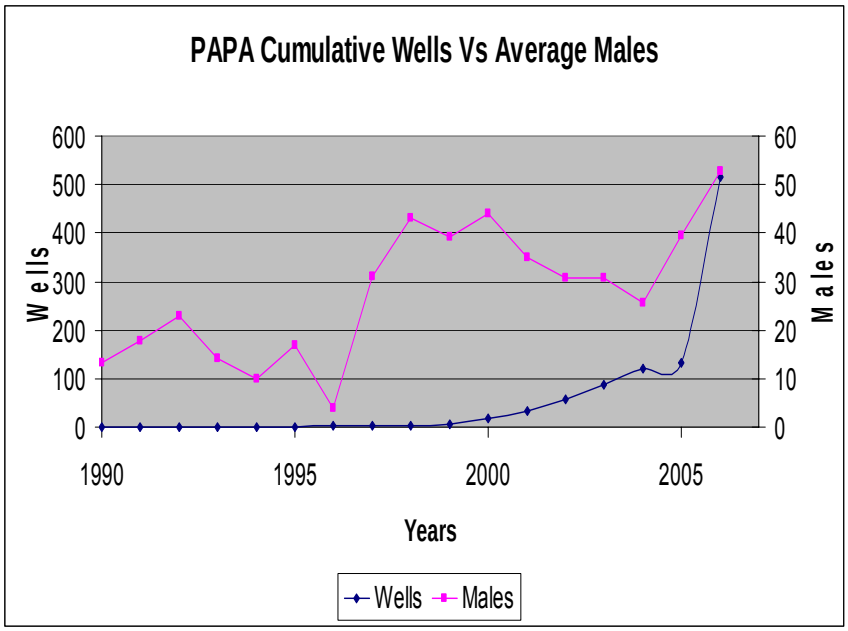


Figure 39 illustrates the cumulative number of wells drilled within the study area. The significant increase in the number of wells drilled from 2005 to 2006 represents the approval by BLM of multi-well pad drilling and year round activity. Pad drilling limits the surface disturbance and concentrates development activity thereby disturbing fewer leks. While this development scenario will limit surface disturbance and duration of development activity, it will enhance development intensity and possibly result in localized impacts to sage-grouse similar to those documented by Holloran (2005) at Lovatt Draw Reservoir and Mesa Springs leks, and to those we have demonstrated at the Big Fred lek.

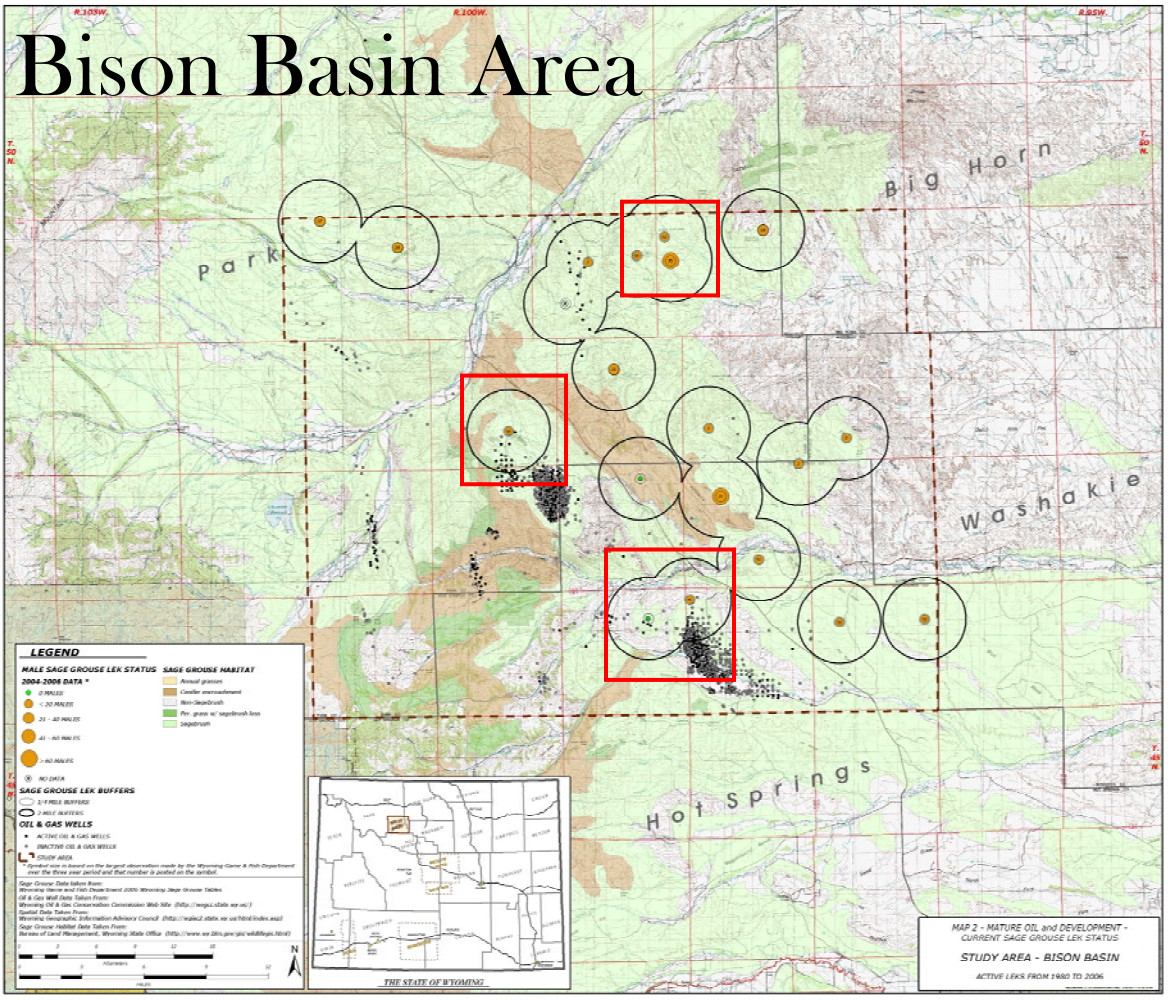
**Figure 39:** Pinedale Anticline comparison of male-lek attendance and wells drilled




