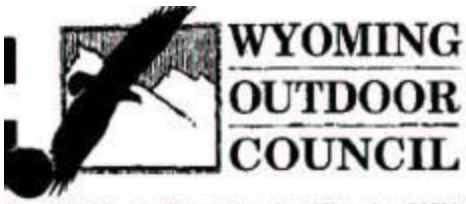

WYOMING OUTDOOR COUNCIL
262 Lincoln Street, Lander, Wyoming 82520
ph. (307) 332-7031 – fax (307) 332-6899

100,455

By Certified Mail, Return Receipt Requested
Article Number 7001 0320 0000 9866 7849

and

By EMAIL to <wymail_jmhcap@blm.gov>

May 23, 2003

Renee Dana
Wyoming BLM
280 Highway 191 North
Rock Springs, Wyoming 82901

Re: 1610 (930) Jack Morrow Hills CAP

Dear Ms. Dana:

In accordance with Part 1503 of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act, 40 CFR §§ 1500 et seq., and the public participation provisions of the Bureau of Land Management's (BLM) planning regulations at 43 CFR § 1610.2, these comment are submitted for and on behalf of Biodiversity Conservation Alliance, The Wilderness Society, Wyoming Outdoor Council (WOC) and their respective memberships in response to the BLM's Jack Morrow Hills Coordinated Activity Plan Supplemental Draft Environmental Impact Statement ("SDEIS"). Together, these groups represent tens of thousands of citizens who use, enjoy and appreciate the natural values found on the public lands managed by the BLM, including lands within the Jack Morrow Hills (JMH) planning area. We appreciate the opportunity to offer our comments and look forward to staying involved in the Jack Morrow Hills planning process.

Specific comments on the JMH SDEIS follow:

I. NO ACTION ALTERNATIVE, RANGE OF REASONABLE ALTERNATIVES AND APPLING FLPMA MULTIPLE USE PRINCIPLES CORRECTLY

At page iv of the SDEIS, BLM defines the no action alternative as the continuation of present course of management based upon the 1997 Green River RMP. However, at page 1-1, BLM states that it deferred "mineral leasing and mineral location decisions within the JMH area" until

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the current JMH CAP planning effort. Therefore, for all mineral leasing and location – not just within the JMH "core" – there is no current land use planning to revert to. As such, for one of the principal areas of concerns of the current SDEIS and land use planning, BLM has inappropriately defined the "no action" alternative. A true baseline for which to compare impacts of the various action alternatives would be no new leasing and development on the 575,000 acre federal mineral estate in the JMH CAP planning area.

Another related problem is the range of alternatives analyzed by BLM. The SDEIS analyzes 4 alternatives including: (1) development alternative with no new WSAs or expansion of ACECs; (2) development with emphasis on protecting wildlife and sensitive species habitat, cultural resources and restricted development to protect other resources; (3) focusing on ensuring resource protection with limited development to protect sensitive resources through mitigation; and (4) (preferred) – balance of uses through timing and sequencing of events and adaptive management.

The present set of alternatives is far from exploring the reasonable set of alternatives that is required by NEPA. For oil and gas decisions, BLM did not address an alternative that would prohibit all new leasing in the JMH and that would rigorously explore buying back or trading existing leases. BLM did not address an alternative that would reduce impacts of mineral leasing and development through directional drilling and other proven technologies. Regarding grazing, BLM failed to explore different options such as limited or sequenced grazing permit retirements, reductions in AUMs and different grazing techniques including limiting or ending hot season grazing.

One alternative missing is a true conservation alternative to protect the Red Desert's wilderness qualities and wildlands. At page 2-4, BLM states that managing for maximum development, production, or use of one resource at the expense of others would "not meet the objective's of BLM's multiple use mandate" under FLPMA. This is an incorrect statement of the law – BLM is free to mix, match and allocate different (or no) use levels given the resources at stake, public input and other considerations.

The Federal Land Policy and Management Act (FLPMA) provides that in the development and revision of land use plans (RMPs), the Secretary shall:

(1) use and observe the principles of multiple use and sustained yield;

(2) use a systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic and other sciences;

(3) give priority to the designation and protection of areas of critical environmental concern;

(4) rely, to the extent it is available, on the inventory of the public lands, their resources, and other values;

(5) consider present and potential uses of the public lands;

(6) consider the relative scarcity of the values involved and the availability of alternative means . . . and sites for realization of those values;

(7) weigh long-term benefits to the public against short-term benefits;

43 U.S.C. § 1712(c)(1)-(9).

"Multiple use" involves several principles, including:

(1) the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present *and future* needs of the American people;

(2) making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions;

(3) *the use of some land for less than all of the resources*;

(4) a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, *recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values*; and

(5) harmonious and coordinated management of the various resources *without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output*.

43 U.S.C. § 1702(c) (emphasis added).

Therefore, in land use planning, BLM need not manage for all uses simultaneously – it can "use some land for less than all of the resources" and take into account the impairment to wildlife, cultural, religious, scenic and historical resources and form an alternative that manages for these resources above, e.g., fluid minerals. This is particularly true where public lands in Wyoming are over 90% open to leasing, and massive oil and gas exploitation is already occurring on public resources in the nearby Pinedale and Great Divide field offices, in addition to other large-scale projects within the Green River resource area – and not to mention the 51,000 coalbed methane wells planned for the Wyoming portion of the Powder River Basin. The failure to exclude a pure conservation alternative is also troublesome given that BLM Wyoming was specifically directed by the Secretary of Interior in 2000 to develop a new set of alternatives with a resource conservation alternative being the preferred one. *See Memorandum from Bruce Babbitt, Secretary of the Interior, to Director, BLM, dated December 22, 2000 and Memorandum from*

John Leshy, Interior Solicitor, to Secretary of the Interior, dated December 22, 2000, attached hereto as Exhibit 1, and incorporated by reference herein.

This is particularly true given what is being sacrificed for 470 BCF of natural gas.[1] As a nation we consume 22 TCF each year – meaning that all the vitally important wildlife, cultural, aesthetic and historical resources are being jeopardized for decades of oil and gas production that will supply us with just *eight days* of natural gas. Nowhere in the SDEIS has BLM analyzed this aspect: whether eight days of natural gas is worth the impacts. This is troublesome since BLM tells the public at A16-15 that it could preserve this oil area and buy back all existing leases for under $5 million. While BLM in chapter 4 has roughly calculated federal, state and local revenues from royalties and taxes, the agency completely failed to address the above multiple use criteria about not necessarily managing for the greatest economic output. In addition, BLM has made no effort to quantify the value brought to state and local economies from tourism, recreation and hunting – and how those dollars may be impacted when it allows the Red Desert to become an oil patch. Lastly, BLM has made no effort to try and assess or quantify the traditionally "non-economic" values associated with vitally important cultural, historical and religious sites that are prevalent throughout the planning area. In short, BLM has narrowly selected a range of alternatives that mostly seek to derive the last dollar out of this region for its oil and gas reserves.

Illustrating this point is the preferred alternative. Of the 575,000 federal acres in the planning area, approximately 239,000 acres are already under lease. (SDEIS at p. 3-71). First, BLM has failed to take a meaningful look at trading or buying back these leases (or at least the non-producing leases) to protect this entire area from oil and gas development. Second, outside of WSAs that legally cannot be leased, BLM proposes to close just 26,000 acres, or less than 5% of the planning area, to oil and gas development. Except for alternative 2, which does propose closing most areas to leasing (in fact, reaching a number that somehow closes already leased areas to leasing), the three other action alternatives, excluding WSAs, mirror each other: from zero acres discretionarily closed to leasing to 9,000 to 26,000 acres. Simply put, this is far from the full range of reasonable alternatives.

BLM should note that this basic, fundamental requirement of developing a full range of reasonable alternatives is the touchstone of *every* EIS and has not gone unnoticed by the federal judiciary, which has rejected EISs that fail to meet it. See e.g., Calvert Cliffs, Coordinating Comm., Inc. v. United States Atomic Energy Comm'n, 449 F.2d 1109, 1114 (D.C. Cir. 1971) (detailed EIS required to ensure that each agency decision maker has before him and takes into account all possible approaches to a particular project . . . which would alter the environmental impact and the cost-benefit balance); Natural Resource Defense Council v. Callaway, 524 F.2d 79, 93 (2d Cir. 1975); ("The duty to consider reasonable alternatives is independent from and of wider scope than the duty to file an environmental statement."); Simmons v. United States Army Corps of Engineers, 120 F.3d 664, 660 (7th Cir. 1997) ("The highly restricted range of

[1] The preferred alternative predicts 205 oil and gas wells, with each gas well averaging 2.3 BCF of production during its 26-year lifespan. (SDEIS at A13-16). This yields 470 BCF of natural gas sought by industry in this area.

alternatives evaluated and considered violates the very purpose of NEPA's alternative analysis requirement: to foster informed decision making and full public involvement."); Alaska Wilderness Recreation & Tourism v. Morrison, 67 F.3d 723, 729 (9th Cir. 1995) ("The existence of a viable but unexamined alternative renders an environmental impact statement inadequate."); Dubois v. U.S. Dept. of Agric., 102 F.3d 1273, 1288 (1st Cir. 1996) (EIS invalid because agency did not consider alternative of using artificial water storage units instead of a natural pond as a source of snowmaking for a ski resort); Libby Rod & Gun Club v. Poteat, 457 F. Supp. 1177, 1187-88 (D. Mont. 1978), rev'd in part on other grounds, 594 F.2d 742 (9th Cir. 1979) (Army Corps violated NEPA in an EIS for a hydroelectric dam by only cursorily addressing the alternatives of meeting the Northwest's energy needs through other sources or conservation.); Northwest Envt'l Defense Center v. Bonneville Power Admin., 117 F.3d 1520, 1538 (9th Cir. 1997) ("An agency must look at every reasonable alternative, with the range dictated by the nature and scope of the proposed action.")

For all of the foregoing reasons, the undersigned groups endorse the Citizen's Wildlife and Wildlands Alternative (attached as exhibit 2) and ask that it be given careful and thorough consideration in the Final EIS and ultimately, that it be adopted by the BLM in the final Record of Decision. Should, however, the BLM determine that the Citizen's Wildlife and Wildlands Alternative is "unreasonable" and thus inappropriate for further consideration in the planning process, we request that the BLM explain in detail the precise rationale for its determination, and how it comports with the requirements of NEPA and FLPMA, applicable case law cited herein, and the former Solicitor's legal analysis of this issue. (See Exhibit 1). Similarly, should the BLM determine that a specific aspect or aspects of the Citizens' Alternative be unreasonable, we request that other elements of the alternative deemed reasonable be carried forward for analysis and evaluation in the Final EIS.

II. FAILURE TO MEANINGFULLY ANALYZE DIRECT, INDIRECT AND CUMULATIVE IMPACTS

In general, the best that can be said about the SDEIS is that it roughly apportions land use allocations in terms of grazing, mineral development, recreation and other land and water uses. The "analysis" of environmental consequences, on the other hand, is woefully inadequate and fails to satisfy the most basic requirements of NEPA.

The section in chapter 4 on impacts to groundwater is a perfect example about how the impact analysis of every section of the SDEIS is lacking. At page 4-13, the EIS discusses the impacts of oil and gas leasing and development on groundwater. However, the EIS makes no effort to incorporate and address environmental impacts from the reasonably foreseeable development scenario of wells planned for in the JMH. By extension, the EIS fails to address impacts of likely places of development in relationship to the location of waterways and what aquifers will be passed through to target formations. Information on coalbed methane (CBM) production is also lacking. What are the water handling methods? Where will CBM occur? How will monitoring take place? Where is data from the four existing wells. For all oil and gas, what is effectiveness of mitigation measures and stipulations on leases? How will surface and ground

water impacts vary by different leasing alternatives (no leasing, special stips, NSO stips, etc.). The same analysis is missing for location of all infrastructure such as pipelines, powerlines, compressor facilities, etc. What about hydraulic fracturing and its impacts on groundwater resources? What about CBM and subsidence, impacts of SAR/EC on surface waters; water quantity in gpm per well as it will vary by coal seam? None of this information is provided or analyzed on its impacts to surface and groundwaters within the JMH CAP planning area.

This example illustrates how BLM has set up the entire EIS framework in a manner that focuses solely on resource allocation rather than the equally important goal of analyzing environmental impacts. In addition, by having to constantly flip to appendices where most of the few details in this SDEIS are contained to be able to understand some parts of Chapter 4, this SDEIS violates the readability requirement of NEPA.

Only two courts have addressed the readability of EISs and each concluded that the EIS it was examining was not sufficiently clear to satisfy NEPA. In Oregon Envtl. Council v. Kunzman, 614 F. Supp 657, 665 (D. Or. 1985), the court enjoined federal actions in circumstances where the EIS was too dense and technical to be read and understood and stated "basic common sense tells us that in order for a document to be used . . . those using it must first be able to read and understand it." Id. Without a clear and concise EIS, they cannot serve NEPA's requirement for informed public participation. The importance of public participation to the NEPA process emphasizes the importance of preparing documents that the public can read and understand. In Sierra Club v. Froehlke, 359 F. Supp. 1289 (S.D. Tex. 1973), rev'd on other grounds sub nom. Sierra Club v. Calloway, 499 F.2d 982 (5th Cir. 1982), the court explained why an EIS must be readable to comply with NEPA:

> All features of an impact statement must be written in language that is understandable to non-technical minds and yet contain enough scientific reasoning to alert specialists to particular problems within the field of their expertise. The reason for this standard is that impact statements must assist in rational, thoroughly informed decision making by officials higher up in the agency chain-of-command, including the Congress, the Executive, and the general public, some of whom may not posses the technical expertise of those who evaluate the impact and prepare environmental impact statements.

The CEQ regulations place a premium on succinct and clear language by requiring that EISs "shall be concise, clear, and to the point . . . ." 40 C.F.R. §1500.2(b). The CEQ regulations require:

> Environmental impact statements shall be written in plain language and may use appropriate graphics so that decision-makers and the pubic can readily understand them. Agencies should employ writers of clear prose or editors to write, review, or edit statements, which will be based upon the analysis and supporting data from the natural and social sciences and the environmental design arts.

40 C.F.R. § 1502.8

Thus, the SDEIS is fundamentally flawed, among other reasons, by its failure to provide a format for understanding impacts to resources. BLM chose a method of outlining management objectives (e.g., fire management, surface waters, vegetation, wildlife) and then proceeded to describe how each of the five alternatives would affect *management goals* and not *environmental impacts*. In preparing another supplement draft EIS for this area, BLM should make the document comprehensible – doing so will make it more than readable, it will also make the document *meaningful*. A much better way to present the information in the SDEIS would be to take one of the resource uses – such as oil and gas leasing and development – and then provide the different alternatives (e.g., number of wells, phasing of leasing, areas open, closed, NSO, etc.) for analysis. Within that section of the EIS, BLM could then take all of the *other* resources, such as water, soils and wildlife, and actually describe the impacts to these resources based upon the different development scenarios presented in the alternatives. This was not done for *any* resource use in the SDEIS and this major conceptual flaw in the design of the SDEIS renders it not only unreadable, unworkable and incomprehensible, but more importantly, virtually meaningless in terms of an actual analysis of impacts to the many, varied and unique resources within the Red Desert.

III. COALBED METHANE

Coalbed methane (CBM) is spreading like wildlife across Wyoming, which has abundant near-surface coal seams that make this play viable in many areas. Currently, Wyoming is facing up to 51,000 CBM wells in the Powder River Basin, where there are 39 trillion cubic feet (TCF) of in-place reserves. At the southeastern portion of the Greater Green River Basin which, according to Gas Research Institute (1999), has an astounding 314 TCF of in place reserves, CBM plays are taking off: up to 4,000 wells in the Atlantic Rim and 1,200 wells for the Seminoe Road project. The JMH CAP lies squarely within this major potential CBM play.

CBM production has all the roads, compressors, pipe and powerlines, and other infrastructure associated with oil and gas development – but it also adds new and significantly unique impacts due to the dewatering process. In the PRB, for example, wells will deplete approximately 15,000 gallons per day from underground aquifers (coal seams) to allow the methane to vent to the surface. The dewatering process brings additional air quality concerns due to increased power needs as each well requires a submersible pump; increased power needs also lead to more powerlines and noisy generators. Moreover, the handling of the water brings a whole set of unique impacts – typically, the water is disposed of onto the ground untreated – either directly into an ephemeral or perennial stream or into an excavated, unlined surface pit designed to bleed into the water table. The water has total dissolved solids (TDS) and a sodium adsorption (SAR) ratio that make surface disposal of the water problematic for soils, vegetation and aquatic life. The mere quantity alone poses significant issues for soil loss, erosion and stream cut-banks. In short, the impacts are potentially severe and possibly on a scale that dwarfs conventional oil and gas plays.

Given this potential for development and severe impacts, particularly in light of the local, regional and national attention over western and Wyoming CBM development, one would hope for a land use plan amendment for the JMH CAP that aggressively addressed the likelihood of CBM development and the range and nature of impacts. To our disappointment, however, the SDEIS is woefully inadequate in its treatment of CBM.

First, BLM has failed the basic mandates of supplemental program guidance (Handbook 1624-1) on providing the reasonable foreseeable development scenario for CBM development. At page 4-69, BLM provides the analyzed RFD for CBM – up to 50 wells by 2020. BLM then speculates that – although there is CBM potential throughout the JMH (see Map 70) – the 50 wells will occur in two PODs of 25 wells each. At page A13-13, Barlow and Haun predict up to 50 BCF of CBM in the Rock Springs formation. However, each CBM well can extract approximately .4 BCF of gas during its life. (PRB DEIS at 4-272, errata). This would mean 50 BCF would result in 125 CBM wells, not 50.

More problematic for BLM on this most basic land use planning question of reasonably foreseeable development, the Wyoming State Geological Survey (WSGS) (SDEIS at p. A13-13) predicts up to 543 CBM wells and 2 TCF of recoverable CBM. In fact, BLM admits at A13-28 that it has made no effort to try and incorporate the WSGS information on CBM into its RFD analysis. BLM also ignores that at .4 BCF per well, 2 TCF could yield as many as 5,000 wells needed to capture the gas. In essence, BLM's few words on these issues make it clear that the very basic questions of how much CBM is there and how many wells may be drilled in the JMH have not been answered in the slightest.

Equally troubling is that BLM hasn't bothered to provide any details about the impacts of whatever CBM development may occur. First and foremost, BLM has failed to provide any information about likely *areas* where wells may be drilled. BLM also fails to mention which of the "phased in" existing leases and newly sold leases will have the most CBM potential. In sum, BLM didn't take any look, let alone a hard look, at likely CBM plays in the JMH area. This is important as CBM impacts will vary significantly by the area – including the coal aquifers targeted, differing water volumes and quantity by formation, soil type, surface resources present (e.g., wildlife, cultural, surface water), impacts to near-surface aquifers and the ability of underground aquifers to receive injected water. On this point, BLM knows that injection of CBM water is troublesome in some areas of the Powder River Basin, yet it assumes, without any testing or data, that high volumes of CBM water can be readily injected in the JMH.

BLM also failed to:

- Analyze how will CBM produced water affect the Colorado River Salinity Control Forum management objectives (SDEIS at p. 2-9);
- Provide any baseline data on seeps, springs and underground aquifers that will be affected by CBM development (SDEIS at pp. 3-4, 5)

- Provide any baseline data on water volumes, EC/SAR of produced water areas with steep slopes, alkaline soils, soils that drain poorly and existing vegetation community types. BLM failed to follow H-1624 and determine whether CBM and its impacts are suitable for all unleased areas.

- Acquire any additional information on CBM quantity by formation other than 120 to 140 barrels per day (Rock springs formation) and 21 to 48 barrels per day (Almond Coal tests). BLM obtained *no* data on the big play in the Ft. Union that WSGS estimates at over 2 TCF. (SDEIS at p. A13-31).

- Analyze the impacts of surface discharge of water. BLM states in Ch. 4 that CBM produced water will be injected, but buried in Appendix A BLM admits that it may allow surface discharge. (SDEIS at p. A13-31).

- Analyze all of the abandoned oil and gas wells in the JMH area for casing integrity and potential harm to aquifers. BLM also failed to analyze any of the impacts of methane migration for any shallow CBM plays. (SDEIS at Map A13-3).

BLM claims as an excuse for ignoring one area of impacts (SDEIS at p. 4-122) that "Expected water production rates associated with [CBM] cannot be predicted for the planning area." This statement reflects BLM's unwillingness to take even the slightest effort to gain readily accessible information at its fingertips. First, there are four CBM wells within the JMH planning area and BLM took absolutely *no* data from them. Second, there are several CBM wells immediately south of the planning area (near Table Mountain) and several more being developed by Kennedy Oil just east of the planning area. For example, a quick review of the Wyoming Oil and Gas Conservation Commission website reveals numerous permitted and producing wells immediately outside the JMH area, including:

- 11 CBM wells permitted in T 25 N R 98 W;
- 10 in T 24 N, R 98 W;
- 11 in T 23 N, R 97 W;
- 18 in T 23 N, R 102 W; and
- 7 in T 22 N, R 102 W.

That BLM didn't even bother to mention these wells in the SDEIS, or gather records and data from the permits about drilling depths and targeted formations, or obtain information on water quantity and quality from wells that have produced, is hard to fathom. BLM also ignored readily available information from the Wyoming State Geological Survey, reporting that the Fort Union formation coal beds are targeted for exploration in the north central Great Divide Basin, the Mesaverde formation is targeted in the Atlantic Rim area, a pilot project has been developed for the Fort Union formation in the northeastern Great Divide Basin and an exploration program has been developed for CBM in the Almond formation in the southeastern flank of the Rock Springs

uplift. Wyoming GeoNotes, Number 76 at pp. 17-18 (April 2003). Moreover, WSGS provides additional information on the Kennedy Oil CBM project near the JMH area that BLM could have incorporated into both its CBM RFD and environmental impact analysis.

Perhaps the most troublesome aspect of the SDEIS providing little or no information on CBM potential and impacts in the JMH area is that the agency is on notice from the judges at the Department of Interior Board of Land Appeals that *all* leases sold that could lead to CBM development will be void with this type of pre-leasing analysis in the RMP. See generally Wyoming Outdoor Council, 156 IBLA 347 (2002) (Buffalo RMP and CBM); Wyoming Outdoor Council, 157 IBLA 259 (2002) (on reconsideration); Wyoming Outdoor Council, 158 IBLA 384 (2003) (Great Divide RMP and CBM). Given this precedent, and BLM's acknowledgment of its RMPs' inadequacies for CBM leasing and development in the past several years, completing another RMP and having the same deficiencies is excusable. Pursuant to the above cases therefore, BLM is left with only one choice: no oil and gas lease may be sold in the JMH area until a thorough and proper pre-leasing study is completed.

BLM faces yet another problem. For all existing leases, BLM has failed in this document to study any of the likely impacts and locations of CBM development. For example, BLM at p. 4-122 states that each CBM POD is expected to have 16 dewatering wells and 9 gas wells, meaning they are separated. This departs from all previous technology involving dewatering, where each CBM well serves as *both* gas and a water well. Has BLM studied or analyzed the impacts of this apparently new drilling technology? Further, all produced water is assumed by BLM to be injected back underground due to salinity issues. However, BLM admits that it may allow surface discharge of CBM water, and BLM has provided no information on EC/SAR values or the rates per well of volumes of produced water. BLM has provided no information on the practice of hydraulic fracturing – the fluids used, the targeted formations and possible contaminations to underground drinking water supplies. With no information on impacts, mitigation, likely plays and location – this planning effort should not allow any CBM on new or old leases until it acquires the necessary information on which to make these impact analyses. Otherwise, BLM would be authorizing CBM development and the impacts stemming from this will not conform to the amended land use plan. BLM will need a second SDEIS to obtain and analyze information on CBM that it failed to do this time around. This position is supported by the SDEIS statement that *no* resource use will be allowed until it can be established that no irreversible effects may occur. (SDEIS at pp. 2-66, 67).

IV. OIL AND GAS LEASING, REASONABLE FORESEEABLE DEVELOPMENT SCENARIO AND SUPPLEMENTAL PROGRAM GUIDANCE

BLM Handbook H-1624-1, "Planning for Fluid Minerals" is the controlling authority for how BLM should properly develop or amend a land use plan to account for oil and gas development. In the JMH SDEIS, BLM has ignored most of its important prescriptions.

First, BLM is to assemble data and information from, e.g., USGS, DOE, API, state agencies, and academic sources, to obtain knowledge on past, present and future oil and gas development and

potential. H-1624-1 at III.B.1-3. Second, BLM is to use all of this information to develop a reasonably foreseeable development (RFD) management scenario under existing management. H-1624-1 at III.B.4. Then, BLM is to develop RFD scenarios for different alternatives to existing management. H-1624-1 at III.B.7-8. Importantly, the RFD scenario is then used to analyze the potential direct, indirect and cumulative impacts to all resources. Thus, the RFD scenario is a very important measure as it (by definition) caps the amount of allowed leasing and development under the plan. The reason is simple: all of the impact analysis is directly tied to a projected level of development (i.e., forecasted number of oil and gas wells), and once that number is reached, by definition, the environmental impacts analysis is no longer valid.

