FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Yates Petroleum Corporation
All Day POD
ENVIRONMENTAL ASSESSMENT –WY-070-08-026

DECISION: BLM's decision is to approve a combination of alternatives C and D as summarized below and described in the attached EA and authorize Yates Petroleum Corporation's All Day Coal Bed Natural Gas (CBNG) POD comprised of the following 35 Applications for Permit to Drill (APDs):

	Twp	Rng	Sec	Well Name	Well#	Qtr	Lease
1	42N	75W	3	ALL DAY VINDICATOR CS	1*	SWNE	WYW128603
2	42N	75W	3	ALL DAY VINDICATOR CS	2	NESE	WYW128603
3	42N	75W	3	ALL DAY VINDICATOR CS C0M	3	NESW	WYW128603
4	42N	75W	3	ALL DAY VINDICATOR CS C0M	4	SWSW	WYW128603
5	42N	75W	12	ALL DAY MARAUDER CS	1	NENW	WYW142823
6	42N	75W	12	ALL DAY MARAUDER CS	2	SWNE	WYW142823
7	42N	75W	12	ALL DAY MARAUDER CS	3	NESE	WYW142823
8	42N	75W	12	ALL DAY MARAUDER CS	4	NESW	WYW142823
9	42N	75W	12	ALL DAY MARAUDER CS COM	5	SWSW	WYW142823
10	43N	74W	7	ALL DAY CS	1	SWSW	WYW131722
11	43N	74W	17	ALL DAY CS	2	NENW	WYW131722
12	43N	74W	17	ALL DAY CS	3	SWNW	WYW131722
13	43N	74W	17	ALL DAY CS COM	4	SWNE	WYW131722
14	43N	74W	17	ALL DAY CS	5	NESE	WYW131722
15	43N	74W	17	ALL DAY CS	6	NESW	WYW131722
16	43N	74W	17	ALL DAY CS	7	SWSW	WYW131722
17	43N	74W	17	ALL DAY CS	8	SWSE	WYW131722
18	43N	75W	9	ALL DAY CINNABAR CS	14	NESW	WYW130608
19	43N	75W	9	ALL DAY CINNABAR CS	15	SWSW	WYW130608
20	43N	75W	9	ALL DAY CINNABAR CS	16	SWSE	WYW130608
21	43N	75W	14	ALL DAY FOREVER CS	3	NESE	WYW142078
22	43N	75W	14	ALL DAY FOREVER CS	4	SWSE	WYW142078
23	43N	75W	23	ALL DAY FOREVER CS	5	NENE	WYW142078
24	43N	75W	23	ALL DAY FOREVER CS	6	SWNE	WYW142078
25	43N	75W	24	ALL DAY FOREVER CS	7	NENW	WYW142078
26	43N	75W	24	ALL DAY FOREVER CS	8	SWNW	WYW142078
27	43N	75W	34	ALL DAY PEPPERSTONE CS	4	SWNE	WYW141656
28	43N	75W	35	ALL DAY PEPPERSTONE CS	5	SWNW	WYW141656
29	43N	75W	35	ALL DAY PEPPERSTONE CS COM	6	NESE	WYW141656
30	43N	75W	35	ALL DAY PEPPERSTONE CS COM	7	SWSE	WYW141656
31	43N	76W	12	ALL DAY ENDLESS CS	2	SWNE	WYW130096
32	43N	76W	12	ALL DAY ENDLESS CS	3	NESE	WYW130096
33	43N	76W	12	ALL DAY ENDLESS CS	4	SWSE	WYW130096
34	43N	76W	13	ALL DAY ENDLESS CS	5	NENE	WYW130096
35	43N	76W	13	ALL DAY ENDLESS CS	7	NESE	WYW130096

The following 19 impoundment locations were inspected and approved for use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	City Bowl	NWSW	14	42	75	14.5	4.3	WYW159992
2	Claus	SENW	6	42	74	3.42	2.1	WDEQ
3	Cosner	NWNW	12	42	75	16	4.1	WYW142823
4	Drilling	SWSE	17	42	74	19.4	6.5	WYW131722
5	East Eychaner	SENE	14	42	75	19	2.9	WYW138135
6	East Pasture #2	SWNE	3	42	75	12.2	1.8	WYW128603
7	East Pasture #3	NWSW	3	42	75	19	4.6	WYW128603
8	East Pasture #4	NWNE	2	42	75	15.1	2.7	WDEQ
9	East Pasture #6	NENE	36	42	75	6.8	1.7	WDEQ
10	Enl of Dangel	SENE	24	42	75	19.9	3	WDEQ
11	Enl T-Chair 41-1-4275	NENE	1	42	75	8.8	2	WDEQ
12	North Dump	NESE	13	42	76	18.9	2.8	WYW130096
13	North Pinnacle	SESE	14	42	75	19.9	3.8	WYW142078
14	Ox Bar	NESW	18	42	75	6.3	1.3	WYW153068
15	Snow Fence	NWNW	17	42	74	19.9	2.8	WYW131722
16	South Dry Willow #1	NESW	7	42	75	15.6	2.4	WDEQ
17	South Dry Willow #2	NWSE	7	42	75	8.1	1.4	WDEQ
18	South Pinnacle	NESE	23	42	75	4.2	0.9	WYW159992
19	Wagoneer	NWSW	6	42	74	18.2	3.7	WYW141222

In addition to the listed APDs and impoundments, it is my decision to approve the following right-of-way grants:

Right-of-Way	Qtr/Qtr	Sec	TWP	RNG	Use/Type
WYW-170032	SENW	3	43N	75W	Access Road

This approval is subject to adherence with all of the operating plans and mitigation measures contained in the Master Surface Use Plan of Operations, Drilling Plan, Water Management Plan, and information in individual APDs. This approval is also subject to operator compliance with all mitigation and monitoring requirements contained within the Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003.

SUMMARY OF SELECTED ALTERNATIVE

The selected alternative includes appropriate components Alternative C and of Alternative D as described in the EA and the Appendix which will alleviate site specific impacts to sage-grouse and habitat. Timing restrictions on surface-disturbing activities are incorporated from Alternative C.

The following items summarize components of Alternative C and D included in the selected alternative:

1. Pull back power drops 0.6 miles from high quality sage-grouse habitat. Power drops from proposed overhead power in the All Day POD will not be approved as proposed, in order to minimize impacts to sage-grouse from vertical intrusions within 0.6 miles of breeding, brood-rearing, late summer and winter high-quality habitat. The power drops will be located and permitted for this federal action under a separate sundry. Thereby providing an opportunity for

the operator and the BLM to work together to assist in protecting sage-grouse habitat. This affects all the proposed power in the POD other than the line proposed to the 2 Marauder well in section 12, T42N R75W.

2. Power generators in the All Day POD will not be approved as proposed, in order to minimize impacts to sage-grouse from noise impacts in breeding, brood-rearing, late summer and high-quality winter habitat. The generators will be located and permitted for this federal action under a separate sundry.
3. Use of the access road in section 26 and the south ½ of section 23 will not be approved in order to minimize human disturbance at the Little Black Butte lek and adjacent nesting habitat. due to high quality sage-grouse habitat within one mile of the Little Black Butte lek (OR)
4. Points of visitation (such as valves) on the proposed pipeline will be prohibited within 0.6 miles of the Little Black Butte lek. BLM will work with the operator to place valves etc. at existing points of visitation such as wells and facilities.
5. Nine out of forty four wells (as stated below) are not approved under the proposed action:
   - The 1, 2, and 3 Pepperstone wells are deferred due to high quality sage-grouse habitat
   - The 1 and 2 Forever wells are denied to the presence of a Ferruginous hawk nest within line of sight of both wells.
   - The 9 All Day well is denied due to the presence of a Ferruginous hawk nest within ¼ mile and line of sight.
   - The 6 Endless well and access road are deferred pending additional onsite visits to determine potential impacts to raptor nests within 1/4 mile and in view of the well or access.
   - The 1 Endless well is denied due to a bald eagle roost within ½ mile of the well location.
   - The Cinnabar 13 well and associated access and pipeline are denied; the well is proposed within the boundary of the TPC and its approval would result in surface disturbance which cannot be mitigated.
6. Nine of the proposed reservoir sites are not approved with POD as stated below:
   - The Pumpkin Pie reservoir site is not approved; it is within the cultural TCP boundary.
   - The Little Black Butte #3 reservoir site is not approved due the presence of a ferruginous hawk at the embankment site. The Little Black Butte #1, 2, 3, 4, 5, 6, and 7 reservoir sites and North Black Butte Reservoir site are not approved with POD due the presence of high quality sage grouse habitat.
7. Infrastructure associated with the above reservoirs and wells will be removed from project. This includes the engineered section across Cottonwood Creek in the NENE Section 34.

RATIONALE: The decision to authorize the selected alternative, as summarized above, is based on the following:

1. The Operator, in their POD, has committed to:
   - Comply with all applicable Federal, State and Local laws and regulations.
   - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
   - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
   - Provide water analysis from a designated reference well in each coal zone.

2. The Operator has certified that a Surface Use Agreement has been reached with the Landowners.

3. The selected alternative will not result in any undue or unnecessary environmental degradation.

4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government. Furthermore, approval of this development will help meet the nation's future needs for energy reserves, and will help to stimulate local economies by maintaining stability for the workforce.

5. The selected alternative incorporates appropriate local sage-grouse research and the best available science from across the species' range in development of the attached conditions of approval. Mitigation measures from the range of alternatives were selected to best meet the purpose and need, and will be applied by the BLM to alleviate environmental impacts.

6. Approval of this alternative is in conformance with the PRB FEIS, and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office, April 2001 (refer to Appendix E of that document relative to adaptive management).

7. The selected alternative incorporates components of the Wyoming Governor's Sage Grouse Implementation Team's "core population area" strategy and executive order and local research to provide appropriate protections for sage-grouse, while meeting the purpose and need for the All Day Project.

FINDING OF NO SIGNIFICANT IMPACT: Based on the analysis of the potential environmental impacts, I have determined that NO significant impacts are expected from the implementation of the selected alternative, and, therefore, an environmental impact statement is not required.

In conformance with Appendix E, *Record of Decision, Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment* BLM Buffalo Field Office has initiated actions within the PRB FEIS analysis area in response to additional information regarding impacts to sage-grouse. These measures include:

1. Early initiation of a Resource Management Plan (RMP) revision, based on the evaluation of monitoring data generated under the mitigation monitoring and reporting plan (MMRP) in the PRB FEIS Record of Decision
2. Establishment of sage-grouse "focus" areas, encompassing approximately 1 million acres of sage-grouse habitat. These areas are managed under strict guidelines designed to preserve sage-grouse habitat for development of alternatives during the RMP process (Appendix 1).
3. Initiation of a population viability analysis in the Powder River Basin. This is a 24-month project involving the USGS, BLM Miles City Field Office, BLM Buffalo Field Office, and the University of Montana.
4. Development of alternatives that modify the proposed action to reflect the best available science in sage-grouse management.
5. Development of conditions of approval, specific to sage-grouse management, that incorporate some recommendations from recent research, the NE Local Sage-grouse Working Group, and the Petroleum Association of Wyoming.

The implementation of the selected alternative best meets the stated purpose and need for the proposed action. With the application of mitigating measures selected from alternatives C and D, sage-grouse population viability in the Powder River Basin will not be compromised due to the larger scope of planning actions and research initiated by the BLM, Buffalo Field Office.

ADMINISTRATIVE REVIEW AND APPEAL: Under BLM regulations, this decision is subject to administrative review in accordance with 43 CFR 3165. Any request for administrative review of this decision must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this Decision Record is received or considered to have been received.

Any party who is adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: _____ Date: 8/28/09

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Yates Petroleum Corporation
All Day POD
PLAN OF DEVELOPMENT
WY-070-08-026

Introduction
This environmental assessment (EA) was prepared by the Bureau of Land Management (BLM) to address site specific analysis conducted by the Buffalo Field Office (BFO). Yates's proposed the All Day Project of Development (POD) for coal-bed methane gas (CBNG) wells on 80 acre spacing with essential infrastructure (roads, power, water and gas pipelines) for development in the Powder River Basin (PRB) of Campbell County, Wyoming, Townships 42-43 North and Ranges 74-76 West.

The EA details site specific impacts of the proposed All Day POD. This process of analysis determines how and under what conditions the leaseholder will develop oil and gas resources on the federal leases.

Background
The PRB expands from the gently rolling hills on the eastern portion of the basin to the Powder River breaks area toward the Big Horn Mountains on the west side of the basin. Due to the nature of the coal seams in the PRB, placement of production facilities, well housing, reservoirs and compressor stations can be located in less environmentally sensitive areas during the planning stages of development.

1. PURPOSE AND NEED

The purpose of this action is to extract coal-bed methane natural gas (CBNG) with wells drilled on 80 acre spacing as a Project of Development (Appendix A, Map A) on federal oil and gas leases issued to the applicant by the BLM. There is a need to analyze the entire project area to thoroughly ascertain the operator's needs, calculate disturbance, and apply effective mitigation to protect multiple resources.

Agency Responsibilities
Federal mineral royalties are directed to the State of Wyoming and to the United States Federal Treasury. Due to the underlying lateral continuity of the coal seams, Federal oil and gas can be drained by neighboring oil and gas development. Concurrent development of Federal minerals avoids drainage by private entities and protects financial interests of the State of Wyoming and the United States.

BLM recognizes extraction of oil and gas resources plays an essential role in meeting the nation's need for energy resources. As a result, private exploration and development of the Federal reserve are integral in the agencies' oil and gas leasing program under the authority of the Mineral Leasing Act of 1920, as amended, and the Federal Land Policy Management Act (FLPMA) of 1976. The oil and gas leasing program, managed by BLM, encourages the development of domestic energy production and provides mitigation measures to protect multiple resources.

1.1. Relationship to Statutes, Regulations, or Other Plans
The proposed action is in conformance with the terms and the conditions of the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office, April 2001 (BFO 2001), the PRB FEIS 2003 and as required by 43 CFR 1610.5 (CFR 2006).

1.2. Current Land Use Plan

The proposed action responds to multiple-use goals and objectives stated in the 1985 Buffalo RMP and the 2003 PRB FEIS. The action conforms to the terms and the conditions of the RMP and the PRB FEIS, as required by 43 CFR 1610.5.

1.3. Buffalo Resource Management Plan Revision and Interim Protection of Sage-Grouse

The Buffalo RMP is currently under revision. Sage-grouse are currently under consideration for listing under the Endangered Species Act. Therefore, the BFO established sage-grouse "focus areas" with rigorous interim protections in order to preserve decision space during this time. Actions proposed in focus areas encounter more stringent protections for sage–grouse. Future actions within focus areas may be considered on 640 acre spacing. The BFO will consider plans of development that demonstrate proposals managed in a manner which effectively conserve sage-grouse habitat.

Outside the focus areas, the BFO will continue to apply mitigating measures and consider well densities up to 80-acre spacing depending on the quality of sage-grouse habitat. Site-specific mitigating measures will be applied incorporating the best available science and technology.

The All Day POD is not within a sage-grouse focus area. The following EA will further determine if the project area has high quality sage-grouse habitat, as indicated by the University of Montana model. The analysis will identify potential mitigation measures under BLM's multiple-use mandate.

1.4. Surface Ownership and Mineral Ownership

The proposed project is located on both private and BLM administered surface. Private surface owners in the All Day POD include T-Chair Land Company, Gilbertz Company Enterprises Inc., Melvin Cosner Trust, Atwood Family LTD Partnership, Pumpkin Buttes Ranch, Jesse and Dale Ruby, James and Carlene Spomer, Iberlin Ranch LTD Partnership, and Jacque Scott.

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Four alternatives, A, B, C and D, were evaluated. A brief description of each alternative follows. For the complete detailed description of alternatives, including the alternatives considered but not analyzed in detail, see Appendix A.

2.1. Alternative A - No Action

A No Action Alternative was considered in the PRB FEIS, Volume 1 pages 2-54 through 2-62. This alternative would consist of no new federal wells. An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits" in the lease lands, "subject to the terms and conditions incorporated in the lease." Thus, under this alternative, the operator's proposal would be denied.

2.2. Alternative B - Proposed Action

Alternative B is the "proposed action" alternative, as originally submitted to the BLM by Yates Petroleum Corporation, prior to any BLM review or modifications. See Appendix A for full description on the proposed action.

2.3. Alternative C – Modified Proposed Action

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator at on-site visits, following the initial project proposal.

At the on-sites, all proposed surface disturbance was inspected to insure that the project would meet the BLM multiple use objectives to conserve natural resources while allowing extraction of Federal minerals. In some cases, access roads were re-routed; well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental impacts. Site specific mitigation and/or Conditions of Approval (COAs) were added to alleviate environmental effects of the proposed action. The specific changes made at the on-site are identified under Alternative C, described in detail in Appendix A. The BLM recommend mitigating or relocating wells and infrastructure that effects other resources, those not mitigated are not approved with this project.

Alternative C represents efforts of the BFO to maintain proposed spacing and infrastructure requirements consistent with the purpose and need. It incorporates sage-grouse habitat mapping, site verification of habitat suitability and includes mitigation measures to reduce environmental effects to multiple resources.

2.4. Alternative D-Sage-Grouse Emphasis

Alternative D represents additional project modifications, from Alternative C, guided by current sage-grouse research to protect sage-grouse and sage-grouse habitat. Alternative D incorporates mitigation measures to minimize habitat fragmentation and accelerate return to habitat effectiveness to benefit the sage-grouse. For a description of the project-level details of Alternative D, see Appendix A.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on May 17, 2007. Field inspections of the proposed All Day CBNG project were conducted on November, 13, 15, and 19, 2007. December 3, 2007 was cancelled due to snow cover, many alternative dates throughout January, February, March and April also were made then cancelled due to snow. The team was out April 14 and April 30, 2008, and another on-site with Yates on September 23, 2008. The on-sites were attended be the following personnel:

DATE	NAME	TITLE	AGENCY
Nov 13, 15, 19 April 14, 30 Sept 23	Jennifer Spegon	Natural Resource Specialist	BLM
Nov 13, 19 April 14, 30	Buck Damone	Archeologist	BLM
Nov 13, 15, 19 April 30	Bill Ostheimer	Biologist	BLM
Sept 23	Chris Durham	Biologist	BLM
Nov 15, 19	Chris Williams	Hydrologist	BLM
Nov 13, 15, 19	Trent Knez	Federal Regulatory Agent	Yates Petroleum Corporation
Nov 15	Buster Ivory	Yates Consultant	Yates Petroleum Corporation
Sept 23	Jeb Tachick	Federal Regulatory Agent	Yates Petroleum Corporation
Nov 13, 15, 19	Shell	Yates Rep	Yates Petroleum Corporation
Nov 19	Tim Barber	Yates Rep	Yates Petroleum Corporation
Nov 15, 19 Sept 23	Vickie Kissack	Yates Rep	Yates Petroleum Corporation
Nov 13, 15, 19	Jim Nies	Yates Rep	Yates Petroleum Corporation
Nov 13, 15	Carlene and James Spomer	Private Surface Owner	Private Surface Owner
Nov 15	Larry Gilbertz	Private Surface Owner	Private Surface Owner
Nov 19 April 30	Patricia Clark	T-Chair Ranch	Private Surface Owner

DATE	NAME	TITLE	AGENCY
Nov 19 April 30 Sept 23	Gene Mankin	T-Chair Ranch	Private Surface Owner

The following section describes the environment that would be affected by implementation of the Alternatives described in Section 2. Aspects of the affected environment described in this section focus on relevant issues. Certain critical environmental components require analysis under BLM policy. These items are presented below in Table 3.1.