*BISON BASIN*

The Bison Basin is an old oil field area located in the Big Horn Basin of northwest Wyoming (Figure 40). The small fields are densely developed, as they pre-dated WOGCC spacing regulations, with some being over 100-years old. Sage-grouse mitigation would not have been applied to the development of these fields. There is renewed interest in this resource area, additional geophysical exploration is in progress. We analyzed 5 impacted and 15 non-impacted leks out of the 96 leks identified in the WGFD management area.

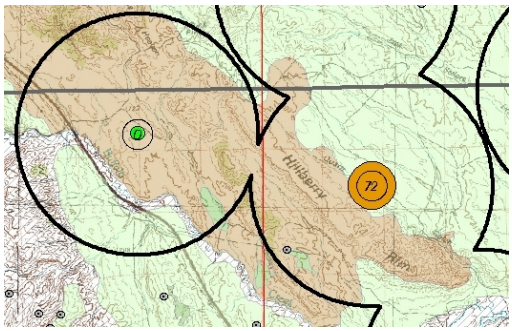
**Figure 40:** Bison Basin study area

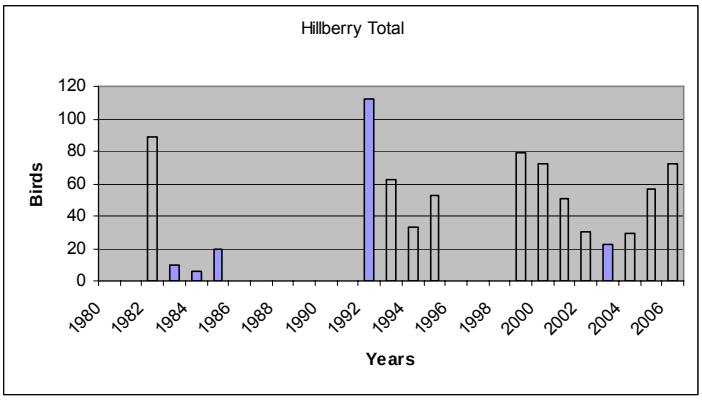



A lack of consistent data for the area limits the comparisons that can be made between impacted and non-impacted leks and lek complexes but an attempt to evaluate three areas from north to south across the study area was made.

HILLBERRY COMPLEX - The Hillberry lek complex (Figure 41) is not impacted by oil and gas development and demonstrates the same oscillations seen in other complexes.