Unfortunately, BLM failed miserably in its responsibility to develop a RFD. In fact, the agency basically listed a few studies for the area and then guessed at the number of reasonably foreseeable oil and gas wells. At page A13-12, BLM cites the ARI 2001 report for 3.3 TCF of undiscovered gas resources in JMH that are available for exploration and development. At page A13-13, BLM cites Barlow and Haun for 2.1 TCF, which includes up to 50 BCF of CBM in Rock Springs formation. With the average deep well recovering 2.3 BCF of gas – this projection means up to 891 producing wells will be in the JMH. BLM then lists a checkerboard study at page A13-13 indicating from 897 to 1,077 wells (not including CBM). BLM then notes that WSGS estimates that 1.255 TCF of deep gas are recoverable and 2.05 TCF of CBM are recoverable in addition to 535,000 barrels of oil. WSGS concludes that 322 conventional and 543 CBM wells are reasonably foreseeable by 2020, the life of the plan.

How did BLM then reconcile all of these figures – which seem to all agree on roughly 800 to 1,000 oil and gas wells in the JMH by 2020? In short, it didn't. Instead, BLM's preferred alternative has an RFD based upon the historical average of 46 wells drilled every five years to conclude that over 20 year planning period, there will be 205 total oil and gas wells. This is an incredibly arbitrary RFD. Not only does it ignore the many sources of information to be relied upon as stated in H-1624, but it also overlooks newer information, drilling technologies and increasing national demand, CBM interest and infill potential. BLM's RFD is so arbitrary that it is in part based on assuming there to be an average density of one well every four sections, or every 2,560 acres. (SDEIS at A13-23). However, BLM states elsewhere in the SDEIS that spacing will be one well per section, or every 640 acres. This creates another problem: at page 4-121 BLM provides data on a producing field, the Nitchie Gulch, that has down spaced to 160 acre spacing. BLM's RFD section, therefore, is nothing more than a set of guesses on density assumptions (that also conflict with each other) and it ignores real production data it lists in other parts of the SDEIS. In fact, what BLM has done here is not properly assess and then analyze the impacts of a RFD; rather, it has looked backward to give us a historical development scenario – not one for the future. On this point, however, the RFD is the RFD, and should BLM choose the preferred alternative, once 205 wells are permitted for all mineral estates in the JMH, all oil and gas leasing and new permitting must stop until 2020 – the life of the plan. At that time, BLM could initiate another plan amendment should industry express interest in a 206th well.

Another major function of planning for fluid minerals is that the RMP is to identify those portions of the resource area that will be open to leasing under the standard lease terms, open to

leasing under seasonal or other controlled surface use restrictions, open to leasing and exploration with a no surface occupancy stipulation or closed to leasing for discretionary or non-discretionary reasons. H-1624-1 at IV.B. Importantly, BLM is to provide a narrative for the justification for constraints, stipulations, closures, areas open to leasing, etc.

BLM did none of this in the SDEIS. Table 4-3 merely states that 142,630 acres are closed to leasing and 434,210 acres are open to leasing for the preferred alternative. Table 4-8 provides that 79,480 acres are to be leased NSO, 257,420 acres with CSU and 297,920 acres with seasonal limitations. Appendix 17 is no better. The "preliminary" adaptive management strategy provides no information about *why* areas were closed and others opened to new leasing and why, and in what areas, seasonal and other CSU stipulations would be imposed. Further, BLM provides *no* justification of why certain areas get the very strong NSO protection and others are left open to leasing with the standard lease terms and conditions. On this point, Appendix 5 (A5-6) talks about the NSO stipulation, and leaves blank the described lands and the reason why the NSO stipulation would be imposed. In short, BLM has given no justification and no specific information for which areas deserve different levels of protective stipulations.

Lastly, BLM, in every alternative, has spoken a half-truth about areas it "closed" to new leasing. The preferred alternative makes it sound like BLM has gone out of its way to make 142,630 acres unavailable for leasing. What BLM *doesn't* tell the reader is that it *cannot* legally lease 116,305 of those acres as they are in WSAs. (SDEIS at p. 3-48).[2] So in effect, BLM has discretionarily closed only 26,000 or so acres in the 575,000 acre planning area, or less than 5% of the planning area. In addition, Table 4-8 really tells the reader upon close examination of the preferred and no action alternatives, that BLM is proposing only 11,000 acres of new NSO leases, 40,000 acres of additional CSU leases and roughly the same (actually less) leases with seasonal (or timing) limitations. BLM should be more upfront with the public about the true acreage of lands it is choosing to protect from oil and gas leasing and production.

Another major problem with this planning effort is that BLM recycles the standard stipulations for CSU and seasonal restrictions from the 1997 Green River RMP and prior management, without bothering to study whether they have been or are effective. See generally SDEIS at p. 4-173; Table 4-8; Appendix 6. BLM has not followed H-1624-1 and developed stipulations (as opposed to merely recycling ones from a decade ago) to adequately protect resources. BLM assumes that previous stipulations will be adequate to protect other resource values, but where is the analysis and scientific data that proves these stipulations to be effective? For example, the CSU stipulations of 1/4 mile buffer for sage grouse leks and a 500 foot buffer on floodplains and wetlands may no longer be valid in light of changing conditions and new scientific studies on the subjects. See, e.g., Northwest Indian Cemetery Protective Association v. Peterson, 764 F.2d 581, 588 (9th Cir. 1985), rev'd on other grounds 485 U.S. 439 (1988) (where the court determined that NEPA requires agencies to "analyze the mitigation measures in detail [and] explain how effective the measure would be. ... A mere listing of mitigation measures is insufficient to

[2] On this point, BLM's numbers are inapposite – at p. 3-70, it states there are 119,340 acres of WSAs. At table 4-3, BLM confuses things a bit further by stating the acreage to be 117,160 acres.

qualify as the reasoned discussion required by NEPA."). In short, BLM has failed to test whether any of these mitigation measures (in the form of lease stipulations) will actually be effective. Another problem is that most of these stipulations are only in place for drilling, which, given the 26-year lifespan of a well, is a very short time frame. BLM has completely failed to address that these stipulations in many respects do not cover year-round noise and human presence for the full production and reclamation phases of these wells.

Further, at page 4-64, BLM admits that stipulations on existing leases may not provide specific mitigation measures to protect wildlife; it then states that post-leasing mitigation measures may provide economic hardship to lessees. Does this mean that beyond stipulations, BLM is already foreclosing its duties under FLPMA and 43 C.F.R. 3101.1-2 to develop post-leasing mitigation measures to minimize impacts to other resources? Again, BLM has failed to analyze what works, what doesn't and what hasn't been tried yet, in addition to the costs and technological feasibility of different types of mitigation measures, including reclamation. In essence, BLM has narrowly focused on the stipulation protections that attach to leases and has ignored two key factors: that these protections are usually only for the drilling cycle and more importantly, that BLM has a great deal of authority in FLPMA and the MLA to impose post-leasing mitigation measures as conditions of approval in project level and APD level NEPA studies.

Appendix 4 demonstrates that many of the perceived protections provided by stipulations are illusory: BLM makes it a practice to waive or except many of the stipulations that are in place on these leases. There are generally two problems here. First, the binding regulations speak only to the practice of "waiver" of a stipulation, which typically includes a period of public comment and review. See 43 C.F.R. § 3101.1-4. In short, when there is a stipulation that is part of the lease/contract signed with an operator, the only mechanisms for changing it are waivers and modifications. BLM has thus created the legal fiction of "exception" to a stipulation, which does not exist in the regulations. To the extent BLM's leasing handbooks and manuals provide for "exceptions" they are illegal as outside the scope of the authority provided in the binding regulation. Second, the stipulations are in place due to long-term studies about wildlife avoidance of and impacts from certain aspects of oil and gas drilling and production. A snapshot determination of "there are no mule deer near the proposed well pad today" to grant a 2 or 3 week exception to winter drilling is scientifically unsupportable. Not until there are long-term studies on the issues that led to the stipulations in the first place should exceptions be so easily and readily granted per the terms in Appendix 4.

From Land Use Planning to Drilling Permits

Appendix 14 is a useful section BLM provided the public about the different stages of oil and gas production and explanations of common drilling terms and practices. After leasing and one or two exploratory or wildcat wells are successful, the practice of BLM in Wyoming is to then have an operator submit a plan for a new field of development, with the site-specific impacts to be evaluated in a project level EA or EIS. This is an interim tier or stage between leasing and APD approvals for a full field POD. BLM correctly states that, "New field developments are analyzed in an environmental assessment or an environmental impact statement after the second

or third confirmation well is drilled." (SDEIS at A14-8). This level of interim analysis between leasing and APD approval is often referred to as a "project level" NEPA analysis.

BLM then confuses matters at page 1-3, by stating this land use planning document is also "making decisions at . . . the activity planning tiers of the planning process due to the mineral development decisions that were deferred at the RMP level and the site-specific management decisions for all other resource and land uses in the CAP area." We agree that if this amendment is to serve as a pre-leasing document for oil and gas, BLM should acquire all of the site-specific information it can on resources, steep slopes, cultural and historical places, etc., before making a leasing determination. However, this statement appears to be directed at post-leasing authorizations, and therefore is seemingly taking away the project level analysis that comes *after* leasing but *before* APD approvals for a new field. We would like clarification from BLM on these points.

Leasing and Development on Split-Estates

At page 1-10 BLM states there are 5,000 acres of split-estate lands (private surface above federal mineral) in the planning area. However, BLM failed to acquire and provide information regarding how it will contact landowners prior to leasing out federal minerals below their private property. For the acres in question, why would BLM not bother establishing a system within the RMP to send a certified letter to the affected landowner a month prior to the sale? The burden here is minimal and the benefits tremendous: first and foremost, this would allow these landowners and ranchers to bid on their minerals and if successful at the auction, have a say in how the mineral estate below them, affecting their private surface estate, is developed. To lease out federal minerals underneath private surface without proper notice and the opportunity for these landowners to participate in the NEPA and sale process is a gross mismanagement of public lands. This results in a direct violation of 40 C.F.R. § 1506.6(b)(3)(viii), which requires "direct mailing" of the EA and sale proposal to "affected landowners." Also at issue is whether split-estate owners' constitutional right of due process is violated by not notifying them of the sale of federal minerals beneath their private property.

V. AIR RESOURCES

The JMHCAP SDEIS contains no new air quality analyses. All conclusions regarding air quality impacts are based on the Pinedale Anticline Oil and Gas Exploration and Development Project DEIS prepared in November, 1999. See JMH SDEIS at 4-157. ("Air quality modeling of regional impacts was performed in 1999 for the Pinedale Anticline Project in Sublette County. The JMH planning area was included in the impact analysis of this air quality modeling. In examining whether the BLM activities in the JMH planning area will result in the exceedence of any of these air quality standards, it has been assumed that the results of the 1999 modeling remain valid." JMH Plan at 4-157. Thus the validity of the JMHCAP's disclosure of air quality impacts depends entirely on the *continuing* accuracy and scientific integrity of the Pinedale Anticline EIS analysis. This assumption is flatly incorrect and renders the air quality analysis utterly inadequate.

The BLM's use of the 1999 Pinedale Anticline EIS analysis to satisfy NEPA's requirements for its Jack Morrow Hills CAP is flawed for several reasons. The Pinedale analysis from the 1999 EIS is dated, as it was based on an existing emissions inventory for 1998 and reasonably foreseeable future development, which was limited to oil and gas projects described in NEPA documents existing at that time. See Pinedale Anticline Oil and Gas Exploration and Development Project DEIS Technical Report, November 1999, CALMET/CALPUFF Modeling Technical Report at 3-1 through 3-6; and Air Emissions Inventory, Sections 3.1.2 and 3.2.2 and Table 3.3 and Table 3.4.

Since the completion of the Pinedale Anticline air impacts analysis, a number of significant mineral, energy and industrial development projects have either been authorized, or proposed in NEPA documents that were not considered in the 1999 Anticline EIS. The large number of new emission sources – both approved and proposed since the 1999 analysis -- make the Pinedale analysis obsolete and wholly inadequate to support the Jack Morrow Hills CAP amendment to the Green River RMP.

1) South Piney - 210 wells, Sublette County, (68 Fed. Reg 4513, January 29, 2003);

2) EnCana, Inc's Jonah Field Infill Drilling Project, Sublette County, 1,250 new wells (68 Fed. Reg. 12100, March 13, 2003);

3) Seminoe Road CBM Project, 1,240 wells, Carbon County, (68 Fed.Reg 12101, March 13, 2003);

4) Atlantic Rim CBM Project, 3,880 wells, Carbon County, (66 Fed. Reg. 33975, June 26, 2001);

5) Desolation Flats Natural Gas Project, Carbon and Sweetwater Counties, 385 wells, (65 Fed. Reg. 31595, May 18, 2000);

6) Wind River Natural Gas Development Project, BIA/BLM, Fremont County, 325 wells being added to existing field consisting of 160 wells never previously analyzed in NEPA document (68 Fed. Reg 3543, January 24, 2003);

7) Vermillion Basin Natural Gas Development Project, 56 wells, Rock Springs Field Office, EA prepared August 2000, BCA appealed decision to IBLA 2002;

8) Big Porcupine, TBNG, 453 CBM wells, scoping closed, EA or EIS pending;

9) Kennedy Oil Pilot Exploratory CBM Project, 20 wells, Rock Springs Field Office, Sweetwater County;

10) Copper Ridge Shallow Gas Project, 89 wells, Rock Springs Field Office, scoping ended November 15, 2002, EA pending;

11) Little Monument Unit Natural Gas Project, proposes 31 additional wells in the Fontenelle National Gas Infill Drilling Project area in Sweetwater County.

None of this additional oil and gas well development and associated air pollution in southwest Wyoming was evaluated in the Pinedale Anticline EIS. Further, the Pinedale Anticline EIS did not address other sources of visibility impairing emissions such as mobile source growth.

Even more important, because the Pinedale Anticline EIS air quality modeling domain (see Pinedale Anticline Technical Report, Figure 2-1) arbitrarily excludes the Powder River Basin, an area experiencing tremendous industrial growth including new coal and natural gas fired power plants, strip mining, and rampant oil and gas development, an array of significant new emission sources were not even considered. Recent environmental studies have shown that the emissions generated in the Powder River Basin contribute to air quality problems in several sensitive receptors in central and western Wyoming.

The January 2003 Final EISs for coal bed methane development in the Powder River Basin in Montana and Wyoming predicted significant visibility impacts to over a dozen mandatory Class 1 areas, including several Class 1 areas in western Wyoming. See Tables 4-95, 4-96 and 4-97 and discussion of cumulative impacts on pages 4-386 through 4-392. As this study shows, emissions of atmospheric pollutants from industrial activity in the Powder River Basin is contributing to visibility impairment throughout the region, including Class 1 areas in western Wyoming such as the Bridger and Washakie Wildernesses. Thus the State's reliance on an outdated study done in 1999 for an oil and gas project in Sublette County that did not even consider emission sources in the Powder River Basin is fatally flawed.

Problems with the EIS's air quality analysis are not limited to the obvious concerns related to the BLM failure to include and evaluate all relevant emission sources. For a detailed review of the many serious deficiencies in the JMH SDEIS, please see Memorandum from Robert E. Yuhnke, to Renee Dana, BLM, attached hereto as Exhibit 3, and incorporated herein by reference.

VI. ADAPTIVE MANAGEMENT AND PHASED/SEQUENCED LEASING

Appendix 17 is the place where BLM truly hides how little it has cared to study the impacts of this land use plan amendment and the likely impacts of oil and gas development. While we support the concept of adaptive management, we only do so when management actions are on hold or voidable based upon the results of monitoring, an aggressive inspection, enforcement and monitoring plan is established with appropriate funding and personnel, appropriate stakeholder groups and the scientific community are given a meaningful voice to participate in the monitoring and proposed changes as a result thereof, specific guidelines are provided on how to take monitoring results and tailor those to management decisions and a system is established for reinitiating NEPA studies when subsequent monitoring reveals impacts not previously disclosed or assumptions relied upon that prove to be incorrect. The adaptive management plan proposed meets none of these criteria.

At page A17-1, BLM admits that the extent and nature of mineral reserves and types and locations of oil and gas development are all unknowns:

> [The SDEIS] contains a detailed description of the speculative nature of use, exploration, and development in the planning area. . . . Based on the limited use, exploration, and development that has take place to date, it is impossible to predict how future development will proceed. In particular, the extent and nature of mineral reserves in the planning area are unknown and are expected to remain so for several years. All agree that there is a great deal of uncertainty about future development. Because of this uncertainty, a number of assumptions were necessary to predict the impacts associated with future development. Those assumptions may or may not be correct.

Given these admissions, the key question up front is how much development is permissible pursuant to NEPA, FLPMA, NHPA and the MLA to test these assumptions and gather data? This stark and candid admission as to pure guesswork in the SDEIS means that BLM has failed the Park County test of taking a hard look at the pre-leasing impacts of oil and gas development. How can BLM justify making an irreversible and irretrievable commitment at the leasing stage with all of these questions unanswered and assumptions untested? As such, we expect BLM to provide in the FEIS and Record of Decision that there will be subsequent NEPA analyses prior to any leasing occurring – and not Documentation of NEPA Adequacy forms, as those just relate back to the lack of analysis in this EIS. In the alternative, all leases must be conditional and subject to buy back or cancellation, as proposed by the 1989 National Academy Science report on land use planning and leasing, or in the existing framework, all leases should be NSO. Further, given the NEPA "look before you leap" requirement, all APD approvals must be very limited, and as discussed above, must be preceded by project level NEPA analyses to provide the detail lacking in this EIS.

At pages A17-6,7 BLM provides the bare framework for a monitoring plan, and admits that no such plan has been developed. Importantly, BLM states, "Prior to implementation of the JMH CAP adaptive management strategy, the BLM team will complete the following [six] items." Thus, BLM has added another level of NEPA study and review – the management and resource specific adaptive management plans that are to be established prior to allowing any resource use – grazing, oil and gas leasing or APD approvals, OHV use, etc. By not doing this now and over the past years in the current EIS process, and by admitting that it needs to be done to set up the monitoring plans to test all of these guessed at assumptions, BLM has appropriately delayed all resource uses until the appropriate plans are developed. Indeed, BLM properly admits that no future activities in the JMH CAP may be authorized until the monitoring plan is in place: "After the initial implementation phase of the adaptive management process (about 2 years) *a determination would be made on whether or not areas may be made available for consideration of future activities*." (SDEIS at p. 2-67) (emphasis added).

The other component of adaptive management is BLM's proposal to phase in leasing based on early feedback from monitoring of existing development. BLM's proposal here in theory is laudable, but as described it is an unworkable bureaucratic nightmare. BLM states that the first step of the implementation of the plan is to divide the JMH CAP into three areas: one open to activity, as well as new leasing and development; one area open to activity on existing leases, (with new leases based on monitoring results); and a third area with no activity on existing leases or any new leasing until adaptive management information is gained and applied. (SDEIS at A17-4). For the three areas, BLM turns the reader to Map A17-1.

Map A17-1 is a mess – a complete management migraine. In many shades of gray and many overlays that make this map far from readable or comprehensible, BLM has combined some of the above information. Importantly, however, the map fails to show which areas are both closed to leasing and closed to development on existing leases. Obviously, with over 230,000 acres already under lease, BLM should provide the public with a map of those areas in this context – to compare how existing leased areas are located in terms of areas closed, open and phased-open to leasing and development. The map is also deficient by not indicating which leasing (existing) and areas open to leasing would have which stipulations (CSU, seasonal timing, NSO). BLM also fails in this SDEIS to explain the reasons why different areas are receiving different levels of treatment. BLM then goes on to say, "Initially, . . . some suspended leases in the planning area would be reinstated, others would remain in suspension, or new suspensions would be implemented." (SDEIS at p. A17-4).

First, it is not clear how BLM will handle complaints from industry about suspending activity on existing leases. BLM has not analyzed the potential for contractual rights issues arising or drainage obligations and other situations. Second, BLM has in no way described which areas in category one will receive priority in terms of APD approvals and new leasing proposals, or how adaptive management will be applied to those areas. In addition, BLM has not made it clear how and if information from those areas will be applied to future decisions on categories two and three. Regarding category two, the same concerns abound, with the additional issue of how will BLM decide which areas become available for future leasing. BLM vaguely refers to acquired monitoring information, but ignores potential drainage situations, changing demand and economics, new technologies and other related factors. In fact, the entire adaptive management program described here by BLM, and particularly the phasing in of new leasing, means that BLM will necessarily need to supplement its NEPA based on monitoring results. 40 C.F.R. 1502.9(c)(1) provides that a new EA or EIS will be required when BLM has obtained new information or learns of new impacts/circumstances that will have bearing on or are relevant to environmental concerns. Where has BLM mentioned how it will carry out its many layers of NEPA duties for phased in leasing – will it be for each lease sale, for each nominated parcel, by geographic area after monitoring results are complete? Lastly, category three – not even located on the map – suspends all activity on existing leases and all new leasing in this area. How will BLM implement this portion – with no activity, on what will it base its adaptive management?

In addition, BLM has failed to describe how existing suspensions will be lifted. Lease suspension seemingly applies only to category three, as that is the only area that initially stops all

activity on existing leases. However, BLM states that "nominations for new leases within the planning area would be considered on a case-by-case basis." (SDEIS at p. A17-4). Which areas – categories one, two or three – will receive priority in terms of new leasing? Category one allows new leasing – is it to be phased here as well? Category two stops new leasing in the "short-term" – how is that defined by BLM? Category three also allows no new leasing – but it is still open to lease proposals in the same fashion as the other two areas on a "case-by-case basis." BLM needs to provide direct guidance and criteria for how, where and in what fashion lease suspensions will be lifted and phased leasing in all three categories may occur.

BLM has also provided conflicting statements about the nature of lease suspensions and phased in leasing. The criteria and process for the lifting of lease suspensions should be fully fleshed out and better explained. For example, on one hand, the BLM states that "Leases will be held [under suspension] until indicators show acceptable effects or a positive response of resources to development . . . " (SDEIS at p. A17-3) yet goes on to state that "Existing lease suspensions will end with the signing of the record of decision for the JMH CAP." (SDEIS at p. A17-4). Moreover, this fictional protection of lease suspensions and phased leasing over time quickly evaporates when the reader comes to realize that, "At anytime, activity proposals could be submitted for any portion of the JMH CAP area, with proposed mitigation to address the issues and sensitive resource needs." Environmental security in the area is further eroded by the fact that, "Lifting of lease suspensions and nominations for new leases within the planning area would be considered on a case-by-case basis using the adaptive management strategy." What the foregoing statements say to us is that no area of the Jack Morrow Hills CAP area is off-limits to oil and gas leasing and development activities. Please reconcile these facially contradictory statements.

Importantly, BLM has also failed to describe *in any fashion whatsoever* how and why it divided the JMH CAP into these three categories. BLM suggests that the lands in category two, for example, are appropriate for new development on existing lease, but are not appropriate for immediate new leasing. Why? What was the rationale used. How did this rational used result in different answers to these questions for categories one and three? How do the lands and resources in category three differ from those in category two – adding the extra layer of protection on continued suspension of leases in addition to no new leasing? We believe BLM has the legal authority to control the timing and sequencing of development and leasing – see, e.g., standard lease term section 4 – but BLM must provide a written basis and record of how and why it is making these decisions and treating seemingly similar lands and resources so in such a significantly different manner. For instance, we strongly believe and maintain that the wildlife, vegetation, aesthetic, historical and cultural resources *throughout* the entire planning area deserve permanent category three status. Therefore, it would have been helpful to the public for BLM to provide a rationale of why and what criteria formulated the decision to divide the planning area into these three categories.

Additional specific questions and concerns:

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The adaptive environmental management process designed by BLM for the Pinedale Anticline EIS/ROD was a complete and utter failure. Among its many problems, the BLM implemented the development aspects of the decision, approving dozens of wells and other project related facilities and activities, while refusing to implement the adaptive management process. Why should the public have any confidence in the BLM to get it right this time? What's different about this effort? What steps will BLM take to ensure that the adaptive management process is implemented?

As the BLM learned from it's experience with the Pinedale AEM process, the Federal Advisory Committee Act imposes substantial procedural requirements on federal agencies such as BLM that invite recommendations and advice from citizens. How does BLM intend to implement the public participation plan of the proposed adaptive management strategy in a manner consistent with the FACA?

The SDEIS states (at A17-1) that "it is impossible to predict how future development will proceed." This statement is nonsense, and impossible only if BLM acts in the usual and customary laissez faire style of management. BLM possesses a full range of regulatory authority sufficient to control and limit the pace, location and level of development in a manner that is consistent with valid existing rights and protection of the environment. Through a combination of lease suspensions, lease stipulations, conditions of approval, monitoring, mitigation measures and other mechanisms, the BLM has the ability (and legal authority) to assure that future development on existing leases does not conflict with or adversely impact other uses and resource values. If BLM is to succeed in preventing adverse environmental impacts, "predicting" and controlling the location, pace and overall level of development in the Jack Morrow Hills area is absolutely essential. Why isn't BLM proposing to do so?

In the introductory paragraphs of Appendix 17, the BLM identifies and discusses six specific steps involved in developing and implementing an adaptive management strategy. During the planning stage, the "management plan and monitoring program are designed." A17-1. "Once the planning stage has been completed, the program is implemented and monitored using protocol developed in the planning stage." Id. Questions: 1) What is the protocol that will be used? 2) Where in the preliminary implementation strategy is it printed?