Table 3.1 - Critical elements requiring mandatory evaluation are presented below.

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species		X		Bill Ostheimer
Floodplains		X		Chris Williams
Wilderness Values			X	Jennifer Spegon
ACECs			X	Jennifer Spegon
Water Resources	X			Chris Williams
Air Quality	X			Jennifer Spegon
Cultural or Historical Values	X			Buck Damone
Prime or Unique Farmlands			X	Jennifer Spegon
Wild & Scenic Rivers			X	Jennifer Spegon
Wetland/Riparian		X		Chris Williams
Native American Religious Concerns	X			Buck Damone
Hazardous Wastes or Solids		X		Jennifer Spegon
Invasive, Nonnative Species	X			Jennifer Spegon
Environmental Justice		X		Jennifer Spegon

Topographic Characteristics of Project Area

The project area is approximately 14.9 miles northwest of Wright, Wyoming near the Pumpkin Buttes. Elevations range from 4,980 to 5,983 feet above sea level. The Pumpkin Buttes were historically utilized as a lookout. They are distinctive landmarks high above the relatively flat horizon. The South Butte is flat on top with steep cliffs that sharply transform to open grasslands. The South Middle Butte has slight slopes and a narrow ridge with rocky ledges. The area is incised by deep ephemeral drainages. Drainages include the All Night Creek on the north end and Cottonwood Creek on the southwest and North Cottonwood which runs through the center of the POD.

For centuries Native Americans frequented the Pumpkin Buttes. Over the last 150 years to the current day lands have been used for ranching. Oil has been extracted in the area for about 50 years. CBNG development began in the late 1990s on fee and State minerals and continues to be extracted on surrounding fee, State and Federal leases.

3.1. Vegetation & Soils

Typical Mixed Sagebrush/Grass Plant Community covers the project area flora. Specific species observed in project area include needle-and-thread grass, junegrass, blue grama and wheatgrasses. Wyoming big sage brush is the primary shrub. Sagebrush is denser along drainages.

A mixed sagebrush/grass plant communities evolved in this area under grazing by bison and a low frequency fire. Currently, this area is under moderate, season-long grazing by livestock. Wyoming big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs.

Dominant grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, and blue grama. Other grasses include little bluestem, prairie junegrass, and Sandberg bluegrass. Common forbs in this plant community include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Big sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found and plains pricklypear and winterfat also occur. Cheatgrass (downy brome) has invaded this area as well as the other areas in the state of Wyoming.

The over story of big sagebrush and understory of grass and forbs provide a diverse plant community that supports domestic livestock and wildlife such as mule deer and antelope. The vegetative state will keep the area stable and protected from excessive erosion. The biotic integrity of the plant community is intact. However, it can be at risk depending on how far a shift has occurred in plant composition toward blue grama, and cheatgrass. The watershed is functioning. However, it can become at risk when bare ground increases.

Soils differ with topographic location, slope and elevation. The soils in the project are primarily loamy but vary from sandy to clayey throughout the project area. Topsoil depths to be salvaged for reclamation range from < 1inch on the ridges to 12+ inches in bottomland. Reclamation and erosion potential vary depending on the soil type, vegetative cover and slope.

Tree species located in the project include mixed stands of juniper, ponderosa pine and limber pine located on the upper slopes of the Buttes.

3.1.1. Wetlands/Riparian

Cottonwood stands are present near main stem drainages along with a few willows and Russian olives. Areas where reservoirs would be located are in small ephemeral drainages where riparian and wetland vegetation generally is not present.

3.1.2. Invasive Species

The following state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of inventory databases on the Wyoming Energy Resource Information Clearinghouse (WERIC) web site (www.weric.info):

- Black henbane
- Scotch thistle

The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. Additionally, the operator or BLM confirmed the following WRIC identified infestations and/or documented additional weed species during subsequent field investigations:

- Leafy spurge
- Salt cedar
- Canada Thistle
- Buffalobur
- Cocklebur
- Musk thistle
- Wild licorice
- Hoary cress (whitetop)

The state-listed noxious weeds are listed in PRB FEIS Table 3-21 (p. 3-104) and the Weed Species of Concern are listed in Table 3-22 (p. 3-105.

3.2. Wildlife

Several resources were consulted to identify wildlife species that may occur in the proposed project area. Resources that were consulted include the POD wildlife reports, wildlife database compiled and managed by the BLM Buffalo Field Office (BFO) wildlife biologists, the PRB FEIS, the Wyoming Game and Fish Department (WGFD) big game and sage-grouse maps, and the Wyoming Natural Diversity Database (WYNDD).

A habitat assessment and wildlife inventory surveys were performed by Jones and Stokes and Wildlife Resources (W.R. 2009, J&S 2009, J&S 2008, 2007a and b). The landowners in the western 2/3-3/4 of the project area restricted wildlife surveys to a single consultant (Wildlife Resources) whose results were incorporated into the J&S reports in 2007-8 and reported independently in 2009. The consultants performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, Ute ladies'-tresses orchid habitat, and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocols. (www.cbmclearinghouse.info).

A BLM biologist conducted field visits April 21, 22, 28, and September 23, 2008. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

Wildlife species common to the habitat types present are identified in the PRB FEIS (pg. 3-114). Species identified in the project area or noted as being of special importance are described below.

3.2.1. Big Game

Big game species expected to be within the project area include pronghorn antelope, mule deer and white-tailed deer. The WGFD lists the entire project area to be Winter/Yearlong range for antelope and the north-western portion (Endless and Cinnabar wells) for mule deer. The rest of the POD is yearlong mule deer range. White-tailed deer may be found along Cottonwood Creek or Dry Willow Creek.

Yearlong use is when a substantial portion of a population makes general use of the habitat on a year-round basis. Winter/Yearlong use is when a population of animals makes general use of suitable habitat sites within a range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD. The project area is part of the Pumpkin Butte deer and pronghorn herds. The Wyoming Game and Fish summaries for these herds set a 2007 Post-season Objective of 18,000 with a 2007 Post-season Population Estimate of 39,600 for pronghorn and a 2007 population objective of 11,000 and a population estimate of 12,000 for mule deer.

3.2.2. Aquatics

The project area is drained by ephemeral tributaries of the Powder and Belle Fourche Rivers. Fish that have been identified in those drainages are listed in the PRB FEIS (3-156-159).

The PRB is one of the last free-flowing prairie stream ecosystems left in the United States, with existing flows, turbidity, and water quality within historic ranges. The Powder River supports an intact native fish community including several rare or declining species. These species have evolved life history strategies that allow them to survive in extreme conditions (Hubert 1993). Native fish species include sauger, shovelnose sturgeon, goldeye, plains minnow, sand shiner, flathead chub, plains killifish, river carpsucker, sturgeon chub, western silvery minnow, channel catfish, fathead minnow, longnose dace, mountain sucker, shorthead redhorse, longnose sucker, stonecat, white sucker and others. Six of these are

designated by the WGFD as either Native Species Status (NSS) 1, 2, or 3 species. Species in these designations are considered to be species of concern, in need of more immediate management attention, and more likely to be petitioned for listing under the Endangered Species Act.

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available about them. Wyoming Game and Fish (WGFD), Montana Natural Heritage and Wyoming Natural Diversity Database (WYNDD) investigations have identified numerous species present within Powder River Basin including:

Table 3.2 Species of Herptiles Expected to Occur in the Powder River Basin of Wyoming (WYNDD 2008)

Common Name	Scientific Name	Found by WGF 2004-2006	Found by WYNDD 2008
Bullfrog*	*Rana catesbeiana*	Maybe	N
Spiny Softshell	*Apalone spinifera*	Y	N
Milksnake*	*Lampropeltis triangulum*	N	N
Northern Prairie Lizard*	*Sceloporus undulatus garmani*	N	N
Boreal Chorus Frog	*Pseudacris maculata*	Y	Y
Northern Leopard Frog	*Rana pipiens*	Y	Y
Great Plains Toad	*Bufo cognatus*	Y	Y
Woodhouse's Toad	*Bufo woodhousii*	Y	Y
Plains Spadefoot toad	*Spea bombifrons*	Y	Y
Tiger Salamander	*Ambystoma tigrinum*	Y	Y
Short-horned Lizard	*Phrynosoma hernandesi*	Y	Y
Sagebrush Lizard	*Sceloporus graciosus*	Y	Y
Eastern Yellowbelly Racer	*Coluber constrictor flaviventris*	Y	Y
Prairie Rattlesnake	*Crotalus viridis*	Y	Y
Western Hog-nosed Snake	*Heterodon nasicus*	Y	Y
Bullsnake	*Pituophis catenifer sayi*	Y	Y
Terrestrial Garter Snake	*Thamnophis elegans*	Y	Y
Plains Garter Snake	*Thamnophis radix*	Y	Y
Common Garter Snake	*Thamnophis sirtalis*	Y	Y
Snapping Turtle	*Chelydra serpentina*	Y	Y
Painted Turtle	*Chrysemys picta*	Y	Y

3.2.3. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151). Those species identified by the BLM biologist in the project area include; McCown's Longspur, Lark Bunting, Vesper Sparrow, Lark Sparrow.

3.2.4. Raptors

Raptors species expected to occur in suitable habitats within the PRB include northern harrier, golden eagle, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, bald eagle, rough-legged hawk, merlin, Cooper's hawk, northern goshawk, and long-eared owl. Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities.

Sixty one primary and alternate raptor nest sites within 0.5 mile of the project area were identified by Jones and Stokes, BLM, and Wildlife Resources in (2009). Of these, 20 nests were active in 2008 and five were active in 2009.

Table 3.3 Documented raptor nests within the Project area project area.

BLM_ID	UTME	UTMN	Legal	Substrate	Year	Condition	Status	Species
2409	434266	4830667	S12 T42N R75W	GHS				
					2009	Gone	DNLO	n/a
					2007	Gone	INAC	n/a
					2006	Remnants	INAC	n/a
					2004	Remnants	INAC	n/a
					2003	Good	INAC	n/a
2410	434053	4829836	S13 T42N R75W	GHS				
					2009	Remnants	INAC	n/a
					2007	Gone	INAC	n/a
					2006	Remnants	INAC	n/a
					2003	Remnants	INAC	n/a
3132	426076	4839249	S18 T43N R75W	CTL				
					2009	Good	INAC	n/a
					2008	Good	ACTI	RETA
					2007	Good	ACTI	RETA
					2007	Good	INAC	n/a
					2006	Good	ACTI	RETA
					2004	Good	INAC	n/a
3133	426161	4838755	S18 T43N R75W	CTL				
					2009	Good	ACTI	GRHO
					2008	Good	OCCU	GRHO
					2007	Good	INAC	n/a
					2006	Good	ACTI	GRHO
					2004	Good	INAC	n/a
3398	434940	4839966	S12 T43N R75W	CTL				
					2009	Gone	INAC	n/a
					2009	Gone	DNLO	n/a
					2007	Remnants	INAC	n/a
					2006	Remnants	INAC	n/a
					2005	Remnants	INAC	n/a
					2004	Gone	INAC	n/a
3654	425810	4841363	S7 T43N R75W	CLF				
					2009	Gone	DNLO	n/a
					2009		DNLO	n/a
					2008	Fair	INAC	n/a
					2007	Unknown	ACTI	GRHO
					2006	Unknown	ACTI	GRHO
					2006	Unknown	ACTI	RETA
					2005	Good	ACTI	RETA
					2004	Gone	INAC	n/a
3658	425538	4841443	S7 T43N R75W	CTL				
					2009	Gone	DNLO	n/a
					2009		DNLO	n/a
					2008	Poor	INAC	n/a
					2007	Fair	INAC	n/a
					2006	Fair	INAC	n/a
					2005	Good	INAC	n/a
					2004	Gone	INAC	n/a
4228	424310	4840135	S12 T43N R76W	CTL				

BLM_ID	UTME	UTMN	Legal	Substrate	Year	Condition	Status	Species
					2009	Poor	INAC	n/a
					2008	Poor	INAC	n/a
					2007	Good	INAC	n/a
					2006	Good	ACTI	RETA
					2006	Good	OCCU	RETA
4249	424360	4840215	S12 T43N R76W	CTL				
					2009	INAC	n/a	2009
					2009	Poor	INAC	n/a
					2008	Poor	INAC	n/a
					2007	Poor	INAC	n/a
					2006	Poor	INAC	n/a
4527	425162	4841951	S1 T43N R76W	JUN				
					2009	Poor	INAC	n/a
					2008	Poor	INAC	n/a
					2007	Fair	INAC	n/a
					2006	Fair	ACTI	LOOW
4528	425405	4841428	S7 T43N R75W	CTL				
					2009	Good	INAC	n/a
					2008	Good	ACTI	GOEA
					2007	Good	INAC	n/a
					2007	Fair	ACTI	GOEA
					2006	Fair	INAC	n/a
4529	425809	4841286	S7 T43N R75W	CTL				
					2009	Poor	INAC	n/a
					2008	Remnants	INAC	n/a
					2007	Poor	INAC	n/a
					2006	Poor	INAC	n/a
4530	429461	4840906	S9 T43N R75W	CLF				
					2009	Poor	INAC	n/a
					2008	Good	ACTI	PRFA
					2007	Unknown	ACTI	PRFA
					2006	Good	ACTI	PRFA
4531	425852	4840885	S7 T43N R75W	CTL				
					2009	Poor	INAC	n/a
					2008	Poor	INAC	n/a
					2007	Poor	INAC	n/a
					2006	Poor	INAC	n/a
4532	430255	4840096	S10 T43N R75W	LIM				
					2009	Good	INAC	n/a
					2009	Good	ACTI	RETA
					2009	Good	ACTI	RETA
					2009	Good	ACTI	RETA
4533	425535	4839860	S18 T43N R75W	CTL				
					2009	Good	INAC	n/a
					2008	Good	INAC	n/a
					2007	Good	INAC	n/a
					2006	Good	INAC	n/a

BLM_ID	UTME	UTMN	Legal	Substrate	Year	Condition	Status	Species
4534	427849	4839843	S17 T43N R75W	CTL				
					2009	Fair	INAC	n/a
					2008	Fair	INAC	n/a
					2007	Fair	INAC	n/a
					2006	Fair	INAC	n/a
4535	431950	4839801	S11 T43N R75W	WIL				
					2009	Poor	INAC	n/a
					2008	Poor	INAC	n/a
					2007	Fair	INAC	n/a
					2006	Good	ACTI	RETA
4536	424825	4839733	S13 T43N R76W	CTL				
					2009	Poor	INAC	n/a
					2008	Fair	OCCU	GRHO
					2007	Gone	INAC	n/a
					2006	Fair	INAC	n/a
4538	430922	4838769	S15 T43N R75W	CLF				
					2009	Unknown	OCCU	PRFA
					2008	Unknown	INAC	n/a
					2007	Gone	INAC	n/a
					2006	Unknown	ACTI	PRFA
4541	434593	4838368	S13 T43N R75W	MMS				
					2009	Excellent	ACTF	FEHA
					2008	Good	ACTF	FEHA
					2007	Good	ACTF	FEHA
4546	431978	4838150	S14 T43N R75W	CTL				
					2009	Poor	INAC	n/a
					2008	Poor	INAC	n/a
					2007	Gone	INAC	n/a
					2006	Fair	INAC	n/a
4553	433207	4834170	S35 T43N R75W	GHS				
					2009	Fair	INAC	n/a
					2008	Good	OCCU	FEHA
					2007	Good	INAC	n/a
					2006	Good	ACTF	FEHA
4555	428977	4833305	S33 T43N R75W	WIL				
					2009	Fair	INAC	n/a
					2008	Fair	INAC	n/a
					2007	Poor	INAC	n/a
4556	433850	4833275	S36 T43N R75W	CTL				
					2009	Good	ACTI	SWHA
					2009	Good	INAC	n/a
					2008	Good	OCCU	SWHA
					2007	Good	ACTI	SWHA
4557	432674	4832732	S2 T42N R75W	GHS				
					2009	Fair	INAC	n/a
					2008	Fair	INAC	n/a
					2007	Good	INAC	n/a
					2006	Good	INAC	n/a
4559	429855	4831839	S4 T42N R75W	CTL				
					2009	Poor	INAC	n/a
					2008	Fair	INAC	n/a
					2007	Good	ACTI	RETA
					2006	Good	ACTI	RETA

BLM_ID	UTME	UTMN	Legal	Substrate	Year	Condition	Status	Species
4560	430445	4831446	S10 T42N R75W	CTL				
					2009	Gone	DNLO	n/a
					2008	Good	OCCU	n/a
					2007	Good	INAC	n/a
					2006	Unknown	ACTI	GOEA
4561	433211	4831400	S11 T42N R75W	GHS				
					2009	Fair	INAC	n/a
					2008	Good	INAC	n/a
					2007	Good	INAC	n/a
					2006	Good	ACTI	FEHA
4562	434279	4830670	S12 T42N R75W	GHS				
					2009	Poor	INAC	n/a
					2007	Remnants	INAC	n/a
					2006	Remnants	INAC	n/a
4696	431110	4833880	S34 T43N R75W	ROC				
					2009	Remnants	INAC	n/a
					2008	Remnants	INAC	n/a
					2007	Remnants	INAC	n/a
5219	431192	4833768	S34 T43N R75W	ROK				
					2009	Remnants	INAC	n/a
					2008	Poor	INAC	n/a
5220	435507	4839061	S18 T43N R74W	ROK				
					2007	Remnants	INAC	n/a
6152	428756	4833705	S33 T43N R75W	CTL				
					2009	Fair	INAC	n/a
6156	433077	4832570	S2 T42N R75W	GHS				
					2009	Fair	INAC	n/a
6185	424860	4839710	S13 T43N R76W	CTL				
					2007	Fair	INAC	n/a
					2006	Fair	INAC	n/a
6200	424736	4839582	S13 T43N R76W	CTL				
					2009	Fair	INAC	n/a
					2007	Poor	INAC	n/a
6499	432193	4837604	S TN RW	GHS				
					2009	Poor	INAC	n/a
6504	424418	4839497	S30 T46N R78W	CTL				
					2009	Good	INAC	n/a
6505	423450	4838692	S TN RW	CTL				
					2009	Good	ACTI	n/a
6518	426766	4840910	S TN RW	JUN				
					2009	Poor	INAC	n/a
6519	426534	4838844	S TN RW	JUN				
					2009	Poor	INAC	n/a
6521	427150	4840503	S TN RW	JUN				
					2009	Gone	INAC	n/a
6522	427191	4840479	S TN RW					
					2009	Fair	INAC	n/a
6523	427191	4840479	S TN RW	JUN				
					2009	Poor	INAC	n/a
6524	427203	4840367	S TN RW	JUN				
					2009	Good	INAC	n/a

BLM_ID	UTME	UTMN	Legal	Substrate	Year	Condition	Status	Species
6525	427216	4840197	S TN RW	WIL				
					2009	Gone	INAC	n/a
6529	426550	4838900	S TN RW	CTL				
					2009	Poor	INAC	n/a
6530	427635	4837250	S TN RW	CTL				
					2009	Poor	INAC	n/a
6534	426984	4840745	S TN RW	CTL				
					2009	Poor	INAC	n/a
6535	426940	4840760	S TN RW	CTL				
					2009	Poor	INAC	n/a
6536	432193	4837604	S TN RW	GHS				
					2009	Gone	DNLO	n/a
6539	424418	4839497	S TN RW	CTL				
					2009	Good	INAC	n/a
6541	432616	4837734	S TN RW	JUN				
					2009	Fair	INAC	n/a
6542	433836	4833058	S TN RW	GHS				
					2009	Poor	INAC	n/a

Notes:

1 ABB = Abandoned burrow; CTD = Cottonwood - dead; CTL = Cottonwood – live; CKB = Creek bottom; MMS=Man made structure; ROK-Rock outcrop; JUN=Juniper tree; ACB= Active Burrow; GHS=Ground/Hillside

2 ACTF = Active failed; ACTI = Active; INAC = Inactive

3 BUOW = Burrowing Owl; GOEA = Golden Eagle; GRHO = Great-horned Owl; RETA = Red-tailed Hawk; LOOW=Long-eared owl

3.2.5. Threatened and Endangered and Sensitive Species

3.2.5.1. Threatened and Endangered Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act.

3.2.5.1.1. Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 2004, the WGFD identified six prairie dog complexes (Arvada, Sheridan, Pleasantdale, Four Corners, Linch, Kaycee, and, Thunder Basin National Grasslands) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Grenier et al. 2004).