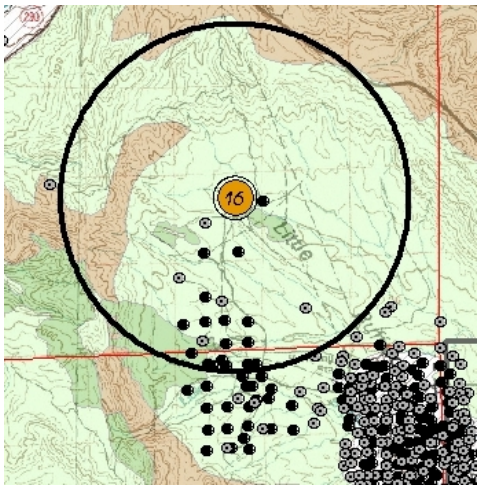
**Figure 41:** Hillberry complex detail

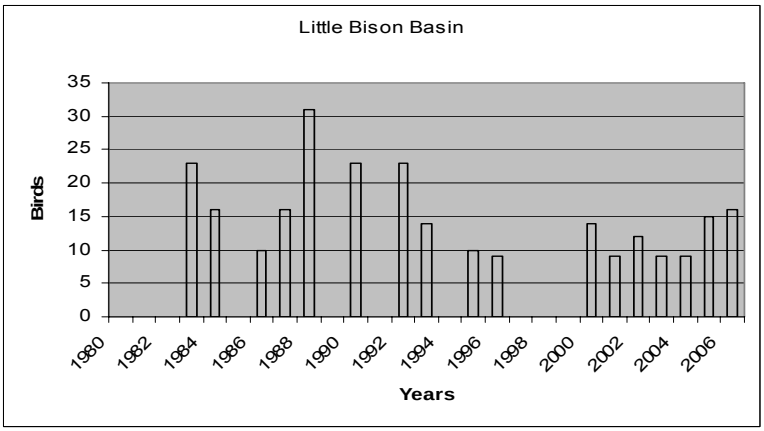



LITTLE BISON BASIN LEK - The Little Bison Basin lek (Figure 42) has had 23 wells drilled within the two mile radius of the lek and hundreds of wells drilled within a four mile radius. This field has been actively producing oil since 1915; sage-grouse continue to attend this impacted lek.

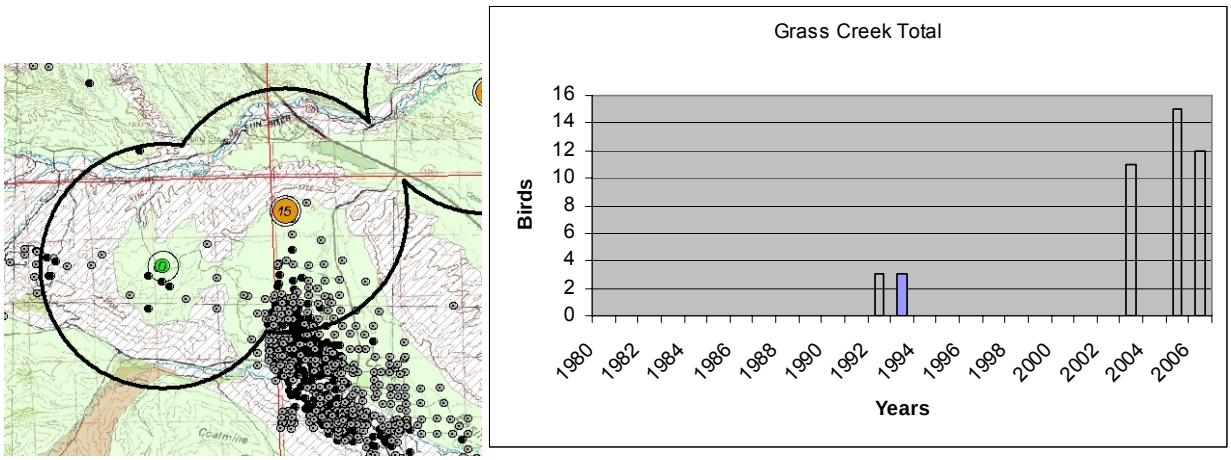
**Figure 42:** Little Bison Basin lek detail:



