ENVIRONMENTAL ASSESSMENT

February 2013 Lease Parcels

Wind River / Bighorn Basin District

DOI-BLM-WY-R010-2012-0087-EA

BLM

Wind River/Bighorn Basin District, Wyoming

The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

BLM/WY/PL-12/001+1310

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1 Introduction

1.1 Introduction

The following Environmental Assessment (EA) documents the review of parcels nominated for oil and gas leasing. All parcels addressed in this EA are under the administration of the Bureau of Land Management (BLM) Wind River / Bighorn Basin District Offices's (WRBBDO) Cody Field Office (CYFO), Worland Field Office (WFO), and Lander Field Office (LFO). It serves to verify conformance with the approved land use plans, addresses new information, and provides the rationale for offering parcels to be sold and subsequently issued during the aforementioned lease sale.

The purpose of this document is to verify conformance with the applicable BLM land use plans, address new information, and determine which stipulations are appropriate for the nominated parcels. This EA will analyze the impacts of offering these lease parcels nominated for the competitive oil and gas lease sale, to provide access to federally managed oil and gas resources to allow exploration for and development of oil and gas resources on lands with Federal Mineral Reserves while meeting the needs of other resource values.

An EA provides evidence for determining whether to prepare an environmental impact statement (EIS) or to support a "Finding of No Significant Impact" (FONSI). If the decision maker determines this project has significant impacts following the analysis in the EA, then an EIS would be prepared for the project. A FONSI documents the reasons why implementation of the selected alternative would not result in "significant" environmental impacts (effects). When a FONSI statement is reached, a Decision Record (DR) may be signed approving the selected alternative which could be the proposed action, another alternative, or a combination thereof.

1.2 Background

The decision as to which public lands and minerals are open for leasing and what leasing stipulations may be necessary, based on information available at the time, is made during the land use planning process.

As required by 43 CFR 3120.1-2, the BLM Wyoming State Office conducts a quarterly competitive lease sale to sell available oil and gas lease parcels. Interested parties file Expressions of Interest (EOIs) to nominate parcels for leasing by the BLM. A Notice of Competitive Lease Sale (NCLS), which lists lease parcels to be offered at the auction, is published and posted by the BLM State Office at least 45 days before the auction is held. Lease stipulations applicable to each parcel are specified in the Sale Notice. Surface management of non-BLM administered land overlaying federal minerals is determined by BLM in consultation with the appropriate surface management agency or the private surface owner.

In the process of preparing a lease sale the BLM Wyoming State Office sends a draft parcel list to each field office where the parcels are located. Field office staff then review the legal descriptions of the parcels to determine if they are in areas open to leasing, if appropriate stipulations have been included; if new information has become available which might change

any analysis conducted during the planning process, if appropriate consultations have been conducted, and if there are special resource conditions of which potential bidders should be made aware. Additional information obtained after the publication of the NCLS, may result in withdrawal of certain parcels prior to the day of the lease sale.

1.3 Purpose and Need

Public lands within the Wind River / Bighorn Basin District have been evaluated through the land use planning process, and in compliance with other laws, management actions were identified within these documents, which reflect the intent of the Federal Land Policy and Management Act of 1976 (FLPMA); stating, "goals and objectives be established by law as guidelines for public land use planning, and that management be on the basis of multiple use and sustained yield unless otherwise specified by law."

The Wind River / Bighorn Basin District further acknowledges the intent of FLPMA in managing multiple use lands for protection of these resources; "the public lands are to be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". However the management of multiple use lands through FLPMA also states that "the public lands are to be managed in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands including implementation of the Mining and Minerals Policy Act of 1970 (84 Stat. 1876, 30 U.S.C. 21a) as it pertains to the public lands."

It is the policy of the Bureau of Land Management (BLM) as derived from various laws, including the Mineral Leasing Act of 1920, as amended [30 U.S.C. 181 et seq.] and the Federal Land Policy and Management Act of 1976 (FLPMA), to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs. The purpose of this document is to verify conformance with the Land Use Plans, address new information, and determine which stipulations are appropriate for the nominated parcels. This EA will analyze the impacts of recommending these lease parcels nominated for the February 2013 competitive oil and gas lease sale, to provide access to federally managed oil and gas resources to allow exploration for and development of oil and gas resources on lands with Federal Mineral Reserves while meeting the needs of other resource values.