As noted earlier, the preferred alternative is the only alternative to adopt an adaptive management approach. The other alternatives displayed in the SDEIS simply contain a "monitoring plan" (SDEIS at 2-8). Please explain why adaptive management was not integrated into any other alternative? Given the obvious environmental advantages associated with properly designed and implemented adaptive management, omitting it from the other alternatives seems to have prejudiced their consideration. Was this done intentionally to compel selection of the preferred alternative?

The SDEIS states (at 2-66) that "[t]he adaptive management strategy would apply to all land and resource programs in the preferred alternative[]" yet the emphasis of the strategy is clearly focused on oil and gas development. Indeed, the discussions in Appendix 17 sections entitled

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"Purpose and Need", "Approach", and "Management Actions" address only oil and gas, to the exclusion of all other resource programs. While we don't disagree with the focus on oil and gas development, given the severe impacts that can result, why hasn't an adaptive management implementation strategy been developed for other resource programs, activities and actions that may cause adverse environmental effects?

Related to the paragraph above, the Preliminary Adaptive Management Implementation Strategy (Appendix 17 at A17-4) states that "Other activities will follow the same process." What process is that? The process or "approach" outlined for oil and gas is necessarily specific to oil and gas and "focuses on the timing and sequence of oil and gas activity." (A17-4). For those reasons, this "process" does not appear to be directly transferable to other resource uses. Specifically, how will adaptive management be applied to activities such as livestock grazing, recreation, mineral development, access and realty, etc.?

The list of monitored "resource indicators" (Table A17-1) should be expanded to include: 1) air and water quality, including compliance with CAA State Implementation Plans and DEQ water quality standards; 2) threatened and endangered species; 3) sensitive species representative of various habitat types in the planning area; 4) significant heritage resources; 5) reclamation success; 6) invasive weeds and exotic species.

The JMH CAP, specifically the section entitled "Monitoring and Evaluation," fails to identify, discuss and meet the monitoring requirements that are most applicable to this planning process: BLM's own regulations for monitoring and evaluation contained in 43 CFR §1610.4-9. The specific monitoring plan promised in Appendix 17 for "each resource indicator" (A17-7) should included in the FEIS for public review and comment, not deferred to some unspecified future date, which almost guarantees it will never be completed. In addition, the monitoring plan must, under the rule cited above, include specific intervals and standards. Although the adaptive management strategy proposes yearly reviews of monitoring data, it lacks standards. What, specifically, will BLM view as an "acceptable effect" or "positive response of resources" (A17-3)?

All of the "additional steps prior to implementation" listed on page A17-7 should be completed as part of this planning process, included in the Final EIS for public review and comment, and adopted as an integral, binding and enforceable component of the Record of Decision. Is that the BLM's intention? If not, how does the BLM intend to involve the public in the development of the "additional steps" which we assume will be developed after the issuance of the ROD?

In conclusion, it is impossible for the reader to decipher and understand exactly what BLM is proposing to do in the Jack Morrow Hills. Most, if not all, important management decisions are deferred to some future unspecified time, and will be made under vague, ill-defined and yet-to-be-developed criteria. If the objective with this planning process was to confuse and mystify the public, congratulations – you have succeeded!

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VII. WILDLIFE

The conservation of wildlife and fish resources is an important consideration in drafting any BLM land management plan. FLPMA states, "the Secretary of the Interior is charged with the responsibility to manage non-wilderness BLM lands for multiple uses, including fish and wildlife conservation." 43 C.F.R. § 24.4(c). FLPMA also requires of BLM that "fish and wildlife must be maintained for their ecological, cultural, educational, historical, aesthetic, scientific, recreational, economic, and social values," and further requires, to this end, "the cooperation of the several States and the Federal Government." 43 C.F.R. § 24.1(b).

The EIS contains a nonsensical statement on sensitive habitats: "Crucial winter habitat, birthing areas, nesting sites, and sensitive fisheries habitats would be maintained or improved by reducing habitat loss or alteration and applying appropriate mitigation requirements…to all activities." JMHCAP EIS at 2-12. It is a mystery how these sensitive habitats will be "maintained or improved" as habitat loss continues (albeit at a slower pace) or new disturbances are introduced (regardless of mitigation practices). There will in fact always be a net loss of habitat acreage and/or effectiveness when new ground-disturbing activities are introduced into a previously unimpacted area. This type of disingenuous statement on the part of the agency should be rectified in the Final EIS. In addition, solid protections should be applied in the JMH CAP that protect these sensitive areas from any habitat loss whatsoever or any activity that might require mitigation measures.

The JMH SDEIS Fails to Provide Credible Analysis on Impacts to Wildlife
For elk, "It is generally agreed that there is no way to eliminate human presence and disturbance from the area, however once disturbance reaches a certain threshold, impacts are expected to become significant. Further study and monitoring are needed to determine what the threshold is for the planning area." SDEIS at 4-81. And yet NEPA requires the kind of hard look that would determine such threshold levels of disturbance PRIOR TO the approval of developments. Will 30 new wells surpass this threshold? 60? 255? The BLM admits it has no idea. Until credible analyses are performed to at least estimate what level of development will exceed this critical threshold, the BLM has no business approving a management plan for the Jack Morrow Hills.

In addition, the BLM simply has not performed the requisite studies to determine elk habitat use and movement patterns in the JMH planning area sufficient to allow planning or adaptive management to occur. According to Powell (in press, p.2, emphasis added),

> Current information on habitat use pattern of elk occupying the JMH ***are inadequate*** to provide resource managers and industry opportunities to determine and mitigate potential effects of energy on this unique elk herd.

According to the SDEIS, "Two types of adverse impacts to wildlife are common to all alternatives: displacement and habitat fragmentation." SDEIS at 4-62. This admission by the BLM points to a serious deficiency in the NEPA analysis: It is perfectly reasonable to analyze at least one alternative for which habitat fragmentation and displacement are not certain outcomes,

and yet the BLM has failed to consider such an alternative. As a result, the BLM has failed to meet its onbligation under NEPA to analyze a range of reasonable alternatives.

The BLM admits, "A lack of information exists for a wide range of wildlife species, including threatened and endangered species, within the planning area." SDEIS at 4-62. This lack is a direct result of the BLM failure to meet NEPA requirements to take a "hard look" at impacts to wildlife. Sound baseline data is a prerequisite to such a hard look, and yet the BLM has failed to gather this data. The BLM further claims, "As activities within the area develop, additional information would be obtained through project-specific data gathering and monitoring." Id. This response is clearly not good enough. The whole reason for undertaking an EIS is to gather sufficient information to make a reasoned and informed decision, so the agency can look before it leaps. It is absolutely appalling that the agency should recognize the black hole of wildlife baseline data in its EIS and do nothing to rectify this deficiency.

"In addition, based on the Reasonably Foreseeable oil and gas Development Scenario (RFD) and the Hydrocarbon Occurrence and Development Report (HOD) for the JMH CAP area, BLM does not anticipate a large amount of new development that would lead to unacceptable levels of adverse effects in all areas." JMHCAP EIS at 2-4. We concur with this statement only insofar as the projected level of development in the Preferred Alternative, 205 oil and gas wells and 50 CBM wells, may not lead to unacceptable levels of adverse effects in **all** areas, but it certain to lead to unacceptable levels of adverse effects in many localized areas, including some very sensitive habitats and wilderness-quality lands. What then, will be the extent of the study area, the Core area, crucial game ranges, and other sensitive habitats, which receive "unacceptable levels of adverse impacts" under the Preferred Alternative or any other alternative? There is no way of knowing based on the SDEIS, because the BLM has failed to do its jobs of presenting a detailed and scientifically defensible analysis of impacts.

Under the Preferred Alternative, "It is unknown whether adverse impacts would occur to Wyoming BLM sensitive species, because of the lack of information on habitat locations or requirements within the planning area. Potential habitats would require searches for the species prior to approval of any project or activity." SDEIS at 4-87. These searches are EXACTLY the type of information gathering that the BLM is required to perform as part of its Affected Environment Analysis, so that adverse impacts can be adequately analyzed and compared between alternatives under NEPA. The BLM's failure to gather this most basic baseline data prior to selecting an alternative is simply one more example of how the agency has failed to undertake a legally sufficient "hard look" at the resource issues at hand.

Cumulative Effects

"Cumulative effects to wildlife habitat would result from surface disturbing and disruptive activities in the form of habitat fragmentation and animal displacement (short- or long-term) depending on the amount, location, and timing of activities." SDEIS at 4-87. With this statement, the BLM outlines the information which must be presented in the EIS in order to make a meaningful analysis of cumulative impacts to wildlife. But while the BLM has presented estimates of amount (i.e., 255 gas and CBM wells with their associated roads and pipelines),

there is no presentation of where any of these developments will occur, nor is there a plan or timetable as to how much development will happen how soon. Unfortunately, the public (nor, apparently, the preparers of the SDEIS) were not given a road map delineating specific locations and sitings of wells, roads, pipeline corridors, surface mines, or other surface impacts. Thus, it is impossible to perform a cumulative impacts analysis and reach conclusions as to the population status and trends of even a single wildlife species in the JMH planning area, for any of the alternatives presented.

Following the cessation of oil and gas drilling and production activities, the BLM adds that "Impacts could be long-term, because some habitats would not reestablish to pre-disturbance conditions for more than 20 years." SDEIS at 4-87. Will such long-term impacts occur? On what scale? What will such long-term impacts translate into in terms of the populations and viability of sensitive wildlife? Under this EIS, the BLM can only speculate in the absence of even the most basic information on the level, intensity, and locations of development activities over the life of the plan.

The BLM follows these first introductory sentences in their Cumulative Impacts "analysis" with more vague and vacuous statements speculating on possible cumulative impacts to vegetation, terrestrial wildlife, and aquatic systems, drenched in the language of uncertainty: Words like "may" and "could" are sprinkled liberally throughout this section, indicating that the BLM cannot predict with any certainty at all what the cumulative impacts to any species or community would be, even at the most vague and diffuse level of predicting whether populations will increase, decrease, or remain the same as a result of implementation of the Preferred Alternative. Thus, the SDEIS utterly fails to meet the most basic requirement of NEPA to analyze impacts and provide a sound comparison of alternatives.

Habitat Fragmentation

Habitat fragmentation occurs whenever there is a change in the spatial continuity of the habitat that affects occupancy, survival or reproduction in a particular species, whether or not a net loss of habitat accompanies the spatial change (Franklin et al. 2002). Oil and gas development, with its sprawl of drilling pads, access roads, and pipelines, is the primary cause of habitat fragmentation in the sagebrush steppes of the Jack Morrow Hills area. The BLM has itself admitted, "Maintaining the integrity of the area is considered paramount to sustaining viable big game herds and other wildlife populations." DSEIS at 3-15. For this reason, management actions that contribute to habitat fragmentation, such as continued oil and gas leasing and development, must not be authorized under the JMH CAP.

Although the portion of the landscape physically disturbed by roads, wellpads, and pipelines is often a relatively small percentage of the overall landscape, GIS analysis of full-field oil and gas development incorporating quarter-mile buffers to account for habitat degradation due to edge effects indicates that almost 100% of lands within a fully developed gas field are degraded (Weller et al. 2002). In this way, the development of an oil and gas field results in widespread habitat destruction that extends well beyond the acreage of roads and wellpads that are bulldozed in.

Fragmentation of shrubsteppe habitats has a particularly strong negative impact on birds. Knick and Rotenberry (1995) and found that sage sparrows and sage thrashers decreased with decreasing patch size and percent sagebrush cover, and reached the following conclusion:

> "Our results demonstrate that fragmentation of shrubsteppe significantly influenced the presence of shrub-obligate species. Because of restoration difficulties, the disturbance of semiarid shrubsteppe may cause irreversible loss of habitat and significant long-term consequences for the conservation of shrub-obligate birds" (p. 1059).

Ingelfinger (2001) found significant declines in nesting songbirds within 100m of gas field roads, and also found that sage sparrows declined near pipelines. Kerley (1994) found that 67% of songbird species selected for the tallest available sagebrush stands, and nest success was associated with 41% shrub cover, while the two nests in 15% shrub cover were both unsuccessful.

Ingelfinger (2001) conducted a study of sagebrush birds in a western Wyoming gas field and found that as gravel roads increased, densities of sagebrush obligate birds, Brewer's sparrows, and sage sparrows declined, while horned larks (a grassland species) increased. According to his findings, "roads associated with natural gas development negatively impact sagebrush obligate passerines. Impacts are greatest along access roads where traffic volume is high" (p. 69), but "bird densities are reduced along roadways regardless of traffic volume" (p.71). Kerley (1994) found that small patches had fewer shrub-nesting species than large patches, and the green-tailed towhee, an interior sagebrush species, was entirely absent from small patches. Remnant patches smaller than 1 ha will not support sagebrush shrub-nesting birds (Kerley 1994).

Predation is believed to be the major factor in the decline of burrowing owl populations in Canada, and habitat fragmentation serves to increase predation risk in burrowing owls (James et al. 1997, Hjertaas 1997).

Vagrant lichens that disperse via wind require continuous habitats; they are negatively affected by habitat fragmentation, particularly roadside ditches that collect these lichens in areas unsuitable for growth and survival (Rosentreter 1997). In several instances vagrant lichen habitats have become so fragmented that some taxa are threatened with extinction (Ibid.).

Sensitive Wildlife Species

There are a number of species on the BLM Sensitive Species List, the WGFD Species Watch List, watch lists of globally imperiled and locally rare species tracked by the Wyoming Natural Diversity Database, and federally listed species under the protection of the Endangered Species Act found within the JMH planning area, all of which merit special conservation concern and attention. These species are of special concern because they are currently rare, are experiencing significant declines in overall population or distribution, or both. Some are at risk for global extinction. The BLM Manual dictates that Sensitive Species should be managed at least at the protective level afforded ESA candidate species: "The protection provided by the policy for candidate species shall be used as the minimum level of protection for BLM sensitive species."

BLM Manual § 6840.06(E). The JMH CAP must therefore include standards that guarantee the viability, an if needed, the recovery of these species. Under the Draft SEIS, there is no alternative which implements or even contemplates such standards.

Furthermore, WGFD (1998) has set forth recommendations for allowing habitat-disturbing activities and mitigation for these activities if allowed. Federal Candidate Species and Native Species Status 1 and 2 receive a mitigation category of "Vital," for which habitat directly limits populations and restoration may be impossible; ***habitat function must be maintained*** if habitat modification is allowed to occur. In the JMH planning area, species in this category include mountain plover, common loon, bald eagle, yellow-billed cuckoo, pygmy shrew, flannelmouth sucker, and black-footed ferret. Big game habitats such as Crucial Winter and Crucial Winter Relief Ranges also receive a mitigation category of "Vital."

Native Species Status 3 receive a mitigation category of "High," for which WGFD recommend ***no net loss*** of habitat function through enhancement of degraded habitat when a habitat disturbing project is proposed. In the Jack Morrow Hills area, species in this category include the American bittern, merlin, peregrine falcon, long-billed curlew, white-tailed prairie dog, Great Basin pocket mouse, and silky pocket mouse. Big game winter-yearlong ranges and parturition areas also fall under the "High" reclamation category, demanding non net loss of habitat function. Furthermore, for Endangered or Threatened Species, WGFD recommends exclusion of any habitat impacting activity. For these species, "The Commission recognizes that some wildlife or wildlife habitats are so rare, complex and/or fragile that mitigation options are not available. Total exclusion of adverse impacts is all that will ensure preservation of these irreplaceable habitats" (Ibid., p. 4).

We concur wholeheartedly, and point out that FLPMA carries a legal requirement for the BLM to manage its lands in accord with state directives such as the WGFD Mitigation Policy. According to FLPMA,

> Guidance and resource management plans and amendments to management framework plans shall be consistent with officially approved or adopted resource related plans, and the policies and programs contained therein, of other Federal agencies, State and local governments and Indian tribes…

43 CFR § 1610.3-2(a). Furthermore, NEPA also provides,

> statements shall discuss any inconsistency of a proposed action with any approved State or local plan and laws (whether or not federally sanctioned). Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law.

40 CFR § 1506.2(d). NEPA also requires Environmental Impact Statements to include, *inter alia*, a discussion of "Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans,

policies and controls for the area concerned." 40 CFR § 1502.16(c). Thus, a dual mandate exists requiring conformity between the JMH CAP and state policy, and if BLM's standards fail to meet the WGFD Mitigation Policy benchmarks, a detailed explanation must be provided.

During the planning process, BLM requirements include "[e]nsuring that provisions for the conservation of special status species, particularly the objectives from approved recovery plans and conservation agreements, are incorporated into land use plans and subsequent activity and interdisciplinary level plans..." BLM Manual § 6840.04(E). And yet there is hardly a word about most of the special status species that occur in the Jack Morrow Hills area in the SDEIS. For example, under the Preferred Alternative,

> It is unknown whether adverse impacts would occur to Wyoming BLM sensitive species, because of the lack of information on habitat locations or requirements within the planning area. Potential habitats would require searches for the species prior to approval of any project or activity.

SDEIS at 4-87. These searches are EXACTLY the type of information gathering that the BLM is required to perform as part of its Affected Environment Analysis, so that adverse impacts can be adequately analyzed and compared between alternatives under NEPA. The BLM's failure to gather this most basic baseline data prior to selecting an alternative is simply one more example of how the agency has failed to undertake a legally sufficient "hard look" at the resource issues at hand.

Furthermore, the BLM is required to ensure that activities on BLM lands not contribute to the need for any species to become listed as Threatened or Endangered under the Endangered Species Act. 16 U.S.C. § 1536(a)(2). And yet the alternatives the BLM contemplates in the SDEIS all push several species that are already petitioned for listing, including the sage grouse and white-tailed prairie dog, further down the road to listing, and ultimately, extinction.

Finally, in addition to rare and declining wildlife species, there are a number of species that through game animal status or other reasons are of high importance to the public, and the JMH CAP must also maintain the viability of these species throughout the Great Divide area.

Sage Grouse

Wyoming sage grouse populations are some of the largest left in the nation and are relatively stable (showing a 17% decline from 1985-1994); nonetheless, sage grouse populations have experienced major declines rangewide in recent decades (Connelly and Braun 1997). WGFD (2000) reported that since 1952, there has been a 20% decline in the overall Wyoming sage grouse population, with some fragmented populations declining more than 80%; Christiansen (2000) reported a 40% statewide decline over the last 20 years. These declines can be attributed to habitat loss (due to agriculture, mining and energy development, reservoirs, roads, and buildings), habitat fragmentation (due to fences, powerlines, roads, and reservoirs), habitat degradation (due to overgrazing, changes in fire regime, and mechanical and chemical sagebrush control efforts), drought, predation (the importance of which is controlled by the amount and quality of sage grouse habitat), and hunting (Braun 1998). It is crucially important

that the JMH CAP provide for the maintenance and recovery of sage grouse populations, because this bird is headed for the Endangered Species List if population losses continue.

Predator-Prey Relationships

A number of raptors and medium-sized mammalian carnivores prey on sage grouse. Sage grouse nest predators include bobcats, golden eagles, red fox, badgers, common ravens, and coyotes (Heath et al. 1997). Hulet et al. (1986) found that the Uinta ground squirrel was the most important nest predator in their southern Idaho study area. The maintenance of appropriate habitat and adequate cover, particularly on nesting and brood-rearing habitats, is important to ensure that predation rates do not increase to abnormal levels. In addition to maintaining cover, it is important to avoid the construction of tall structures that serve as raptor perches and concentrate predation pressure, like powerlines and gas condensate tanks, near these habitats.

Sage Grouse Habitats

To ensure the viability of sage grouse populations, it is important to consider nesting, brood-rearing, and winter habitats (Call and Maser 1985). Connelly et al. (2000) proposed comprehensive guidelines regarding the management of sage grouse, focused around the conservation of breeding/nesting habitat, late summer brood-rearing habitat, and wintering habitat. These guidelines be implemented across all alternatives in the forthcoming JMH CAP, with the modification of a 3-mile NSO and no surface disturbance/vegetation treatment buffer for sage grouse leks in order to protect the leks themselves as well as adjacent nesting habitat.

Breeding and Nesting Habitats

Autenreith (1985) considered the lek site "the hub from which nesting occurs" (p. 52). Grouse exhibit strong fidelity to individual lek sites from year to year (Dunn and Braun 1986). During the spring period, male habitat use is concentrated within 2 km of lek sites (Benson et al. 1991). Young males may establish new leks in order to take part in breeding (Gates 1985). Because leks sites are used traditionally year after year and represent selection for optimal breeding and nesting habitat, it is crucially important to protect the area surrounding lek sites from impacts.

The maintenance of high-quality sagebrush steppe habitats, particularly nesting and wintering habitats, is necessary to maintain sage grouse viability on the landscape scale. Sage grouse are dependent on sagebrush steppe habitats, and sage grouse distribution is closely linked with the distribution of big sagebrush (McCall 1974). Numerous studies have shown that female sage grouse show strong fidelity to specific nesting areas from year to year (Berry and Eng 1985, Fischer et al. 1993, Lyon 2000). Fischer et al. (1993) concluded, "Because Sage Grouse hens appear to seek suitable habitat within a relatively small area, nest-area fidelity may reduce nesting if large areas of nesting habitat are destroyed" (p. 1040). Thus, it is important to foster sagebrush growth at levels useful to sage grouse and to avoid activities that destroy suitable sagebrush habitat.

The optimum height and cover of sagebrush for sage grouse nesting habitats varies from region to region. In their eastern Oregon study, Call and Maser (1985) reported that sagebrush between 30 and 60 cm made the best nesting habitat, while a range of 15-80 cm was suitable for nesting.

In the foothills of the Sierra Madres, shrub height at nest sites averaged 22 cm (Klott and Lindzey 1989). In other studies, nesting habitat is typified by greater shrub height and shrub cover (Wallestad and Pyrah 1974, Sveum et al. 1998). Dunn and Braun (1986) found that grouse selected areas with taller shrubs and more homogeneous sagebrush densities, and closer distance to wooded or meadow edges. But in Idaho, Klebenow (1969) found that sage grouse did not nest in areas where sagebrush cover exceeded 35%. Within suitable nesting habitat, nest sites tend to be located under taller-than-average shrubs, particularly sagebrush (Hulet et al. 1986).

Mesic meadows and surface waters are focal points of sage grouse activity during certain times of year. Mesic sites associated with springs, seeps, and streams are critical for sage grouse on a yearlong basis, and assumes even greater importance as brood rearing habitat (Autenreith et al. 1982). Call and Maser (1985) stated, "We believe that free water is an essential component of sage grouse habitat", but noted that "[s]age grouse may do well in the absence of free water where they have access to succulent vegetation." (p. 4). Oakleaf (1971) found that the presence of surface water was an important factor that increased the value of meadows as grouse rearing habitat. Thus, management for sage grouse should include special emphasis on protecting wet meadows, springs, and seeps.

Habitat attributes have a direct effect on sage grouse population dynamics. Connelly et al. (1991) found that nest success was higher for birds nesting below sagebrush (53%) versus other shrubs (22%), and hypothesized that avian predation was the key to nest success. In central Washington, Sveum et al. (1998) found that sagebrush cover at successful nest sites averaged 51%, and height averaged 64 cm, while at depredated nests cover and height averaged 70% and 90 cm, respectively. Wallestad and Pyrah (1974) found that sagebrush cover exceeded 15% for all nest sites, and cover of sagebrush was positively correlated with nest success. Several studies have shown that successful nest sites have greater cover of tall grass (Gregg et al. 1994, Sveum et al. 1998). With this in mind, Holloran (1999) recommended leaving residual grass heights greater than 12 cm following removal of livestock in autumn. Thus, not only sagebrush height and density but also understory grass cover are important to maintain in sage grouse nesting areas. The SDEIS makes no mention of protective measures or adaptive management procedures that would foster understory grass growth in crucial sage grouse habitats; this deficiency needs to be addressed.

Early and Late Brood Rearing Habitats

Sage grouse may move some distance from nesting sites for early and late brood rearing. In the neighboring upper Green River valley, Lyon (2000) found that sage grouse moved an average of 1.1 km from the nest site for early brood-rearing, and late brood-rearing habitats averaged 4.8 km distant from the early brood-rearing areas. In Bates Hole, Holloran (1999) found that early brood rearing habitats are typified by decreased sagebrush cover and height and increased forb abundance, and movement to riparian sites occurred as uplands became dessicated. This pattern of movement and habitat selection is echoed in the findings of Oakleaf (1971). In western Wyoming, wet meadows, springs, seeps, and other green areas within sagebrush steppe were important for early brood-rearing, while late brood rearing focused on irrigated hay meadows,

wet meadows, and drainage bottoms which remained green when early brood rearing habitats were withering (Lyon 2000). This researcher found that most recruitment loss occurred during the early brood rearing stage, and that this may be a limiting factor in sage grouse populations (Ibid.). In Nevada, Oakleaf (1971) found that meadows with succulent forbs, while occupying only 2.3% of grouse home ranges during the brood rearing period, were disproportionately important as brood-rearing habitat. In central Washington, Drut et al. (1994b) found that during late brood-rearing, habitat use shifted from low sagebrush to big sagebrush sites, with heightened use of meadows and lakeshores. Brood-rearing habitats should thus be identified and managed to maximize sage grouse recruitment success.