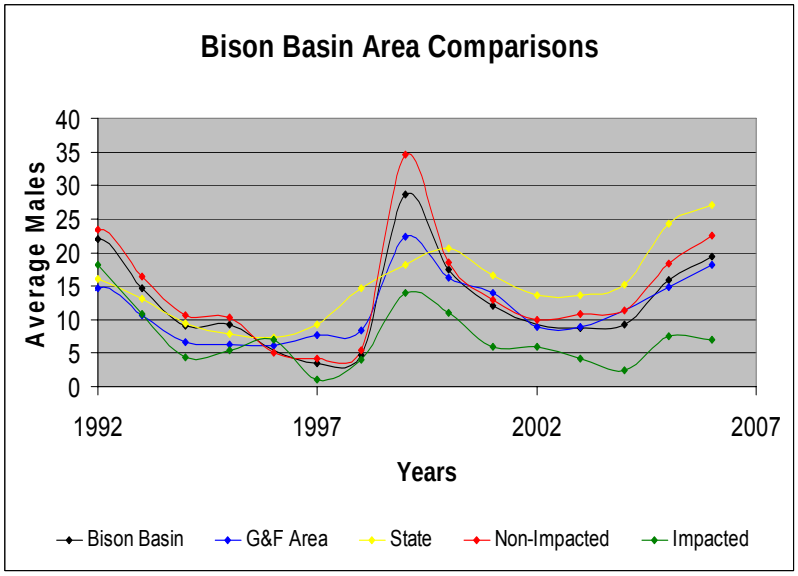
GRASS CREEK COMPLEX - Data are poor for the Grass Creek complex (Figure 43) but surveys conducted in the last four years indicate that the leks are occupied and stable. The complex is located in the Grass Greek oil field where almost 900 oil wells have been drilled since 1910. The Grass Creek oil field continues to be active today as does the sage-grouse complex of the same name.

**Figure 43:** Grass Creek complex detail




SUMMARY OF BISON BASIN FINDINGS - The comparison of the five lek categories for the Bison Basin study area (Figure 44) indicates that, even in this very old development area where no protective stipulations or spacing restrictions would have been applied, trends in this sage-grouse population are consistent with other populations and with state-wide trends. The only deviation seen is a slight decline in male attendance on impacted leks which is explained by the loss of three males attending the Grass Creek complex in 2006.

**Figure 44:** Bison Basin area comparisons



## CONCLUSIONS

Five general conclusions emerge from this analysis.

***1. Density of development is an important factor affecting male lek attendance***

Sage-grouse continue to inhabit energy development areas characterized by a variety of well density scenarios. However, well density appears to affect lek activity. In both the PRB and Moxa, sage-grouse leks with more than 10 producing wells within the 2-mile lek radius continue to be attended by males during the breeding season, but leks with wells drilled within the ¼ mile lek-buffer or with more than 100 wells drilled within the 2-mile radius appear to become inactive. In the PAPA, the data show that year round drilling and completion activity within the ¼-mile and 2-mile radii (i.e. BLM granting exceptions to the sage-grouse protection stipulations or leks proximal to state leases) may lead to lek abandonment in a relatively short period of time.

Previous research has suggested that ≤1 well per 283 ha (approximately 1 well per section) within 3 km of a lek would reduce the negative consequences of gas field development (i.e. Holloran 2005, Walker et al. 20XX). There is no doubt that less than 1 well/square mile would reduce impact to sage-grouse but yet again we are left with the question about thresholds of development that no previous research has addressed. We have initiated research that will attempt to address this question.

It is likely that habitat quality plays a role in determining the level of development that impacts lek activity. Sage-grouse within relatively poor or marginal habitat (i.e. Moxa, PRB) appear to be less tolerant of increased well density than sage-grouse in areas of high quality habitat (i.e. PAPA, Wamsutter).

The conditions under which energy development impacts sage-grouse populations are more complex than has been previously suggested. Impacts appear to reflect an interaction of several factors including development density, the intensity of development activities, the life-history stage of the sage-grouse (i.e., brood rearing, lekking), and habitat quality. Some impacts are minimal while others pose a serious concern; the degree of impact seems to be related to the quality of the habitat affected by energy development, but this relationship is not always straightforward. Are the impacts of habitat fragmentation/conversion more severe when habitat is less-than-optimal, such as may be the case in PRB and Moxa? It cannot be stated that 80-acre spacing will facilitate population persistence in all instances; Moxa illustrates that this is not the case. But Moxa also illustrates the ¼ mile buffer caveat; leks that were abandoned in Moxa had development activity within this buffer. It is clear that 40-acre spacing will not support sage-grouse, but questions remain about the respective roles that increased human activity and habitat fragmentation/conversion play and whether some type of mitigation may be effective in areas impacted by 40-acre spacing. The implication for managing sage-grouse in energy development areas is that strategies will be most effective if they are developed on a population-specific basis. This will require site-specific research and activity planning.