This nocturnal predator is closely associated with prairie dogs, depending almost entirely upon them for its food. The ferret also uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1000 acres of black-tailed prairie dog colonies for survival (USFWS 1989). Four prairie dog colonies were totaling approximately 400 acres identified by searching the BLM database that are within or adjacent to the project area. On-site investigations by both BLM personnel and wildlife consultants did not identify any prairie dog towns in or near the project area. Potential black-footed ferret habitat is not present within the project area.

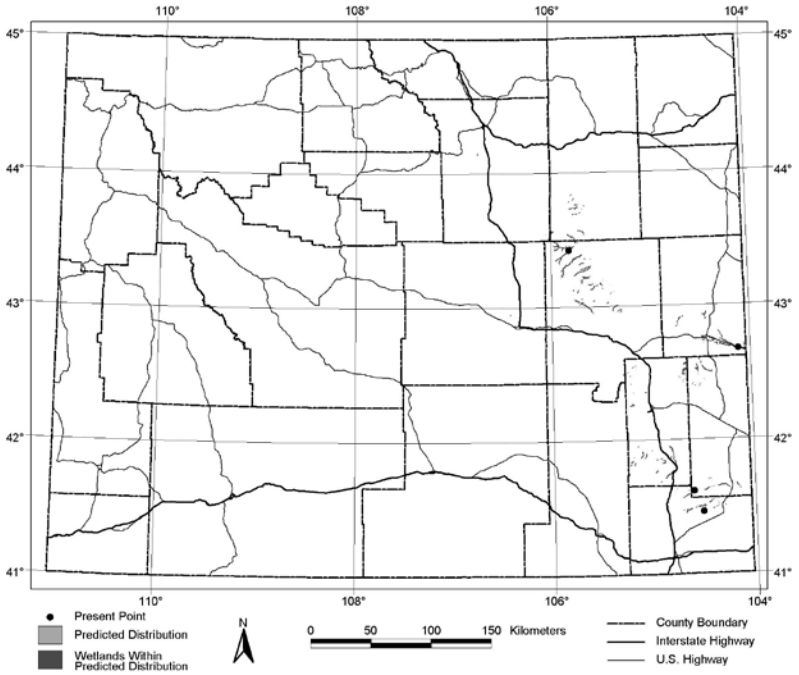
The WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Big Horn

Mountains (Grenier 2003). The U.S. Fish and Wildlife Service has also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

3.2.5.1.2. Ute Ladies'-Tresses Orchid

Ute ladies'-tresses orchid (ULT) is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Wyoming Natural Diversity Database model predicts undocumented populations may be present particularly within southern Campbell and northern Converse Counties. In Wyoming, ULT blooms from early August to early September, with fruits produced in mid August to September (Fertig 2000).

Figure 1. Predicted Distribution of Ute ladies'-tresses in Wyoming



Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Wind Creek and Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

Suitable orchid habitat was assessed (J&S 2007, 2009b; W.R. 2009b). Marginal habitat is present within the project area along Dry Willow Creek, however a steep transition between creek and uplands combined with saline soils reduces the habitat suitability. The closest known Orchid population is the Antelope Creek population in northern Converse County.

3.2.5.1.3. Blowout Penstemon

On May 22, 2009 the Buffalo Field Office received a species list from the US Fish and Wildlife (USFWS) that included Blowout Penstemon. This plant occurs on sand dunes or blowouts. At the time

the All Day POD was visited this species was not on the USFWS list and was not looked for. The operator was notified of the addition of this plant to the listed species list in July of 2009 and surveys for suitable Blowout Penstemon habitat were conducted that July and August. No suitable habitat was identified (ICF 2009c, Wildlife Resources 2009c).

3.2.5.2. Sensitive Species

BLM Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. Two habitat types – prairie dog colonies and sagebrush ecosystems – are the most common within the Powder River Basin and contain habitat components required in the life cycle of several sensitive species. The species associated with these ecosystems are described below in general terms. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are also described in more detail in this section. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.2.5.2.1. Prairie dog colony obligates

Prairie dog colonies create habitat for many species of wildlife (King 1955, Reading et al. 1989). Agnew (1986) found that bird species diversity and rodent abundance were higher on prairie dog towns than on mixed grass prairie sites. Several studies (Agnew 1986, Clark 1982, Campbell and Clark 1981 and Reading et al. 1989) suggest that species richness increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of prey species (Clark 1982, Agnew 1986, Agnew 1988).

In South Dakota, forty percent of the wildlife taxa (134 vertebrate species) are associated with prairie dog colonies (Agnew 1983, Apa 1985, McCracken et al. 1985, Agnew 1986, Uresk and Sharps 1986, Deisch et al. 1989). Of those species regularly associated with prairie dog colonies, six are on the Wyoming BLM sensitive species list: swift fox (*Vulpes velox*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), and long-billed curlew (*Numenius americanus*).

3.2.5.2.2. Sagebrush obligates

Sagebrush ecosystems support a variety of species. Sagebrush obligates are animals that cannot survive without sagebrush and its associated perennial grasses and forbs; in other words, species requiring sagebrush for some part of their life cycle. Sagebrush obligates within the Powder River Basin, listed as sensitive species by BLM Wyoming include greater sage-grouse, Brewer's sparrow, sage thrasher, and sage sparrow. Sage sparrows, Brewer’s sparrows, and sage thrashers all require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Sage sparrows prefer large continuous stands of sagebrush, and Brewer’s sparrows are associated closely with sagebrush habitats having abundant scattered shrubs and short grass (Paige and Ritter 1999). Other sagebrush obligate species include sagebrush vole, pronghorn antelope, and sagebrush lizard.

3.2.5.2.3. Bald Eagle

On February 14, 1978, the bald eagle was federally listed as Endangered. On August 8, 2007, the bald eagle was removed from the Endangered Species list. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In order to avoid violation of these laws and uphold the BLM’s commitment to avoid any future listing of this species, all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) (USFWS 2007) shall continue to be complied with.

Bald eagle nesting habitat is generally found in areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles are often more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, carcasses of domestic sheep and big game may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

The riparian corridor of Dry Willow Creek represents suitable bald eagle roosting and potential nesting habitat. Several other scattered cottonwoods exist within minor draws throughout the area. According to the project wildlife reports, no bald eagle nests occur within one mile of the project area. Bald eagles have been documented roosting within 1/2 mile of the project area. The combination of Pumpkin Buttes, mature cottonwoods along Dry Willow Creek, and winter/yearlong antelope range make the project area important to wintering bald eagles. The following table shows results of bald eagle roost surveys:

OBSERVER	DATE	Bald Eagle Total	Adults	UTME	UTMN	BEHAVIOR	COMMENTS
Jones and Stokes	2/2/2004	1	1	431434	4834720	Perched	Cottonwood
Wildlife Resources	12/3/2007	7	5	427109	4840792	Perched	Cottonwood
Jones and Stokes	12/16/2008	5	5	426930	4840788	Perched	Cottonwood
Jones and Stokes	1/12/2009	1	1	427086	4840624	Perched	Cottonwood
Jones and Stokes	2/11/2009	13	10	425603	4841684	Perched	Three cottonwoods

3.2.5.2.4. Black-tailed prairie dog

Historic black-tailed prairie dog colonies were identified in the project area on the BLM database, however both consultants stated no active prairie dog towns in the project area. No prairie dog towns were identified at the on-site.

3.2.5.2.5. Burrowing owl

The BLM BFO databases and the survey information provided for the project indicate no burrowing owl nests within 0.25 mile, of the project area.

3.2.5.2.1. Greater sage-grouse

The greater sage-grouse is listed as a sensitive species by BLM (Wyoming). In recent years, several petitions have been submitted to the USFWS to list greater sage-grouse as Threatened or Endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was "not warranted" following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse. In 2007, the U.S. District Court remanded that decision, stating that the USFWS' decision-making process was flawed and ordered the USFWS to conduct a new Status Review as a result of a lawsuit and questions surrounding the 2005 review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

In conformance with ROD in the BFO has initiated actions within the PRB FEIS analysis area in response to additional information regarding impacts to sage-grouse. These measures include:

1. Early initiation of a Resource Management Plan (RMP) revision, based on the evaluation of monitoring data generated under the mitigation monitoring and reporting plan (MMRP) in the PRB FEIS Record of Decision.
2. Establishment of sage-grouse "focus" areas, encompassing approximately 1 million acres of sage-grouse habitat. These areas are managed under strict guidelines designed to preserve sage-grouse habitat for development of alternatives during the RMP process (Appendix 1).
3. Initiation of a population viability analysis in the Powder River Basin. This is a 24-month project involving the USGS, BLM Miles City Field Office, BLM Buffalo Field Office, and the University of Montana.
4. Development of alternatives that modify the proposed action to reflect the best available science in sage-grouse management.
5. Development of conditions of approval, specific to sage-grouse management, that incorporate some recommendations from recent research, the NE Local Sage-grouse Working Group, and the Petroleum Association of Wyoming.

The BFO has taken several steps to consider evolving information on impacts to sage-grouse which could result from development activities on Federal lands. See Appendix A for analysis of alternatives. With effective application of mitigating measures selected from alternatives C and D, sage-grouse populations in the Powder River Basin will remain viable.

The 2003 PRB EIS has significance thresholds and population viability assumptions based on analysis that sufficient functioning habitat for sage grouse will remain to support population viability within the project area. In addition, the six areas identified as BFO sage-grouse focus areas assume that sufficient amounts of good quality sage-grouse habitat remain mostly unfragmented by energy or other man-made infrastructure; it is also assumed that the fragmented portions in the "energy areas" of sage-grouse habitat provide for the necessary breeding, feeding and sheltering components to sustain sage-grouse habitat connectivity between the six focus areas.

These basic concepts for management are based on the assumptions that sufficient "islands" of undisturbed (by human infrastructure) sage-grouse habitat would remain to sustain a large enough sage-grouse population for the long-term, and be surrounded by the planned major management activities (MMAs) in the PRB (for sage-grouse in the PRB, the MMA are livestock grazing and energy development). Research on sage-grouse in the PRB was initiated to determine what direct, indirect and cumulative impacts energy development would have on both sage-grouse habitat and its constituent resident population.

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM

2003). Suitable sage-grouse habitat is present throughout the project area. The entire project area meets seasonal habitat requirements and is large enough to meet the landscape scale requirements of the bird (BLM 2008). Sage-grouse habitat models indicate that 95 percent of the project area contains high quality sage-grouse nesting habitat and the entire project area (with exception of those portions of the project adjacent to the Pumpkin Buttes) contains high quality sage-grouse wintering habitat (Walker et al. 2007). BLM records identified 17 sage-grouse leks within 4 miles of the project area. The 4-mile distance was recommended by the State wildlife agencies' ad hoc committee for consideration of oil and gas development effects to nesting habitat (WGFD 2008). The lek combined peak male numbers from these 17 leks dropped from 105 males in 2008 to 37 in 2009. Little Black Butte lek represents the majority of the identified males in the project area with 35% in 2008 and 48% in 2009. Little Black Butte lek currently has 1.4 wells/square mile, mostly located to the east and north of the lek. Leks within four miles of the All Day project are identified below (Table 3.5)

Table 3.5 Sage-grouse leks within four miles from the Project area project boundary.

LEKID	QQ	Q	Sec	Twn	Rng	Easting	Northing	peak male 2009	peak male 2008	WY Game and Fish Category of impact
38-Cottonwood Creek II	SE	SE	15	43	76	421621	4838450	1	11	E
38-Gilbertz III	SE	SW	21	44	75	429307	4846518	0	0	E
38-Little Black Butte	SW	NW	26	43	75	432215	4835747	18	36	M
38-Brown Ranch	SW	SW	4	42	75	428868	4832056	2	5	E
38-Collins	NW	SE	13	42	76	424600	4828800	0	0	H
38-Collins North	SE	SE	12	42	76	424969	4830420	0	0	H
38-Dry Willow	NW	NE	34	44	76	421648	4844290	4	28	E
38-Hines	NW	SE	16	43	75	429600	4838600	0	0	M
38-Hines NW	NE	NE	17	43	75	428443	4839637	5	3	H
38-Mud Spring Creek	NE	NE	33	44	75	430151	4844662	0	0	E
38-Pumpkin	NW	NE	29	43	75	427719	4836167	0	0	M
38-South Butte	SW	NW	21	43	75	428765	4837311	1	0	M
38-T-Chair	NW	NE	17	42	75	427892	4829890	1	8	E
38-Windmill	SE	SE	2	43	76	423323	4841666	0	4	E
New Windmill SE	NE	NE	11	43	76	423429	4841417	4	unk	E
38-Windmill North	SE	SE	35	44	76	423500	4843360	1	10	E
38-Windmill NW	NE	SW	2	43	76	422599	4842051	0	0	E

M= moderate = 1-2 wells/square mile; H= high = 2-3 wells/square mile; E= extreme = 4 or more wells/square mile

3.2.5.2.2. Sharp-tailed grouse

The most recent (2003) BLM and WGFD data base does not indicate any known occurrences of sharp-tailed grouse leks within 0.64 miles of the Project area. The nearest known sharp-tailed grouse lek (Iberlin) is located 28 miles north of the Project area. No sharp-tailed grouse, leks, or sign were observed within the project area.

3.2.5.2.3. Mountain plover

No mountain plover were documented on or near the project area during contractor surveys (J&S 2007-2009 W.R 2007-2009).

3.3. West Nile Virus

West Nile virus (WNv) is a mosquito-borne disease that can cause encephalitis or brain infection. Mosquitoes spread this virus after they feed on infected birds and then bite people, other birds, and animals. WNv is not spread by person-to-person contact, and there is no evidence that people can get the virus by handling infected animals.

Since its discovery in 1999 in New York, WNv has become firmly established and spread across the United States. Birds are the natural vector host and serve not only to amplify the virus, but to spread it. Though less than 1% of mosquitoes are infected with WNv, they still are very effective in transmitting the virus to humans, horses, and wildlife. *Culex tarsalis* appears to be the most common mosquito to vector, WNv.

The human health issues related to WNv are well documented and continue to escalate. Historic data collected by the CDC and published by the USGS at www.westnilemaps.usgs.gov are summarized below. Reported data from the Powder River Basin (PRB) includes Campbell, Sheridan and Johnson counties.

Table 3.6 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007*	155	22	Unk	1
2008*	10	0	0	0

*Wyoming Department of Health Records.

Human cases of WNv in Wyoming occur primarily in the late summer or early fall. There is some evidence that the incidence of WNv tapers off over several years after a peak following initial outbreak (Litzel and Mooney, personal conversations). If this is the case, occurrences in Wyoming are likely to increase over the next few years, followed by a gradual decline in the number of reported cases.

Although most of the attention has been focused on human health issues, WNv has had an impact on vertebrate wildlife populations. At a recent conference at the Smithsonian Environmental Research Center, scientists disclosed WNv had been detected in 157 bird species, horses, 16 other mammals, and alligators (Marra et al 2003). In the eastern US, avian populations have incurred very high mortality, particularly crows, jays and related species. Raptor species also appear to be highly susceptible to WNv. During 2003, 36 raptors were documented to have died from WNv in Wyoming including golden eagle, red-tailed hawk, ferruginous hawk, American kestrel, Cooper's hawk, northern goshawk, great-horned owl, prairie falcon, and Swainson's hawk (Cornish et al. 2003). Actual mortality is likely to be greater. Population impacts of WNv on raptors are unknown at present. The Wyoming State Vet Lab determined 22 sage-grouse in one study project (90% of the study birds), succumbed to WNv in the PRB in 2003. While birds infected with WNv have many of the same symptoms as infected humans, they appear to be more sensitive to the virus (Rinkes 2003).

Mosquitoes can potentially breed in any standing water that lasts more than four days. In the Powder River Basin, there is generally increased surface water availability associated with CBNG development. This increase in potential mosquito breeding habitat provides opportunities for mosquito populations to increase. Preliminary research conducted in the Powder River Basin indicates WNv mosquito vectors were notably more abundant on a developed CBNG site than two similar undeveloped sites (Walker et al. 2003). Reducing the population of mosquitoes, especially species that are apparently involved with bird-to-bird transmission of WNv, such as *Culex tarsalis*, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).
The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is not necessary to place the briquettes in the main water body because wave action prevents this environment from being optimum mosquito breeding habitat. Follow-up treatment of adult mosquitoes with malathion may be needed every 3 to 4 days to control adults following application of larvicide (Mooney, personal conversation). These treatment methods seem to be effective when focused on specific target areas, especially near communities, however they have not been applied over large areas nor have they been used to treat a wide range of potential mosquito breeding habitat such as that associated with CBNG development.