The availability of forage with a high nutritional content is an important factor determining brood success. Broods require forbs, insects and cover for growth, concealment and shade (Autenreith 1985). The diet of sage grouse chicks is dominated by insects in the first week of life, with forbs becoming more important as time progresses (Call and Maser 1985). Oakleaf (1971) reported that succulent forbs dominated the diets of brood-rearing hens and juveniles until the chicks reached 11-12 weeks of age. Drut et al. (1994a) found that in the area with high sage grouse productivity, insects and forbs made up 80% of chicks' diets, while sagebrush buds made up 65% of diets in the area of low sage grouse productivity. These researchers reached the following conclusions: "Substantially lower consumption of forbs and invertebrates and increased reliance on sagebrush may affect chick growth and survival, which would be reflected in long-term differences in productivity between areas. Insects are a critical nutrition source for developing chicks" (p. 93). Dunn and Braun (1986) argued that meadows, as important forb-producing areas, should be preserved. Thus, the BLM should manage sage grouse brood-rearing habitat to maximize high-quality forage for chicks.

Wintering Habitats

Non-migratory sage grouse winter on their nesting and brood-rearing habitats, while migratory populations may travel some distance to winter on traditional wintering areas. For non-migratory populations, nesting habitat and wintering habitat are one and the same (e.g., Wallestad and Pyrah 1974). In a western Wyoming study, however, sage grouse were migratory and traveled at least 35 km to separate wintering grounds (Berry and Eng 1985). In Colorado's North Park, Beck (1977) found that grouse migrated 5-20 km away from breeding areas during winter. In a southeastern Idaho study, Connelly et al. (1988) found that some adult sage grouse moved more than 60 km to winter range, and some juveniles moved more than 80km, despite the availability of suitable wintering habitat nearby. In some cases, sage grouse may be widely dispersed during mild winters but concentrate during severe winters (e.g., Autenreith 1985). The SDEIS shows grouse winter habitat as point locations, but in fact these should be mapped spatially in two dimensions, with boundaries. The BLM needs to determine whether sage grouse in the Jack Morrow Hills are migratory or non-migratory, and map the winter habitats fully so that these crucial habitats can be placed off-limits to activities that lead to habitat degradation.

Sage grouse may be keying in on several habitat variables when selecting appropriate wintering habitat. In the southern Red Desert, Kerley (1994) found that wintering sage grouse moved to tall sagebrush stands on steep south-facing slopes, where the sagebrush were exposed above the

snow. Conversely, Beck (1977) found that in North Park, Colorado, 66% of sage grouse wintered on slopes of less than 5%, while only 13% of sage grouse use occurred on slopes greater than 10%. In Montana, Eng and Schladweiler (1972) found that 82% of winter sage grouse sightings occurred in canopy cover greater than 20%, and a preference was shown for dense stands on lands with little slope. The BLM must identify sage grouse wintering habitats within the planning areas an emplace strong measures to protect them from vegetation treatments and industrial projects.

Researchers appear to be unanimous in their recommendations that sage grouse winter habitat be protected from disturbance. Kerley (1994) recommended, "Because shrub stands used during winter (category 3 stands) make up a small proportion of available habitats, these patches on south facing slopes, as well as other traditional wintering sites, should not be treated [to remove or reduce shrubs]" (p.113). Connelly et al. (2000) concurred, recommending against habitat manipulation in sagebrush stands of 10-30% canopy cover heights of at least 25 cm to protect winter habitats. According to Beck and Braun (1980), "Areas of winter concentrations of sage grouse need to be documented and afforded maximum protection" (p. 564). Lyon (2000) recommended that sage grouse wintering habitats be placed off-limits to oil and gas development. Thus, in the Jack Morrow Hills planning area, the BLM needs to rapidly identify sage grouse winter concentration areas and place the areas off-limits to surface disturbance and vegetation treatments.

Vegetation Treatments

Because the sage grouse is dependent on sagebrush, sagebrush treatments are likely to have major impacts on sage grouse population viability. Call and Maser (1985) asserted that the spraying of sage grouse nesting habitats is deleterious because it reduces nest cover from avian predators and suppresses forbs that are important in the sage grouse diet. According to Kerley (1994), "shrub stands of 20-40% cover are needed for successful nesting and this shrub coverage should be maintained on identified breeding complexes [within 3.2 km of leks]" (p. 113). These percentages are typical of undisturbed sagebrush stands in the Jack Morrow Hills area. Wamboldt et al. (2002) stated:

> Natural or prescribed burning of sagebrush is seldom good for sage-grouse. This assessment recommends that fires within sage-grouse habitat be avoided in most cases, and should be allowed only after careful study of each local situation. The evidence also indicates that habitat loss due to fire may well be the most serious of all the factors contributing to the decline of sage-grouse (p.24).

Heath et al. (1997) went even farther: "Based on our results, we recommend no reduction or control of sagebrush in areas containing between 18-30% live sagebrush canopy coverage within 4.5 km of leks" (p.50). According to Beck and Braun (1980),

> At present we do not know the relative value of a small versus large strutting ground to the population. Therefore we should afford equal merit to all and strive to maintain the adjacent habitats, especially areas with sagebrush (Artemesia) suitable for nesting and brood rearing (p. 563).

Call and Maser (1985) stated that spraying should not occur within the breeding complex (which they defined as within 2 miles of a lek), and should also be forbidden in known grouse winter

ranges. Taking into account the negative effects of vegetation treatments on sage grouse nesting and lekking areas, and uncertainty in the overall extent of sage grouse nesting habitat surrounding lek sites in the JMH area, the BLM should prohibit vegetation treatments within ***3 miles*** of sage grouse lek sites.

Strip Mining
Coal mining can impact sage grouse populations through major local decreases in recruitment (Braun 1986); local distribution patterns and decreases in lek use are the principal effects, with disturbance, rather than habitat loss, being the primary factor (Remington and Braun 1991). Klott (1987) recommended that areas near sage grouse leks be avoided for the purposes of strip mining. We concur, and ask the BLM to withdraw lands within 3 miles of a sage grouse lek from lands suitable for surface mining under SMCRA.

Road Development
Road development can lead to lek abandonment (e.g., Braun 1986). In western Wyoming, Lyon (2000) found that for sage grouse leks within 3 km of oil and gas developments, grouse hens successful at raising their broods selected habitats farther from roads than unsuccessful hens. This finding indicates that habitats near roads experience reduced brood survivorship. Thus, we seek a moratorium on all road-building within 3 miles of a lek site.

Oil and Gas Development
Oil and gas development poses perhaps the greatest threat to sage grouse viability in the region. In a study near Pinedale, sage grouse from disturbed leks where gas development occurred within 3 km of the lek site showed lower nesting rates, traveled farther to nest, and selected greater shrub cover than grouse from undisturbed leks (Lyon 2000). Lyon found that impacts of oil and gas development to sage grouse include: (1) direct habitat loss from new construction, (2) increased human activity and pumping noise causing displacement, (3) increased legal and illegal harvest, (4) direct mortality associated with reserve pits, and (5) lowered water tables resulting in herbaceous vegetation loss. In addition, pump noise from oil and gas development may reduce the effective range of grouse vocalizations (Klott 1987). Thus, lek buffers are needed to ensure that booming sage grouse are audible to conspecifics during the breeding season. Connelly et al. (2000) recommended, "Energy-related facilities should be located >3.2 km form active leks" (p. 278). But Clait Braun (pers. comm.), the worlds most eminent expert on sage grouse, recommended even larger NSO buffers of 3 miles from lek sites, based on the uncertainty of protecting sage grouse nesting habitat with smaller buffers. Thus, areas within 3 miles of a sage grouse lek should be put under year-round "No Surface Occupancy" stipulations. This measure, necessary to protect the viability of sage grouse in the planning area, is not even considered in any of the alternatives in the SDEIS.

Livestock Grazing
Livestock grazing can influence sage grouse habitat suitability, particularly overgrazing which can reduce understory grasses below critical thresholds and alter the density of sagebrush. In their study on sage grouse in eastern Oregon, Call and Maser (1985) made the following basic assumption: "Where there are conflicts between sage grouse and livestock on public lands, it

may be essential to give priority to sage grouse if they are to continue to exist on these areas" (p. 3). According to Autenreith et al. (1982), heavy livestock grazing during the sage grouse nesting or brood rearing seasons is deleterious. According to Gregg et al. (1994), "Land management practices that decrease tall grass and medium height shrub cover at potential nest sites may be detrimental to sage grouse populations because of increased nest predation....Grazing of tall grasses to <18 cm would decrease their value for nest concealment....Management activities should allow for maintenance of tall, residual grasses or, where necessary, restoration of grass cover within these stands" (p.165). Once again, the SDEIS makes no mention of protective measures or adaptive management procedures that would foster understory grass growth in crucial sage grouse habitats; this deficiency needs to be addressed.

The potential conflict between livestock grazing and sage grouse is intensifies near water sources due to the importance of these areas to sage grouse. Heavy cattle grazing near springs, seeps, and riparian areas can remove grasses used for cover by grouse (Klebenow 1982). According to Call and Maser (1985), "rapid removal of forbs by livestock on spring or summer ranges may have a substantial adverse impact on young grouse, especially where forbs are already scarce" (p. 17). We support the BLM's current policy of fencing off natural springs and placing livestock water sources outside the fences rather than at the spring itself.

Holloran (1999) documented that livestock disturbance caused a sage grouse hen to abandon her nest in one case. Call and Maser (1985) noted that nest desertion is most prevalent in the vicinity of sheep bedgrounds, and reached the following conclusion: "There is no indication that livestock are a serious factor in the destruction of nests, although desertion of nests because of livestock activities is frequent under certain conditions" (p. 17). In addition, the presence of livestock in nesting habitats can cause problems for sage grouse. Livestock drives could also negatively impact sage grouse populations during the nesting season. According to Call and Maser (1985), "Hens abandon their nests with little provocation during the egg-laying period (mid-April through early May). Yearling hens are prone to abandon their nests even when disturbed during incubation. The impact of a livestock drive could, therefore, be great because yearling hens are usually the largest reproductive age class" (p. 18). For allotments where sage grouse nesting is known to occur, shifting on-off dates (if necessary) could minimize the chances of impacts to nesting sage grouse, and livestock drives should be routed to avoid sage grouse leks during the strutting and nesting seasons.

Off-Road Vehicle Use

Certainly, off-road vehicle use in sage grouse nesting habitats has negative consequences for the grouse. Call and Maser (1985) made the following recommendations concerning off-road vehicle use and sage grouse:

> "Organized motorcycle or four-wheel drive races across sage grouse nesting habitat, however, can cause substantial loss of production from direct destruction of nests, from abandonment of nests during egg-laying, from destruction of young chicks, or from all three. If sage grouse production is a management goal, then it is wise to postpone such races until after the first of September when the birds are old enough to fly out of harm's way" (p. 19).

We concur, and urge the BLM not only to avoid the proliferation of new roads and user-created vehicle routes in nesting habitats but also to schedule events away from nesting habitats and avoid scheduling them during the nesting period, if they are allowed at all.

Insecticide and Herbicide Spraying

In addition to destroying the insects and forbs required by sage grouse broods, the spraying of insecticides and herbicides may cause direct mortality of sage grouse. In a Montana study, Wallestad (1975) found that treatment of 24% (751 acres) of suitable sagebrush habitat around one lek resulted in a 50% reduction of cocks, while treatment of 11% (640 acres) of suitable habitat around a second lek showed no change in sage grouse numbers; during the same time period, sage grouse numbers at control leks with no sagebrush treatment increased over 300%. Klebenow (1970) found that spraying of nesting habitat caused a long-term cessation of nesting activity in the area. Blus et al. (1989) found that the spraying of two types of insecticides over grouse was fatal to 78% of grouse, and hypothesized that insecticides have played a role in region-wide sage grouse declines. Standards should be issued preventing the spraying of insecticides in sensitive sage grouse habitats during periods where these habitats are occupied.

Lek Buffers

The proposed nest buffers of _ mile for controlled surface disturbance and 2 miles for seasonal stipulations in the Preferred Alternative are grossly inadequate to maintain sage grouse viability in the Jack Morrow Hills planning area. The lek buffer must be based not only on maintaining the lek but also the nesting habitat that surrounds the lek. In addition, seasonal prohibitions that prohibit only construction activities near leks are pointless: If roads or wells are built near leks during the off-season, the resulting regular vehicle traffic will have major negative impacts when the sage grouse are present, effectively circumventing any mitigation value of delaying construction activities.

As a rule, breeding and nesting activity are concentrated in the habitats adjacent to the lek site. In a Montana study, Wallestad and Schladweiler (1974) found that no male sage grouse traveled farther than 1.8 km from a lek during the breeding season. But following breeding, males may make long migrations to distant summer ranges (Connelly et al. 1988). Hulet et al. (1986) found that 10 of 13 hens nested within 1.9 miles of the lek site during the first year of their southern Idaho study, with an average distance of 1.7 miles from the lek site; 100% of hens nested within 2 miles of the lek site during the second year of this study, with an average distance from lek of 0.5 mile. In Montana, Wallestad and Pyrah (1974) found that 73% of nests were built within 2 miles of the lek, but only one nest occurred within 0.5 mile of the lek site.

But in Bates Hole, Wyoming, Holloran (1999) found that average nesting distance from lek site was 3.25 km for adults and 5.27 km for yearlings. Wakkinen et al. (1992) cautioned that leks were poor predictors of sage grouse nest sites; although 92% of sage grouse nested within 3.2 km of a lek in this study, sage grouse did not necessarily nest near the same lek where breeding took place.

Lyon (2000) pointed out that quarter-mile lek buffers were insufficient to maintain the viability of grouse populations. Connelly et al. (2000) recommended that sage grouse habitat should be protected within 3.2 km of lek sites under ideal habitat conditions, within 5 km when habitat conditions are not ideal, and within 18 km where sage grouse populations are migratory. Furthermore, these researchers stated that in areas where 40% or more of the original breeding habitat has been lost, all remaining habitat should be protected. This is the case in the Jack Morrow Hills, where counts of breeding males indicate that populations in the Jack Morrow Hills have declined by 90% since 1949.

But Beck (1977) cautioned that protection of lek sites alone is insufficient to maintain sage grouse winter habitats. And Connelly et al. (1988) later cautioned, "Protection of sagebrush habitats within a 3.2 km radius of leks may not be sufficient to ensure the protection of year-long habitat requirements" (p. 116). Furthermore, Braun (pers. comm.) recommended even larger buffers of 3 miles from lek sites where surface disturbance and vegetation treatments should be prohibited, based on the uncertainty of protecting sage grouse nesting habitat with smaller buffers. Areas within 3 miles of a sage grouse lek should be put under year-round stipulations preventing habitat alterations. The BLM should implement this standard in each alternative in the Final SEIS.

The JMH CAP and Sage Grouse

Not one of the alternatives analyzed by the BLM considers adequate protective stipulations for sage grouse leks, nesting habitats, or wintering areas. Under all alternatives, avoidance areas for sage grouse leks and nesting habitat would be variable, and even the weak timing limitations and seasonal stipulations would be subject to the granting of exceptions. JMHCAP EIS at 2-13. These alternatives require Controlled Surface Use within _ mile of leks with only seasonal restrictions within 2 miles of lek sites, by far insufficient to protect this species. At minimum, 3-mile NSO buffers for leks and NSO stipulations for wintering grounds must be established.

Pygmy Rabbits

Pygmy rabbits are obligate residents of sagebrush stands that are tall with dense canopy cover (Green and Flinders 1980, Katzner 1994. Fragmentation of tall sage habitats can reduce the size, stability and success of pygmy rabbit populations because these animals are reluctant to cross open habitats (Katzner 1994). Tall sage makes up 7.62% of the JMH planning area (Powell, in press); this relative scarcity of this habitat type indicates the need for concrete measures to map and study the impacts of each alternative on the tall sagebrush resource. This has not been done.

Mountain Plover

The mountain plover is proposed for listing as Threatened under the Endangered Species Act, and its rangewide decline appears to be continuing. BLM is required to manage such species *with the same level of protection provided for listed species and designated critical habitat* except that formal consultation with FWS is not required. BLM Manual § 6840.06(B). Pursuant to this requirement, the BLM must determine the occurrence, distribution, population dynamics and habitat condition of mountain plovers, evaluate the significance of lands in the Jack Morrow

Hills to the conservation of plovers, develop and implement a management plan that will conserve plovers and their habitat, ensure that all activities affecting the populations and habitats of mountain plovers consistent with recovery needs and objectives, and implement conservation recommendations included in biological opinions. BLM Manual § 6840.06(A)(1).

Wyoming (along with Colorado and Montana) is one of three states that encompass the majority of plover's breeding population (USFWS 1999); approximately 1,500 birds are estimated to occur in Wyoming (Long 2001). A number of plover occurrences have been recorded along the Bush Rim and the divide between Parnell Creek and Bear Creek, and indeed the type specimen for this species was first recorded in the Jack Morrow Hills area (Beauvais and Smith 1999). Recent research showing a shorter lifespan than previously known also has implications for plover conservation: "[A] mean lifespan of less than 2 years influences opportunities to reproduce, seek alternate breeding and wintering sites, and engage in intraspecific behavior that may influence population recruitment" (USFWS 2002).

Habitat Requirements

Low or sparse vegetation is a key habitat requirement for nesting plovers. Habitat requirements for plover consist of short vegetation, bare ground, and flat topography; habitat associations also found within the Jack Morrow Hills area include plains, alkali flats, prairie dog towns, and low shrub communities, but rarely in association with surface water (Long 2001). Bare ground near objects such as rocks or dung are the nest sites of choice (Knopf and Miller 1994). Knowles et al. (1999) defined suitable habitat as "an area of at least 10 to 20 ha, with relatively level topography, and the vegetation is maintained at less than 10 cm…" Knopf and Rupert (1996) found that successful nesting plovers on the High Plains of northern Colorado used home ranges of 28-91 hectares of land. Plovers may move up to 2 km to early brood-rearing habitat immediately after egg hatching (Knopf and Rupert 1996). In the Wyoming Basins region, the availability of the low vegetation that constitutes high-quality plover habitat is largely based on low soil quality, low precipitation, and wind scour, and patches of high-quality habitat are likely to remain persistent from year to year (Beauvais and Smith 1999).

Importance of Prairie Dogs to Plover Viability

Mountain plovers are often found closely associated with prairie dog colonies of all species. Kotliar et al. (1999) listed the mountain plover as a species that is dependent on prairie dog colonies for its persistence, with abundances higher on prairie dog colonies, habitat selection for prairie dog colonies, reproductive fitness higher on colonies, and population declines occurring when prairie dogs decline. An analysis of pre-settlement records of mountain plover occurrence in Montana indicates that this species was closely associated with prairie dog colonies even before the arrival of EuroAmerican settlers (Knowles et al. 1999). Knowles (1999) went so far as to state that prairie dog colonies are "necessary to provide suitable habitat for mountain plovers" on Montana's Great Plains, and termed prairie dogs "necessary for the long-term persistence of mountain plovers" in that region. This study also found that even small areas of active colonies are important plover habitat. In Wyoming, the distribution of plovers has been linked with the widespread occurrence of white-tailed prairie dogs (Oakleaf et al. 1996). White-tailed prairie dogs are very limited in their occurrence within the JMH planning area, and thus prairie dog

colonies need to be mapped accurately, protected from disturbance, and surveyed for the presence of mountain plover.

The reduction in prairie dog colonies has been directly implicated as an important cause of mountain plover declines rangewide. Knowles et al. (1999) found that the disappearance of prairie dogs due to plague and/or recreational shooting also led to abandonment of nesting habitat by plovers, and plover numbers increased on sites where prairie dog populations were expanding. According to the U.S. Fish and Wildlife Service (1999), "Further loss of prairie dog towns within the current breeding range of the mountain plover would be detrimental to plover conservation. Conversely, the conservation of the mountain plover can be enhanced by implementing strategies to increase the distribution and abundance of prairie dogs on breeding habitat" (p. 7594). Thus, the conservation of prairie dog colonies is a prerequisite to maintaining viable populations of mountain plover.

Effects of Management Activities and Industrial Development

Grazing and other activities detrimental to other species may benefit plovers in some cases. Areas of heavy grazing, whether by sheep, cattle, bison, or other ungulates, may be favorable for mountain plover nesting habitat (Knowles et al. 1999). Because the important effect is the creation of substantial areas with little or no vegetation, one may infer that heavy grazing by wild horses could also create favorable plover habitat. Wallis and Wershler (1981) noted that inadequate grazing may be detrimental to nesting plovers on the High Plains. But livestock grazing is far from universally beneficial to mountain plovers. Wallis and Wershler concluded that patchiness in grazing intensity was of greatest benefit, and that even distribution of cattle and uniform overgrazing may be detrimental to plover habitat. Winter and spring grazing create more favorable habitat conditions for mountain plover than does summer grazing (Knowles et al. 1999).

Other management activities may also influence plover viability. On the Great Plains of Colorado, where wildfires are a natural occurrence, prescribed burning has been shown to increase the attractiveness of habitat to nesting plovers (Svingen and Giesen 1999). Knowles et al. (1999) also stated, "prairie dog eradication, carefully regulated summer grazing of cattle, and agricultural conversion of rangelands all appear to be detrimental to mountain plover conservation."

Oil and gas development in nesting concentration areas is a direct threat to mountain plover population viability. The U.S. Fish and Wildlife Service found that the Seminoe Road Coalbed Methane project "is likely to adversely affect the proposed mountain plover," stating that wellfields are likely to become an "ecological trap," attracting feeding plovers to roadways where they become susceptible to vehicle-related mortality, or alternately increased vehicle traffic could drive plovers away from preferred nesting areas (Long 2001). The USFWS (1999) added that vehicle traffic on roads could lead to stress and chick abandonment. These officials noted that any human disturbance that significantly modifies adult behavior could cause death to chicks, which can die in as little as 15 minutes due to exposure to sun at temperatures greater than 81° F. Long (2001) noted that construction equipment and permanent structures inherent to

oilfield development constitute a radical increase in raptor perches that could result in increased predation pressure. In addition to these problems, wellfield development can lead to increased invasion rates of non-native weed species, which can have serious impacts on plover nesting habitat by decreasing the availability of bare ground (Good et al. 2001).

Wind-power developments can be equally harmful to plover nesting habitats. According to Johnson et al. (2000), nesting plovers abandoned the southern third of the Foote Creek Rim during wind farm construction activities in 1998, abandonment of the southern half of the Foote Creek Rim in 1999, and overall reductions in use of this area heavily impacted by roads and wind turbines during previous years, was likely related either to construction activities or reduced habitat effectiveness due to the presence of roads, trenches, or other project-related impacts.

The BLM has historically mapped and surveyed for plover nesting areas on a catch-as-catch-can basis, limiting efforts to lands slated for imminent development projects. A broader and more comprehensive survey of nesting plovers by trained personnel is needed throughout the planning area. The Wyoming Game and Fish Department has made the identification of plover nesting areas one of its highest conservation priorities (Oakleaf et al. 1996). Wind speeds greater than 18 m.p.h., as well as precipitation or sunny days warmer than 86 degrees F, can radically decrease census effectiveness, as these weather conditions cause plover to crouch in the lee or shade of shrubs and essentially become invisible (Knowles et al. 1999). Depending on climate shifts from year to year, abundant vegetation associated with favorable growing conditions can decrease plover observation distance from 400m to 100m at the same site (Knowles et al. 1999). In Montana, surveys must be completed prior to mid-July fledging dates, and observability is higher during courtship and brood-rearing periods than it is during incubation of eggs (Knowles et al. 1999).

There is no alternative that contemplates protective measures for mountain plover nesting areas that are sufficiently strong. Alternative 2 offers the greatest (but still insufficient) level of protection, with aggregations receiving a $^1/_4$-mile buffer and NSO stipulations. SDEIS at 4-75. Based on the recommendations of Dr. Stephen Dinsmore (Exhibit 4), we recommend a half-mile NSO buffer around known plover nesting areas as well as white-tailed prairie dog colonies.

Raptors

Raptor populations are on the rebound following declines based largely on insecticide spraying, predator poisoning programs, and shooting in the 1960s and 1970s. Raptors of special concern in the Jack Morrow Hills area include the golden eagle, prairie falcon, peregrine falcon, ferruginous hawk, merlin, and burrowing owl. Because they require large natural areas for survival, raptors may be good umbrella species for the protection of entire ecological communities (Burnham and Holroyd 1995).

Importance of Cliff Habitats

Cliffs provide important nesting substrates preferred by a broad spectrum of raptors. A study near Medicine Bow, Wyoming found that cliffs provided the single most important nesting

habitat for raptor species in the region, and 93% of all prairie falcon nests were found on cliffs, despite the comparative rarity of this landform in the Medicine Bow area (MacLaren et al. 1988). In a Utah study, prairie falcons and golden eagles nested exclusively on cliff sites (Smith and Murphy 1982). The spatial distribution of known raptor nest sites in the Jack Morrow Hills also follows this pattern. Thus, in terms of value to nesting raptors, areas with cliff topography may be of heightened conservation importance.