The purpose of this document is to not only verify conformance with existing Land Use Plans but also to defer actions that may limit the choice of reasonable alternatives of ongoing Land Use Planning efforts. Therefore, in accordance with Council on Environmental Quality regulations found in Title 40 CFR 1500 – 1508, and in accordance with BLM Washington Office guidance, lands on which oil and gas leases have not been issued, leasing decisions should be withheld pending completion of the planning decisions associated with an EIS for an RMP amendment or revision that is being undertaken where oil and gas is the primary issue being considered. This policy applies even though lands may be open to oil and gas leasing under the existing RMP.

The need is established by the Federal Oil & Gas Leasing Reform Act of 1987 to respond to Expressions of Interest, the Federal Land Policy Management Act, and Mineral Leasing Act of 1920, as amended. The sale and issuance of oil and gas leases is needed to meet the growing energy needs of the United States public. Wyoming is a major source of oil and natural gas for heating and electrical energy production in the lower 48 states, especially for markets in the Eastern United States. Continued sale and issuance of lease parcels is necessary to maintain options for production as oil and gas companies seek new areas for production or attempt to develop previously inaccessible or uneconomical reserves.

1.4 Conformance with BLM Land Use Plans

Pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21, this EA tiers to and incorporates by reference the information and analysis contained in the Grass Creek Resource Management Plan (RMP) 1998 (BLM 1998a); Washakie RMP 1988 (BLM 1988b); Cody RMP 1990 (BLM 1990); Lander RMP 1987 (BLM 1987) and Final Environmental Impact Statement and Record of Decision for each RMP. The parcels nominated for the lease sale have been identified as available for leasing in each RMP. Application of stipulations to nominated parcels is directed by these RMPs.

1.5 Relationship to Statues, Regulations, or Other Plans

The proposed action and alternatives are consistent with other plans, program, and policies of affiliated Tribes, other federal agencies, state, and local governments to the extent practical, including but not limited to the following:

- Federal Land Policy and Management Act (FLPMA) of 1976, as amended (43 U.S.c.1701 et seq.)
- Mineral Leasing Act of 1920
- Clean Air Act (42 U.S.C. 1857 et seq.), as amended and recodified (42 U.S.C. 7401 et seq.).
- Clean Water Act (33 U.S.C. 1251 et seq.)
- Rangeland Health Standards
- Endangered Species Act (16 U.S.C. 1531 et seq.)
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- Migratory Bird Treaty Act (16 U.S.C. 703 et seq.)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.)
- Protection of Historic Properties (36 CFR 800)
- Native American Graves Protection and Repatriation Act of 1990 and 43 CFR Part 10
- American Indian Religious Freedom Act of 1978
- Native American Trust Resource Policy standards are presented in the Department of the Interior Comprehensive Trust Management Plan dated March 28, 2003
- U.S. Fish and Wildlife Service Bald and Golden Eagle Protection Act, as amended

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties. Compliance with Section 106 of the NHPA is a non-discretionary action that all federal agencies must perform. The implementing regulations at 36 CFR 800 allow for a phased approach to compliance. Since it is impossible to determine the type and extent of surface disturbance associated with oil and gas development at the leasing stage, BLM completes its compliance responsibilities when an operator submits an Application for Permit to Drill (APD) or other application for surface-disturbing activities on the Federal lease. Subsequently, the on-the-ground cultural resources inventory associated with Section 106 compliance does not take place until the APD stage. Due to this approach, BLM may not be aware of all cultural resources that are located in proposed lease parcels. In order to address any lack of data at this stage, every fluid mineral lease issued by BLM includes the special lease stipulation which reads:

> *This lease may be found to contain previously unknown historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.*

Cultural resource specialists reviewed each parcel to determine if it contains known sites that are difficult or impossible to mitigate. Reviews included BLM and State Historic Preservation Officer (SHPO) record and file searches for known sites in or near each parcel. When BLM receives an APD, a site-specific cultural records review is completed to determine if there is a need for cultural inventory for areas affected by surface-disturbing activities. Cultural resource inventory is required prior to new surface disturbance. All sites that are determined to be historic properties (sites that are listed on or are eligible for listing on the National Register of Historic Places) are avoided or mitigated. If avoidance or mitigation is not possible, proposals may be modified or denied.