The WDEQ and the Wyoming Department of Health sent a letter to CBNG operators on June 30, 2004. The letter encouraged people employed in occupations that require extended periods of outdoor labor, be provided educational material by their employers about WNv to reduce the risk of WNv transmission. The letter encouraged companies to contact either local Weed and Pest Districts or the Wyoming Department of Health for surface water treatment options.

3.4. Water Resources

The project area is located within the headwaters of the Upper Powder River and Belle Fourche drainage systems near Pumpkin Buttes. Larger drainages that headwater at the buttes and are intersected by POD boundaries include Cottonwood Creek, North Cottonwood Creek, Dry Willow Creek, All Night Creek, Fourmile Creek and the headwater reach of the Belle Fourche River.

3.4.1. Groundwater

WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for TDS: 500 mg/l TDS for Drinking Water (Class I), 2000 mg/l for Agricultural Use (Class II) and 5000 mg/l for Livestock Use (Class III).

The ROD includes a Monitoring, Mitigation and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation of the EIS. The MMRP called for the use of adaptive management where changes could be made based on monitoring data collected during implementation.

Specifically relative to groundwater, the plan identified the following (PRB FEIS ROD page E-4):

- The effects of infiltrated waters on the water quality of existing shallow groundwater aquifers are not well documented at this time;
- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions;
- It may be necessary to conduct investigations at representative sites around the basin to quantify these impacts;

- Provide site specific guidance on the placement and design of CBM impoundments, and;
- Shallow groundwater wells would be installed and monitored where necessary.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 47 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 5 to 1,132 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.4.2. Surface Water

The project area is within headwater areas of tributaries to the Upper Powder River and Belle Fourche watersheds. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels range from well-vegetated, grassy swales without defined bed and bank to well-formed channels with well-formed floodplains. Some channels are incised into the landscape with steep, erosive banks.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Upper Powder River watershed, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS gauging station located at Arvada, WY, Station ID 06317000 (PRB FEIS page 3-49).

For the Belle Fourche River watershed, the EC ranges from 1,532 at Maximum monthly flow to 2,755 at Low monthly flow and the SAR ranges from 3.81 at Maximum monthly flow to 6.77 at Low monthly flow. These values were determined at the USGS gauging station located below Moorcroft, WY, Station ID 06426500 (PRB FEIS page 3-49).

The operator did not identify any natural springs within this POD boundary.

For more information regarding surface water, please refer to the PRB FEIS Chapter 3 Affected Environment pages 3-36 through 3-56.

3.5. Socioeconomics

Development of energy producing minerals in the Powder River Basin has an effect on community and government services, economies, and public finance. For a complete description of socioeconomic effects of permitting CBNG in the Powder River Basin refer to PRB FEIS Chapter 3 Socioeconomics pages 3-275 through 3-290.

3.5.1. Alternatives Other than 80 acre Spacing

CBNG can be developed on spacing other than 80 acre spacing. Operators have the option to form unitizations allowing neighboring leases to share economic gains. This project is not in a unit.

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the All Day project prior to on-the-ground project work (BFO project no. 70070139 and 70070139.a). ACR Consultants, Inc. conducted a block and

linear Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. BLM Archaeologist, G.L. "Buck" Damone III, reviewed the report for technical adequacy and compliance with BLM standards, and determined it to be adequate. The following resources are located within the project area.

Table 3.7 Cultural Resources Inventory Results

Site Number	Site Type	National Register Status
48CA268	Pumpkin Buttes TCP	Eligible
48CA1522	Prehistoric	Destroyed
48CA1568	Deadwood Road	Eligible
48CA1570	Sawyers Wagon Road	Eligible
48CA4975	Crook's 1876 Belle Fourche Scout	Eligible
48CA5225	Prehistoric/Historic	Eligible
48CA5460	Prehistoric	Not Eligible
48CA6480	Prehistoric	Eligible
48CA6488	Prehistoric	Eligible
48CA6554	Prehistoric/Historic	Not Eligible
48CA6622	Historic	Not Eligible
48CA6623	Prehistoric/Historic	Not Eligible
48CA6624	Prehistoric/Historic	Not Eligible
48CA6625	Prehistoric	Not Eligible
48CA6626	Prehistoric	Not Eligible
48CA6627	Prehistoric	Eligible
48CA6628	Prehistoric	Eligible
48CA6629	Prehistoric	Not Eligible
48CA6630	Prehistoric	Not Eligible
48CA6631	Historic	Not Eligible
48CA6632	Prehistoric	Not Eligible
48CA6633	Historic	Not Eligible
48CA6634	Prehistoric	Unevaluated
48CA6635	Prehistoric	Unevaluated
48CA6636	Prehistoric/Historic	Not Eligible
48CA6637	Prehistoric	Not Eligible

Site Number	Site Type	National Register Status
48CA6638	Prehistoric	Eligible
48CA6639	Prehistoric	Not Eligible
48CA6640	Prehistoric/Historic	Not Eligible
48CA6641	Prehistoric/Historic	Eligible
48CA6642	Prehistoric	Not Eligible
48CA6643	Prehistoric	Not Eligible
48CA6644	Prehistoric	Eligible
48CA6645	Prehistoric/Historic	Not Eligible
48CA6646	Prehistoric/Historic	Eligible
48CA6647	Prehistoric	Eligible
48CA6648	Prehistoric	Not Eligible
48CA6649	Prehistoric	Not Eligible
48CA6650	Prehistoric/Historic	Eligible
48CA6651	Prehistoric/Historic	Not Eligible
48CA6652	Prehistoric/Historic	Not Eligible
48CA6653	Prehistoric	Not Eligible
48CA6654	Prehistoric/Historic	Not Eligible
48CA6655	Prehistoric	Eligible
48CA6656	Prehistoric	Not Eligible
48CA6657	Prehistoric/Historic	Not Eligible
48CA6658	Prehistoric	Eligible
48CA6659	Prehistoric/Historic	Not Eligible
48CA6660	Prehistoric	Not Eligible
48CA6661	Prehistoric	Not Eligible
48CA6662	Prehistoric	Unevaluated
48CA6663	Prehistoric	Eligible
48CA6664	Prehistoric	Not Eligible
48CA6665	Prehistoric/Historic	Eligible
48CA6908	Prehistoric	Unevaluated

Site Number	Site Type	National Register Status
48CA6909	Prehistoric	Unevaluated
48CA6910	Prehistoric	Eligible
48CA6928	Prehistoric	Not Eligible
48CA6929	Prehistoric	Not Eligible

Sites CA1568 (Deadwood Road), 48CA1570 (Sawyers Wagon Road) and 48CA4975 (Crook's 1876 Belle Fourche Scout) are eligible for the National Register. Portions of the Deadwood Trail (expressed as wagon ruts) which contribute to the significance of the site occur near the project area. There are no significant portions of the other trails in or near the project area. At the landowner's request, Yates Petroleum and BLM modified the plan to deny project related vehicle access on a non-contributing segment of the Deadwood Trail near Little Black Butte.

There are 16 prehistoric sites in or near the project area which are eligible for the National Register due to their potential for having significant scientific data. These sites are typically expressed as buried campsites with artifacts, bone, and hearth features. Of the 52 sites with prehistoric components in the project area, over 30% are determined eligible. This is more than twice the percentage of eligible sites (13% as noted in the PRB EIS) that occur in the Powder River Basin as a whole. One possible reason for this higher density is the close vicinity of Pumpkin Buttes, which are a prominent landmark significant to numerous tribes. The high eligible site density may also be due to an increased likelihood of preserving intact buried deposits within the area. The Ruby Site, a bison kill site excavated by the University of Wyoming in the 1970's within a few miles of the project area, is located in a unique upland setting and exhibited excellent site preservation. Some of the sites in the project area are in similar upland settings, and may have similar preservation characteristics. Some of the project area also occurs in deep alluvial deposits. Alluvial deposits typically have a high potential for buried cultural resources, which are nearly impossible to locate during a Class III inventory.

The Pumpkin Buttes (48CA268) are a series of four prominent buttes which are eligible for the National Register, and have also been determined by the Bureau (in consultation with 15 tribes and the Wyoming SHPO) to be a Traditional Cultural Property (TCP). Generally, a TCP is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a community that are rooted in that community's history and are important in maintaining their continuing cultural identity. The Bureau determined that the buttes are a TCP and established a boundary for the site in consultation with the tribes and SHPO. The site boundary is based on topographic lines, varying in elevation from butte to butte.

3.7. Air Quality

Existing air quality throughout most of the Powder River Basin is in attainment with all ambient air quality standards. Although specific air quality monitoring is not conducted throughout most of the Powder River Basin, air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

Existing air pollutant emission sources within the region include following:

- Exhaust emissions (primarily CO and nitrogen oxides [NOx]) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;
- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;
- Transport of air pollutants from emission sources located outside the region;
- Dust (particulate matter) from coal mines;
- NOx, particulate matter, and other emissions from diesel trains and,
- SO2 and NOx from power plants.

For a complete description of the existing air quality conditions in the Powder River Basin, please refer to the PRB Final EIS Volume 1, Chapter 3, pages 3-291 through 3-299.

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action (Alternative B) resulted in development of Alternative C as the preferred alternative. The changes have reduced impacts to the environment which will result from this action. The environmental consequences of Alternative C are described below. A detailed description of Alternative D can be found in Appendix A.

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 35 well locations 33 can be drilled without a well pad. Surface disturbance associated with the drilling of the 2 wells with slotted disturbance would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes). Each location of may disturb a surface area of approximately 0.35 acres during construction for reserve pits (estimated approximate size of 15 x 60 feet), and compaction (from vehicles driving/parking at the drill site). Construction area on the well location is estimated to be up to 100 x 150 feet. While estimated disturbance during construction of these 35 wells would involve approximately 0.35 acre/well for 12.25 acres, interim reclamation will reduce disturbance areas to 0.1 acre/well. The total estimated disturbance after interim reclamation for all 35 wells would be 3.5 acres.

For a detailed record of surface disturbance associated with the All Day POD, see Appendix A. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, wing ditches, culverts, rip-rap, etc.) would ensure land productivity/stability is regained and maximized.

Proposed stream crossings, including culverts and low water crossing are shown on the MSUP and the WMP maps (see the POD). These structures would be constructed in accordance with sound, engineering practices and BLM standards.

The PRB FEIS made predictions regarding the potential impact of produced water to the various soil types found throughout the Basin, in addition to physical disturbance effects. "Government soil experts state that SAR values of 13 or more cause potentially irreversible changes to soil structure, especially in clayey soil types, that reduce permeability for infiltration of rainfall and surface water flows, restrict root growth, limit permeability of gases and moisture, and make tillage difficult." (PRB FEIS page 4-144).

4.1.1. Soils Direct and Indirect Effects

The effects to soils resulting from well pad, access roads and pipeline construction include:

• Mixing of horizons – occurs where construction on roads, pipelines or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
• Loss of soil vegetation cover, biologic crusts, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
• Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography and cover.
• Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.

An important component of soils in Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are biological soil crusts or cryptogamic soils that occupy ground area not covered with vascular plants. Biological soil crusts are important in maintaining soil stability, controlling erosion, fixing nitrogen, providing nutrients to vascular plants, increasing precipitation infiltration rates, and providing suitable seed beds (BLM 2003). They are adapted to grow in severe climates; however, they take many years to develop (20 to 100) and can be easily disturbed or destroyed by surface disturbances associated with construction activities.

Surface disturbance increases the potential for valuable soil loss due to increased water and wind erosion, invasive/noxious/poisonous plant spread, invasion and establishment, and increased sedimentation and salt loads to the watershed system.

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). The Wyoming Reclamation Policy applies to all surface disturbing activities. Authorizations for surface disturbing actions are based upon the assumptions that an area can and ultimately will be successfully reclaimed. BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to an approved "Reference Site" or NRCS Ecological Site Transition State. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.

Cumulative Effects: Most soil disturbances would be short term impacts with expedient, effective interim reclamation and site stabilization, as committed to by the operator in their POD Surface Use Plan and as required by BLM in COAs.

4.1.2. Wetland/Riparian

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment. Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges. Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root

zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas." (PRB FEIS Page 4-175).

Sporadic groupings of cottonwood trees may be found on larger tributaries downstream of the All Day POD area. Other riparian and wetland vegetation may be found in the POD area along streams perrenialized by CBNG discharge in the Belle Fourche watershed.

4.1.3. Invasive Species

Based on the investigations performed during the POD planning process, the operator has committed to the control of noxious weeds and species of concern using the following measures in an Integrated Pest Management Plan (IPMP) included in the proposal:

1. Weed inspection and pre-treatment to control the weed, prior to disrupting area
2. Mowing prior to seed formation
3. Hand pulling small infestations
4. Cleaning equipment after site visits to prevent the spreading between locations
5. Weed education and awareness includes construction supervisors, foreman and landowners

Cheatgrass or downy brome (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) are known to exist in the affected environment. These two species are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible at this time.

The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle and perennial pepperweed. However, mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants.

4.1.4. Cumulative Effects

The PRB FEIS stated that cumulative impacts to soils could occur due to sedimentation from water erosion that could change water quality and fluvial characteristics of streams and rivers in the sub-watersheds of the Project Area. SAR in water in the sub-watersheds could be altered by saline soils because disturbed soils with a conductivity of16mmhos/cm could release as much as 0.8 tons/acre/year of sodium (BLM 1999c). Soils in floodplains and streambeds may also be affected by produced water high in SAR and TDS. (PRB FEIS page 4-151).

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and soils are within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River and Belle Fourche River drainages, which area approximately 20.3% and 21.0% respectively of the total predicted in the PRB FEIS as of 2008.

- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The WMP for the All Day POD proposes that produced water will not contribute significantly to flows downstream in the Powder River drainage.

4.2. Wildlife

During the environmental analysis process, the BLM identified project modifications resulting in an environmentally preferred alternative (Alternative C). At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be reduced. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate or minimize environmental impacts.

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, Winter-Yearlong range for pronghorn antelope and Yearlong and Winter-Yearlong range for mule deer will be directly and impacted with the construction of wells, reservoirs, pipelines and roads. Short-term disturbances (pipeline for example) should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). The WGFD indicates a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests not only do mule deer avoid mineral activities, but after three years of drilling activity the deer have not become accustomed to the disturbance (Madson 2005).

Big game animals are expected to return to the project area following construction; however, populations will likely be lower than prior to project implementation as the human activities associated with operation and maintenance continue to displace big game. Mule deer are more sensitive to operation and maintenance activities than pronghorn, and, as the Pinedale Anticline study suggests, mule deer do not readily habituate. A study in North Dakota stated “Although the population (mule deer) had over seven years to habituate to oil and gas activities, avoidance of roads and facilities was determined to be long term and chronic” (Lustig 2003). Deer have even been documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

Winter big game diets are sub-maintenance, meaning animals lose weight and body condition as the winter progresses. Survival below the maintenance level requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978) further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

Reclamation and other activities that occur within big game habitats during the spring will likely displace does and fawns due to the human presence in the area. This may cause reduced survival rate of does and fawns that expend increased energies to avoid such activities.

4.2.1.1. Big Game Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-211.

4.2.2. Aquatics Direct and Indirect Effects

Water produced from the project wells will be contained in a series of on-channel reservoirs. Yates will manage this project so that infiltration and evaporation losses from the reservoirs will consume the produced water. Reservoirs shall only discharge coincident with the occurrence of overtopping during a storm event according to the POD water management plan. If a reservoir were to discharge, produced water may reach the fish-bearing Powder River.

The Wyoming Department of Environmental Quality (DEQ) regulates effluent discharge through the National Pollution Discharge Elimination System in compliance with the Federal Water Pollution Control Act and the Wyoming Environmental Quality Act. The Wyoming DEQ has established effluent limits for the protection of game and non-game, aquatic life other than fish, wildlife, and other water uses.

4.2.2.1. Aquatics Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247.

4.2.3. Migratory Birds Direct and Indirect Effects

Disturbance of the habitat types within the project area is likely to impact migratory birds. Native habitats are being lost directly with the construction of wells, roads, and pipelines. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Human activities likely displace migratory birds farther than simply the physical habitat disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

Habitat fragmentation results in more than just a quantitative loss in the total area of habitat available; the remaining habitat area is also qualitatively altered (Temple and Wilcox 1986). Ingelfinger (2004) identified that the density of breeding Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses (displacement) were much greater than the direct physical habitat losses.

Reclamation activities that occur in the spring may be detrimental to migratory bird survival. Those species that are edge-sensitive will be displaced further away from vegetative edges due to increased human activity, causing otherwise suitable habitat to be abandoned. If the interior habitat is at carrying capacity, then birds displaced from the edges will have no place to relocate. One consequence~~s~~ of habitat fragmentation is a geometric increase in the proportion of the remaining habitat that is near edges (Temple 1986). In severely fragmented habitats, all of the remaining habitat may be so close to edges that no interior habitat remains (Temple and Cary 1988). Over time, this will lead to a loss of interior habitat species in favor of edge habitat species. Other migratory bird species that utilize the disturbed areas for nesting may be disrupted by the human activity and nests may be destroyed by equipment.

Overhead power lines may affect migratory birds in several ways. Power poles provide raptors with perch sites and may increase predation on migratory birds. Power lines placed in flight corridors may result in collision mortalities. Some species may avoid suitable habitat near power lines in an effort to avoid predation.

Migratory bird species within the Powder River Basin nest in the spring and early summer and are vulnerable to the same affects as sage-grouse and raptor species. Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor

nesting timing limitations are applied (the entire POD area), nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Migratory Birds Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235.

4.2.4. Raptors Direct and Indirect Effects

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to overheating or chilling of eggs or chicks. Prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near nests may attract predators and increase nest predation.

The presence of overhead power lines may impact foraging raptors. Raptors forage opportunistically throughout the Powder River Basin. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, US Fish and Wildlife Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a one-half mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructures requiring human visitation be located in such a way as to provide an adequate biologic buffer for nesting raptors. During the on-sites, staked well locations were moved and agreed upon (Yates and BLM). Those well moves are listed in Appendix A. The Little Black Butte #3 reservoir site is not approved with this POD due the presence of a ferruginous hawk at the embankment site.

Table 4.1 Proposed and existing infrastructure within 0.5 mile of documented raptor nests within the All Day POD project area.