Importance of Prairie Dogs to Raptor Populations

Prairie dogs can be an important mainstay of raptor diets. In a study near Medicine Bow, Wyoming, white-tailed prairie dogs made up 38% of the biomass in the diets of prairie falcons, 18% for golden eagles and red-tailed hawks, and 22% of ferruginous hawk diet biomass (MacLaren et al. 1988). Prairie dog colonies are also important to the survival of raptor populations on their wintering areas. Jones (1989) studied winter raptor aggregations on the High Plains of Colorado and noted, "Aggregations of ferruginous hawks, red-tailed hawks, and bald eagles were frequently observed in the vicinity of prairie dog colonies." p. 256. In this study, golden eagles, ferruginous hawks, and red-tailed hawks were observed taking prairie dogs, while bald eagles and northern harriers competed for the captured prairie dogs. Declines in prairie dog colonies as a result of a plague epidemic resulted in a more than 60% decline in wintering bald eagles, ferruginous hawks, and red-tailed hawks (Ibid.). Numbers of wintering ferruginous hawks also declined dramatically following a crash in prairie dog populations in New Mexico (Cully 1991). There is no doubt that white-tailed prairie dogs have declines markedly in the Jack Morrow Hills area: Almost 100% is good potential prairie dog habitat, and yet active colonies are very scarce. Thus, full recovery of prairie dog populations should be an explicit management goal of the JMH CAP, with concrete measures put into place, in order to maintain and recover raptor populations.

Effects of Management Activities and Development on Raptors

The primary impact to raptor populations is direct disturbance of raptors on the nest, leading to reductions or loss of viability for eggs or nestlings. Disturbance of nesting raptors may cause nest abandonment, damage to the eggs, subject eggs or nestlings to cooling, overheating, or dehydration leading to mortality, prevent young nestlings from receiving sufficient feedings to remain viable, and cause premature fledging (Parrish et al. 1994). Thus, the BLM should establish adequate nest buffers (on the order of 2 miles in diameter) around nest sites, preventing all construction of developments (such as wells and roads) that would lead to future disturbance of nesting raptors through focusing human activities in these areas. There is no alternative presented in the SDEIS that offers this level of protection. Seasonal restrictions are completely insufficient; a well or road constructed outside the nesting season is still likely to lead to nest abandonment or reductions in recruitment due to disturbance from vehicle traffic that does occur during the nesting period.

The overall landscape-scale effects of widespread industrialization threaten the viability of raptor populations through habitat loss and fragmentation. Nest buffers currently in force are unlikely to safeguard the viability of native raptors in the Great Divide; a more conservative approach is needed in order to safeguard raptor viability in this region. White and Thurow (1985) stated:

"We would prefer to see ecosystems kept intact (cf. Wagner 1977) rather than divided into isolated islands set aside for nesting raptors, because aspects of general land use other than restricted areas also affect the health of raptor populations" (p. 21). Thus, not only should nest buffers be implemented, but the overall integrity of the landscape should be maintained (or improved in areas where it is currently degraded) in order to better provide for raptor viability.

Powerline Corridors

Powerline towers are likely to concentrate raptor nesting and perching activities, to the potential detriment of prey species. Transmission towers may be particularly attractive as nest sites for ravens, and Steenhof et al. (1993) reported that 133 pairs of ravens had colonized transmission towers on a single stretch of powerline in Idaho during its first 10 years of existence. Gilmer and Wiehe (1977) found that nest success for ferruginous hawks was slightly lower for transmission towers than other nest sites, and noted that high winds sometimes blew tower nests away. Steenhof et al. (1993) also found that transmission tower nests tended to be blown down, but found that nest success was not lower on towers for ferruginous hawks and was significantly higher on towers for golden eagles. In North Dakota, Gilmer and Stewart (1983) found that ferruginous hawk nest success was highest for powerline towers and lowest for nests in hardwood trees. Thus, although powerlines can be designed to minimize impacts to raptors, these corridors should be sited more than 2 miles away from prairie dog colonies and sage grouse leks (as exclusion areas) to prevent major impacts to these sensitive prey species.

Effects of Livestock Grazing

Effects of livestock grazing on raptors vary by species. Kochert (1989) examined the effects of livestock grazing on raptors and found that grazing can decrease the amount of nesting substrate, change populations of rodents (causing declines in many groups), and alter the vulnerability of prey species. He further pointed out that few prey species tolerate intensive long-term overgrazing. Bock et al. (1993b) reported that golden eagles probably respond positively to grazing in shrubsteppe habitats, but ferruginous hawks, Swainson's hawks, red-tailed hawks, and northern harriers probably respond negatively. It is likely that overgrazing is the greatest threat to those raptors sensitive to grazing impacts.

Golden Eagles

Golden eagles, their nests and young are strictly protected under the Bald Eagle Protection Act. 16 USC 668a-d. This species is very popular with the wildlife viewing public, and conversely has historically suffered from shooting as well as poisoning directed at terrestrial predators. For this reason, we encourage the BLM to stick with the proposed nonlethal predator control requirements in the JMH CAP. Furthermore, the maintenance of viable golden eagle populations should be a guiding principle in the Jack Morrow Hills plan.

Conservation efforts should focus on protecting nest sites and important foraging areas, such as prairie dog colonies. Golden eagles are highly territorial. Even when surface-disturbing activities such as strip mining are located away from golden eagle nest sites, the destruction of important foraging habitats, such as prairie dog colonies, within the territory of nesting pairs can be a major problem for the viability of nesting golden eagles (Tyus and Lockhart 1979). In New Mexico,

plague-related declines in prairie dog abundance from 30 per hectare to less than 1 per hectare triggered a decline in the nesting population of golden eagles (Cully 1991). Thus, golden eagle protection may be linked with the maintenance and recovery of prairie dog colonies.

Ferruginous Hawks

The ferruginous hawk has been experiencing declines across the continent for the past 30 years, although Wyoming is often viewed as a stronghold for the species. The ferruginous hawk has been petitioned for listing under the Endangered Species Act in the past, and more recently it has been identified by the Wyoming Game and Fish Department as a Species of Special Concern (Oakleaf et al. 1996) and a BLM Sensitive Species.

Prey Base

The ferruginous hawk has been identified as a species dependent on prairie dogs, and ferruginous hawk populations have shown declines in response to prairie dog population declines (Kotliar et al. 1999, and see Jones 1989). Olendorff (1993) pointed out that prairie dogs and ground squirrels were the most important prey in some areas, while hares and rabbits predominated the ferruginous hawk diet in others. In a study near Medicine Bow, MacLaren et al. (1988) found that jackrabbits contributed 48% to the ferruginous hawk diet biomass, white-tailed prairie dogs 22%, and Wyoming ground squirrels 16%. In several studies from central Utah, ferruginous hawks were found to be highly dependent on jackrabbits as prey, and hawk population fluctuations were closely tied to the rise and fall of jackrabbit populations (Woffinden and Murphy 1977, Smith and Murphy1978). The proximate cause of this hawk population decline was linked to a decrease in nesting effort and an increase in nomadism in ferruginous hawks following the jackrabbit decline (Woffinden and Murphy 1989). In southeastern Idaho, a jackrabbit population crash was also implicated in a decline of the ferruginous hawk population (Powers 1976).

In contrast, a study on the Canadian high plains found that ferruginous hawk population density and fledging success were consistently correlated with the abundance of Richardson's ground squirrels, and negatively correlated with poisoning efforts (Schmutz and Hungle 1989). On the plains of South Dakota, thirteen-lined ground squirrels dominated the ferruginous hawk diet, while meadowlarks, pocket gophers, and jackrabbits also played important roles (Blair and Schitoskey 1982). In southwestern Idaho, Steenhof and Kochert (1985) found that ferruginous hawks were heavily dependent on Townsend's ground squirrels, and that squirrel declines linked to drought resulted in depressed nest success for the local ferruginous hawk population.

Secondary prey may attain paramount importance during prey declines, droughts, and other stochastic events. Secondary prey species become critical to maintaining hawk population numbers when primary prey species crash (Olendorff 1993). Smith and Murphy (1978) found that ferruginous hawk diets shifted increasingly to rodents as jackrabbits became scarce. Thus, it is important to maintain both primary and secondary prey bases to guarantee ferruginous hawk viability over the long term.

Nesting Habits
Ferruginous hawks use the same nest from year to year and also build alternate nests within the same territory (Smith and Murphy 1978). In the Jack Morrow Hills, ferruginous hawks may nest on the ground atop rims, or on cliffs, pinnacles, badlands, or outcrops. Ground-nesting ferruginous hawks can be quite susceptible to predation. Foxes and coyotes have been documented as important predators of ferruginous hawk ground nests (Blair and Schitoskey 1982). The availability of elevated topographical features may be important to nest success for this species.

Effects of Development
Ferruginous hawks are among the most sensitive of all raptor species, and are prone to nest abandonment if disturbed (Parrish et al. 1994). Nest abandonment, egg mortality, parental neglect, and premature fledging are common results of disturbing ferruginous hawk nests (White and Thurow 1985). Smith and Murphy (1978) noted that increased human access is a primary threat to the viability of ferruginous hawk nest success. For their central Utah study, these researchers found that "in all instances of nesting failure where the cause could definitely be determined, humans were at fault" (p. 87). White and Thurow (1985) found that walking disturbance and vehicle use had the greatest effect on ferruginous hawk nest success, while vehicle use had the greatest flushing distance. Instead of becoming habituated, most hawks in this study increased their flushing distances with repeated disturbance (Ibid.). In addition, disturbed nests averaged one less offspring fledged per nest when compared to undisturbed control nests. Oakleaf et al. (1996) pointed out that the cumulative effects of oil and gas development may impact large areas of ferruginous hawk habitat.

White and Thurow (1985) recommended quarter-mile nest buffers during years of prey abundance, but noted that sensitivity to disturbance increased when prey were scarce, and recommended that nest buffers be "considerably larger" during years of prey scarcity. Although Olendorff (1993) recommended buffer zones of only _ mile for ferruginous hawk nests, he recommended much larger buffers during periods of prey scarcity. Because it is impractical to move roads away from nest sites when prey bases decline, the appropriate way to ensure the persistence of ferruginous hawks at traditional nesting sites is to use large buffers within which ground-disturbing activities are prohibited. Cerovski et al. (2001) reviewed the issue of appropriate nest buffers and recommended a 1-mile buffer, kept free from human disturbance. We urge you to implement the Citizens' Wildlife and Wildlands Alternative, with 2-mile buffers prohibiting surface disturbance should apply to ferruginous hawk and peregrine falcon nest sites as well as 1-mile buffers at all other raptor nest sites.

Burrowing Owl
Nationwide, the burrowing owl is a species on the decline. As of 1997, over half of the agencies across North America tracking burrowing owl population trends reported declining populations, while none reported increasing populations (James and Espie 1997). Burrowing owl populations are highly susceptible to stochastic disturbances such as drought, and thus may decline more rapidly than would be predicted on the basis of demographic factors alone (Johnson 1997). In Wyoming, data suggest an overall population decline, with 17.5% reoccupancy of historic sites,

but the spotty quality of historical data makes comparisons difficult (Korfanta et al. 2001). The burrowing owl has been identified as a species of concern by both the BLM and the Wyoming Game and Fish Department.

Dependence on Prairie Dog Colonies

Burrowing owls are in a select group of wildlife most closely tied to prairie dog colonies, and prairie dog burrows are preferred nest sites for burrowing owls. Thompson (1984) reported that owls preferred abandoned prairie dog burrows in the early stages of succession. Green and Anthony (1989) found that nest burrows lined with dung were less susceptible to predation, perhaps explaining this unusual behavioral attribute. On the Great Plains, Sidle et al. (n.d.) found that burrowing owls actively selected for active prairie dog towns, and showed much lower usage of towns that had been decimated by plague, shooting, or poisoning. Desmond and Savidge (1999) found that burrowing owl nest success was positively correlated with density of active prairie dog burrows, and recommended preserving prairie dog colonies to maintain the viability of burrowing owl populations. And in the Columbia Basin, where prairie dogs are absent, burrowing owls nested in badger burrows, but as a result were subjected to badger predation (Green and Anthony 1989). Thus, the ongoing loss of prairie dog colonies has undoubtedly been a prime factor in the decline of the burrowing owl in the Jack Morrow Hills area.

The ties of burrowing owls to prairie dogs vary by region. Thompson (1984) found that burrowing owls near Casper were associated with white-tailed prairie dogs, while near Torrington they were associated with black-tailed prairie dogs. But in eastern Wyoming, fewer than half of the nesting burrowing owls were associated with active prairie dog towns (Korfanta et al. 2001).

Hunting Habits

Burrowing owls hunt most actively during the twilight hours (Thompson 1984). In the Columbia Basin, pocket mice are the primary mammalian prey (Green and Anthony 1989). In Wyoming, insects are the most frequent prey item, but small mammals dominate the dietary biomass (Thompson 1984). Due to the importance of insects (particularly grasshoppers) in the diets of burrowing owls, the widespread use of pesticides would most likely result in impacts to burrowing owl viability.

Effects of Livestock Grazing

Bock et al. (1993b) reported that burrowing owls probably respond positively to grazing in grassland habitats, but negatively in shrubsteppe habitats. The BLM should bear these trends in mind when drafting individual Allotment Management Plans.

Monitoring

As a BLM Sensitive Species, annual monitoring efforts should be directed at burrowing owls to gain an index of population trend. Haug and Didiuk (1993) reported that 57% of burrowing owls responded to recorded calls in their study, and that the "tall and white" stance adopted in response to calls made detection easier. These researchers recommended a series of three surveys

at 5-7 day intervals during the nesting season to monitor population trends. These monitoring protocols should be established as requirements under the new RMP.

Prairie Dogs

Virtually the entire Jack Morrow Hills area is potential habitat for the white-tailed prairie dog. Collectively, all species of prairie dogs have been reduced to only 2% of their historical range (Miller et al. 1990). White-tailed prairie dogs have declined to 8% of their native range in North America, and the survival of remaining populations is threatened by habitat destruction and modification, sylvatic plague, recreational shooting, poisoning, oil, gas, and mineral extraction, fire suppression, overgrazing, off-road vehicle use, noxious weeds, and climate change (Center for Native Ecosystems et al. 2002). In Wyoming, the white-tailed prairie dog occupies less than 2% of the suitable habitat for the species (Center for Native Ecosystems et al. 2002). In July 2002 a petition to list white-tailed prairie dogs as threatened under the ESA (Center for Native Ecosystems et al. 2002) was jointly filed by the Center for Native Ecosystems, Biodiversity Conservation Alliance, Southern Utah Wilderness Alliance, American Lands Alliance, and Forest Guardians. For that reason alone, the SDEIS should address the status of prairie dog colonies on the Jack Morrow Hills. Moreover, both prairie dogs and their habitat are highly important to numerous other species, such as the swift fox, mountain plover, burrowing owl, ferruginous hawk, and our nation's most endangered mammal, the black-footed ferret. For the Red Desert, Maxell (1973) noted, "Most active prairie dog towns were located some distance from the main thoroughfares in the [Great Divide] Basin, probably due to human predation in the form of varmint hunters" (p.85). In the Jack Morrow Hills area, prairie dog colonies are radically reduced from historic distributions, and are in dire need of protection and recovery.

Prairie Dogs are Ecosystem Regulators

Prairie dogs are fundamental regulators of ecological processes within the area occupied by active colonies. According to Miller et al. (1990), "Prairie dogs have been implicated as ecosystem regulators that influence primary productivity, species composition, species diversity, soil structure, and soil chemistry by their burrowing and grazing" (p. 765). Hansen and Gold (1977) concluded, "This study, compared with previous research, provides evidence that blacktail prairie dgs [sic] are an important ecosystem regulator as they disturb the soil, increase plant diversity (Gold 1976), increase animal diversity, and cause a decrease in primary production of the areas they use." p. 213. Agnew et al. (1986) labeled prairie dogs as ecosystem regulators, maintaining shortgrass habitats. As regulators of ecosystem processes, prairie dogs are keystone species in shrubsteppe and grassland habitats.

On the High Plains, Ingham and Detling (1984) found that root-eating nematodes were more abundant and root biomass lower on a heavy-grazing prairie dog site, while available soil nitrogen was higher on the prairie dog colony. Holland and Detling (1990) subsequently found that nitrogen mineralization was highest in active prairie dog colonies and lowest in uncolonized grassland. Root biomass is lower within prairie dog colonies that on uncolonized sites (Holland and Detling 1990). In Wyoming's Shirley Basin, Schloemer (1991) found that prairie dog burrowing improves growing conditions for sagebrush by increasing snow entrapment, water infiltration, and deep percolation. Kotliar et al. (1999) concurred that the prairie dog clearly

functions as a keystone species in the ecosystems it inhabits, creating habitat through its burrow networks, altering vegetation patterns, and providing an important prey base.

The Prairie Dog Ecosystem is Crucial to Many Wildlife Species

According to Miller et al. (1990), "Ecologically, the prairie dog ecosystem is an oasis of species diversity on the arid plains" (p. 764). Sharps and Uresk (1990) found that 134 vertebrate wildlife species are associated with prairie dog colonies in western South Dakota. In a comparative study which incorporated Wyoming sites, Clark et al. (1982) found that white-tailed colonies showed a greater number of associated vertebrate species (83 species) than either black-tailed or Gunnison prairie dogs; larger towns had a greater species diversity than smaller towns. O'Meila et al. (1982) found that rodent biomass (excluding prairie dogs) was almost twice as great on prairie dog towns than off; this higher rodent abundance was echoed in the results of Agnew et al. (1986). Goodrich and Buskirk (1998) demonstrated that badgers have a heavy dependence on white-tailed prairie dogs in Wyoming. The importance of prairie dogs as prey for raptors has been noted in many studies (e.g., Tyus and Lockhart 1979, Campbell and Clark 1981, MacLaren et al. 1988, Jones 1989, Cully 1991, Kotliar et al. 1999).

Many rare and declining species, notably black-footed ferret, mountain plover, burrowing owl, ferruginous hawk, and swift fox are dependent on prairie dogs for their own persistence (Kotliar et al. 1999). Based on study of the last remaining wild ferret population that was extirpated near Meteetsee, Forrest et al. (1985) reported that black-footed ferrets are confined almost exclusively to prairie dog colonies. In Wyoming, other species associated with white-tailed prairie dogs that are of particular note due to special status or management concern include the eastern short-horned lizard, northern plateau lizard, Great Basin gopher snake, prairie falcon, merlin, sage grouse, burrowing owl, sage thrasher, Brewer's sparrow, sage sparrow, swift fox, and pronghorn (Clark et al. 1982).

Habitat Selection and Colony Attributes

In the Red Desert, Maxell (1973) found that prairie dogs were restricted to sagebrush-grass communities with shrub height less than 12 inches and cover less than 40%, on loam and clay textured soils. In the Shirley Basin, Orabona-Cerovski (1991) found that average plant cover on towns was 38%, with high amounts of bare ground. These preferences should be borne in mind when evaluating habitats for potential prairie dog recovery efforts.

The spatial distribution of prairie dog colonies is an important conservation priority. Clark et al. (1982) made the following observation for white-tailed prairie dogs in Wyoming: "Prairie dog colonies were found clumped in suitable habitat, and nearby colonies served as sources for colonizing animals" (p. 579). The dispersal ability of the white-tailed prairie dog is not great; Orabona-Cerovski (1991) found that less than 1% of juvenile males and 3% of juvenile females dispersed more than 200m from their natal burrows. Thus, maintaining a few isolated colonies is by far inferior to maintaining colony complexes with a high degree of connectivity to facilitate dispersal.

The Myth of Prairie Dogs as Meaningful Competitors for Livestock Forage

Hansen and Gold (1977) noted that the diets of prairie dogs and cattle are broadly similar, and that prairie dogs do reduce the amount of available forage. But O'Meila et al. (1982) found that although prairie dogs reduced the available forage for cattle, cattle on prairie dog plots failed to show a statistically significant decrease in weight gain over control animals. These researchers concluded, "The statistically similar steer weight gain performances during the green-herbage period indicates that sufficient herbage was available to meet the demands of both steers and prairie dogs, even under a regime of heavy utilization" (p. 583). Knowles (1986) found a symbiotic relationship between livestock and prairie dogs: Prairie dogs selected areas disturbed by overgrazing to establish colonies, while livestock preferentially foraged on prairie dog colonies due to higher-quality of forage. Krueger (1986) found higher shoot nitrogen in prairie dog towns, indicating enhanced forage quality for all grazers.

Sylvatic Plague

Sylvatic plague is a major threat to the viability all species of prairie dog. Sylvatic plague has been documented in Sweetwater, Albany, Natrona, and Laramie Counties, and plague has been present continuously in the Shirley Basin since 1985 (Cully and Williams 2001). These researchers stated that "all 4 species of prairie dogs are highly susceptible to plague infections" (Ibid., p. 895). But plague outbreaks may spread more slowly in white-tailed colonies than in black-tailed colonies. According to Ubico et al. (1988), "The Meteetsee area has a short, cool summer season...a plague epizootic under these circumstances probably progresses more slowly over several years, although the end result of almost complete depopulation could be the same" (p. 404). Clark (1977) recorded a plague epizootic in a small colony of white-tailed prairie dogs in Wyoming that killed 85% of the colony. According to Cully and Williams (2001), the comparative low density of white-tailed prairie dog colonies slows the spread of plague, allowing the disease to persist for long periods of time, rather than wiping out a colony and dying out quickly as is the case with black-tailed prairie dogs. There is currently no effective method to control the spread of plague in prairie dog colonies. Because prairie dogs in the Jack Morrow Hills area may already be stressed by endemic or epidemic levels of sylvatic plague, stronger conservation measures are needed to prevent impacts from activities that can in fact be controlled.

Conservation Measures

The ecological importance of prairie dogs, when paired with their low and declining population levels and imminent threats to colony viability, make the compelling case that strong measures must be put in place to protect and restore prairie dogs in the Great Divide planning area. Large prairie dog colonies, plus a half-mile buffer, should be withdrawn from all surface-disturbing activities with minerals leased only under "No Surface Occupancy" provisions. No alternative in the SDEIS contemplates such protections.

Monitoring

Currently, the most recent comprehensive data on prairie dog distribution is from the 1980s; new colony surveys are needed to determine where conservation efforts should be focused and which colony sites require restoration efforts. Forrest et al. (1985) admonished, "All prairie dog

colonies should be accurately and consistently mapped" (p. 28). Martin and Schroeder (1979) noted that aerial photography failed to identify many active colonies; these researchers recommended winter photography after snowfall as providing the best visibility of prairie dog colonies. The new JMH CAP should require surveys to determine the spatial extent as well as periodic sampling protocols to index population trends within the major colonies.

DEER AND ELK

Mule deer and elk are important game species in the Jack Morrow Hills planning area. These game animals contribute importantly to the Wyoming economy, both from hunting and wildlife viewing visitors. The JMH planning area contains virtually all of the year-round range for the Steamboat Mountain elk herd as well as resident mule deer. Thus, protections to maintain the viability of elk and mule deer are needed in the Jack Morrow Hills, an these protections sould be focused on crucial winter ranges, crucial winter yearlong ranges, severe winter relief ranges, and calving areas identified by the Wyoming Game and Fish Department.

Effects of Livestock Grazing

Loft et al. (1991) found that moderate to heavy cattle grazing pushed deer out of riparian habitats and into upland shrub communities that deer avoid when cattle are absent. These researchers noted that these habitat shifts could substantially impact deer populations, concluding that "high quality forage may be limiting on Sierra Nevada summer ranges grazed by cattle, thus contributing to suboptimal nutrition for female deer and their offspring" (p. 24). Elk avoid areas where livestock stocking rates are high (Knowles and Campbell 1982), so standards and guidelines should be authored such that livestock are not present in calving areas during the calving season or in crucial winter ranges between November 15 and April 15. But in some cases, overgrazing by cattle and horses may improve winter range for mule deer (Hubbard and Hansen 1976, Reiner and Urness 1982) and elk (Reiner and Urness 1982) through stimulating shrub productivity. In the final analysis, livestock grazing should be managed in a way that does not reduce or impair the viability of elk and mule deer populations.

Winter Ranges

These areas will address specific habitat needs of plant and wildlife species, particularly crucial winter, migration, and birthing areas used by elk, deer, and bighorn sheep. Prescribed burning has been shown to improve browse quality on winter ranges (Bunting et al. 1984, Gruell et al. 1984, Cook 1990), and thus management objectives will be attained preferentially through prescribed burning.

There may be some habitat partitioning between elk and mule deer on winter ranges. According to Oedekoven and Lindzey (1987), wintering mule deer in southwestern Wyoming favored draws, flats, and ridgelines, while wintering elk selected ridges, hilltops, and steep topography. In this study, mule deer used lower elevation sagebrush grasslands preferentially, while elk preferred to remain at high elevations until deep snows pushed them down.

Elk

The BLM freely acknowledges that the best available science indicates that elk avoid areas within 1-3 miles of roads and oil and gas facilities. DEIS at 4-63. This avoidance is typically greater in open habitats lacking cover than in areas where trees are present. Ibid. The strongest protections considered in the SDEIS are under Alt. 2, in which big game crucial winter range would receive only seasonal limitations, while birthing areas would receive full NSO protection. SDEIS at 4-75. And yet on Table 4-3, wildlife crucial ranges would be closed to new leasing. SDEIS at 4-173.

"It is generally agreed that there is no way to eliminate human presence and disturbance from the area, however once disturbance reaches a certain threshold, impacts are expected to become significant. Further study and monitoring are needed to determine what the threshold is for the planning area." SDEIS at 4-81. NEPA requires the kind of hard look that would determine such threshold levels of disturbance PRIOR TO the approval of developments. Until credible analyses are performed to at least estimate what level of development will exceed this critical threshold, the BLM has no business approving a management plan for the Jack Morrow Hills.

Calving Habitats

Calving habitats in the Jack Morrow Hills are crucially important to the Steamboat Mountain elk herd. Parturient cows are dependent on achieving a high plane of nutrition during the calving period, as the metabolic strain imposed by lactation exceeds even the cost of carrying a pregnancy. With this in mind, parturient cows must select habitats with the highest-quality forage. If they are forced onto suboptimal spring range, the survival of the calf may be threatened.