***2. BLM standard stipulations for reducing impacts to sage-grouse appear to be effective.***

The stringent application of the current BLM lek and nesting habitat protection stipulations in the Pinedale Anticline reduced the impact of drilling and completion activities on lek attendance when compared to those leks where the stipulations were not applied. This comparison provides evidence that the BLM standard stipulations appear to be effective in reducing the impact of development activity on sage-grouse populations. Although we caution against extrapolating the results of a single short-term study to other populations or sage-grouse in

general, the evidence suggests that any statement that BLM stipulations are ineffective is unsupported.

While reviewing the existing body of research regarding the effectiveness of the standard BLM stipulations for mitigating the impacts of drilling operations on sage-grouse it became evident that the base assumption for the conclusion that these stipulations were ineffective was incorrect. Holloran (2005) states "My results suggest that current development stipulations are inadequate to maintain greater sage-grouse breeding populations in natural gas fields", Walker (20XX) agrees stating "Current lease stipulations that prohibit development within the 0.4 km of sage-grouse leks on federal lands are inadequate to ensure lek persistence and may result in impacts to breeding populations over larger areas". Also, in Braun et al. (2002), "We believe it is the responsibility of the oil and gas industry to demonstrate their activities have no negative impacts initially, short-term, or over the long term." We have demonstrated that, while energy development can negatively impact sage grouse, populations persist in oil and gas fields through decades and, indeed, centuries of oil and gas activity. It is unreasonable to expect an absence of any negative impact because any activity that modifies habitat directly or indirectly will have consequences for wildlife populations. The question is, at what threshold of development can we maintain viable sage-grouse populations and productive oil and gas fields? To date, previous research has aimed to determine whether energy development affects sage-grouse populations. This is what has been referred to as gratuitous testing, that is, research based on questions for which we almost certainly already know the answer. Research aimed at finding feasible solutions is needed.

The BLM standard sage-grouse stipulations were intended to reduce the impact of the activity, not to eliminate impact altogether; this clarification is found in the CEQ NEPA regulations at 40 CFR 1508.20, "mitigation may include one or more of the following:

> (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation."

BLM stipulations intended to mitigate impacts to sage-grouse on the Pinedale Anticline (BLM 2006) are spatial and temporal, and include:

- no surface disturbance within ¼ mile of a lek to protect the integrity of the lek site, including a specific prohibition of high profile structures within the ¼ mile if BLM does not apply the stipulation and allows activity within the ¼ mile,
- no surface disturbing activity within 1 mile of a lek from March 1 to May 15 to avoid disturbing breeding birds, and
- no activity within 2 miles of a lek from April 1 to July 31 to protect nesting hens and early brood rearing.

All BLM offices in Wyoming that manage sage-grouse habitat have similar stipulations in place, the two mile no surface activity restriction is applied, with slight variation, from March 1 to July 15. When the effectiveness of the stipulation is evaluated in accordance with the CEQ regulations the results are significantly different. For example, on the PAPA, sage-grouse leks that were protected using the BLM standard stipulations continue to have males in attendance; leks at which these stipulations were waived (Lovatt Draw Reservoir and Mesa Springs) for research purposes were impacted and no longer have males in attendance.

Clarification of the intended purpose and potential effectiveness of the existing BLM stipulations is essential as research outlined above is routinely cited as the evidence to compel BLM to change their sage-grouse management strategies. For example the draft Big Horn Basin Conservation Area Sage-grouse Conservation Plan (2007) states "Researchers concluded existing stipulations were inadequate to maintain sage-grouse breeding populations." We have

cast doubt on this contention and provide evidence that existing stipulations may in fact reduce the impact of energy development on sage grouse populations.

Table 1 shows that well density and application of the BLM standard stipulations are important for maintaining lek attendance over the long term. Well densities at about 100 wells within the two mile radius were generally associated with persistence of sage-grouse populations. As well density exceeded 100 wells/2 mile radius, negative impacts on sage-grouse populations such as lek abandonment became apparent.