BLM field offices must base site specific lease stipulations (such as controlled surface use (CSU) or no surface occupancy (NSO)) and decisions to close areas from leasing on decisions made within a RMP. RMPs are updated every 5 to 30 years and may not contain current information. If a decision maker determines a resource is difficult or impossible to mitigate and wishes to apply lease stipulations or exclude the site from leasing, the RMP must be updated, amended, or a maintenance action performed prior to leasing.

The proposed action, sale and issuance of a lease, does not directly result in surface disturbance. Additional environmental analysis and permitting is required prior to development and production of oil and gas resources.

1.6 Identification of Issues and Scoping

It is unknown whether a particular parcel will be sold and a lease issued. It is also unknown when, where, or if future well sites, roads, and facilities might be proposed. Detailed site-specific analysis of activities associated with any particular parcel would occur when a lease holder submits an APD or other application for surface-disturbing activities on the Federal lease. For purposes of issue identification, BLM assumes each parcel would be sold and developed.

Interdisciplinary teams comprised of Worland, Cody, and Lander BLM resource specialists reviewed the proposed action and identified environmental issues.

In the event of changing resource values, new information, and current policy, the Field Offices conducted site visits, when necessary, to validate existing data or gather new information in order to make an informed leasing recommendation. However, the site visits are not a substitute for acquiring the site-specific cultural or wildlife data that is typically gathered during the permit approval stage. For a parcel that is inaccessible due to location or other factors, it is sufficient to conduct a review from a nearby vantage point or to use remote-sensing data (e.g., aerial photos, satellite imagery, and topographic maps). Use of data collected from site visits is for evaluating the RMP oil and gas leasing management decisions, identify any new resource values, evaluate the adequacy of associated stipulations in the RMP, and provide information for the NEPA compliance process. Since there is a high level of confidence in the available data and Field Office specialist knowledge of site specific landscapes to evaluate the parcels, a site visit may not be necessary. Generally, field site visits were not conducted on parcels known to be recommended for deferral due to conflicts with the Draft RMP EISs in the Bighorn Basing and Lander Field Office. Other parcels were not site visited due to the Field Office specialist's familiarity of the area and the resources known to exist in the area. The following parcels were visited and documented as part of the administrative record of this document: In the Cody Field Office, parcels WY-1302- 394, 432, 433, 434, 435, 436, 437, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 484, 485, 486, 487, 495, 496, 497, 498, 499, 500 were visited; in the Worland Field Office, parcels WY-1302- 263, 228, 229, 265, 127, 138, 139, 126, 125, 132, 133, 143, 135, 136, 137, 140, 128, 129, 130, 118, 176, 177, 171, 118, 119, 181, 182, 195, 141, 142, 179, 170, 446, 415 were visited; and in the Lander Field Office, parcals WY-1302-110, 111, 112, 160, 166, 222, 223, 260, 261, 299, 318, 319, 349, 351, 355, 356, 358, 396, 397, 403, 404, 406, 407, 408, 410, and 413 were visited.

Issues have been identified based upon a conceptual determination of realistic foreseeable development. These issues are essentially effects on particular resource components.

The Council on Environmental Quality regulations state: "NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1(b)). 40 CFR 1500.4(g) directs that the scoping process should be used "not only to identify significant environmental issues deserving of study but also to deemphasize insignificant issues narrowing the scope of the EIS process accordingly." Significant issues directly influence the initiation, development, and technical design of the proposal; are disclosed in the analysis; and were used to develop alternatives to the proposed action. Issues are

significant because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflict (BLM 2008).

Non-significant issues are identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, or other higher level decision; 3) unrelated to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

Those issues which cannot be dismissed and must be carried forward through analysis in this EA are the following:

How would air quality be impacted?

How will this contribute to greenhouse gas emissions and climate change?

What economic impact would occur?

How would cultural resources, including historic trails, be affected?

Would livestock grazing management be affected?

How would vegetation be affected?