Disturbances associated with oil and gas exploration and development can drive elk away from their preferred calving range. Powell (in press) also found that experimental disturbances in calving habitats led to reduced use of disturbed areas. Powell speculated that in the absence of forest cover, elk would flee in order to put a topographic barrier between themselves and the source of the disturbance. With this in mind, the disturbed area surrounding a road or a gas well would effectively be the entire viewshed visible from that road or structure. According to Powell (in press, p. i),

> Disturbance treatments, simulating human activity at a gas/oil well, were conducted on calving ranges during the parturition period. Significantly fewer pellet groups were counted in disturbed areas of calving ranges compared to those areas not disturbed ($p<0.05$). These results support maintaining disturbance-free area for calving elk.

Powell concluded,

> These experiments support observations that suggest elk expend more energy when disturbed by humans and that even short-term, low-level disturbance can result in displacement of elk from traditional calving areas. Inferences about population level effects appear supported in the ungulate literature. Stipulations

> that restrict entry into calving areas and those stipulations aimed at reducing daily disturbance of elk appear warranted in the JMH study area. (Ibid., p. 43).

We concur with the need to keep all calving areas in the Jack Morrow Hills disturbance-free.

According to Powell (in press, p. 23),

> Habitat use patterns of elk in the JMH are also strongly influenced by roads, and areas within 2 km of major roads are used significantly less than expected. This avoidance of roads reduces the amount of habitat effectively available to elk and makes the effective habitat lost much larger than the actual physical "footprint" of a road or structure.

A number of studies have shown that elk avoid open roads (Grover and Thompson 1986, Rowland et al. 2000). Edge and Marcum (1991) found that elk use was reduced within 1.5 km of roads, except where there was topographic cover. (It is important to note that much of the Great Divide planning area has very little topographic variation, and thus provides little topographic cover). Gratson and Whitman (2000) found that hunter success was higher in roadless areas than in heavily roaded areas, and that closing roads increased hunter success rates. On the Black Hills, elk chose their day bedding sites to avoid tertiary roads and even horse trails (Cooper and Millspaugh 1999). Cole et al. (1997) found that reducing open road densities led to smaller elk home ranges, fewer movements, and higher survival rates. The reduction of road densities on the winter ranges as a whole and the maintenance of low road densities in important habitat areas would aid in maintaining healthy elk populations. As noted by Powell (in press), elk in open habitats lacking cover, like the sagebrush steppe of the Jack Morrow Hills, are even more sensitive to disturbance associated with roads. This disturbance is long-lived, and extends into the winter season when difficult weather radically reduces human use of the area. Powell (in press) observed: "Elk in the JMH continued to avoid areas around wells and roads during winter when few humans were present in the area" (p. 25).

On winter ranges, elk are highly susceptible to disturbance. They are so sensitive to human disturbance that even cross-country skiers can cause significant stress to wintering animals (Cassirer et al. 1992). Disturbance during this time of year can be particularly costly, since the metabolic costs of locomotion are up to five times as great when snows are deep (Parker et al. 1984). The regular vehicle traffic associated with oil and gas fields constitutes a significantly higher threshold of disturbance, and thus would cause even greter stress to the animals. Thus, <u>all</u> human activities should be prohibited on elk winter ranges between November 15 and April 30.

Several studies have shown that elk abandon calving and winter ranges in response to oilfield development. In mountainous habitats, the construction of a small number of oil or gas wells has caused elk to abandon substantial portions of their traditional winter range (Johnson and Wollrab 1987, Van Dyke and Klein 1996). Drilling in the mountains of western Wyoming displaced elk from their traditional calving range (Johnson and Lockman 1979, Johnson and Wollrab 1987). Powell and Lindzey (2001) found that elk avoid lands within 1.5 kilometers of oilfield roads and

well sites in sagebrush habitats of the Red Desert. Migration corridors may in some cases be equally important to large mammals and are susceptible to impacts from oil and gas development (Sawyer et al., in press). Thus, winter range areas should be withdrawn from the surface disturbances associated with oil and gas development, and leased only under "No Surface Occupancy" stipulations.

The ability of mule deer to forage effectively on winter ranges in a stress-free environment is the key to maintaining viable populations in this region. Winter mortality has claimed up to 80% of the adult mule deer population of southeastern Wyoming, and also depresses fawn production during the following spring (Strickland 1975). On winter ranges, mule deer are easily disturbed by snowmobile traffic and even nonmotorized visitors (Freddy et al. 1996). This can be a critical factor, because metabolic costs of locomotion in snow can be five times as great as normal locomotion costs for mule deer (Parker et al. 1984). Thus, due to the sensitivity of mule deer to disturbance on winter ranges and the crucial nature of winter range performance to maintaining healthy deer populations, mule deer winter ranges must be with drawn from all road construction and development, particularly oil and gas development, which would increase the level of human disturbance on these winter ranges.

Pronghorns

Pronghorns are a unique species, which evolved on the plains and steppes of North America. This species is so unique that it has been given its own Order, Antilocapridae, distinct from the cervids and the bovids that comprise the remainder of native ungulate species in North America. It evolved in wide-open habitats; it possesses great speed and endurance, but is a very poor jumper. Wyoming is the last stronghold of this species, once commonplace throughout the desert and plains environments throughout North America. It is a favorite with hunters and wildlife viewers alike. While the SDEIS presents a modest amount of analysis on elk, this document fails to take a hard look at the current status and trends of pronghorn populations, and gives short shrift to meaningful protective measures for pronghorn crucial habitats. The wide-open spaces found in the Jack Morrow Hills area are a haven for important concentrations of pronghorn, which must be granted adequate protection to assure the continued survival and vigor of the native herds, and to assure that the natural patterns of their migrations are not further altered.

Diet

In a Red Desert study, Taylor (1972) found that forb use made up 29% of the diet in spring and summer versus 62 and 69% for browse, respectively; browse use in fall and winter rose to 97% of the antelope's diet. In this study, grass use peaked at 9% in spring and otherwise hovered around 2%. Taylor concluded that competition with cattle for grass is therefore low. Another Red Desert study showed that sagebrush made up 95% of antelope winter diets, but only 77% of the summer diet (Olsen and Hansen 1977). Yoakum (1986) reported that rabbitbrush was also a highly preferred forage. Taylor (1972) reported that sagebrush and rabbitbrush were the most important antelope forages in both summer and winter in the Red Desert. In addition to the importance of shrubs in the pronghorn diet, shrubs provide cover important for the survival of newborn fawns (Yoakum 1986). But Kindschy et al. (1982) reported that pronghorns avoid areas where sagebrush is tall. The BLM should perform spatial analyses of pronghorn habitats by

alternativebeyond merely the crucial winter range, so that effects on summer range can be elucidated.

Competition with Domestic Livestock and Wild Horses

Schwartz et al. (1977) observed that pronghorns are more selective and take in higher quality diets than either cattle or bison, allowing them to coexist. These researchers concluded:

> "[The] botanical and chemical dietary divergence between bison and pronghorn may indicate evolutionary interspecific niche separation and dietary selection strategies between small and large ruminants. It can partially explain the coexistence of large herds of bison and pronghorn...on the pristine prairies of North America. It also suggests, as does empirical experience, that antelope can coexist on rangelands more successfully with cattle than with sheep" (p. 167).

A study from New Mexico showed that pronghorns have an annual diet dominated by forbs (51-99%), while cattle diets are dominated by grass (48-97%) and domestic sheep diets were roughly equally weighted toward grass and forbs (40-50%, Beasom et al. 1982). Dietary overlap between pronghorns and domestic livestock is greatest in winter (58% overlap for sheep and 29% overlap for cattle, *ibid.*). McNay and O'Gara (1982) found only a 2.3-2.9% overlap between the diets of pronghorns and cattle on spring ranges. The presence of cattle can drive off parturient pronghorns and their fawns from fawning areas (McNay and O'Gara 1982). Wild horses have a lower degree of dietary overlap with pronghorn, approximately 13%, with horses concentrating heavily on grasses while pronghorns used shrubs and forbs (Meeker 1982). Olsen and Hansen (1977) found that in the Red Desert, antelope did not show meaningful competition with other grazers. But Taylor (1975) reported that during severe winters, cattle will forage on browse, increasing competition with antelope.

Potential competition between pronghorns and domestic sheep is a much more important consideration. Clary and Beale (1983) found that pronghorns avoided areas grazed by sheep, and noted that winter sheep grazing severely depletes pronghorn forage until spring greenup. Even moderate winter grazing by domestic sheep can have deleterious effects on pronghorn winter ranges (Clary and Holmgren 1982). Taylor (1975), made the following recommendations regarding grazing on pronghorn winter ranges: "Winter sheep use, especially, should be avoided; however, moderate grazing by cattle during summer months would not materially reduce winter carrying capacity for pronghorns" (p.48). Currently, there are no sheep allotments in the Jack Morrow Hills, and pronghorn would benefit if this were to remain the case.

While competition for forage between pronghorns and cattle or wild horses is rarely an issue, access to water may be a focal point for conflict between these species. Taylor (1972) reported that antelope are quite wary and easily disturbed when watering. In the Red Desert, pronghorns avoid water sources when they were crowded with domestic cattle or wild horses (Miller 1980). Water developments that minimize crowding may be beneficial for pronghorns.

Predator-Prey Relationships

Barrett (1984) reported that in Alberta, coyotes and bobcats caused a 50% mortality rate annually on pronghorn fawns over a 10-year period, but the population grew dramatically over this period

despite this high predation rate. Beale and Smith (1973) reported a similar fawn mortality rate of 42% as a result of predation in Utah. Bobcats were also the most important fawn predator in this study, followed by coyotes and golden eagles. Beale and Smith noted that predator control efforts directed at coyotes may cause increases in the numbers of bobcats, which are more effective predators on fawns. There is little evidence to support the idea that the predators of the Jack Morrow Hills area are driving pronghorn population dynamics.

Pronghorn Winter Range

Winter range is critically important to pronghorn populations, as its availability and quality is likely the strongest determinant of population dynamics. Barrett (1982) reported that during a severe winter in Alberta, overall pronghorn mortality was 48.5%, with fawns and adult males taking particularly heavy losses. This same study documented that pregnant female pronghorns resorbed their fetuses when conditions were poor. Deep winter snows also decrease the survival rate of fawns born the following spring (Cook 1984). Between direct mortality, resorption of fetuses, and low fawn survival the following spring, poor conditions on winter ranges can lead to major and long-term pronghorn declines. Emergency supplemental feeding in ineffective in promoting pronghorn survival during severe winter weather (e.g., Julian 1973, Barrett 1982). Thus, it is critically important to be sure that the winter ranges are maintained in the best possible condition.

Ryder (1983) studied pronghorn winter range in the eastern Red Desert, and found that pronghorns selected winter range at a landscape scale, rather than on a microsite basis. This study found that pronghorns used both sagebrush and greasewood habitat types in winter, and that most of the pronghorn winter use was on greasewood flats and along Separation Creek, with windblown ridges receiving increasing use during deeper snow years (Ibid.). In the Bighorn Basin, Cook (1984) reported that winter range areas were characterized by greater shrub cover (specifically Wyoming big sagebrush), greater topographic diversity, but lower shrub height. Ryder (1983) concluded that optimal winter range would possess varied topography to allow shelter from wind and offer areas with wind-blown vegetation.

Vagrant lichens may be important pronghorn winter forage on windblown benches during severe winters (Thomas and Rosentreter 1992), and these lichens are significantly reduced through trampling by cattle and eliminated by domestic sheep grazing. The relationship between pronghorns and vagrant lichens may be commensal, as pronghorns may also assist in the dispersal of vagrant lichens (Rosentreter 1997).

Although vagrant lichens have apparently been studied little in Wyoming, they are widespread in other cold-desert shrubsteppes in the Great Basin province. In Wyoming, occurrences have been recorded for *Aspicilia fruticulosa* in Uinta County (Rosentreter 1993), for *Dermatocarpon reticulatum* in Yellowstone National Park and the Bighorn Basin (Rosentreter and McCune 1992). Dermatocarpon species have been found in sagebrush steppe habitats associated with pools of standing water in winter and spring for the interior Columbia River Basin (Rosentreter and McCune 1992). Surveys should be undertaken to identify the occurrence and distribution of vagrant lichens of the taxa *Aspicilia*, *Dermatocarpon*, *Masonhalea*, and *Xanthoparmelia* ,

occurring in cold deserts in the western U.S. (Rosentreter 1993) within the lands managed by the Rawlins Field Office, particularly in cold desert shrubsteppe habitats and on windblown ridges. Rosentreter (1997) proposed a number of management recommendations for conserving vagrant lichen populations, and we endorse these recommendations. Further study of the distribution and abundance of vagrant lichens on pronghorn winter ranges in the Jack Morrow Hills is needed.

Antelope migration routes become critically important during severe winters that occur periodically in the Red Desert. During the severe winter of 1971-72, snows were so deep that no brush remained exposed, and antelope in the Washakie Basin migrated to winter ranges across the Colorado state line (Julian 1973). North of Interstate 80 during the same winter, a major storm concentrated both domestic sheep and antelope in the Shamrock Hills, aggravating competition between these two species (Taylor 1975). Deep and crusty snows cause antelope to flounder, and increase predation by coyotes, which can run along atop the snow crust (Julian 1973). During such severe winters, the crucial winter relief habitats rise to paramount importance for herd survival.

Thomas and Rosentreter (1992) recommended limiting livestock grazing to low levels in crucial pronghorn winter range. Cook (1984) noted that densities of pronghorns on winter ranges were lowest in areas of "severe" oil and gas development. This result indicates that oil and gas development tends to drive pronghorns away from winter range areas.

Flannelmouth Suckers

Flannelmouth suckers are found in the Pacific Creek watershed, and this species should be of prime conservation concern in the Jack Morrow Hills planning effort. In the Upper Colorado Basin, the flannelmouth sucker has been extirpated from about 50% of its historic range (Bezzerides and Bestgen 2002). According to Wheeler (1997), this species (together with the bluehead sucker and roudtail chub) "have experienced dramatic reductions in their range in western Wyoming since 1965, and may need immediate conservation attention" (p. 54).

Flannelmouth suckers are generally found in large rivers and sometimes small streams, and even occasionally in lakes (Baxter and Stone 1995). They can sometimes become abundant in impoundments, but have not been found to persist there (Minckley 1973).

Flannelmouth suckers are found in a variety of habitat types, but typically inhabit deeper runs and pools (Bezzerides and Bestgen 2002). They also utilize a variety of substrates, from mud and silt to cobble and gravel (McAda et al. 1980). Juveniles use lower velocity habitats and are likely to be found in shallow riffles, eddies, side channels, and backwaters (Bezzerides and Bestgen 2002). Larvae prefer backwater and shoreline habitats (Haines and Tyus 1990) and congregate along the edges of shallow pools (Minckley 1973).

Although information on temperature preferences is scarce, Sublette et al. (1990) reported that flannelmouth suckers in the Virgin River, Utah were most common at 26°C and preferred temperatures between 10 to 27°C.

Flannelmouth suckers display a definite affinity for a well-defined home range (Chart and Bergerson 1992). Flannelmouth suckers can be tolerant of cold tailwaters, but long-distance migrations are impeded by dams (McKinney et al. 1999). On Colorado's White River, Chart and Bergerson (1992) observed that flannelmouth movements were random rather than directed migrations, but noted that dam construction blocked movements to preferred areas. Chart and Bergerson (1992) found that a dam on the White River lowered downstream temperatures only a few degrees, but flannelmouth populations decreased markedly, possibly due to a loss of turbidity which can lead to sunburn in catostomids. Douglas and Marsh (1998) observed that flannelmouth suckers tend to congregate at and enter tributaries, and confirmed movements into tributary streams.

Flannelmouth suckers may not breed until they reach their fourth year (McAda and Wydoski 1985). In the Colorado River, flannelmouths spawned in tributary streams, and returned to the main stem following spawning (Weiss et al. 1998). This population spawned over gravel and cobble substrates (16-32 mm preferred size class), at water depths ranging from 5 to 41 cm, and at temperatures from 9-18°C (Ibid.). Juvenile flannelmouth suckers use wetlands during spring peak flows, and flooded bottomlands may be important nursery areas (Modde 1996).

Strong protections must be provided in the JMH CAP for flannelmouth suckers, particularly with regard to the potential for coalbed methane wastewater and/or construction activities to alter the temperatue, turbidity, sodicity, alkalinity, and chemical composition of the waters of Pacific Creek an its tributaries.

Stipulation Exceptions

Another reason that seasonal stipulations for crucial wildlife habitats are unacceptable is the ease with which oil and gas companies can get waivers. The BLM outlines the procedures for getting a waiver for seasonal restrictions at page A4-2; hardly a firm commitment to upholding these restrictions and preventing impacts to game animals during the crucial season. While elk calving areas will not be subject to exceptions (a standard which we would encourage BLM to extend to all crucial ranges statewide), exceptions will be made available for measures designed to protect crucial winter ranges. SDEIS at A4-3. In fact, BLM notes that for pronghorn, "Exceptions will generally be granted except where physical barriers (i.e., highways, fences, rivers, canyons, etc.) limit the animals' ability to move into other suitable habitats." SDEIS at A4-3. Thus, it is apparent that crucial antelope winter range stipulations are completely voluntary, as exceptions will "generally be granted" upon request.

Exceptions are similarly available for raptor nest sites, including shortening the period of restriction and excepting inactive nests. SDEIS at A4-4.

Fences

Barbed-wire fences are known to be a major impediment to pronghorn migration and dispersal. Taylor (1975) reported, "Fences were an important factor preventing optimum range use by antelope" in the Red Desert (p. 1). He added that "[u]npublished department data indicate that the wintering areas have been reduced by roughly one half because of fences" (p.2). Bruns

(1977) found that fences are major impediments to winter travel, as are roadways with high traffic volume. During the severe winter of 1971-72, fences impeded antelope movements to crucial winter relief ranges: Some 1500-2,000 antelope were trapped by the highway fence beside what is now U.S. 191 near Farson before the fence was cut, allowing them to proceed; hundreds of antelope were trapped in fenced pastures outside Evanston, and open gates apparently were insufficient to allow them to escape (many died despite supplemental feeding); and 66 antelope were found dead beside the railroad right-of-way fence outside Granger (Julian 1973). Julian concluded, "The lack of fences, mainly high net wire fences in Southwestern Wyoming, probably prevented antelope losses from being higher" (p. 10). Fences also aid coyotes in catching pronghorns (e.g., McNay and O'Gara 1982), potentially inflating predation losses. The current low density of fences found in the JMH area must be assiduously maintained.

Taylor (1975) recommended that "Fences which cross migration routes should be removed or at least modified to allow ready passage by pronghorns under adverse weather conditions..." (p. 47). Bruns (1977) recommend a minimum clearance of 46 cm and a barbless lower strand for fences. Rosentreter (1997) recommended that fences which could affect pronghorn dispersal be modified so that the bottom wire is smooth (not barbed) and is kept more than 60 cm (24 inches) above the ground.

Under the SDEIS, for pronghorn and deer winter ranges and migration routes, fences would be constructed "to minimal standards (3-strand wire fence with bottom wire smooth and top 2 barbed; total fence height of 38 inches)" SDEIS at A8-1. While this is a good start, we'd like to point out that there must also be minimum height requirements for the bottom strand of 18 inches to comply with WGFD fence standards, and we urge the BLM to adopt even stronger standards, with a minimum bottom strand height of 24 inches (after Rosentreter 1997). In addition, ALL fences throughout the planning area should meet WGFD standards for wildlife passage, not just those which fall within crucial winter ranges or migration corridors. FLPMA requires that BLM actions conform to the standards set by other governing agencies (in this case, WGFD). According to FLPMA,

> Guidance and resource management plans and amendments to management framework plans shall be consistent with officially approved or adopted resource related plans, and the policies and programs contained therein, of other Federal agencies, State and local governments and Indian tribes…

43 CFR § 1610.3-2(a). Thus, the BLM is required to strengthen its fencing standards to comply with WGFD standards at minimum. Existing fences should also be modified to meet or exceed these standards. Wire net fences should be prohibited, and removed in areas where they currently exist. In the Jack Morrow Hills, there should be no new fence construction, illegal fences should be removed, and all existing fences should at least conform to antelope passage requirements set forth by WGFD.

VIII. VEGETATION MANIPULATION PROJECTS

The BLM outlines options for brush "control," a method for destroying the natural sagebrush communities in hopes of increasing the amount of forage for livestock permittees. This practice is rather ineffective at increasing graminoids, and often has detrimental impacts on wildlife through direct habitat destruction and through habitat fragmentation.

There is a prevailing belief among range managers that vegetation treatments that reduce or eliminate sagebrush stimulate a compensatory growth of forage grasses. For instance, Wamboldt and Payne (1986) found that the burning of sagebrush reduced sagebrush and increased forage. There is currently a move afoot to engage in a program of widespread sagebrush "control" through prescribed fire in order to increase edge, boost forage production for livestock, and create a patchier landscape. Proponents of this program argue that there is a need to return the landscape to its pre-settlement mosaic, which was driven by natural wildfire. However, there are absolutely **no reliable data** available for the Jack Morrow Hills on pre-settlement fire frequency or the landscape pattern of fire-driven habitat mosaics. Thus, proponents of this policy have no scientific backing for a campaign of widespread sagebrush eradication that would recapitulate the ecologically disastrous efforts west-wide in the 1960s and 70s. Such a campaign could cause habitat fragmentation on a massive scale and drive the sage grouse and other sagebrush obligate wildlife toward extinction.

Ironically, numerous studies have demonstrated that sagebrush treatments actually increase sagebrush density over the long term. In the Big Horn Mountains, Thilenius and Brown (1974) found that after sagebrush spraying, total herbage production was actually less on two of three treated sites after spraying, and remained the same on the third site. Along the Beaver Rim, Johnson (1969) found that within 5 years, grass production on unsprayed plots exceeded treated areas. Similarly, Harniss and Murray (1973) found that overall grass production increased at the 12-year mark following prescribed burning before declining below original levels at the 30-year mark, and forbs showed a small short-term increase followed by a long-term decline. Wamboldt and Payne (1986) found that plowing increased sagebrush canopy cover 15 years post-treatment.

Johnson (1969) studies sagebrush spraying along the Beaver Rim, and found that there were more sagebrush on treated sites than adjoining unsprayed areas within 14 years after spraying. According to Watts and Wamboldt (1996), prescribed burning reduced sagebrush density for a period of 30 years, after which densities returned to pre-treatment levels; plowing and seeding, rotocutting, and 2,4-D chemical treatments returned to pre-treatment sagebrush densities within 5-10 years, and over the long term significantly increased the density of sagebrush on the treatment site. Their findings: "Equilibrium level for plowing and seeding was 1.41, which means the canopy cover of Wyoming big sagebrush in that treatment was 41% greater than in the untreated controls...In rotocutting, spraying and plowing and seeding, the estimated equilibrium resulted in more sagebrush canopy cover than the control...burning resulted in less sagebrush, but also produced less herbaceous growth than other treatments" pp.100-101. Thilenius and Brown (1974) did find that sagebrush failed to return to original densities following spraying, but attributed this failure to marginal sagebrush growing conditions in the montane zone of the Big

Horn Mountains. Harniss and Murray (1973) found that after prescribed burning, rabbitbrush increased markedly at the 12-year level before ultimately falling off to below original levels, and sagebrush were reduced initially, but returned to near original levels after 30 years.

Sagebrush may not compete for the same resources as graminoids, explaining the lack of compensatory forage growth when sagebrush is eliminated. Harniss and Murray (1973) concluded that sagebrush must use nutrients unavailable to other steppe plants, because maximum vegetation yields are found when sagebrush is present. This lack of competition between shrubs and grasses explains why sagebrush treatments typically fail to achieve long-term enhancements of forage or wildlife habitat.

Because sagebrush "treatments" typically have negative impacts on sage grouse, such activities should be banned within 3 miles of leks and on wintering habitats. For Wyoming big sagebrush habitats, Connelly et al. (2000) stated that vegetation treatments (whether chemical, mechanical, or prescribed fire) should never exceed 20% of sage grouse breeding habitat in any 30-year period. Vegetation treatments in tall sagebrush stands on south-facing slopes may destroy sage grouse wintering habitat (Kerley 1994). Heath et al. (1997) cautioned against vegetation treatments in sage grouse nesting and wintering habitats: "Winter ranges were comprised almost exclusively of Wyoming big sagebrush and land managers should refrain from removing sagebrush from these important habitats. Because of the long time period required to re-establish Wyoming big sagebrush any treatment could severely affect sage grouse winter habitat. Furthermore, most of the winter range is located in potential sage grouse nesting habitat. Typically, treatments occur in areas where canopy cover is >20% in order to open canopies and increase grass production for herbivores and because fire carries easily in dense sagebrush canopies. These burns will then have a negative impact on sage grouse nesting and winter habitat" (pp. 52-53).

Sagebrush "control" also can have deleterious effects on nongame wildlife. Vegetation treatments such as prescribed burning and 2,4-D herbicide application had negative effects on Brewer's blackbirds (burning only), Brewer's sparrows, and sage thrashers, while green-tailed towhees and white-crowned sparrows were entirely excluded by such treatments (Kerley 1994). Due to negative impacts on sagebrush obligate passerines, sagebrush treatments should be closely scrutinized in order to minimize their ecological impacts.