**Table 1:** Development Impact Summary

| Development Scenario | Lek Status (1/4 mile lek buffer) | Development within 2 mile radius | Attendance Status |
|---|---|---|---|
| PRB 40 acre spacing | compromised | 200 wells | abandoned |
| PRB 80 acre spacing | intact | 100 wells | reduced and stable |
| Notches, un-spaced; an example of cluster development? | intact | 40 wells in a one $mi^2$ area w/in the 2 mi radius | stable and increasing |
| Wamsutter, modified 80's | intact | 50 to 60 wells | increasing |
| Wamsutter, modified 80's | intact, but close | +80 wells | increasing |
| Moxa 80 acre spacing | compromised | approaching 100 wells | abandoned |
| Moxa 80 acre spacing | compromised | between 50 and 100 wells | abandoned |
| Moxa 80 acre spacing | intact | between 50 and 100 wells | reduced and stable |
| Moxa 160 acre spacing | intact, but close | 30 wells | increasing |
| PAPA | compromised | year round pad drilling | abandoned |
| PAPA | intact | year round pad drilling | increasing |
| PAPA 40 acre spacing | intact | between 100 and 200 wells | stable and increasing |
| Bison Basin, un-spaced | intact, but close | 23 wells in 2 miles and hundreds w/in 4 miles | stable and increasing |
| Bison Basin, un-spaced | intact | hundreds of wells w/in 2 miles | stable and increasing |
| Bison Basin, un-spaced | compromised | 28 wells in 2 miles and hundreds w/in 4 miles | abandoned |

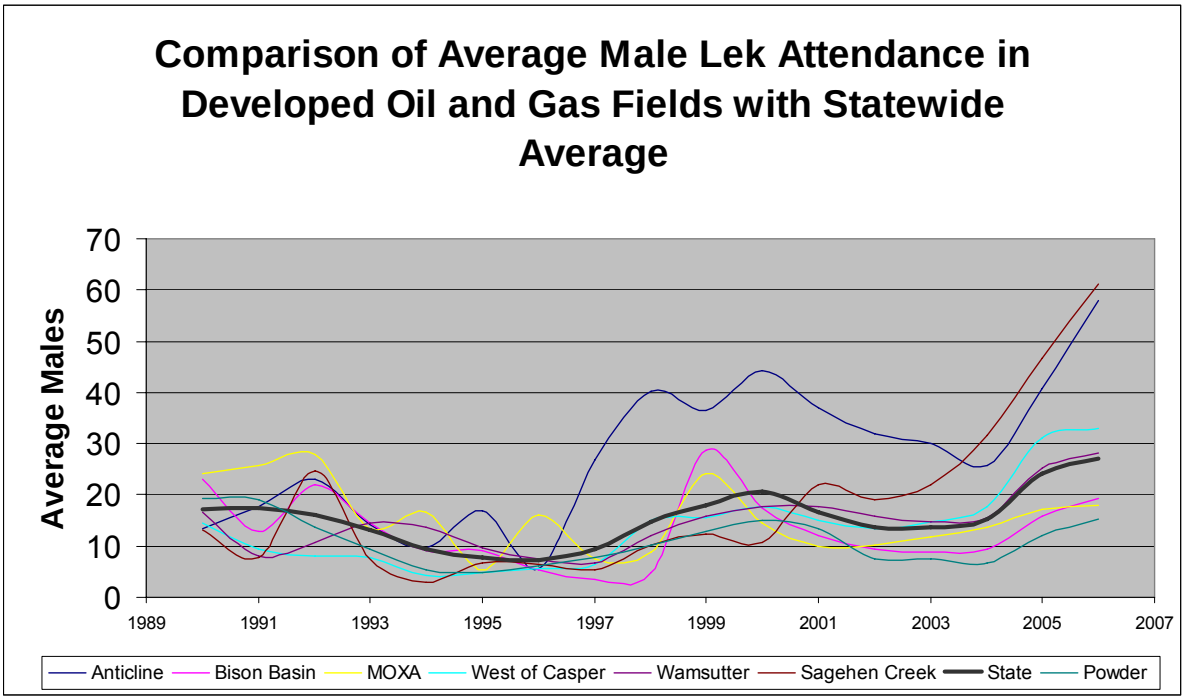
***3. Extirpation has not occurred in any study area with either new or old development.***
The data show that sage-grouse populations have persisted in energy development areas. Any contention that energy development will result in population extirpation must be qualified with statements on development density and intensity. However, there is concern about the effects of continued rapid expansion of energy development because we have yet to quantify the extent to which viable sage-grouse populations will tolerate habitat modification.