BLM ID	Infrastructure
2409	1, 2, 3, and 4 Marauder wells, overhead power in Section 11 T42N R75W
2410	4, and 5 Marauder wells
3132	Ox Bar Reservoir
3133	Ox Bar Reservoir
3398	1 All Day well
4228	4 Endless well, overhead power
4249	2 Endless well, 3 Endless well, 4 Endless well. Overhead power in section 12 T43N

BLM ID	Infrastructure
	R73W
4530	14 Cinnabar well
4531	South Dry Willow Reservoirs #1 and #2.
4532	13 and 16 Cinnabar well
4533	5 Endless well, South Dry Willow Reservoir #1, Access corridor, overhead power in section SW 7 NW 18, T43N R75W and SE 12 T43N R76W
4534	Access corridor section 17 T43NR75W
4536	4, and 5 Endless wells
4538	Access corridor NE section 16 T43NR75W
4541	1,2,7 Forever wells
4546	4 Forever well, City Bowl Reservoir
4553	6 Pepperstone well, Little Black Butte Reservoir 2,3,6,7
4556	Access Corridor, Section 36, SE section 35 T43NR75W
4557	7 Pepperstone well, East Pasture 4 Reservoir
4559	4 Vindicator well
4560	East Pasture 3 Reservoir, 4 Vindicator well
4561	1 Marauder well, Cosner Reservoir
4562	1, 2 Marauder well
4696	4 Pepperstone well, Little Black Butte Reservoir 4, Overhead Power in section 34 T43N R 75W.
5219	4 Pepperstone well, Little Black Butte Reservoir 4, Overhead Power in section 34 T43N R 75W.
5220 (6339)	9 All Day, overhead power in section 18 T43N R74W
6152	Little Black Butte Reservoir 5
6156	East Pasture Reservoir 4
6185	5 and 6 Endless wells
6200	5, 6, and 7 Endless well
6499	6 Forever well
6504	4, 5, Endless well
6518	South Dry Willow #2 Reservoir
6519	Oxbow Reservoir
6521	South Dry Willow #2 Reservoir
6522	South Dry Willow #2 Reservoir
6523	South Dry Willow #2 Reservoir
6524	South Dry Willow #2 Reservoir
6525	South Dry Willow #2 Reservoir, access corridor in section 17 T43NR75W
6529	Oxbow Reservoir
6534	South Dry Willow # 2
6535	South Dry Willow # 2
6541(6503)	4, 5, 6 Forever wells, overhead power and corridor in section 23 T43NR75W
6542	Corridor and overhead power in SE 35, SW 36, T43NR74W

Unlikely and Potentially Impacted

All the nests listed above could be impacted by the proposed development if nesting pairs are sensitive to human presence within 0.5 miles of their nests. The nests discussed below have a higher potential for impacts due to the proximity of proposed project infrastructure.

Likely to be impacted

The nests discussed in this paragraph may be impacted from increased human activity within close proximity to the nests. Due to limitations associated with non-unitized CBNG projects, changes could not be made to alleviate these impacts. Yates' representative stated that overhead power (OHP) placement could not be determined exactly because power is contracted to a 3rd party; therefore, no overhead power moves were made at the on-sites.

The 6 Endless well and access follows a ridge between nests BLM ID #4228 (Red-tail) and 4249 (unknown) to the west and 4536 (Great-horned owl), 6185 (unknown) and 6200 (unknown) to the east. The 4536, 6185 and 6200 nest locations are within ¼ mile and in view of the 6 Endless well. Due to the proximity and visibility of the 6 Endless location and access, human activity along the access and at the well would have a high possibility of precluding use of these nest locations. Therefore the 6 Endless location will not be permitted.

The 5 Endless well was staked in view of the tree with the 4536, 6185 nests; however Yates agreed to move this well out of view on the tree. The access road to the 5 Endless well is not in view of the nests. These efforts, in combination with the loss of the Endless 6 location, increase the potential for continued use of these nests.

Nest 4532 (Red-tailed hawk) in within ¼ mile of the 13 Cinnabar well. The nest location is out of view and 100-200 feet higher than the well location. Both the visual screening and the nest being higher than the well location increase the potential for this nest location to remain active.

Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS.

Nest 4541 (Ferruginous hawk) is located on a windmill. At the 2008 on-site visit, there were no signs of breeding activity at the windmill nest site, although the pair had initiated a nesting attempt, which failed. The BLM biologist did not anticipate that this pair would use the windmill site again, thus no changes were suggested (or made) for the 1 and 2 Forever wells, both within ¼ mile and in view of the windmill nest site. In 2009, the pair again nested and failed at the windmill nesting site. If either of the 1 or 2 Forever wells are constructed, then the Windmill nest location will likely become permanently compromised. The 7 Forever well could be built with little risk to future breeding productivity to Nest 4541, As it is ½ mile from the current nest location, down slope, and out of line-of-sight.

Nest 4553 (Ferruginous hawk) is located at the proposed construction site for the Little Black Butte Reservoir #3. If built, this reservoir would permanently remove the nest location. The number 6 Pepperstone well location was moved at the on-site, out of view of Nest 4553. Three other reservoirs are proposed within 0.5 mile of this nest, but all are located outside line-of-site view from Nest 4553. Denial of the reservoirs (discussed in alternative D) combined with moving the 6 Pepperstone well location may allow continued successful reproduction at this nest, by breeding Ferruginous hawks.

Nest 2409 (Ferruginous hawk) is located within ¼mile of both the number 2 and 4 Marauder wells, as well as within ½mile of the number 1 and 3 Marauder wells. The access road to the number 4 and 6 Marauder wells is within 0.1 mile from the Nest 2409. Yates did not propose any alternative locations for these wells. Permitting both of the number 2 and 4 Marauder wells will most likely preclude Ferruginous hawk nesting at the 2409 location.

Nest 5220 (6339) (Ferruginous hawk) nest was not identified at the on-site and is within ¼ mile of the 9 All Day well. It has not yet been documented as an active sitesince it was first identified in the 2007 survey as a remnant nest. Permitting the 9 All Day at the proposed location would almost certainly preclude future use of this nesting location by Ferruginous hawks.

Nest 3398 is within ¼ mile of the 1 All Day well. The nest has not yet been documented as an active site, including when it was identified in 2004 surveys. No breeding activity information was collected for this nest site in either 2005 or 2006. The nest location is on the opposite side of a hill, which is between Nest 3398 and theproposed number 1 All Day well location. Human activity at the 1 All Day well may preclude future use of this nest location by breeding raptors.

Nest 4562 is within ¼ mile of both 2 and 4 Marauder wells, as well as the proposed access road between the numbers 3 and 4 Marauder wells. This nest has not been active since it was initially discovered in 2006. The Nest 4562 location has a very low probability of continued use by raptors with the proposed construction and operation of the All Day POD.

4.2.4.1. Raptor Cumulative Effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-221.

4.2.5. Threatened and Endangered and Sensitive Species

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered Species

Table 4.2 Summary of Threatened And Endangered Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat of insufficient size.
Blowout penstemon (*Penstemon haydenii*)	Unstable, sandy blow-outs and active sand dunes	NP	NE	Depositional sands/dunes not present.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	NE	Suitable habitat is not present.

Presence
K Known, documented observation within project area.
S Habitat suitable and species suspected, to occur within the project area.
NS Habitat suitable but species is not suspected to occur within the project area.
NP Habitat not present and species unlikely to occur within the project area.

Project Effects
LAA Likely to adversely affect
NE No Effect.
NLAA May Affect, not likely to adversely affect individuals or habitat.

4.2.5.1.1. Black-Footed Ferret Direct and Indirect Effects

Because no black-tailed prairie dog colonies were found within the All Day POD project area implementation of the proposed development will have "***no effect***" on the black-footed ferret.

4.2.5.1.2. Blowout Penstemon Direct and Indirect Effects

Based on habitat assessments of the project area (ICF 2009 c, Wildlife Resources 2009 c), there is no suitable Blowout Penstemon habitat that could be disturbed within the proposed action area. Therefore the project will have no "***no effect***" on Blowout Penstemon.

4.2.5.1.3. Ute Ladies'-Tresses Orchid Direct and Indirect Effects

The Ute ladies'-tresses orchid is listed as threatened by the USFWS. The 5-factor analyses in its listing determination showed that increasing energy development, noxious weeds, and anthropogenic on-channel water developments related to coalbed methane production, were direct threats to its long-term viability. Also, the USFWS found that prolonged absences of disturbance (flooding, herbivory, mechanical mowing), may also be a potential threat, just as repeated mowing and grazing during its brief flowering stage may lead to population declines (Hazlett 1996, 1997, Heidel 2007). Invasive weeds transplanted by vehicle or foot traffic into suitable mesic habitats, could prevent Ute Ladies'-Tresses from potential population expansions.

On-channel reservoir seepage may create suitable habitat if historically ephemeral drainages become perennialized, however no historic seed source is known to occur within the project area. Implementation of the proposed coal bed natural gas project will have "***no effect***" on the Ute ladies'- tresses orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

BLM will take necessary actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22 A states: "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the Endangered Species Act are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary."

4.2.5.2.1. Sagebrush obligates

Shrubland and grassland birds are declining faster than any other group of avian species in North America (Knick et al. 2003). In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats and creating soil conditions facilitating the spread of invasive plants (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100 m of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001). Increased numbers of corvids and raptors associated with powerlines (Steenhof et al. 1993, Knight and Kawashima 1993, Vander Haegen et al. 2002) increases the potential predation impact on sage-grouse and other sagebrush-breeding birds (Knick et al. 2003).

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as remnants surrounded by unusable environments (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Populations of sagebrush-obligate species can decline because the areas of affected suitable habitats decrease (Temple & Cary 1988); because of lowered vital rates: 1) Decreasing nest success and, 2) Increased juvenile/adult mortality rates (Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe habitats has the potential to negatively affect the populations of shrub-obligate species (Knick and Rotenberry 1995). Several decades are required to reestablish mature sagebrush communities. Due to this, sagebrush obligate species may not return until decades after reclamation has occurred.

Table 4.3 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (*Lithobates pipiens*)	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will affect existing waterways.
Spotted frog (*Ranus pretiosa*)	Mountain ponds, sloughs, small streams	NP	NI	Prairie not mountain habitat.
Birds				
Baird's sparrow (*Ammodramus bairdii*)	Grasslands, weedy fields	S	MIIH	Sagebrush cover will be affected.
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body.	S	MIIH	Project includes occupied habitat & overhead power. Documented roost may be compromised by the proposed project.
Brewer's sparrow (*Spizella breweri*)	Basin-prairie shrub	S	MIIH	Sagebrush cover will be affected.
Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	S	NI	No prairie dog towns impacted.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	K	WIPV	Active nests present within 0.5 miles of CBNG wells.
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush cover will be affected.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	NP	NI	Habitat not present.
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	NP	NI	Habitat not present.
Northern goshawk (*Accipiter gentilis*)	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon (*Falco peregrinus*)	cliffs	NP	NI	No nesting habitat present.
Sage sparrow (*Amphispiza billneata*)	Basin-prairie shrub, mountain-foothill shrub	NP	NI	Species has not been documented in the Buffalo

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
				Field office area.
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Trumpeter swan (*Cygnus buccinator*)	Lakes, ponds, rivers	NP	NI	Reservoirs may provide migratory habitat.
White-faced ibis (*Plegadis chihi*)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (*Coccyzus americanus*)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (*Oncoryhynchus clarki bouvieri*)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (*Cynomys ludovicianus*)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	NP	NI	No Prairie dog towns found.
Fringed myotis (*Myotis thysanodes*)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (*Myotis evotis*)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat (*Euderma maculatum*)	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not present.
Swift fox (*Vulpes velox*)	Grasslands	S	MIIH	Project may increase red fox population.
Townsend's big-eared bat (*Corynorhinus townsendii*)	Caves and mines.	NP	NI	Habitat not present.
Plants				
Porter's sagebrush (*Artemisia porteri*)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
William's wafer parsnip (*Cymopterus williamsii*)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

Presence
K Known, documented observation within project area.
S Habitat suitable and species suspected, to occur within the project area.
NS Habitat suitable but species is not suspected to occur within the project area.
NP Habitat not present and species unlikely to occur within the project area.

Project Effects
NI No Impact.
MIIH May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.
WIPV Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
BI Beneficial Impact

4.2.5.2.2. Bald eagle Direct and Indirect Effects

Based on the raptor nesting and bald eagle winter roost surveys and suitable habitat, it is unlikely bald eagles nest within the All Day POD project area, although there is habitat and prey base present. Bald eagles have been observed roosting along Dry Willow Creek with 13 seen in one tree in February 2009 and 5 in December 2008. The USFWS and the BLM have determined that these roosting locations will be adequately protected with the following actions: the 1 Endless well is not constructed and no construction or maintenance of the 2 and 3 Endless wells between November 1 and April 1 every year. Exceptions may be granted on a case by case basis. These wells (2&3 Endless) are along an established resource road and out of view so routine pumper traffic should not disrupt roosting eagles. These and other steps have been taken to minimize loss of bald eagles such as buried power lines, and roads designed for minimal speeds. The proposed project should not impact bald eagle nesting or winter roosting provided Yates complies with all mitigation.

There are approximately 10 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Yates is proposing an additional 8 miles of overhead three-phase distribution lines. There are currently 18.2 miles of improved roads within the project area, with 2.14 miles proposed.

The presence of overhead power lines may impact foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin, particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with power lines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and one along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

Produced water will be stored in reservoirs which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.2.5.2.3. Black-tailed prairie dog Direct and Indirect Effects

No black-tailed prairie dogs, or prairie dog obligate species (e.g. burrowing owl) will be impacted by the proposed action.

4.2.5.2.4. Grouse

4.2.5.2.4.1. Greater sage-grouse Direct and Indirect Effects

Seventeen active leks are within four miles of the All Day POD boundary. The proposed action will adversely impact breeding, nesting,brood rearing, and winter habitat. According to the Surface Use Data Summary Form submitted by Yates for the All Day POD (April 7, 2007 received by BLM September 12, 2008), 296 acres will be disturbed. Areas of sagebrush with sage-grouse habitat will be physically altered by the proposed project. Project elements anticipated to negatively impact grouse are (approximately): 38 CBNG wells on 38 locations, 2.14 miles of new improved roads, 5 miles of new pipelines, 8.0 miles of new 3-phase overhead power, 26 new reservoirs, increased vehicle traffic on established roads and increased noise from compressor stations. Active wells, roads, compressors and power lines have been shown to preclude grouse use up to 0.6 miles, therefore the entire project area (all of the acreage within the POD boundaries) can be considered affected.

During the on-site process, Yates' representative dropped three reservoirs, made adjustments to well locations and access routes to mitigate impacts to sage grouse. In sage-grouse habitat, Yates has committed to restricting brush-hogging to 30 feet on corridors and a 35-foot radius around wells.

BLM has established a 0.25 mile controlled surface use (CSU) policy for sage grouse leks. In the All Day POD, Yates proposed to use an existing road and install a pipeline corridor within the CSU for the Little Black Butte Lek. The Little Black Butte lek is the most productive lek within four miles of project elements. A condition of approval limiting travel on this road between 9AM and 3 PM, March 1to June 15 each year would increase the potential for grouse breeding on and nesting near the lek. To further minimize impacts to sage-grouse using habitat affected by the proposed action, surface-disturbing activities could be restricted during sage-grouse breeding and nesting periods (March 1 to June 15) for project components located in sage-grouse habitat for the life of the project. These restrictions would affect the entire POD with the exception of Cosner, Snow Fence, Drilling, End of T-Chair, East Pasture reservoirs, 2, 3, 4, 5, 6, 7, 8, All Day wells, and the Mara Wells**.** This restriction provides a more accurate application of protection than the original 2-mile timing restriction from the BFO RMP and the 2003 PRB Oil & Gas Project EIS.

Based on the best available science, which is summarized in the next section, the proposed action would most likely contribute to the extirpation of the local grouse population and subsequent abandonment of the 17 leks within four miles of the project area.

LEKID	Easting	Northing	peak male 2008	peak male 2009	WY Game and Fish Category of impact	Effects of the All Day POD on Category
38-Cottonwood Creek II	421621	4838450	11	1	E	E
38-Gilbertz III	429307	4846518	0	0	E	E
38-Little Black Butte	432215	4835747	36	18	M	E
38-Brown Ranch	428868	4832056	5	2	E	E
38-Collins	424600	4828800	0	0	H	H
38-Collins North	424969	4830420	0	0	H	H
38-Dry Willow	421648	4844290	28	4	E	E

LEKID	Easting	Northing	peak male 2008	peak male 2009	WY Game and Fish Category of impact	Effects of the All Day POD on Category
38-Hines	429600	4838600	0	0	M	M
38-Hines NW	428443	4839637	3	5	M	M
38-Mud Spring Creek	430151	4844662	0	0	E	E
38-Pumpkin	427719	4836167	0	0	M	M
38-South Butte	428765	4837311	0	1	M	M
38-T-Chair	427892	4829890	8	1	E	E
38-Windmill	423323	4841666	0	4	E	E
New Windmill SE	423429	4841417	4	unk	E	E
38-Windmill North	423500	4843360	1	10	E	E
38-Windmill NW	422599	4842051	0	0	E	E

M= moderate = 1-2 wells/square mile; H= high = 2-3 wells/square mile; E= extreme = 4 or more wells/square mile

4.2.5.2.4.2. Greater sage-grouse Cumulative Effects

In addition to the direct impacts to sage-grouse habitat created by federal wells and associated infrastructure, the project area contains existing fee, state, and federal fluid mineral development. The sage-grouse cumulative impact assessment area for this project encompasses a four mile radius from the leks listed above. As of February 9, 2009, there are approximately 1,069 existing wells and associated infrastructure within four miles of these leks - an area of 207 square miles. The existing well density is approximately five wells per square mile. Due to this level of development there is a strong potential that the population(s) breeding at these leks may become extirpated without the federal development.

According to the federal well database (AFMSS) as of July 2009, there are 620 proposed federal wells (44 of which are the wells from this project). With the proposed wells not associated with this action, the well density within four miles of the 17 leks could increase to7.9 wells/section. With the approval of alternative C (38 proposed well locations) the well density could increase to 8.1 wells/section.

CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (WGFD 2004). The PRB FEIS estimated 51,000 CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003).

The Powder River Basin Oil and Gas Project FEIS (BLM 2003) concluded that “Activities associated with the proposed project would affect sage-grouse in several ways. These effects may include: (1) increased direct mortality (including legal hunting, poaching, and collision with power lines and vehicles); (2) the introduction of new perches for raptors and thus the potential change in rate of predation; (3) direct loss or degradation of habitats; (4) indirect disturbance resulting from human activity (including harassment, displacement, and noise); (5) habitat fragmentation (particularly through construction of roads); and (6) changes in population (pg. 4-257).” The FEIS goes on to state that “implementation of several mitigation measures would reduce the extent of each impact addressed by those measures. Despite these measures, the synergistic effect of several impacts would likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its federal listing. Local populations may be extirpated in areas of concentrated development,

but viability across the Project Area (Powder River Basin) or the entire range of the species is not likely to be compromised (pg. 4-270).

The Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) included a Mitigation Monitoring and Reporting Plan (MMRP). The uncertainties as to where and at what level development was to proceed (as well as the uncertainties associated with the assumptions that were used to predict impacts) suggest that the one-time determination of impacts that is included in the EIS may not occur as projected. The MMRP helps to continually assess the effects of the project and the adequacy of the mitigation. Such a plan/process provides a mechanism to continuously modify management practices in order to allow development, while continuing to protect the environment (E-1). In other words, development pace and patterns may not occur as predicted, and so the BLM may use the adaptive management process provided for in the BFO RMP.

Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (WGFD 2004). Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, powerlines, reservoirs, and other infrastructure in the Powder River Basin (WGFD 2005, WGFD 2004). Sage-grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. In southwestern Wyoming, yearling female greater sage-grouse avoid nesting in areas within 0.6 miles of producing well pads (Holloran et al. 2007), and in southern Alberta, brood-rearing females avoid areas within 0.6 miles of producing wells (Aldridge and Boyce 2007). Doherty et al. (2008) demonstrated that sage-grouse in the Powder River Basin avoided otherwise suitable wintering habitats once they have been developed for energy production, even after timing and lek buffer stipulations had been applied. The WGFD feels a well density of eight wells per section creates a high level of impact for sage-grouse and that sage-grouse avoidance zones around mineral facilities overlap, creating contiguous avoidance areas (WGFD 2004). As interpreted by coordinated effort with state fish and wildlife agencies from Montana, Colorado, Utah, South Dakota, North Dakota and Wyoming, (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008), research indicates that oil or gas development exceeding approximately 1 well pad per square mile, with the associated infrastructure, results in calculable impacts on breeding populations, as measured by the number of male sage-grouse attending leks (Holloran 2005, Walker et al. 2007).

Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). In a study of greater sage-grouse population response to natural gas field development in western Wyoming, Holloran (2005) concluded that increased noise intensity, associated with active drilling rigs within 5 km (3.1 miles) of leks, negatively influenced male lek attendance. In 2002, Braun et al. documented approximately 200 CBNG facilities within one mile of sage-grouse leks. Sage-grouse numbers were found to be consistently lower for these leks than for leks without this disturbance. Direct habitat losses from the facilities themselves, roads and traffic, and the associated noise were found to be the likely reason for this finding.

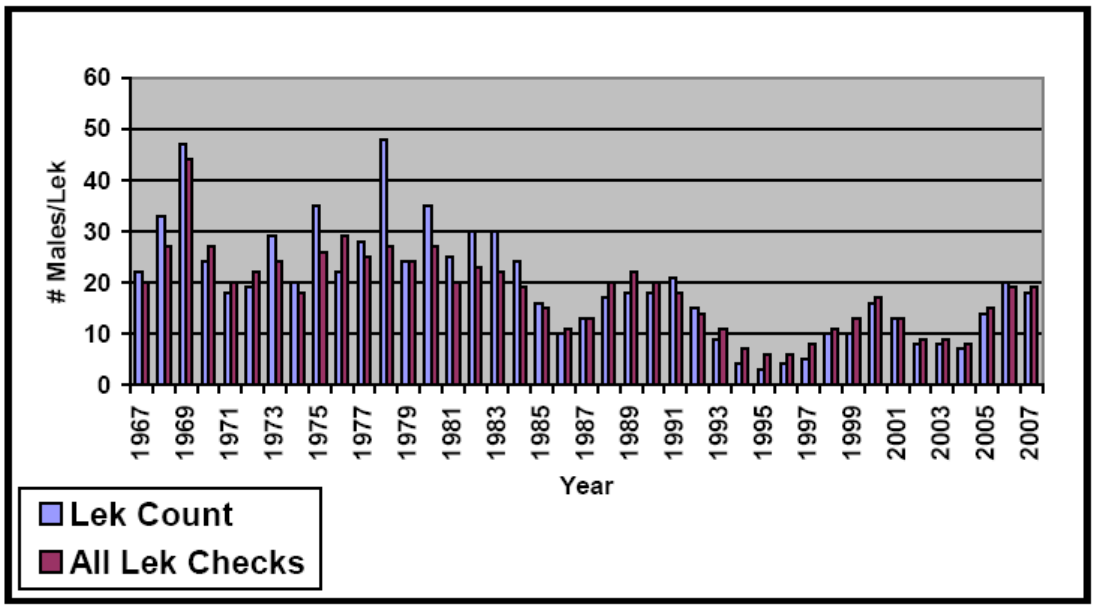
Vegetation communities within the Powder River Basin are naturally fragmented, as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. A sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within the Powder River Basin to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size has decreased by more than 63% in the past forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). The existing development within the cumulative impacts assessment area has further fragmented the sage-grouse habitat. Disturbance created by this project will contribute to additional fragmentation.

Addition of overhead power would also contribute to fragmentation. Power lines have an adverse impact on sage-grouse. Cross arms provide perching substrate for sage-grouse predators, wires are a collision risk, and poles create a vertical element in habitat that has very little native vertical structure (Connely et al 2004).

Another concern with CBNG development is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (WGFD 2004). West Nile virus represents a significant new stressor, which in 2003 reduced late summer survival of sage-grouse an average of 25% within four populations including the Powder River Basin (Naugle et al. 2004). In northeastern Wyoming and southeastern Montana, West Nile virus-related mortality during the summer resulted in an average decline in annual female survival of 5% from 2003 to 2006 (Walker et al. 2007). Powder River Basin sage-grouse losses during 2004 and 2005 were not as severe. Summer 2003 was warm and dry, more conducive to West Nile virus replication and transmission than the cooler summers of 2004 and 2005 (Cornish pers. comm.).

The sage-grouse population within northeast Wyoming is exhibiting a steady long term downward trend (Figure 1) (WGFD 2005). The figure illustrates a ten-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Long-term harvest trends are similar to that of lek attendance (WGFD 2005).

Figure 1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2007.



The BFO Resource Management Plan (BLM 2001) and the Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA) (BLM 2004). BLM Wyoming adopted the two-mile recommendation in 1990 (BLM 1990). The two-mile recommendation was based on early research which indicated between 59 and 87 percent of sage-grouse nests were located within two miles of a lek (BLM 2004). These studies were conducted within prime, contiguous sage-grouse habitat such as Idaho's Snake River plain.

Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the breeding lek (BLM 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage-grouse hens nested within 3 km (1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found only 36% of their grouse nesting within 3 km of

the capture lek. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. 2007). Habitat conditions and sage-grouse biology within the Buffalo Field Office are more similar to Moynahan's north-central Montana study area than the Upper Green River area.

Based on these studies, the BLM has determined that a two-mile timing limitation, given the long-term population decline and that less than 50% of sage-grouse are expected to nest within the 2-mile area, is insufficient to reverse the population decline. Moynahan and Lindberg (2004) like WAFWA (Connelly et al. 2000), recommend increasing the protective distance around sage-grouse leks. The BLM and University of Montana are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development. Thus far, this research suggests that impacts to leks from energy development are discernable out to a minimum of four miles, and that some leks within this radius have been extirpated as a direct result of energy development (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008). Even with a timing limitation on construction activities, sage-grouse may avoid nesting within CBNG fields because of the activities associated with operation and production. In a typical landscape in the Powder River Basin, energy development within two miles of leks is projected to reduce the average probability of lek persistence from 87% to 5% percent (Walker et al. 2007).

Walker et al, 2007 indicates the size of a no-development buffer sufficient to protect leks would depend on the amount of suitable habitat around the lek and the population impact deemed acceptable. Also, rather than limiting mitigation to only timing restrictions, research suggests more effective mitigation strategies include, at a minimum, burying power lines (Connelly et al. 2000 b); minimizing road and well pad construction, vehicle traffic, and industrial noise (Lyon and Anderson 2003, Holloran 2005); and managing produced water to prevent the spread of mosquitoes with the potential to vector West Nile Virus in sage grouse habitat (Walker et al 2007).

The multi-state recommendations presented to the WGFD for identification of core sage grouse areas acknowledges there may be times when development in important sage grouse breeding, summer, and winter habitats cannot be avoided. In those instances they recommend, "…infrastructure should be minimized and the area should be managed in a manner that effectively conserves sagebrush habitats (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008).

In January 2008, BFO staff identified that sage-grouse protections in the 2003 PRB EIS may not be adequate to preserve sage-grouse population viability in the Powder River Basin. BFO consolidated research and data to identify high-quality sage-grouse habitat in the basin and developed a map of sage-grouse "focus areas". These areas encompass approximately 1 million acres of habitat, and are managed under criteria established in "Guidance for general management actions during BFO Resource Management Plan Revision" (Appendix 1). This general guidance includes the following requirement; "The proponent will be asked to demonstrate that the proposal can be managed in a manner that effectively conserves sage-grouse habitats affected by the proposal."

Based on the best available science presented above, the proposed action will most likely contribute to the abandonment of the 17 leks within four miles of the project area. However, given the ongoing planning actions specific to sage-grouse, changes to the proposed action identified, and timing limitations applied, the proposed action should not affect population viability across the project area or the species' range. The selected alternative limiting wells, reservoirs, and overhead power in sage-grouse habitat most likely used by grouse breeding on Little Black Butte lek is intended to increase the probability of persistence of the lek to 50%.

4.2.5.2.5. Mountain plover Direct and Indirect Effects

Suitable mountain plover habitat is present, but limited within the project area. The presence of mountain plovers has not been documented within the All Day project, however given their cryptic nature they may be present. Additional surveys will be conducted annually.

Mineral development has mixed effects on mountain plovers. Disturbed ground, such as buried pipeline corridors and roads, may be attractive to plovers, while human activities within one-quarter mile may be disruptive. To reduce impacts to nesting mountain plovers, the BLM BFO requires a 0.25 mile timing limitation for potential nesting habitat prior to nest survey completion and a 0.25 mile timing limitation for all occupied nesting habitat for the entire nesting season.

Use of roads and pipeline corridors by mountain plovers may increase their vulnerability to vehicle collision. Limiting travel speed to 25mph provides drivers an opportunity to notice and avoid mountain plovers and allows mountain plovers sufficient time to escape from approaching vehicles. Even if a nesting plover flushes in time, the nest likely would still be destroyed. Overhead power lines provide perch sites for raptors that could result in increased mountain plover predation. CBNG infrastructure such as well houses, roads, pipeline corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

Mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat when loss or alteration of their natural breeding habitat (predominately prairie dog colonies) occurs, such as heavily grazed land, burned fields, fallow agriculture lands, roads, oil and gas well pads and pipelines. These areas could become reproductive sinks. Adult mountain plovers may breed there, lay eggs and hatch chicks; however, the young may not reach fledging age due to the poor quality of the habitat. Recent analysis of the USWFS Breeding Bird Survey (BBS) data suggests that mountain plover populations have declined at an annual rate of 3.7 % over the last 30 years which represents a cumulative decline of 63% during the last 25 years (Knopf and Rupert 1995). An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

4.2.5.3. Sensitive Species Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-271.

4.3. West Nile Virus Direct and Indirect Effects

This project is likely to result in standing surface water which may increase *Culex tarsalis* breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNv species and its effects in Wyoming.

There is no evidence that treatment, either through the use of larvicides or malithion, on a site specific or basin-wide scale will have any effect on the overall spread of WNv. The State agencies have not instituted state-wide treatment for mosquitoes due to WNv, nor are they requiring any mitigation specific to permitting for CBM operations.

Cumulatively, there are many sources of standing water, beyond CBM discharge, throughout the PRB that would add to the potential for mosquito habitat. Sources include; natural flows, livestock watering facilities, coal mining operations, and outdoor water use and features in and around communities.
BLM will keep monitoring this issue by continuing to consult with the State agencies and the researchers working in the area in order to stay abreast of the most current developments and any need to apply mitigation.

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. This section is written under the assumption that all wells proposed under Alternative C, would produce water. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River and Belle Fourche River watersheds and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies. Reservoirs are proposed to provide full containment of water discharged in the Powder River drainage, and water will be discharged into new and existing impoundments in the Belle Fourche River drainage that will provide stock watering for landowners, but these reservoirs can overflow water into downstream channels**.**

The WDEQ has assumed primacy from United States Environmental Protection Agency for maintaining the water quality in the waters of the state. The WSEO has authority for regulating water rights issues and permitting impoundments for the containment of surface waters of the state.

The maximum water production is predicted to be 30.0 gpm per well or 1320.0 gpm (3.04 cfs or 2,129 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Belle Fourche River drainage, the projected water volume produced within the watershed area was 79,493 acre-feet in 2008 (maximum production is estimated in 2007 at 84,507 acre-feet). As such, the volume of water resulting from the production of these wells is 2.7% of the total volume projected for 2008. For the Upper Powder River drainage, the projected water volume produced within the watershed area was 147,481acre-feet in 2008 (maximum production is estimated in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells is 1.2% of the total volume projected for 2008

This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, if all produced water were discharged in to the Upper Powder drainage it may be assumed that a maximum of 528 gpm would infiltrate at or near the discharge points and impoundments (851 acre feet per year). A similar calculation can be made for Belle Fourche River drainage where 28% may infiltrate to groundwater aquifers and coal zones (PRB FEIS pg 4-5). If all produced water were discharged from this action to the Belle Fourche River drainage it may be assumed that a maximum of 370 gpm would infiltrate at or near the discharge points and

impoundments (596 acre feet per year). In each case this water would saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, "the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater." (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 6 to 1132 feet compared to an approximate depth of 1500 feet to the top of the Big George. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

Recovery of the coal bed aquifer was predicted in the PRB FEIS to "…resaturate and repressurize the areas that were partially depressurized during operations. The amount of groundwater storage within the coals and sands units above and below the coals is enormous. Almost 750 million acre-feet of recoverable groundwater are stored within the Wasatch - Tongue River sand and coals (PRB FEIS Table 3-5). Redistribution is projected to result in a rapid initial recovery of water levels in the coal. The model projects that this initial recovery period would occur over 25 years." (PRB FEIS page 4-38).

Adherence to the drilling plan, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures will protect any potential fresh water aquifers above the target coal zone. This will ensure that ground water will not be adversely impacted by well drilling and completion operations.

In order to determine the actual water quality of the producing formations in this POD, and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well within the POD. The reference well will be sampled at the well head for analysis within sixty days of initial production and a copy of the water analysis will be submitted to the BLM Authorizing Officer.

The BLM has installed shallow groundwater monitoring wells at five impoundment locations in the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. Water quality data has been sampled from these wells on a regular basis. Preliminary data from three sites show increasing TDS level as water infiltrates while two sites are not. On-going shallow groundwater monitoring at four other impoundment locations are less intensive and consist of batteries of between 4 and 6 wells. Preliminary data from two sites are showing increasing TDS levels as water infiltrates, while two monitoring wells do not.

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments. As of April of 2009, approximately 1,999 impoundment sites had been investigated through over 2,272 borings. Of these

impoundments, 277 met the criteria to require "compliance monitoring" if constructed and used for CBNG water containment. Only 155 impoundments requiring monitoring are presently being used. As of the first quarter of 2009, only 18 of those monitored impoundments caused a change in the "Class of Use" of the underlying aquifer water.

4.4.1.1. Groundwater Cumulative Effects:

As stated in the PRB FEIS, "The aerial extent and magnitude of drawdown effects on coal zone aquifers and overlying and underlying sand units in the Wasatch Formation also would be limited by the discontinuous nature of the different coal zones within the Fort Union Formation and sandstone layers within the Wasatch Formation." (PRB FEIS page 4-64).

Development of CBNG through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water "…cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch Formation - Tongue River Member sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5)." (PRB FEIS page 4-65).

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watersheds for SAR, and EC, the average value measured at selected USGS gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in the WDEQ's WYPDES permit, and the levels found in the POD's representative water sample.

Table 4.5 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Most Restrictive Proposed Limit –			
Belle Fourche River		10	2000
Powder River		2	1000
Least Restrictive Proposed Limit			
Belle Fourche River		10	2500
Powder River		10	3200
Belle Fourche River below Moorcroft, WY			
Historic Data Average at Maximum Flow		2.82	1800
Historic Data Average at Minimum Flow		2.6	2354
Powder River at Arvada			
Historic Data Average at Maximum Flow		4.76	1797
Historic Data Average at Minimum Flow		7.83	3400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirement for			
WY0051217	5000	10	2000
WY0053019	5000	10	2000
WY0055131	5000	10	2000
Predicted Produced Water Quality			
Big George	1060	8.6	1910

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1060 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal.

The quality for the water produced from the Big George target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 30.0 gallons per minute (gpm) is projected is to be produced from these 44 wells, for a total of 1,320 gpm (2.94 cfs) for the POD. See Table 4.5 .

For more information, please refer to the WMP included in this POD.

There were 31 new discharge points proposed originally proposed for this project, along with 3 existing. It is anticipated that only 16 discharge points would be needed. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the on-site.

To manage the produced water, 24 impoundments (354.6 acre-feet) would potentially be used for this project as specified by Alternative C. Several more reservoir location were not approved in the chosen alternative, therefore this scenario represents a more conservative case in reference to potential impacts. Three impoundments are existing and complete, eight are existing and will be upgraded, and 13 are new impoundments that would be constructed within the project area. These impoundments will disturb approximately 71.2 acres including the dam structures. Of these water impoundments, all would are on-channel reservoirs. Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the on-site.

As stated in the PRB FEIS, sediments exposed to CBNG-produced water and stored in impoundments and downstream channels may require special handling at the time of reclamation due to the potential to concentrated compounds in those materials (see PRB FEIS page 4- 120). In order to establish soil chemistry target ranges for reclamation, baseline soil samples will be collected from the proposed impoundments and analyzed for the standard WYPDES permit suite of parameters plus soil specific characteristics. .

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, if all produced water were discharged into the Powder River drainage, the volume of water produced from these wells may result in the addition of 0.44 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). Any water discharged into the Belle Fourche may be discharged down channel, therefore a maximum of 2.96 cfs could be added to stream flow if all produced water were discharged there. The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution of 68 cfs to the mainstem of the Upper Powder River and 61 cfs to the mainstem of the Belle Fourche River(PRB FEIS pg 4-86). The predicted maximum discharge rate from these 44 wells is anticipated to be a total of

1320 gpm or 2.94 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in various tributaries from this action (0.44 cfs) may add a maximum 0.35 cfs to the Upper Powder River flows (assuming all production water), or 0.5% of the predicted total CBNG produced water contribution. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

The proposed method for surface discharge provides passive treatment through the aeration supplied by the energy dissipation configuration at each discharge point outfall. Aeration adds dissolved oxygen to the produced water which can oxidize susceptible ions, which may then precipitate. This is particularly true for dissolved iron. Because iron is one of the key parameters for monitoring water quality, the precipitation of iron oxide near the discharge point will improve water quality at downstream locations.