A decrease in grazing pressure may be more effective at reducing sagebrush density than costly and high-impact eradication programs. Overgrazing may increase sagebrush density, and in areas where this is occurring, a rest from grazing pressure can reduce sagebrush density. Wamboldt and Murray (1986) found that rest from grazing alone resulted in a 29% decrease in sagebrush canopy cover. In areas where sagebrush is perceived to be decadent, rest from grazing should be evaluated as an alternative to more heavy-handed methods.

Crested wheatgrass seeding

According to the SDEIS, "Where needed, reseeding is a viable technique to establish a more desirable plant community." SDEIS at A8-5. But in the case of crested wheatgrass, reseeding is a

viable technique to destroy the native vegetation community and replace it with a biological desert, a monoculture of exotic grass that is poor habitat for native wildlife. In Idaho, large-scale crested wheatgrass plantings were implemented in an effort to increase forage for domestic livestock. In the Red Desert, this non-native species has often been used to reseed reclaimed roads and well pads. But crested wheatgrass plantings create poor habitat. Reynolds and Trost (1980) found that crested wheatgrass plantings supported significantly fewer species of nesting birds than did sagebrush. Crested wheatgrass monoculture also produces a depauperate prey fauna for raptors (Kochert 1989), and has been implicated in reductions to ferruginous hawk nest success (Woffinden and Murphy 1989, *sensu* Howard and Wolfe 1976). Call and Maser (1985) reported that crested wheatgrass plantings are of little use to sage grouse. According to Connelly et al. (1991), "conversion of large tracts of sagebrush habitat to other vegetation (e.g., crested wheatgrass[*Agropyron cristatum*]) will probably result in declining sage grouse populations because of reduced nesting success" (p. 524). Rosentreter (1997) recommended against the conversion of native habitats to non-native seedings such as crested wheatgrass in order to encourage the persistence of vagrant lichens. Thus, the use of crested wheatgrass in seedings and reclamation should be prohibited.

IV. NATIVE PLANTS AND PLANT COMMUNITIES

The BLM has failed to perform a detailed analysis on how each alternative will impact rare and sensitive plant species and communities. In fact, beyond listing BLM Sensitive Plant Species in an Appendix, there is little discussion about how individual species will fare under the various alternatives. There is no alternative that provides the firm standards protecting native plants and plant communities that offers a strong likelihood of maintaining or recovering rare native plant species or communities. Vague references to "particular attention" to be given to important plant communities in the SDEIS are insufficient to meet NEPA requirements. In addition, the "adaptive management" approach that form the basis of the Preferred Alternative does not identify where development activities will occur, and therefore precludes the BLM from performing the required scientific analysis of how this alternative will affect rare native plants and rare plant communities.

Of particular concern is the big sagebrush/lemon scurfpea community, a habitat critically important to the Steamboat Mountain elk herd and which is found nowhere else in the world in such extensive area. According to the BLM's own analysis, the rare big sagebrush/lemon scurfpea cushion plant communities found in the Jack Morrow Hills are likely to take up to 70 years to recover following disturbance. SDEIS at 4-63. Given this bleak prospect for recovery, the BLM must adopt hard-and-fast measures to protect this plant communities from development, mechanical disturbance, and prescribed fire.

We are also concerned that the BLM has made no attempt to analyze the effects of the various alternatives on BLM Sensitive Plant Species including but not limited to meadow pussytoes, Nelson's milkvetch, Payson's tansymustard, dunes wildrye, Nelson's phaecelia, and intermountain phaecelia. It is disturbing that the BLM has identified these plants as having special conservation concern due to scarcity, population decline, or likelihood to be listed under

the ESA, and yet has made no attempt to quantify the populations and distributions of these species in the SDEIS or project the effects of the various alternatives on these species.

In addition to the big sagebrush/lemon scurfpea community, a number of vegetation communities are particularly sensitive to disturbance and warrant analysis in the Affected Environment and Environmental Consequences sections of the SFEIS far beyond the level of inattention given them in the SDEIS.

Dunal Ponds

Dunal ponds that arise from the melting of ice-cored dunes to the west and south of Essex Mountain are incredibly important sites of biodiversity, both plant and animal. These rare desert wetlands support hydric plant communities, aquatic insect, amphibians, shorebirds, and waterfowl. The graminoid-dominated "vernal pond" wetlands in this area is rated "highest priority" for conservation by the Wyoming Gap study (USGS 1996). According to the SDEIS,

> The dunal ponds generally are not as alkaline as other water sources in the area and are known to provide an oasis for plants and animals. The dunal ponds also provide excellent habitat for waterfowl, amphibians, songbirds, and small mammals.

SDEIS at 3-50.They are islands of biodiversity and deserve special protection and management.

The SDEIS makes no mention of the sensitivity of dunal pond communities (they are not marked on the Sensitive Plant Resources map on Map 15) and they receive no special protection under the plan, beyond WSA status for many, which does not protect against the most pervasive and severe impacts – those that result from cattle concentrating their grazing, urinary/fecal, and trampling impacts on the edges and waters of the ponds. Currently, these ponds fall within two cattle grazing allotments (the Sands and Pacific Creek Allotments), and make up a minority proportion of each allotment. As part of the SDEIS, the BLM should restructure these allotments to exclude the dunal pond areas, and compensate the permittees with comparable grazing on less sensitive habitats elsewhere. This change should be formalized by modifying the Greater Sand Dunes ACEC to require a moratorium on livestock grazing within dunal pond areas.

Sand Dune Communities

The Killpecker Dune Fields represent the largest active dune field in North America, originating at the foot of Essex Mountain and stretching eastward across the southern end of the planning area. Under the Wyoming Gap study, both vegetated and active sand dune plant cover types are given the highest priority for protection, because "their current protection is minimal and because they are potentially the most vulnerable to ongoing land management practices" (USGS 1996). For the Great Divide Basin, Maxell (1973) found that scurfpea and ricegrass communities in the sand dunes contained the greatest kangaroo rat concentrations, and drew the following conclusion: "Kangaroo rats were almost exclusively restricted to the sand dunes and adjacent areas in the Basin" (p. 86).

Bury and Luckenback (1983) observed that "[d]unes often lack adjacent or nearby colonization sources and much of the biota may be endemic" (p.218), and made the following recommendations for the conservation of sand dune communities:

> "A paradigm for the management of desert dune systems should follow the recommendations of Whitcomb et al. (1976), who urge that ecological preserves be kept as large as possible because (1) large areas have low extinction rates and high immigration rates; (2) some taxa require very large areas for survival; (3) preservation of entire ecological communities, with all trophic levels represented, requires large areas; (4) large preserves are a better buffer against human disturbance; (5) large areas are necessary to minimize the predation, parasitism, and competition exerted by species abundant in the disturbed area surrounding reserves; (6) the failures of small reserves have been adequately documented; and (7) because fragmentation is irreversible, a conservative preservation strategy needs to be adopted" (p.219).

Bury and Luckenback also documented that ORV use causes major destruction of dune plant communities, and reported decreases in fringe-toed lizard and desert kangaroo rat populations as a result of ORV activity. The sensitive nature of the surviving dune areas in pristine condition demands strong protections.

Tall Sagebrush

Tall sagebrush communities make up 7.62% of the planning area, are a preferred summer habitat for elk, and are the only habitat type that elk select out of proportion to availability during the calving season in the JMH planning area (Powell, in press). These areas are also important to pygmy rabbits, which are obligate residents of this habitat type. Sagebrush is a very important habitat component for wildlife species. Call (1974) asserted, "In spite of past recommendations and opinions of administrators of various governmental agencies regarding sagebrush, the plant is still considered by many wildlife biologists to be the most valuable food and cover plant for wildlife on ranges of the Intermountain Region" (p.8). Call added, "Any land use practice which has as its objective the permanent elimination of sagebrush and establishment of grasses in the Mountain West will ultimately reduce the collective carrying capacity of that range for livestock (especially sheep), elk, mule deer, antelope, sage grouse, and many smaller species of wildlife" (Ibid., p. 8). In another example, Kerley (1994) found that 67% of songbird species selected for the tallest available sagebrush stands, and nest success was associated with 41% shrub cover, while the two nests in 15% shrub cover were both unsuccessful. The BLM must analyze the effects of alternatives on this uncommon and disproportionately important habitat type in the SFEIS.

Riparian Areas

Riparian areas are of critical importance in a biological sense, due to their high productivity and diversity of life forms. Riparian areas are important corridors for the movements of animals and dispersal of plants, and the high diversity of microsites and the complex, high-frequency disturbance related to flooding and channel movements leads to greater species diversity in riparian areas over upland sites (Gregory et al. 1991). Franzreb (1987) observed that riparian habitats are centers of bird diversity and abundance in ecosystems throughout the West.

According to Bock et al. (1993b), "Migratory landbirds inhabiting riparian vegetation in western North America are particularly vulnerable to disturbance" (p. 299). In Wyoming, 19% of reptile species, 55% of amphibians, 21% of birds and 20% of mammals are dependent on riparian habitats (Gerhart and Olson 1982). Thus, riparian areas of high biological concern should receive special protection under the new JMH CAP. We encourage the BLM to continue to implement explicit standards to manage these areas to achieve Properly Functioning Condition as outlined in the Rangeland Reform practices currently in force for all BLM lands.

The maintenance of natural hydrographic patterns and processes is crucial to maintaining riparian communities. According to Ohmart (1996), "Natural floods play a vital role in the functioning and health of riparian systems" (p. 249). Thus, BLM activities with the potential to alter streamflows or retard flooding should be avoided. Riparian areas should be the focus of monitoring efforts, as these areas can become ecologically impaired before upland habitats begin to show signs of damage. Riparian areas should be a management indicator in any adaptive management strategy that is implemented for the Jack Morrow Hills.

Biological Soil Crusts

Throughout the entire SDEIS, there is no mention of, much less evaluation and analysis of alternatives for, biological soil crusts. Although little-known in the Jack Morrow Hills area, biological soil crusts (also known as cryptobiotic or cryptogamic soils) are a critically important component of soil systems in arid shrubsteppe ecosystems. Biological soil crusts typically consist of complex communities of bacteria, blue-green algae, microfungi, green algae, mosses and other bryophytes, and lichens (Belnap et al. 2001). Fungal hyphae can be important components of biological soil crusts (States et al. 2001). Wyoming biological soil crusts in several sites were found to be dominated by lichens (States and Christensen 2001).

Biological soil crusts confer many benefits on shrubsteppe ecosystems. Campbell et al. (1989) summarized the critical role of biological soil crusts as follows:

> "By allowing a natural soil cover to form, erosional processes are brought under control. This retains the soil in place as well as improves its quality as a soil bank for possible future changes in climate or irrigation. Silting in the watershed downstream is reduced, which may have important consequences for the longevity of reservoirs and hydroelectric projects. Dust storms threatening neighboring inhabited or agriculturally used regions are also reduced. Therefore, land management should not merely be restricted to the maintenance of areas of *direct* economic importance, but must include prevention of soil erosion by preservation, if not rehabilitation, of microbial soil crusts" (p. 217-218).

Biological soil crusts act as "living mulch" by retaining moisture and discouraging weed invasion (Belnap et al. 2001). According to Rychert et al. (1978), "Blue-green algae crusts and/or blue-green algae-lichen crusts can fix significant amounts of atmospheric nitrogen in desert soils, and are probably responsible for a major input of nitrogen into desert ecosystems." Snyder and Wullstein (1973) implicated free-living blue-green algae as the primary nitrogen fixers in crusts, and noted that lichens also fix nitrogen. These researchers concluded, "Cryptogams may be important to the nitrogen supply of higher plants, particularly at the seedling stage" (Ibid., p.

263). The crusts serve to stabilize the soil surface, to reduce erosion and to increase water retention and infiltration" (p.30). Algal sheaths serve to increase the water-holding capacity of the soil by retarding the speed of dehydration (Campbell et al. 1989).

Wilshire (1983) pointed out that biological soil crusts reduce soil erosion. In cool deserts, biological soil crusts tend to form pedicelled or roughened surfaces and dramatically reduce runoff while aiding infiltration of rain and meltwater into the soils (Belnap et al. 2001). Campbell et al. (1989) noted that soil crusts reduce the amount of sediment loss during flash flood events. They also provide desert soils with substantial protection from the effects of wind erosion (Belnap 2001). Thus, erosion would be expected to increase in areas where biological soil crusts have become degraded.

Numerous experts have warned about the negative effects of soil crust destruction. According to Belnap (1995):

> Maintaining soil stability and normal water and nutrient cycles in desert systems is critical to avoiding desertification. These particular ecosystem processes are threatened by trampling of livestock and people, and by off-road vehicle use. Soil compaction and disruption of cryptobiotic soil surfaces (composed of cyanobacteria, lichens, and mosses) can result in decreased water availability to vascular plants through decreased water infiltration and increased albedo with possible decreased precipitation. Surface disturbance may also cause accelerated soil loss through wind and water erosion and decreased diversity and abundance of soil biota. In addition, nutrient cycles can be altered through lowered nitrogen and carbon inputs and slowed decomposition of soil organic matter, resulting in lower nutrient levels in associated vascular plants.

Physical disturbance, through damaging soil crusts, has been shown to cause long-term nutrient losses from soils in arid regions (Evans and Belnap 1999). Soil disturbances can reduce soil nitrogen fixation by 30-100%, and thus surface disturbances may have serious impacts on nitrogen fixation in cold desert ecosystems (Belnap 1996). Thus, the widespread destruction of biological soil crusts can have long-term impacts on soil and plant productivity, and the BLM must incorporate into its land management directives standards which prevent these impacts from occurring..

Biological soil crusts are quite sensitive to trampling from livestock, and significant reductions in soil crust cover have consistently been found in trampled areas (Belnap 1985). In controlled experiments, nitrogen levels in plants have been shown to be higher in untrampled versus trampled sites (Belnap 1995). Trampled areas also have higher infestation levels of exotic grasses (Belnap 1995). Biological soil crusts are more susceptible to destruction when dry than they are when moistened (Belnap et al. 2001). Crusts which are destroyed by trampling during the dry season may never recover (Anderson et al. 1982a). According to Belnap et al. (2001), "Managing for healthy biological soil crusts requires that grazing occur when crusts are less vulnerable to shear and compressional forces," in effect, when crusts are likely to be moist for sandy soils and when they are likely to be dry for soils with high clay content. Crusts are fairly resistant to trampling in grassland systems where crusts evolved with grazers, while arid and

semi-arid ecosystems (as are found in Wyoming's Red Desert) typically evolved with few grazers and thus are highly susceptible to trampling damage (Belnap and Eldridge 2001).

Vehicle use has a much greater impact on soil crusts than do foot and livestock traffic. Compressional and shear forces are greater for vehicles than for trampling by foot or hoof traffic (Belnap and Eldridge 2001). Webb (1983) found that shear forces generated by tires are greatest at the surface and less noticeable with increasing depth; these forces are highest for knobby or treated tires. Belnap and Gillette (1997) found that even a single pass by a wheeled vehicle damaged biological soil crusts to the extent that the potential for wind erosion of the soil was radically increased. Areas with intact soil crusts that are not susceptible to wind erosion often are subjected to wind erosion following damage by vehicles or ungulates (Belnap and Gillette 1998). The sensitivity of biological soil crusts to off-road vehicle travel make it imperative that the BLM restrict vehicles to designated roads and trails.

Full recovery from compaction and soil destabilization is estimated to take several hundred years (Belnap 1995). One study in Utah found that chlorophyll levels (a measure of blue-green algae) recovered fully after 40 years, lichens would recover in 45-85 years, while mosses would take over 250 years to recover fully following removal (Belnap 1993). However, the ability of biological soil crusts may be predicated on microsite characteristics. In the foothills of southern Idaho, biological soil crusts showed statistically significant levels recovery 10 years after livestock removal for Wyoming big sagebrush and mountain big sagebrush community types, while low sagebrush sites on windswept ridges and alluvial fans failed to show any significant recovery (Kaltenecker et al. 1999). And the initial burst of soil crust recovery slows long before full recovery occurs. Anderson et al. (1982b) reported that on a Utah winter range, cryptobiotic soil crust increased from 4% to 15% in the first 14-18 years following removal of grazing, but only an additional 1% in the next 20 years.

Long-term damage to soil crusts leads to long-lasting reductions in soil productivity. For instance, disturbance of cold desert soils in Utah led to major decreases in soil nitrogen that remained statistically significant even 32 years after the disturbance had ceased (Evans and Belnap 1999). For the long-term health of rangelands and wildlife habitats, the recovery of biological soil crusts should be fostered to enhance the health of rangelands throughout the planning area.

The SDEIS does not so much as mention biological soil crusts, despite their importance to soils and vegetation communities in sagebrush steppe and desert habitats. A comprehensive survey of soil crusts should be performed throughout the area and presented in the "Affected Environment" section of the SFEIS. In addition, standards must be drawn up to foster the maintenance and recovery of biological soil crusts.

Sensitivity to disturbance makes biological soil crusts an excellent indicator of environmental degradation. According to Belnap et al. (2001), biological soil crusts are good indicators of long-term environmental condition, because they are influenced little by short-term climate factors. Moss and lichen cover can be visually estimated, but the amount of cyanobacteria and/or blue-

green algae cannot be quantified through visual measurements (Belnap 1993). The BLM should protect a series of relatively undisturbed relict sites as a rangeland reference (after Belnap et al. 2001), and use these to measure departure of rangeland health from an undisturbed state. We recommend standardized survey methods (after Rosentreter and Eldridge 2002) be used to monitor biological soil crusts at least at a coarse scale within each grazing allotment, with permanent fixed-area plots established and exclosure areas providing controls at each site. Thus, if adaptive management strategies are employed in the JMH CAP, biological soil crusts should be an indicator, with firm threshold levels that trigger remedial measures established and presented in the Plan.

X. WILDERNESS

Citizens have submitted intensive inventory reports for the Honeycomb Buttes, Harris Slough, Oregon Buttes, Oregon Buttes Badlands, the Big Empty, the Joe Hay Rim, the Pinnacles and South Pinnacles, Alkali Draw, the Pinnacles, Sand Dunes, and Buffalo Hump. We incorporate these inventory reports in full into these comments. BLM has responded to many of these inventories, but not all – we are still awaiting a response on Whitehorse Creek and Sand Dunes. The responses indicate a cursory and superficial level of inventory effort, and clearly do not match the comprehensive quality of the citizens' inventories to which they respond. Similarly, the conclusions of the BLM's inventories thus far have been deeply flawed, featuring arbitrary and capricious judgments that areas lack naturalness and outstanding recreation opportunities, while similar areas were judged to possess full wilderness qualities during the initial BLM series of inventories, and are now protected as WSAs.

There is no alternative that contemplates establishing new WSAs for the entire citizens' proposal. In light of NEPA's requirement to analyze a range of reasonable alternatives, even if such alternatives are outside the agency's jurisdiction, the BLM must consider, and should implement, such an alternative. Clearly, it would be within the prerogative of Congress to designate all of these lands as Wilderness. In addition, recent reconnaissance by citizens has opened up the possibility that an area including **Steamboat Mountain** and the canyons to the northwest of it may also possess the size, naturalness, and solitude and outstanding recreation opportunities to qualify as wilderness. Steamboat Mountain is a well known landmark which also possesses incredible wildlife, cultural and historical values (e.g., buffalo jump); we urge you to not only give serious consideration to all of these wilderness values, but to go one step further and recommend this deserving landmark for designation as Wilderness. As part of an amended Affected Environment section, the BLM should evaluate the wilderness qualities of these lands and consider establishing a new WSA here in at least one of the agency's alternatives.

All of the lands within the citizens' wilderness proposals submitted to BLM over the past several years meet the criteria of size, naturalness, solitude, and/or outstanding opportunities for primitive and unconfined recreation that are the benchmarks for the wilderness act. Each of these areas substantially exceeds the levels of these attributes for some lands already within the National Wilderness Preservation System. All of these areas should become Wilderness Study Areas (WSAs) under the JMHCAP, and the BLM should establish standards to ensure that the

wilderness qualities of such areas are not impaired or degraded, in accordance with *Southern Utah Wilderness Alliance v. Norton*, 301 F.3d 1217 (10th Cir. 2002).

The VRM Class for citizens' proposed wilderness should be VRM Class 1 in all cases. The Joe Hay Rim, Big Empty, and portions of the Oregon Buttes Badlands, Honeycomb Buttes, and Pinnacles have been classified as VRM Class 3 under the SDEIS; this is clearly unacceptable. Even worse, a portion of the Parnell Creek unit, which has been proposed for wilderness and is in a pristine state, is classified as VRM Class 4 under the SDEIS. These misclassifications are inexcusable, and must be rectifies in the SFEIS.

Powell (in press) documented that elk use of Wilderness Study Areas increased significantly with the onset of the hunting season despite lower habitat preferences there, indicating that that these areas are important security areas for elk at this time of year due to their lack of vehicle traffic. This indicates two things: (1) higher-quality habitats outside WSAs are being underutilized because the density of vehicle routes is currently too great, and (2) WSAs are key security areas for elk, and elk may benefit from an increased number and extent of WSAs, just as hunters seeking a more primitive hunting experience would likewise benefit. Brief notes on proposed expansions are found below; please re-read the Citizens' Wilderness Inventories for the JHM study area and respond to it in detail (beyond the cursory and brief Area Evaluations) in the SFEIS:

Alkali Draw – Regarding the Blue Rock Release tract, the BLM has claimed that this area is still scarred by old seismic exploration. With its Wilderness Inventory for Alkali Draw, BCA presented a photograph showing the entire extent of the Blue Rock Release tract from a lofty vantage point. The photograph demonstrates that no trace of past seismic exploration can be detected in the area. This photograph has made the Blue Rock Release Tract a poster child for the ineptitude of BLM's inventories, ineptitude that seemingly is increasing over time. The time has come for the BLM to own up to past mistakes and make this area part of the WSA.

For the Bush Rim release tract, the BLM, in its recent Inventory Area Evaluation, notes that "The main reason the Bush Rim release tract was dropped from further wilderness review was that there was, and still is, a major improved road leading through this area to the Treasure Unit wells located in the Alkali Draw WSA." This statement is only partially correct – the imporved road runs through the south half of the Bush Rim release tract, leaving the north half unaffected. We concur that this road precludes wilderness designation for the lands to the west of it (unless and until this route is fully reclaimed), and noted as much in the Citizens' Wilderness Inventory. This road and lands to the west were purposefully excluded from the citizens' proposal for this very reason. These facts render the Treasure Unit access route irrelevant to the consideration of the citizens' proposal for wilderness.

Big Empty – BLM claimed that although this area was fully roadless, that human intrusions were sufficient to detract from naturalness and that the area lacked solitude and outstanding recreation opportunities. The naturalness of the area is equal to lands already designated as WSAs in the JMH area; on an impact-per-acre basis, the plugged wells and two-tracks are

equivalent to any existing WSA. In terms of solitude, the vast expanse of the area alone – some 35,000 acres – confers ample solitude. In addition, this is the only stretch of the old Point of Rocks – South Pass Stage Road, dating from 1860, that remains in its original condition and runs through a pristine landscape similar to that during pre-settlement times. Thus, traveling this route through desert wilderness is a historical recreation opportunity unparallelled in Wyoming. Much is left to judgment in the BLM's wilderness area evaluation reports, and this leads to a vulnerability to poor judgment, which is evidenced in this particular case.

Harris Slough – The BLM argues for this area that it lacks naturalness and solitude/outstanding recreation opportunities. This area is outstandingly suitable for hiking and horseback riding, is scenic, and by the very nature of the rarity of untrammeled Red Desert landscapes, is outstanding. The naturalness of the area is comparable to existing BLM WSAs in the area, and is certainly far greater than many areas, like the Great Swamp and Collegiate Peaks, which Congress has already designated as wilderness.

Buffalo Hump – While the BLM agrees that this area has the requisite naturalness, it claims that solitude/outstanding recreation is lacking here. The landscape in the citizens' proposal for this area is virtually identical to that of the adjacent Buffalo Hump WSA, which the BLM has already acknowledged as possessing these qualities. The innumerable vegetated dunes and swales in this area make a person invisible to others even a few hundred meters away; thus, solitude is outstanding and this area should be granted WSA status.

Honeycomb Buttes – BLM has claimed that most of the impacts in this area are reclaiming, but are still visible, Nonetheless, at no point are many impacts visible at any one time, and correspondingly, none of the individual impacts are major landscape scars. In point of fact, the number and extent of impacts per acre in this unit is comparable to levels within existing WSAs, demonstrating that naturalness here meets wilderness criteria. Furthermore, BLM claimed that the area lacked outstanding recreation opportunities, and yet protecting this area will enhance the solitude and recreation opportunities in adjacent lands within the Honeycomb Buttes WSA, and conversely, development of this area would reduce the quality of recreation opportunities within the current WSA by destroying the viewshed and creating visual intrusions that detract from the wilderness experience of the visitor. For these reasons, this area should be united with the current Honeycomb Buttes WSA and granted the full protection of WSA status.

Oregon Buttes – BLM recognized that the proposed addition possesses naturalness, but argues that it lacks solitude and/or outstanding recreation opportunities. This area adjoins the Oregon Buttes WSA and is prominent in the viewshed of the Oregon Buttes, and were this area to be subjected to development, the quality of the wilderness experience in the current WSA would be diminished. The BLM should protect the current integrity of the viewshed and the quality of the overall recreation experience in the Oregon Buttes by making the proposed expansion a WSA.