***4. Impacted leks show varying rates of reduced male attendance compared to non-impacted leks.***
Average male-lek attendance and population-growth rates are lower on impacted leks when compared to non-impacted leks.

PAPA development activity, which accelerated in 1998, appears to have decreased average male-lek attendance on impacted leks. We can see from the graph (Figure 32) that there was no divergence between the impacted and non-impacted lek averages prior to 1996. While there is now a significant difference in average male-lek attendance numbers on impacted vs. non-impacted leks, male attendance has increased in recent years on leks within the development areas and impacted leks continue to support males. However, in Wamsutter (Figures 24 and 25) the differential between impacted and non-impacted leks was in place before development activity began and may be due, in part, to the variation in habitat quality in the area. In the PRB (Figure 4) the differential between impacted and non-impacted leks was small before CBNG development (<0.6 males) and is only slightly higher today (<1.9 males).

***5. All Greater Sage-Grouse populations studied showed synchronous fluctuations in male-lek attendance.*** The analysis presented in this report found that, regardless of the population in question, the male-lek attendance trend is the same throughout the State (Figure 45). Population increases and declines occur at approximately the same time and are generally of the same magnitude regardless of the specific population being evaluated. A similar observation was made by Braun et al. (2002) relative to the sage-grouse in the McCallum Oil Field in North Park, Colorado, "During the 1973 to 2001 interval, number of male sage-grouse counted and active leks in this area fluctuated in synchrony with the entire sage-grouse population in North Park." These same fluctuations are seen range wide; see Figure 4 taken from the WAFWA Greater Sage-grouse Conservation Assessment (Connelly et al. 2004). Greater sage-grouse populations, like many wildlife populations, show periodic fluctuation in abundance and distribution. These fluctuations are likely the result of a suite of factors including climatic trends and anthropogenic influences.

**Figure 45:** Comparison of average male-lek attendance in developed oil and gas fields with statewide average



***Summary and implications***

a) Strict application of the BLM protective stipulations reduces impact to sage-grouse populations in development areas. These stipulations should be implemented with further testing.
   i) It should be anticipated that multi year-round drilling and completion activity within 2 miles of a lek will negatively impact lek attendance and associated nesting and brood rearing activity.
b) Consider well density and removal of habitat, for example
   i) cluster 40 acre spaced wells (if geologically applicable, see the Lox Notches and Grass Creek complex discussions as examples) in marginal habitat, this is preferred over full scale 40 acre spacing that removes good quality habitat,
   ii) drilling multiple wells from a single location,
   iii) use the fewest number of surface well sites possible to extract the resource,
c) Leave undisturbed patches of habitat scattered throughout the field development area, for example map the habitat, the resource and create habitat set aside areas.
d) Application of management practices to reduce direct impacts to sagebrush habitats should assist in reducing the differential between impacted and non-impacted male-lek attendance and the likely displacement of grouse from development areas.
   i) Avoid impacting lek buffers.
   ii) Avoid impacting high quality nesting and early brood rearing habitats.
   iii) Reestablish or enhance sage-grouse habitat as quickly as possible using locally selected forb and sagebrush species.

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Spatial data: Wyoming Geographic Information Advisory Council
http://wgiac2.state.wy.us/html/index.asp

Oil and Gas Well Data: Wyoming Oil and Gas Conservation Commission
http://wogcc.state.wy.us/)

**Acknowledgements:**
Tom Christensen, Wyoming Game and Fish Department, for providing the sage-grouse data.
Rick Marvel, Wyoming Oil and Gas Conservation Commission, for making the well data acquisition as painless as possible.
Petroleum Association of Wyoming and Public Lands Advocacy member companies, with special thanks to Yates, Fidelity, British Petroleum, ConocoPhillips, ExxonMobil and Devon for their support of the project. Thanks also to Questar and the American Petroleum Institute for their support.
Thanks also to Mark Knoll, at Gene George and Associates, for cartography and Jay Taylor for data analysis.