How would paleontological and geological resources be affected?

How would recreation, visual resources, and special designations be affected?

How would segments of streams eligible for wild and scenic river designation be affected?

How would wilderness characteristics be affected?

How would water resources, including surface and subsurface water, be affected?

How would wildlife habitat, including special status species, be affected?

1.7 Issues Considered and Eliminated From Further Analysis

Through resource review and clearance documents, BLM determined the following resources and supplemental authorities are not present in the area potentially affected or they would be affected to a degree that detailed analysis is required:

- Wilderness and Wilderness Study Areas
    - Three portions of parcels nominated were found to be located with an existing designated Wilderness Study Area (WSA). WSAs are closed to oil and gas leasing; therefore, the following portions of parcels were deleted from the review list and are not analyzed in this document.

Parcel # 1302-	Area Deleted from Nomination	Acres	WSA Name
195	T0460N, R0900W, Sec.002,NWSW	40.000	Honeycombs WSA
197	T0460N, R0900W, Sec.013,ALL	640.000	Honeycombs WSA

199	T0460N, R0900W, Sec.031,L10 T0460N, R0900W, Sec.036,E2NE; NW	274.980	Honeycombs WSA

  - Therefore, there are no parcels brought forward in this analysis within Wilderness or Wilderness Study Areas.
- Environmental Justice
  - Executive Order 12898 requires Federal agencies to assess projects to ensure there is no disproportionately high or adverse environmental, health, or safety impacts on minority and low income populations. A review of the parcels offered for lease indicates there are no impacts on minority or low-income populations.
- Wastes, Hazardous or Solid
  - There are no identified hazardous or solid waste sites on the parcels addressed in this EA.
- Public Health and Safety
  - Oil and gas development, as well as other industrial use such as mining has been occurring in the WRBBDO for many decades. Due to the industrial safety programs, standards, and state and federal regulations, offering these parcels is not expected to materially increase health or safety risks to humans, wildlife, or livestock. Leasing of the parcels analyzed in this EA would present no new or unusual health or safety issues not covered by existing state and federal laws and regulation.

2 Description of Alternatives, Including Proposed Action

2.1 Introduction

Chapter 2 provides a detailed description of each alternative that will be analyzed in detail, a brief description of alternatives that were considered but not analyzed in detail, and a brief summary of the environmental effects of the proposed action and alternatives.

2.2 Alternative 1 – No Action Alternative

The BLM NEPA Handbook (H-1790-1) states that for EAs on externally initiated proposed actions, the No Action Alternative generally means that the proposed action would not take place. In this case, this would mean that an EOI to lease (parcel nomination) would be denied or rejected, and a lease would not be offered for that parcel.

2.3 Alternative 2 – Proposed Action

Alternative 2 would offer for sale 402 nominated parcels (27 parcels, 29,595.37 acres, in Cody FO), (118 parcels, 224,774.39 acres, in Lander FO), and (257 parcels, 452,335.96 acres, in Worland FO) covering a total of 706,705.72 acres, found in Appendix A, with stipulations consistent with the approved RMPs, and if sold, a lease issued. Oil and gas leases would be issued for a 10-year period and would continue for as long thereafter as oil and gas is produced in paying quantities. If a lessee fails to produce oil and gas, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease, the lease would terminate.

2.4 Alternative 3 – Modified and Deferred

Alternative 3 adds stipulations to address resource concerns consistent with the approved RMPs or defers and partially defers offering parcels for sale due to resource conflicts or protection measures not addressed in the approved RMPs and are being analyzed in ongoing Draft RMP EISs for the Bighorn Basin (Cody and Worland Field Offices) and the Lander Field Office. The following is a summary of the parcel numbers.

Cody FO: 27 total parcels, 5 to be offered in whole, 12 deferred in whole, and 10 partial deferrals.
Lander FO: 118 total parcels, 18 to be offered in whole, 80 deferred in whole, and 20 partial deferrals.
Worland FO: 257 total parcels, 7 to be offered in whole, 212 deferred in whole, and 38 partial deferrals.