Oregon Buttes Badlands – The BLM admitted that this area possesses naturalness, but argued that the recreation opportunities were not outstanding. To the contrary, the scenic badlands of the

Joe Hay Rim lend outstanding qualities to the recreation experience, and the uniqueness of the few pristine landscapes that remain make this area outstanding. It deserves to be a WSA.

Parnell Creek – The BLM makes a litany of 9 reservoirs and 4 abandoned well sites, and yet these number are comparable on a per-acre basis to other existing WSAs. Furthermore, the position of the proposed wilderness in deep draws out of sight of improved roads and human activities gives this area perhaps the greatest degree of remoteness in the JMH area. Furthermore, the few human impacts are so reclaimed as to be virtually unnoticeable. For these reasons, the BLM's inventory arrives at erroneous conclusions.

The Pinnacles – The BLM acknowledged that 8,900 acres of this wilderness proposal possessed wilderness qualities, but arbitrarily cut off part of the area at faint two-tracks, excluding adjacent, qualifying lands that are just as pristine. This entire area should be a WSA, joined together with the current South Pinnacles WSA.

The Joe Hay Rim – BLM argues that this area lacks solitude and naturalness, but the biggest impairments they can come up with to support this contention are a handful of stock ponds and a strip of crested wheatgrass that doesn't match the neighboring vegetation. Atop the Joe Hay Rim, you can get top-of-the-world vistas that stretch for miles, a recreation opportunity almost unmatched in the Jack Morrow Hills.

Whitehorse Creek and Sand Dunes – The BLM has yet to respond to these inventories; the agency must respond to this significant new information in the SFEIS.

XI. SOCIOECONOMICS

Section 4.8.1,
Page 4-121. The DEIS assumes a recovery rate of 2.2 billion cubic feet per well, based on historic data. Please analyze and display the variance that goes with this average. Please take a hard look and analyze and discuss the statistical accuracy of this estimate. Is the average recovery rate a statistically accurate estimate? What is the variance and standard deviation of the average? Does the estimate pass a simple t-test or is the standard deviation too high? Please analyze and discuss.

The majority of gas discussed in the DEIS is gas that has yet to be discovered. Estimating quantities of undiscovered gas is fraught with uncertainties and economic risks for communities, companies, and the public. The Congressional Research Service (Corn et al. 2001)[3] recommends economically recoverable resources as the basis of policy analysis. Virtually every report on gas supply in the past 20 years has reported results in terms of economically recoverable resources

[3] Corn, M.L., B.A. Gelb and P. Baldwin. 2001. The Arctic National Wildlife Refuge: The Next Chapter. Congressional Research Service. Updated August 1, 2001.

(Environmental Law Institute 1999).[4] If economic constraints on production are ignored, land management plans will overestimate the quantity of gas that will be recovered in the reasonably foreseeable future. Please discuss the economic assumptions and parameters used in developing the RFD and planning alternatives.

The USGS 50-percent estimate (the mean estimate) for economically recoverable gas represents the best, unbiased estimate currently available. Please justify why the USGS data, developed by government scientists, were not used in the analysis. Please justify why USGS estimates of economically recoverable resource were not used in the DEIS. Please repeat the analysis using USGS data for both technically and economically recoverable gas resources.

The costs that USGS uses to assess economically recoverable gas and oil include the direct costs of exploration, development, and production at the wellhead, plus a profit margin. For gas to be considered profitable to recover, the full costs of gas recovery must be less than or equal to the price for gas. It is important to note that USGS estimates do not include transportation costs, non-market costs, or off-site mitigation costs such as increased water treatment costs. Please discuss potential mitigation costs and transportation costs associated with bring the gas to market. The DEIS discusses water quality concerns and should include an analysis of mitigation costs.

To account for the uncertainty inherent in price forecasts, USGS uses a range of prices, rather than a single-point estimate, to attain its estimates of economically recoverable gas. In the Rocky Mountains, the USGS estimates that less than 20 percent of technically recoverable gas is economically recoverable when prices (adjusted for inflation to 2002 dollars) are between $2.17 and $3.62 per thousand cubic feet (mcf) (Table 1, below). As context, from 1996 to 1999, wellhead gas prices in the United States averaged about $2.16 per mcf, with $2.00 per mcf viewed as the long-term price trend (Energy Information Administration 2002). At these prices, more than 60 percent of technically recoverable gas in the lower 48 states cannot be extracted profitably. USGS research underscores the economic risks from drilling in general, and the specific risks to the public and communities from developing management plans that ignore economics.[5]

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[4] Environmental Law Institute. 1999. How abundant? Assessing the estimates of natural gas supply. Washington, DC

[5] While gas prices recently spiked, such prices will not be maintained in the long run due to market forces (conservation, efficiency and an economic recession) and substitute supplies, from wind and solar, that can be produced at lower prices and with greater price stability.

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Economic recovery rates for technically recoverable gas in the United States based on prices of $2.17 and $3.62 per mcf (2002 dollars)

Region	USGS Economic recovery rates[a]
United States	38 – 46%
Rockies and Northern Plains	13 – 18%
Southwestern Wyoming	1 - 5%

[a] Percent of technically recoverable gas in reserves and gas left undiscovered that is profitable to extract (before accounting for environmental costs). Excludes recovery rates for offshore gas. Source: Root et al. 1997[6], Attanasi 1998[7], LaTourrette et al. 2002[8]

The fact that the USGS estimates that less than 5% of the gas in SW Wyoming can be recovered economically underscores the need to generate management plans and to estimate potential economic impacts to communities based on the gas and oil resources that are economic to recover. A more recent report by RAND estimated that 35-45% of the gas in the Greater Green River area is economic to recover.

Management plans that rely on technically recoverable estimates will dramatically overstate the gas recoverable and hence the jobs and revenues from future gas production (Morton et al. 2002)[9]. Please discuss how economic constraints on gas production were included in the analysis of expected gas recovery from each alternative, including the economic impacts associated with each alternative. Please complete a marginal revenue-cost analysis of estimated gas production levels. Please compare and contrast the marginal revenues with the marginal costs for the full range of drilling levels. For example, examine the cost from drilling wells in deeper formations with the potential revenues from deeper wells.

Section 4.12 Socioeconomics
Page 4-160
Oil and gas development is associated with boom and bust cycles that cause social and community distress that should be discouraged if not avoided. Given the desire to reduce boom and bust cycles, please explain why staying within historical deviations – for employment or

[6] Root,D.H. E. Attanasi, R.F. Mast, and D.L. Gautier. Estimates of Inferred reserves for the 1995 USGS National Oil and Gas Resource Assessment, US Geological Survey Open-File Report 95-75L, Washington DC

[7] Attanasi, E.D. 1998. Economics and the 1995 National Assessment of United States Oil and Gas Resources. US Geological Survey Circular 1145. US Department of the Interior, Washington DC

[8] LaTourrette, T., M. Bernstein, P. Holtberg, C. Pernin, B. Vollaard, M. Hanson, K. Anderson, and D. Knopman. 2002. Assessing Gas and Oil Resources in the Intermountain West: Review of Methods and Framework for a New Approach. RAND Science and Technology. Santa Monica, CA

[9] Morton, P. C. Weller, and J. Thomson. 2002. Why Drill? There isn't much recoverable oil and gas in western wildlands. Energy, Fall 2002, pp. 4-8.

income, is a desirable goal? Please explain why the goal is not to reduce the deviation – that is to decrease the boom and bust cycles – that result from proposed management actions. Please discuss how the historic deviation in employment and income in the study area compare the deviation at the state and national level. Is the local deviation in employment greater than or less than the deviation at state and national levels?

Please expand the socio-economic analysis to include costs to communities from oil and gas development. The current boom-bust cycle has generated significant costs to communities in the Powder River Basin of Wyoming – costs that must be considered by public agencies rapidly promoting energy development. Many landowners are spending thousands of dollars on attorneys in order to negotiate a surface damage agreement to protect their property (i.e. the split estate problem). Other landowners have seen dramatic declines in property values. The City of Gillete has experienced a 12 to 15 percent increase in truck traffic plus a 26 percent increase in traffic violations between 1999 and 2000 (Pederson Planning Consultants 2001). As a result, the expected life of city streets has decreased, while road operation and maintenance costs have increased. Dust from poorly constructed access roads causes health problems with horses, reduces the grass available for cattle, and negatively impacts air quality and visibility. County officials and residents are concerned that they will have to pay for clean up and restorations costs, as the bonds posted by CBM companies for plugging and abandoning a well are inadequate. Please include an analysis of the costs of mitigating the air and water quality impacts from gas extraction. How do these costs change the analysis of gas potential? Please discuss who pays for these costs. Given that water quality may vary between plays, please include an analysis and discussion of water quality mitigation costs for each play, and the affect of those costs on the economic viability of the resource.

As a result of recent coal-bed methane boom, Campbell County has seen an increase in larceny, traffic accidents, destruction of private property, family violence, and child abuse – resulting in the county spending money to add 36 cells to its existing jail. The fire department has seen a 40 percent increase in emergency calls between 1997 and 2000 (Pederson Planning Consultants 2001). Similar trends have occurred in other counties in the Powder River Basin. There has also been a shift in the labor force. County workers have left for CBM jobs, resulting in instability in the labor force and making it more difficult to hire public workers (e.g. policemen, firemen) at a time where the counties and cities are stretched thin to handle the increased work load. The accelerated energy development has left many counties and communities unable to pay for or finance the increase in public service costs. We have every reason to believe that similar costs and burdens will be placed on other communities where public and private land is threatened by energy development. The socio-economic risks and costs associated with expedited energy development must be fully accounted for as part of the NEPA process involved with current push for energy development in the west. Please expand the analysis and discussion to fully account for such community costs.

In the last 15 years the economies of the Rocky Mountain States have diversified, and resource extraction makes up an even smaller part of the economy. For many of these states and communities, service jobs, retirees, recreation, and hunting are the mainstays of the economy. In

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the new economy, public wildlands play a direct role in sustaining the recreation and tourism businesses, and wildlands play an indirect role in attracting non-recreational businesses and retirees to western states. There is a growing body of literature suggesting that the future diversification of rural western economies is dependent on the ecological and amenity services provided by public lands in the west (Power 1996, Rasker 1995, Haynes and Horne 1997). These services (e.g. watershed protection, hunting, fishing, wildlife habitat, and scenic vistas) improve the quality of life for a trained and educated workforce, which in turn can attract new businesses and capital to communities. The natural amenities from public land provide communities with a comparative advantage over other rural areas in diversifying their economies. It is therefore important to recognize and analyze the potential negative impacts of oil and gas exploration on public land amenities and hence the economy as a whole, including the service and recreation industries, as well as on retirees and other households with investment income. The socio economic analysis included in the DEIS acknowledges that the economy is changing but then fails to estimate the costs to these sectors of the economy from proposed oil and gas development. Please analyze, quantify and discuss the negative impacts to the regional economy from energy development, Please examine and quantify the net impacts not just the gross positive impacts from oil and gas drilling.

The DEIS acknowledges the importance of nonlabor income, which includes investment income, dividends and rent, and retirement income, to the regional economy. In fact, if retirees and investment income were classified as an industry, it would be the number one industry in the study area and in most western states. The forces attracting retirees to Wyoming and other western states are largely based on sustaining our environment and quality of life. It is therefore important to fully evaluate the negative impacts of a rapid expansion of oil and gas production on a region's natural amenities and, hence, the potential negative impacts on retiree and investment income. Consider for example the negative economic impacts when a company drills gas wells on ranchettes owned by retired couples. If the drill rig goes in, despite objections of the landowner, and causes the couple's quality of life to decrease, the couple might move and take a significant chunk of a county total personal income with them. Please analyze and quantify the negative impact of oil and gas drilling on other sectors of the economy, including retirees and service sector employees. Once again the net impacts from each alternative must be evaluated in the economic impact analysis.

Amenity-based development is bringing new workers and service businesses to the west. The DEIS acknowledges the importance of the service sector to the regional economy. Jobs in the service sector are often mischaracterized as those of burger flippers and maids. However many of the fastest growing jobs in the service sector are high paying jobs in business, health, and engineering services. These jobs are increasing, in part, because people are moving to Wyoming because it is a nice place to live. Please analyzed the negative impact to the service sector from oil and gas drilling. Surveys have showed that service workers want to live in a nice place with a clean environment. Sustaining our environment and quality of life is, therefore, a prerequisite to sustaining our economy. If oil and gas development degrades our environment and decreases our quality of life, however, these businesses may move someplace else. The bottom line is that the BLM needs to carefully assess the **net impacts** of from oil and gas development, taking into

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full consideration the potential negative impacts of oil and gas extraction on other, perhaps more important, sectors of the western economy.

Most economists agree that economic diversity is key to healthy communities. With this in mind, please discuss how the proposed alternatives will promote economic diversity. Economic diversity indices are often used to estimate the change in diversity from proposed actions. Please include an analysis of county-community economic diversity using the Shannon diversity index, for example, to measure the health of local communities and how that health might change with gas drilling.

Page 4-161 I/O Model fails to include Fremont County economic and recreation data. The BLM uses the 3 county area of Sweetwater, Sublette and Fremont as its base for determining the regional economy, but relied on an I/O model that excluded Fremont County. This is unacceptable. An I/O model for the 3 county study area is not difficult for most regional economists to generate. The BLM does acknowledge that "There may be certain businesses located in Fremont County that are not represented in Sublette and Sweetwater counties," but they only mention livestock auction & implement dealers, and not the large outdoor education/outfitter and guide businesses that are predominant there. Please expand the economic analysis to include consideration of the outdoor recreation- outfitter –guide business in not only Fremont County but surrounding counties. Please examine employment trends for recreation based businesses in the 3 county study area, especially Fremont County.

The DEIS estimates for dispersed recreational activities were only estimated using the Rock Springs database, and did not include the Fremont County office figures which may have provided better information regarding outfitter/guide use in the northern sections of the area. Please repeat the recreation and socio-economic analysis including recreation data from Fremont County.

Page 4-162, Table 4-13. Please discuss the economic data from COHVCO that was used to estimate economic impacts for OHV use. Was the COVCO data collected in the 3-county study area? What was the study area used in the COHVCO study? Was the COHVCO study peer-reviewed? Was the study published in a journal? Please state the assumption of the study. Please state the explicit and implicit assumptions used by relying on the COHVCO study to estimate economic impacts in the 3-county study area. Did the study break out expenditures by resident and non-resident? Did the COHVCO study estimate expenditures by RVD? How were OHV RVDs estimated?

Page 4-163 The DEIS assumes that "management actions that causes herd numbers to decline may actually increase the number of hunting days spent in an area (i.e., hunters spend more days hunting fewer animals)." This is truly an embarrassing assumption and shows the pro-gas development bias in the BLM analysis. While hunters may spend more time hunting fewer animals at first, this will be a short-lived, and unsustainable situation – as they won't come back to the area. Hunting success is key to return visits. Please analyze, display and discuss the data

used the support such an assumption. Please discuss the scientific studies used to develop this assumption.

The bogus assumption is repeated in Table A-16-12 where the agency states "hunting days increase due to oil and gas development dispersing elk." The BLM fails to consider that declining herd size can also mean less available elk to hunt, fewer licenses issued and thus fewer hunter days. Once again, please display and analyze the data used to justify such a biased assumption. Please also analyze the negative impacts to the economy from fewer hunters, fewer hunting licenses and less hunting expenditure in the local economy

Page 4-163 Recreation. Please display in a table and a graph the historic recreation data used in the analysis. Please discuss and display the data used to estimate expected trends in hunting, and recreation visitation. Please discuss and display the data used to estimate a 2.5% annual increase in OHV use. What methods were used to estimate the OHV trend? Please explain why OHV use was estimated with a 3-year historic average while antelope and mule deer hunting were estimated with a 5-year average.

What about the economic impacts from other forms of outdoor recreation? Please discuss the assumptions used to estimate the economic impacts associated with hiking, camping, biking, bird and wildlife watching, fishing and other activities that occur in the study area. How were recreation trends from these activities estimated? Please display in tables and graphs, the historic recreation data from the RMIS database for all recreation activities that occur in the 3 counties in the study area.

Page 4-164. Average gas production was assumed to follow historic trends. Please state the explicit and implicit economic assumptions that go along with this assumption. Are they reasonable assumptions. Please display and graph the historic oil and gas production data for the 3 county area. Have gas production levels been stable over the last 20? Or does production rise and fall depending on price? If past production has been cyclical, does the DEIS analysis assume that production will also be cyclical in the future? If not, why not? What impact does price instability have on the analysis and the results? If the DEIS assumes stable production, what is the justification for such an assumption? Please discuss and analyze past gas production trends and annual variation in gas production.

Appendix 1, page A1-6. Criteria for selecting preferred alternative. "....has the BLM considered the potential of those lands for occurrence and development of energy and mineral resources?" The BLM acknowledges in the DEIS that economics—extraction costs and market prices – play a big role in the amount of the gas resources actually developed. Please discuss how economics was used to evaluate gas potential. Please explain the economic data used to classify lands as having low, moderate and high mineral potential. Since development of gas resources is dependent on economic criteria, please explain why economic criteria, such as drilling and transportation costs and market prices, were not used when estimating the gas potential in the study area. Please explain how ignoring economic criteria, including economic constraints on gas production, does not overestimate development potential of an area.

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Appendix 13. Hydrocarbon Occurrence and Development Potential Scenarios

Please discuss and display data used to describe the market conditions and extraction costs used by Stillwell (2002) in developing the RFD. Please also discuss all the assumptions used in the Stillwell analysis.

Page A13-2 Assumption of stable commodity prices that are favorable for continued oil and gas development. Please discuss and display historic commodity price trends and annual variation in prices. Have commodity prices been stable in the past? If not, what is the justification for assuming stable prices in the future? What data were used as the basis for the assumption of stable prices in the future? What is the rational for assuming stable commodity prices when they have not been stable in the past? What impact does price instability have on the analysis and the results? Please discuss and complete a sensitivity analysis of the impact of price instability on gas development potential.

Page A13-8.
Well depths. Please expand the discussion on well depths. Given that 62% of the wells drilled in the area are at depths less than 10,000 feet, what percent of undiscovered gas plays are at depths less than 10,000 feet? How does the depth of discovered resources and producing wells compare to the depths of undiscovered resources? Please examine the relationship between producing wells and drilling success with well depth. Are shallow wells more likely to be successful? Do deeper wells have lower success rates? Please analyze and discuss these relationships in the context of estimated success when drilling undiscovered resources.

Page A13-9. "Wells must be drilled deeper outside the Nitchie Gulch field to reach the same target formations (Frontier and Dakota)." Given that deeper wells cost more, please discuss and analyze the additional costs and economic constraints associated with drilling deeper wells outside the Nitchie Gulch field.

Page A13-9, Table A13-2. Drilling rates and success percentages. Please analyze and graph the relationship between depth of resource and success. Please complete this analysis for each time period in the table. Also please discuss and analyze separately the success rates for exploration wells and development wells. Please complete the analysis of success rates for exploration wells and development wells for each time period in Table A13-2.

Page A13-12. "The comment letter from Barlow and Haun, Inc. (1998) was used as the most up-to-date reference for JMH plays and their potential gas resources." Please justify why this data included in a comment letter are more scientifically credible than USGS data rigorously developed by a team of government scientists. Was the data from Barlow and Haun peer reviewed? Please discuss the economic assumptions, parameters, costs, and market conditions assumed and used in the Barlow and Haun estimate of gas potential. What prices and costs were used to estimate the potential gas resources? Please compare and contrast in a table the estimates of economically recoverable gas resources from Barlow and Haun, the USGS and WYGS. Why

are the estimates different? How do the economic assumptions and parameters used in each study differ?

Please consider the results from the 2002 report from RAND by LaTourrette et al. that estimated gas resources in the Green River area. This report is more current that the Barlow and Haun report and should be included in the analysis.

Page A13-13. Please discuss the economic assumptions, parameters, costs, and market conditions assumed and used in the WYGS gas report. What prices and costs were used to estimate the potential gas resources?

Page A13-16. "…the average well would produce 2.3 bcf of gas…"
Please analyze and display the variance that goes with this average. Please take a hard look and analyze and discuss the statistical accuracy of this estimate. Is the average recovery rate a statistically accurate estimate? What is the variance and standard deviation of the average? Does the estimate pass a simple t-test or is the standard deviation too high?

Table A13.4 . Analysis of the WYGS data included in this table indicates that production rates for recoverable resources vary from .28 bcf/well for the Lewis Shale Turbidites play, to 8.87 bcf/well for the overpressured low permeability wells in Mesaverde sandstone play. This indicates significant variation in production rates depending on the geologic play and targeted formation. What is the justification for estimating an average production rate for all plays and all formation? Please estimate, analyze, display and discuss the production rates for undiscovered resources on a play by play basis – and on a formation by formation basis.

Page A13-16…"there is significant variation in total production and well life.." Please expand the analysis and discussion to account for such variation in production and well life. What are the characteristics of producing wells? How do the characteristics compare to non-producing wells?

Please take a hard look at projected success rates for exploratory wells and development wells.

Page A13-19. Table A13-5.
To improve the information content of the DEIS, please add the depth of each well drilled to this table. Such information is useful for understanding estimated success rates based on the characteristics of past success rates.

Appendix 16- Socioeconomic data and assumptions

Page A16-7 Table A16-7
Conventional wells were assumed to average 9,000 feet in depth. What data were used to estimate average depth? Was data for the depth of undiscovered deposits used and analyzed? If not, why not? Please analyze and display the depths of all the undiscovered gas resources on a play by play basis? Please expand the analysis to estimate the costs for drilling gas resources

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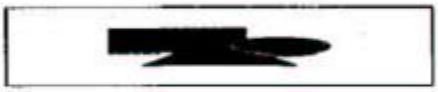
based on the depth of each resource play. Drilling costs increase non-linearly with deeper deposits – deeper deposits costs much more to drill than shallow deposits. Please discuss and analyze the impact of drilling costs for deeper deposits on the economic development potential of those resources.

Page A16-7, Table A16-8 Economic assumptions for gas production
Value of production was assumed to be $2.81. This price is high when compared to historic well head prices in Wyoming. The average wellhead price in Wyoming was $2.42 as reported by EIA (based on data from 1996 to 2000), but more importantly, regionally observed wellhead prices range mainly from $1.20 to $2.09 per mcf. Based on the temporal analysis of Sproule Associates, wellhead prices in Wyoming price reach $2.81 less than 25% of the time. (see article August 7, 2002 from the Gillette, WY new paper). Please provide a more detailed analysis of historic wellhead prices from the local, regional and state perspective – include an analysis of the variation in those prices. Please obtain the Sproule analysis and fully consider the economic implications of their analysis in the estimates of gas resource potential and recoverable gas resources.



August 07, 2002
Methane drilling slows to a trickle
Coal bed methane drilling has fallen off the table in the Powder River Basin during what should be the industry's busiest season.
As of Tuesday, there were only 58 drilling rigs operating in the basin, while there were 135 at this time last year. That is a 57 percent decrease.
The reason for the drop is simple, said Don Likwartz, the supervisor of the Wyoming Oil and Gas Conservation Commission. "Low gas prices, low gas prices, low gas prices," he said. "Everything is down because of the gas prices." Likwartz said drilling rigs are "parked everywhere" because coal bed methane operators aren't drilling because of the low prices.
Today's gas prices out of Cheyenne at the Colorado Interstate Gas hub, where most of the Powder River Basin's coal bed methane gas is transported to markets nationwide, was about $1.25 per thousand cubic feet (mcf) of gas.
"It's got all of us sitting back waiting to see if the price will come out of the tank to something that we can make a profit on," said Bud Isaacs, RIM Operating's president.
He said another cause for the slowdown is the delay in releasing the coal bed methane Environmental Impact Statement, which would open up another 24,000 federal mineral wells. **Since 1990, gas prices out of the Cheyenne hub have been above $1.20 per mcf about 75 percent of the time, according to a price analysis by Sproule Associates. At the same time, the Sproule analysis shows that prices have exceeded $2.09 per mcf only about 25 percent of the time, so the relatively low prices are**

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nothing new.

By ADAM RANKIN
News-Record Writer

Page A16-9. Recreation.
Recreation RVDs were separated into resident and nonresident use. This is a very important step given that the economic impact I/O analysis only accounted for expenditures from non-residents. Please discuss the assumption, parameters and methods used to separate resident use from non-resident use for all recreation activities. Was any data collected in the RMRIS database that indicates place of resident? How were non-resident hikers, campers, anglers, etc. estimated from RMRIS data? Please complete a sensitivity analysis to estimate the impact of these methods on the economic impacts.

The DEIS states that observations by BLM staff were used to estimate residents from non-residents for each recreation category. Please present the results of the separation. Please discuss and display the data used by BLM staff to make this estimation. Please display RMRIS data and discuss the results for each recreation activity. What percent of the hikers, campers, bikers, birders, hunters, anglers, and OHVers were assumed to be residents and non-residents? This is important information to display and understand given the economic impact analysis. Please estimate the impact of these ad-hoc adjustments for residents and non-residents on the results. Please conduct a sensitivity analysis to see how the ad hoc allocation of visitation days to the resident-non-resident categories affects the results for the economic impact analysis.

Table A16-12. Recreation Assumptions
Please discuss the data used to estimate trends in recreation use.

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