The operator has applied for a Wyoming Pollutant Discharge Elimination System (WYPDES) permit from the WDEQ for the discharge of water produced from this project in the Upper Powder River drainage.

Example effluent limits for the Upper Powder River watershed are shown below for the nearby Pine Tree North POD from permit WY0051217 (Part I page 2 of permits):

Chlorides, mg/l	46
Dissolved Iron, µg/l	1000
pH, standard units	6.5-8.5
Sodium Absorption Ratio, unitless	10
Specific Conductance, µS/cm	2000
Sulfates, mg/l	3000
Total Arsenic, µg/l	2.4
Total Barium, µg/l	1800
Total Dissolved Solids, mg/l	5000
Total Flow, Million Gallons per Day (MGD)	4.4
Total Petroleum Hydrocarbons, mg/l	10
Total Radium 226, pCi/l	1

The operator has Wyoming Pollutant Discharge Elimination System (WYPDES) permits from the WDEQ for the discharge of water produced from this project in the Belle Fourche River drainage.

Permit effluent limits were set at (WYPDES permit number WY00511331 page 2):

Total Petroleum Hydrocarbons	10 mg/l
pH	6.5 to 8.5
TDS	5000 mg/l
Specific Conductance	2000 mg/l
Sulfates	3000 mg/l
Radium 226	1 pCi/l
Dissolved iron	1000 µg/l
Dissolved manganese	820 µg/l
Total Barium	1800 µg/l
Total Arsenic	3.1 µg/l
Chlorides	46 mg/l

Permit effluent limits were set at (WYPDES permit number WY0049352 part 1, page 1):

Total Petroleum Hydrocarbons	10 mg/l
pH	6.5 to 8.5
TDS	1800 mg/l
Specific Conductance	2000 mg/l
Sulfates	3000 mg/l
Radium 226	1 pCi/l
Dissolved iron	1000 µg/l
Dissolved manganese	820 µg/l
Total Barium	1800 µg/l
Total Arsenic	3.1 µg/l
Total Petroleum Hydrocarbons	10 mg/l
Chlorides	46 mg/l

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The designated point of compliance identified for this permit is end of pipe.

In order to determine the actual water quality of the producing formations in this POD and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well to each coal zone within the POD boundary. The reference well will be sampled at the wellhead for analysis within sixty days of initial production. A copy of the water analysis will be submitted to the BLM Authorized Officer.

As stated previously, the operator has committed to offer water well agreements to properly permitted domestic and stock water wells within the circle of influence of the proposed CBNG wells.

In-channel downstream impacts are addressed in the WMP for the All Day POD prepared by Western Water Consultants for Yates Petroleum Corporation. If full containment is maintained in the Upper Powder River watershed, impacts to downstream area are estimated to be minimal. Discharge from other CBNG project is currently occurring to reservoirs and channels in the Belle Fourche watershed, and no additional effects are expected as a result of this project.

4.4.2.1. Surface Water Cumulative Effects

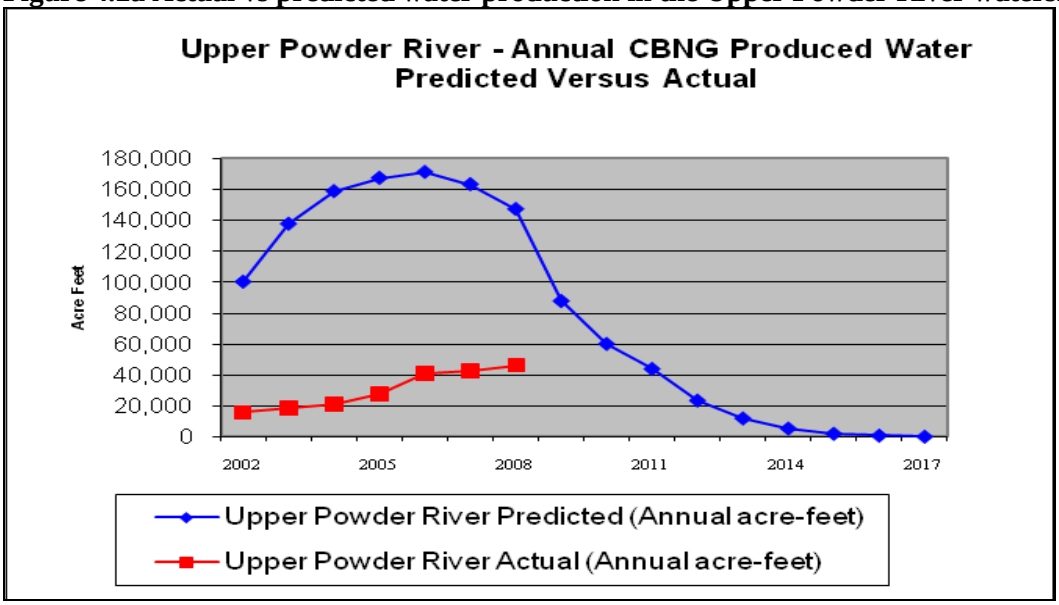
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2008, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 212,522 acre-feet of water compared to the predicted 1,047,521 acre-feet disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 20.3 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.6a Actual vs predicted water production in the Upper Powder River watershed *2008 Data Update 06-08-09*

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,112	25.8	166,096	18.5
2008	147,481	1,047,521	45,936	31.1	212,522	20.3
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	**1,285,233**		**212,522**			

Figure 4.2a Actual vs predicted water production in the Upper Powder River watershed



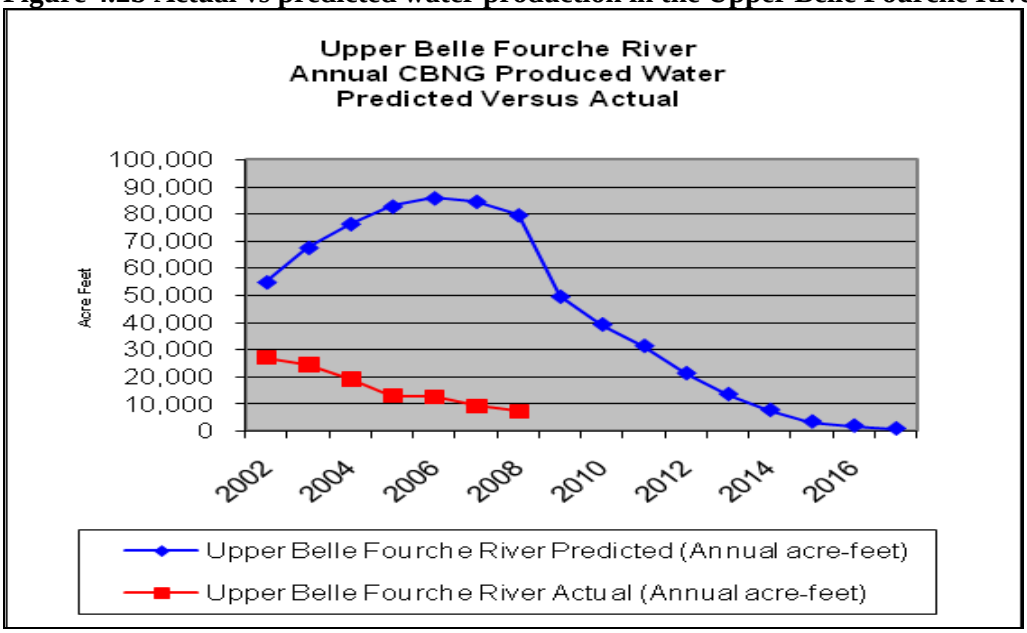
As of December 2008, all producing CBNG wells in the Upper Belle Fourche River watershed have

discharged a cumulative volume of 111,602 acre-ft of water compared to the predicted 530,949 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 21% of the total predicted produced water analyzed in the PRB FEIS for the Upper Belle Fourche River watershed.

Table 4.6b Actual vs predicted water production in the Upper Belle Fourche River watershed *2008 Data Update 06-08-09*

Year	Upper Belle Fourche Predicted (Annual acre-feet)	Upper Belle Fourche Predicted (Cumulative acre-feet from 2002)	Upper Belle Fourche Actual (Annual acre-feet)		Upper Belle Fourche Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	54,735	54,735	26,761	48.9	26,761	48.9
2003	67,481	122,216	24,309	36.0	51,070	41.8
2004	76,259	198,475	18,906	24.8	69,975	35.3
2005	82,713	281,188	12,817	15.5	82,792	29.4
2006	85,761	366,949	12,502	14.6	95,294	26.0
2007	84,507	451,456	8,677	10.3	103,971	23.0
2008	79,493	530,949	7,275	9.2	111,602	21.0
2009	49,435	580,384				
2010	39,170	619,554				
2011	31,277	650,831				
2012	21,215	672,046				
2013	13,495	685,541				
2014	7,630	693,171				
2015	3,347	696,518				
2016	1,849	698,367				
2017	790	699,157				
Total	**699,157**		**111,602**			

Figure 4.2b Actual vs predicted water production in the Upper Belle Fourche River watershed



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Electrical Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation water. The water quality analysis in the PRB FEIS was conducted using produced water quality data, where available, from existing wells within each of the ten primary watersheds in the Powder River Basin. These predictions of EC and SAR can only be reevaluated when additional water quality sampling is available.

The PRB FEIS states, "Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ's (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met." (PRB FEIS page 4-117)

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur as a result of discharged produced CBNG water. The cumulative effects relative to this project are within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage and Upper Belle Fourche, which is approximately 20.3% and 21.0 % respectively of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

Refer to the PRB FEIS, Volume 2, page 4-115 – 117 and table 4-13 for cumulative effects relative to the Upper Powder River watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Socioeconomics

The cumulative socioeconomic effects associated with this POD are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4 pages 4-336 though 4-370.

4.5.1. Alternatives Other than 80 acre Spacing

Alternative spacing allows protection of other sensitive resources while allowing for development of minerals. Economic impacts can be expected by placing wells in spacing units other than 80 acre spacing. See Appendix A, Alternative D

4.6. Cultural Resources

Non eligible sites 48CA6622, 48CA6623, 48CA6624, 48CA6632, 48CA6636, 48CA6637, 48CA6639, 48CA6640, 48CA6642, 48CA6643, 48CA6645, 48CA6653, 48CA6654, 48CA6657, 48CA6659, 48CA6661, 48CA6664, 48CA6928 and 48CA6929 will be impacted by the proposed project. No portions of eligible sites CA1568 (Deadwood Road), 48CA1570 (Sawyers Wagon Road) and 48CA4975 (Crook's 1876 Belle Fourche Scout) will be physically impacted by the project as designed. The project will not be visible from the single contributing portion of the Deadwood Trail near the project area.

As originally planned the project would have lead to an adverse effect to numerous eligible prehistoric sites. During several on-site visits representatives from BLM and Yates Petroleum re-located wells and infrastructure, in consultation with the landowner, to minimize impacts. As a result, no eligible prehistoric sites will be adversely impacted. Sites 48CA5225, 48CA6488, 48CA6641, 48CA6644, 48CA6646, 48CA6658, 48CA6663, 48CA6665 and 48CA6910 will be impacted by the project in areas that do not contribute to their eligibility. Although ACR consultants performed extensive subsurface testing in all areas of proposed disturbance within these sites, buried artifacts and features may be present. As a condition of approval all earth moving activity in, and with 100 feet of, the sites an archeological monitor must be present.

Pumpkin Buttes TCP:

Portions of the project, as designed will result in an adverse impact to the Pumpkin Buttes TCP (48CA268). In 2009, the Buffalo BLM and Wyoming SHPO signed the "*PROGRAMMATIC AGREEMENT BETWEEN THE BUREAU OF LAND MANAGEMENT AND THE WYOMING STATE HISTORIC PRESERVATION OFFICER REGARDING MITIGATION OF ADVERSE EFFECTS TO THE PUMPKIN BUTTES TRADITIONAL CULTURAL PROPERTY FROM ANTICIPATED FEDERAL MINERALS DEVELOPMENT CAMPBELL COUNTY, WYOMING"* (Hereafter referred to as the "Pumpkin Buttes PA") . The document describes types of mitigation that operators can apply to projects within 2 miles of Pumpkin Buttes to reduce adverse effects. Mitigation of physical impacts to the buttes is not discussed in the document since numerous tribes expressed that such impacts could not be mitigated. The types of mitigation primarily involve impacts to the view shed, or setting, of the topography surrounding the buttes. As designed the majority of the proposal will create a weak to moderate contrast to the setting of the TCP, which will result in a finding of "no adverse effect" to the site.

A portion of the proposal includes use of an existing access on the south side of South Middle Butte which is within the TCP boundary. Although there is a culvert planned very near the boundary, Yates plan does not propose to modification the road within the site. Use of the access will not result in surface disturbance within to the site.

Alternative locations that do not create an adverse effect to the Pumpkin Buttes TCP could not be established during on-site visits for the following well and infrastructure locations. It is the recommendation of the cultural resources specialist that these locations be denied under the proposed action.

The Cinnabar 13 well and associated access and pipeline – the well is proposed within the boundary of the TPC and its approval would result in surface disturbance which cannot be mitigated.

The Pumpkin Pie Reservoir – Approval of the reservoir in the proposed location will result in a strong visual contrast to the setting of the TCP.

As a result of project redesign by Yates Petroleum and in consultation with Wyoming State Historic Preservation Officer (SHPO) and the landowner, the Bureau determined that approval of the project (excluding the above mentioned well, infrastructure and reservoir) will result in a finding of "no adverse effect". Following the Wyoming State Protocol Section VI (B)(3) the Bureau of Land Management electronically notified the SHPO on 8/21/09 the finding of "no adverse effect" for the project. Following the Pumpkin Buttes PA Part III (A), SHPO and the tribes will be notified of Bureaus' determinations relating to impacts to the setting of Pumpkin Buttes TCP.

When a project is constructed in an area with a high potential for buried cultural material, archaeological monitoring is often included as a condition of approval. Construction monitoring is performed by a qualified archeologist working in unison with construction crews. If buried cultural resources are located by the archeologist, construction is halted and the BLM consults with the SHPO on mitigation or avoidance. Due to the presence of alluvial deposits the operator will be required to have an archeologist monitor all earth moving activities associated with certain construction, as described in the site specific COA's.

If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the ***Standard COA*** (General) (A)(1).

4.7. Air Quality

In the project area, air quality impacts would occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including non-CBM well production equipment, booster and pipeline compression engine exhaust). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Air quality impacts modeled in the PRB FEIS concluded that projected oil & gas development would not violate any local, state, tribal or federal air quality standards.

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at On-site
Mary Hopkins	Interim Wyoming SHPO	Wyoming SHPO	No

6. OTHER PERMITS REQUIRED

A number of other permits are required from Wyoming State and other Federal agencies. These permits are identified in Table A-1 in the PRB FEIS Record of Decision.

7. REFERENCES AND AUTHORITIES

Agnew, W. D. 1983. Flora and Fauna Associated with Prairie Dog Ecosystems. Unpublished thesis. Colorado State University, Fort Collins. 47pp.

Agnew, W. D. 1988. Arthropod Consumption by Small Mammals on Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Eighth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM 154. pgs. 81-87.

Agnew, W., D. W. Uresk. and R. M. Mansen. 1986. Flora and Fauna Associated with Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Journal of Range Management 39, pgs 135-139

AHPIS, Animal and Plant Health Inspection Service. 2002. General information available online at http://www.aphis.usda.gov/lpa/issues/wnv/wnv.html.

Aldridge, C. L., and M. S. Boyce. 2007. Linking occurrence and fitness to persistence: a habitat-based approach for endangered greater sage-grouse. Ecological Applications 17:508-526.

Apa, A. D. 1985. Efficiency of Two Black-tailed Prairie Dog Rodenticides and Their Impacts on Non-target Bird Species. Unpublished thesis, South Dakota State University Brookings. 71pp.

Avian Power Line Interaction Committee (APLIC) 2006. R. Harness, contributing author to: Suggested Practices for Avian Protection on Power Lines: State of the Art in 2006. 207pp.

Bills, Thomas E. 2004. Powder River Basin Oil & Gas Project Semi-Annual Report: May 1, 2003 – October 31, 2003. BLM Buffalo Field Office. Buffalo, WY. 8pp.

Big Horn Environmental Consultants. 2008. Powder Valley Unit – Delta POD Wildlife Survey and Habitat Report. Sheridan, WY. 11pp.

Braun C. E. 1998. Sage-grouse declines in western North America: what are the problems? Proceedings of the Western Association of State Fish and Wildlife Agencies. 67:134–144.

Braun C. E., M. F. Baker, R. L. Eng, J. S. Gashwiler, and M. H. Schroeder. 1976. Conservation committee report on effects of alteration of sagebrush communities on the associated avifauna. Wilson Bulletin. 88:165–171.

Braun, C.E., O.O. Oedekoven, and C.L. Aldridge. 2002. Oil and Gas Development in Western north America: Effects on Sagebrush Steppe Avifauna with Particular Emphasis on Sage Grouse. In: Transactions of the 67th North American Wildlife and Natural Resources Conference. Pp 337-349.

Bureau of Land Management. 2004. Instruction Memorandum No. WY-2005-057: Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

Bureau of Land Management. 2008. Fact Sheet Greater Sage-Grouse Buffalo Field Office RMP Amendment. May 28, 2008

Bureau of Land Management. 1990. Instruction Memorandum No. WY-90-564: Resource Management Plan Action and Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

Campbell, Thomas and Tim Clark. 1981. Colony Characteristics and Vertebrate Associates of White-tailed and Black-tailed Prairie Dogs. American Midland Naturalist, Vol. 105, No. 2 (April 1981). pgs 269-276.

Canfield, J. E., L. J. Lyon, J. M. Hillis, and M. J. Thompson. 1999. Ungulates. Chapter 6 in Effects of Recreation on Rocky Mountain Wildlife: A Review for Montana, coordinated by G. Joslin and H. Youmans. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society.

Clark, T. W., T. M. Campbell, D. G. Socha, and D. E. Casey. 1982. Prairie Dog Colony attributes and Associated Vertebrate Species. Great Basin Naturalist 42: 572-582.

Code of Federal Regulations (CFR)

1. 40 CFR All Parts and Sections inclusive Protection of Environment. Revised as of July 1, 2004.
2. 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2006.

Confluence Consulting, Inc. 2004. Powder River Biological Survey and Implications for Coalbed Methane Development. Bozeman, MT. 179pp.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines for management of sage grouse populations and habitats. Wildlife Society Bulletin 28:967-985.

Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.

Cornish, Todd; Terry Creekmore; Walter Cook; and Elizabeth Williams. 2003. "West Nile Virus - Wildlife Mortality in Wyoming 2002-2003". In: The Wildlife Society Wyoming Chapter Program and Abstracts for the Annual Meeting at the Inn in Lander, WY November 18-21, 2003. Wildlife Society Wyoming Chapter. 17pp.

Cornish, Todd. Personal Communication. Wyoming State Veterinary Laboratory, University of Wyoming. Laramie, WY. (307) 742-6638. tcornish@uwyo.edu.

Dantzker, M. S., Deane, G. B. & Bradbury, J. W. 1999. Directional acoustic radiation in the strut display of male sage grouse Centrocercus urophasianus. Journal of Experimental Biology, 202, 2893–2909.

Danvir, Rick E. 2002. Sage Grouse Ecology and Management in Northern Utah Sagebrush-Steppe: A Deseret Land and Livestock Wildlife Research Report. Deseret Land and Livestock Ranch and the Utah Foundation for Quality Resource Management. Woodruff, UT.

Deisch, M. S., D. W. Uresk, and R. L. Lindor. 1989. Effects of Two Prairie Dog Rodenticides on Ground Dwelling Invertebrates in Western South Dakota. Ninth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM. Pgs 171-181.

Dobkin D. S. 1994. *Conservation and management of Neotropical migrant landbirds in the northern Rockies and Great Plains*. University of Idaho Press, Moscow, ID.

Doherty, K.E., D.E. Naugle, B.L. Walker, J.M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. Journal of Wildlife Management. In press.

Fahrig, L., and J. Paloheimo. 1988. Determinations of local population size in patchy habitats. Theorectical Population Biology 34:194-213.

Fertig, W. 2000. *Status Review of the Ute Ladies Tresses (Spiranthes diluvialis) in Wyoming*. Wyoming Natural Diversity Database, Laramie, Wyoming.

Fischer, Don, P.G. 2009. Wyoming Department of Environmental Quality, Groundwater Pollution Control Division, Personal Communication, January, 2009.

Geist, V. 1978. Behavior. Big Game of North America; ecology and management. Stackpole Books, Harrisburg, Pennsylvania.

Gelbard J. L., and J. Belnap. 2003. Roads as conduits for exotic plant invasions in a semiarid landscape. Conservation Biology. 17:420–432.

Gibson, R. M. 1989. Field playback of male display attracts females in lek breeding Sage Grouse. Behavioral Ecology and Sociobiology 24: 439-443.

Gibson, R. M. and J. W. Bradbury. 1986. *Male and female mating strategies on sage grouse leks*. Pp. 379-398 in Ecological aspects of social evolution: birds and mammals (D. I. Rubenstein and R. W. Wrangham, eds.). Princeton Univ. Press, Princeton, New Jersey.

Grenier, M., B. Oakleaf, K. Taylor, and M. Hymas. 2004. *Inventory and Mapping of Black tailed Prairie Dogs in Wyoming – An Estimate of Acreage Completion Report*.

Grenier, M. 2003. An Evaluation of Black-footed Ferret Block Clearances in Wyoming: Completion Report. Wyoming Game and Fish Department. Lander, WY. 16pp

Haug, E. A. and L. W. Oliphant. 1985. Movements, Activity Patterns, and Habitat Use of Burrowing Owls in Saskatchewan. Journal of Wildlife Management. 54(1):27-35.

Hazlett, D.L. 1996. *The discovery of Spiranthes diluvialis along the Niobrara River in Wyoming and Nebraska*. Report prepared for the Bureau of Land Management Wyoming State Office.

Hazlett, D.L. 1997. *A 1997 search for Spiranthes diluvialis in southeastern Wyoming and western Nebraska*. Report prepared for the Bureau of Land Management Wyoming State Office.

Heidel, Bonnie. Botanist. Wyoming Natural Diversity Database. University of Wyoming. Laramie, WY

Hiat, G.S. and D. Baker. 1981. Effects of oil/gas drilling on elk and mule deer winter distributions on Crooks Mountain, Wyoming. Wyoming Game and Fish Department.

Holloran, M. J, and S. H. Anderson. 2005. Spatial distribution of Greater Sage-Grouse nests in relatively contiguous sagebrush habitats. Condor 107:742-752.

Holloran, M J.; B. J. Heath; A. G. Lyon; S. J. Slater; J. L. Kuppiers; and S. H. Anderson. 2005. Greater sage-grouse nesting habitat selection and success in Wyoming. J. Wildl. Manage. 69(2):638-649.

Holloran, M. J., R. C. Kaiser, and W. A. Hubert. 2007. Population Response of yearling greater sage-grouse to the infrastructure of natural gas fields in southwestern Wyoming. Completion report. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie, WY, USA. 34pp.

Hoogland, J. 1995. *The black-tailed prairie dog: Social life of a burrowing mammal*. Chicago: Chicago University Press.

Hubert, W. A. 1993. *The Powder River: a relatively pristine stream on the Great Plains*. Pages 387-395 in L. W. Hesse, C. B. Stalnaker, N. G. Benson, and J. R. Zuboy, editors. Restoration planning for the rivers of the Mississippi River ecosystem. Biological Report 19, National Biological Survey, Washington, D.C.

(ICF Thunderbird-) Jones and Stokes 2007. January 31, 2007. Wildlife and Ute ladies'-tresses habitat assessment and wildlife surveys.

(ICF Thunderbird-) Jones and Stokes 2007 (a). February 26, 2007. Yates All Day POD Bald Eagle winter roost survey results 2006-2007

(ICF) Jones and Stokes 2007 (b). November 2, 2007. Spring 2007 wildlife surveys on the Yates All Day POD (Addendum A)

ICF Jones and Stokes 2008. September 15, 2008. Spring 2008 wildlife surveys on the Yates All Day POD.

ICF Jones and Stokes 2009 (a) May 12, 2009 Yates All Day POD Grouse and Raptor Survey Results.

ICF Jones and Stokes 2009 (b). July 23, 2009 Yates All Day POD Ute Ladies'-tresses Orchid and Blowout Penstemon Habitat Assessments.

Ingelfinger, F., and S. Anderson. 2004. Passerine response to roads associated with natural gas extraction in a sagebrush steppe habitat. Western North American Naturalist 64:385-395

Ingelfinger F. 2001. *The effects of natural gas development on sagebrush steppe passerines in Sublette County, Wyoming*. M.Sc. thesis, University of Wyoming, Laramie, WY.

Jalkotzy, M.G., P.I. Ross, and M.D. Nasserden. 1997. The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature. Arc Wildlife Services Ltd., Calgary, Alberta, Canada.

Jellison, Bert. 2005. Sage-Grouse Restoration Project: Lake DeSmet Conservation District. Wyoming Game and Fish Department. Sheridan, WY.

Kelly Brian T. 2004. Letter to interested parties: Black-footed ferret clearance surveys. U.S. Fish and Wildlife Service (February 2, 2004). Cheyenne, WY. 4pp.

King, J. A. 1955. Social Behavior, Social Organization and Population Dynamics in a Black-tailed Prairie Dog Town in the Black Hills of South Dakota. Contr. Lab. Vert. Biol., University of Michigan. 67pp.

Klute, D. S., L.W. Ayers, M.T. Green, W.H. Howe, S.L. Jones, J.A. Shaffer, S.R. Sheffield, and T.S. Zimmerman. 2003. *Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States*. U.S. Department of the Interior; Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.

Knick, S. T., and J. T. Rotenberry. 1995. Landscape characteristics of fragmented shrubsteppe habitats and breeding passerine birds. Conservation Biology 9:1059-1071.

Knick S. T., D. S. Dobkin, J. T. Rotenberry, M. A. Schroeder, W. M. Vander Haegen, and C. van Riper III. 2003. Teetering on the edge or too late? Conservation and research issues for avifauna of sagebrush habitats. Condor. 105:611–634.

Knight R. L., and J. Y. Kawashima. 1993. Responses of raven and Red-tailed Hawk populations to linear right-of-ways. Journal of Wildlife Management. 57:266–271.

Knopf F.L. and J.R Rupert. 1995. Habits and habitats of Mountain Plovers in California. Condor 97:743-751.

Landry, R.E. 1979. *Growth and development of the Burrowing Owl*. M.S. thesis, California State University, Long Beach, CA.

Litzel, R. 2004. Personal communication [January 6 phone conversation with Jim Sparks]. Johnson County Weed and Pest District.

Lowham, H.W. Streamflows in Wyoming WRIR 88-4045 U.S. Geological Survey 1988

Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67th North American Wildlife and Natural Resources Conference.

Marra PP, Griffing SM, McLean RG. West Nile virus and wildlife health. Emerg Infect Dis [serial online] 2003 Jul. Available from: URL: http://www.cdc.gov/ncidod/vol9no7/03-0277.htm.

McCraken, J. G., D. W. Uresk and R. M. Mansen. 1985. Burrowing Owl Foods in Conata Basin, South Dakota. Great Basin Naturalist 45: 287-290.

McDonald, D., N.M. Korfanta, and S.J. Lantz. 2004. *The Burrowing Owl (Athene cunicularia): a technical conservation assessment*. USDA Forest Service, Rocky Mountain Region.

Meffe, G.K. and C.R. Carroll. 1994. *Principles of Conservation Biology*. Sinauer Associates, Inc. Sunderland, MA.

Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003

Mooney, A. 2004. Personal Communication [January 6 phone conversation with Jim Sparks]. Campbell County Weed and Pest District.

Moynahan, B. J. and M. S. Lindberg. 2004. *Nest Locations of Greater Sage-Grouse in Relation to Leks in North-Central Montana*. *Presented at* Montana Sage-Grouse Workshop, Montana Chapter of The Wildlife Society, Billings.

Moynahan, B. J.; M. S. Lindberg; J. J. Rotella; and J. W. Thomas. 2005. Factors Affecting Nest Survival of Greater Sage-Grouse in Northcentral Montana. J. Wildl. Manage.

Moynahan, B. J., M. S. Lindberg, J. J. Rotella, and J. W. Thomas. 2007. Factors affecting nest survival of greater sage-grouse in north-central Montana. Journal of Wildlife Management 71:1773-1783.

Naugle, D. E.; C. L. Aldridge; B. L. Walker; T. E. Cornish; B. J. Moynahan; M. J. Holloran; K. Brown; G. D. Johnson; E. T. Schmidtmann; R. T. Mayer; C. Y. Kato; M. R. Matchett; T. J. Christiansen; W. E. Cook; T. Creekmore; R. D. Falise; E. T. Rinkes; and M. S. Boyce. 2004. West Nile virus: Pending Crisis of Greater Sage-grouse. Ecology Letters. 7:704-713.

Naugle, David E.; Brett L. Walker; and Kevin E. Doherty. 2006. Sage Grouse Population Response to Coal-bed Natural Gas Development in the Powder River Basin: Interim Progress Report on Region-wide Lek Analyses. May 26, 2006. University of Montana. Missoula, MT. 10pp.

Noss, R. F. and A. Cooperrider. 1994. *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Defenders of Wildlife and Island Press, Washington, D. C.

Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.

Olenick, B. E. 1990. *Breeding biology of burrowing owls using artificial nest burrows in southeastern Idaho*. Thesis, Idaho State University, Pocatello, Idaho, USA.

Paige, C., and S. A. Ritter. 1999. *Birds in a sagebrush sea: managing sagebrush habitats for bird communities*. Partners in Western Flight working group, Boise, ID.

Patterson, C. T. and S. H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (Haliaeetus leucocephalus) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.

Porneluzi, P, J. C. Bednarz, L. J. Goodrich, N. Zawada, and J. Hoover. 1993. Reproductive performance of territorial Ovenbirds occupying forest fragments and a contiguous forest in Pennsylvania. Conservation Biology 7:618-622.

Primack, R.B. 1993. Essentials of conservation biology. Sinauer Associates, Sunderland, Massachusetts, USA.

Reading, R. P., S. R. Beissinger, J. J. Grensten, and T. W. Clark. 1989. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. pgs 13-28.

Reading, R., and Randy Matchet. 1997. Attributes of Black-tailed Prairie Dog Colonies in Northcentral Montana. Journal of Wildlife Management 61(3): 664-673.

Rinkes, T. 2003. Personal communication [Draft notes from Annual Sage-Grouse and Sagebrush Species of Concern Meeting]. Bureau of land Management Wildlife Biologist/Sage Grouse Coordinator.

Robinson, S. K. 1992. *Population dynamics of breeding birds in a fragmented Illinois landscape*. Pages 408-418 in J. Hagan and D. W. Johnston, editors. Ecology and conservation of neotropical migrant land birds. Smithsonian Institution press, Washington, D. C.

Rogers, Brad. Personal Communication. Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Cheyenne Field Office. Cheyenne, WY.

Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah

Rotenberry J. T., and J. A. Wiens. 1980a. Habitat structure, patchiness, and avian communities in North American steppe vegetation: a multivariate analysis. Ecology. 61:1228–1250.

Rowland, M. M., M. Leu, , S. P. Finn, S. Hanser, L. H. Suring, J. M. Boyd, C. W. Meinke, S. T. Knick, and M. J. Wisdom. 2005. Assessment of threats to sagebrush habitats and associated species of concern in the Wyoming Basins. Version 1.1, June 2005, unpublished report on file at USGS Biological Resources Discipline, Snake River Field Station, 970 Lusk St., Boise, ID 83706.

Rowland, M. M., M. Leu, , S. P. Finn, S. Hanser, L. H. Suring, J. M. Boyd, C. W. Meinke, S. T. Knick, and M. J. Wisdom. 2005. Assessment of threats to sagebrush habitats and associated species of concern in the Wyoming Basins. Version 1.1, June 2005, unpublished report on file at USGS Biological Resources Discipline, Snake River Field Station, 970 Lusk St., Boise, ID 83706.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. The Scientific Basis for Lynx Conservation: Qualified Insights. Ch16. USDA Forest Service Technical Report RMRS-GTR-30.

Saab, V., and T. Rich. 1997. *Large-scale conservation assessment for neotropical migratory landbirds in the Interior Columbia River Basin*. USDA Forest Service General Technical Report PNW-GTR-399, Portland, Oregon, USA.

State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development. 2008. Using the best available science to coordinate conservation actions that benefit greater sage-grouse across states affected by oil and gas development in Management Zones I-II (Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming). Unpublished report. Colorado Division of Wildlife, Denver; Montana Fish, Wildlife and Parks, Helena; North Dakota Game and Fish Department, Bismarck; Utah Division of Wildlife Resources, Salt Lake City; Wyoming Game and Fish Department, Cheyenne.

Steenhof K., M. N. Kochert, and J. A. Roppe. 1993. Nesting by raptors and Common Ravens on electrical transmission line towers. Journal of Wildlife Management. 57:272–281.

Stinson, D. W., D. W. Hays, and M. A. Schroeder. 2004. Washington State Recovery Plan for the Sage-grouse. Washington Department of Fish and Wildlife, Olympia, Washington. 109 pages.

Temple S. A. 1986. Predicting impacts of habitat fragmentation on forest birds: A comparison of two models. Pages 301-304 in Wildlife 2000 (J. Verner, C. J. Ralph, and M. L. Morrison, Eds.). Univ. Wisconsin Press, Madison.

Temple S.A., and J. R. Cary. 1988. Modeling dynamics of habitat-interior bird populations in fragmented landscapes Conserv. Biol.2 :340-347.

Temple, S.A., and B.A. Wilcox. 1986. Introduction: Predicting effects of habitat patchiness and fragmentation. In *Wildlife 2000: Modeling Habitat Relationships of Terrestrial Vertebrates*, ed. J. Verner, M.L. Morrison, and C.J. Ralph, 261-62. Madison: University of Wisconsin Press.

The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).

Urban, D. L., and H. H. Shugart, Jr. 1984. Avian demography in mosaic landscapes: modeling paradigm and preliminary results. Pages 273-280 in J. Verner, M. L. Morrison, and C. J. Ralph editors. Wildlife 2000: Modeling habitat relationships of terrestrial vertebrates. University of Wisconsin Press, Madison.

U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.

U.S. Department of the Interior 2001, Bureau of Land Management, Buffalo Field Office. Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office April 2001.

U.S. Department of the Interior 2003, Bureau of Land Management. Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. April 30, 2003.

U.S. Department of the Interior 2007, US Fish and Wildlife Service. Reinitiation of Formal Consultation for Powder River Oil and Gas Project. March 23, 2007

U.S. Department of the Interior, Fish and Wildlife Service. 2002. Final Biological and Conference Opinion for the Powder River Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties (WY6633). U.S. Fish and Wildlife Service. December 17, 2002. Cheyenne, WY. 58pp.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 1989. Black-footed ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.

Vander Haegen, W. M., F. C. Dobler, and D. J. Pierce. 2000. Shrubsteppe bird response to habitat and landscape variables in eastern Washington, USA. Conservation Biology 14:1145-1160.

Walker B, Naugle D, Rinkes T. 2003. The Response of Sage Grouse to Coal-bed Methane Development and West Nile virus in the Powder River Basin: Is There a Link ? Page 6 in: Program and Abstracts for the Annual Wildlife Society Meeting, Wyoming Chapter.

Walker, B.L., D. E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654.

WDEQ, June 14, 2004. Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments

Wildlife Resources 2009 (a) May 18, 2009 Wildlife report for Yates' All Day POD.

Wildlife Resources 2009 (b) June 19, 2009 Wildlife report revised for Yates' All Day POD.

Wildlife Resources 2009 (c) August 3, 2009 Blowout PEnstemon and Ute Ladies'-Tresses Orchid Habitat Assessment for Yates' All Day POD.

Windingstad, R. M., F. X. Kartch, R. K. Stroud, and M. R. Smith. 1987. Salt toxicosis in waterfowl in North Dakota. Jour. Wildlife Diseases 23(3):443-446.

Wyoming Game and Fish Department (WGFD). 2004. Minimum Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats on BLM Lands. WGFD. Cheyenne, WY

WGFD. 2003. Wyoming Greater Sage-Grouse Conservation Plan. WGFD. Cheyenne, WY

WGFD. 2004. Sheridan Region Wyoming Game and Fish Department: Annual Sage-Grouse Completion Report for 2004. Wyoming Game and Fish Department. Gillette, WY.

WGFD. 2005. Northeast Wyoming Local Working Group Area: Annual Sage-Grouse Completion Report for 2005. Wyoming Game and Fish Department. Buffalo, WY. 42pp.

WGFD. 2008. Hunting and Sage-Grouse: A Technical Review of Harvest Management On a Species of Concern in Wyoming. Wyoming Game and Fish Department. Green River, WY. 21pp.

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