Under this alternative, 98 whole parcels and partial parcels covering 88,047.65 acres, would be offered for sale and if sold a lease issued (15 whole and partial parcels covering 14,494.32 acres in Cody FO, 38 whole and partial parcels covering 40,486.26 acres in Lander FO, and 45 whole and partial parcels covering 33,067.07 acres in Worland FO). Rationale for deferral includes

management actions from the Bighorn Basin Resource Management Plan (BB RMP) Draft Environmental Impact Statement (EIS) (BLM 2011b) and the Lander Field Office Resource Management Plan (LFO RMP) Draft Environmental Impact Statement (EIS). Appendix A identifies the parcels offered for sale with applicable lease stipulations for Alternative 3.

Rationale for deferral includes management actions from the Bighorn Basin Draft Resource Management Plan EIS and the Lander Draft Resource Management Plan EIS. For reference, the Draft plans are located on the Cody, Lander, and Worland Field Offices Wyoming BLM web sites located at www.blm.gov.

2.5 Alternatives Considered and Eliminated from Further Analysis

Offering Subject to Standard Lease Terms and Conditions

Offering all nominated parcel with only the lease terms and conditions on the lease form was considered as a means to reduce impediments to oil and gas development on public lands. Such an alternative is not consistent with the approved RMPs where the applicable RMP prescribes stipulations in accordance with FLMPA's Section 102(8) mandate to manage the public lands to protect resource values. Therefore this alternative was not analyzed in detail.

Deferral of all Parcels within Greater Sage-Grouse Core Areas

Deferring all parcels within Greater sage-grouse Core Areas was considered but eliminated from detailed analysis as it is within the range of alternatives analyzed in detail.

3 Affected Environment

3.1 Introduction

This section describes the environment that could be affected by implementation of the alternatives described in Section 2, above. Aspects of the affected environment described in this section focus on relevant major resources and issues to determine if a significant impact may occur. Only those aspects of the affected environment that are potentially impacted are described in detail. All parcels were reviewed against the Greater Sage-Grouse key habitat requirements in BLM Wyoming IM WY-2012-019, and against the lands with wilderness characteristics (LWC) requirements in BLM Washington Office (WO) IM 2011-077, and against the Master Leasing Plan (MLP) requirements in WO IM 2010-117 and the approved BLM Wyoming Leasing Reform Implementation Plan.

3.2 General Setting

Cody Field Office
The CYFO encompasses 2.2 million acres of the Big Horn Basin in north central Wyoming and includes portions of Park and Big Horn counties and is bordered by the Shoshone and Bighorn National Forests. CYFO manages 1.1 million acres of public land and 1.5 million acres of federal mineral estate within this area.

Lander Field Office
The LFO encompasses 6.6 million acres in central Wyoming and includes most of Fremont County, the southwest corner of Natrona Country, and small portions of Carbon, Sweetwater and Hot Springs counties. Of the 6.6 million acres, 2.4 million acres are public lands managed by the BLM. The LFO also manages approximately 2.7 million acres of federal mineral estate. Approximately 2.2 million acres of the planning area are within the Wind River Indian Reservation (WRIR). The BLM has a fiduciary trust responsibility for the management of minerals on the WRIR. The BLM does not make land management decisions for the WRIR, and duties associated with trust responsibilities are performed independent of the provisions of the Lander RMP.

Worland Field Office
The WFO encompasses 3.4 million acres. This area includes Big Horn, Hot Springs, and Washakie counties. The WFO manages over 2 million acres of public land and 2.7 million acres of federal mineral estate.

3.3 Resources Brought Forward for Analysis

3.3.1 Air Quality and Climate Change

Air Quality

The Clean Air Act Amendment of 1970 established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. The environmental protection agency (EPA)

continues to define and set NAAQS. Ambient air is that which is accessible to the public. National air quality health standards have been set for pollutants called "criteria pollutants." These include ozone, particulates, sulfur dioxide, nitrogen dioxide, carbon monoxide and lead. The Wyoming Department of Environmental Quality (WDEQ) has set standards for these criteria pollutants also called Wyoming Ambient Air Quality Standards (WAQQS).

The State of Wyoming has determined through available monitoring that the area is in compliance with WAAQs and NAAQs. The counties that lie within the jurisdictional boundaries of the WRBBDO are classified as in attainment of all state and national ambient air quality standards as defined in the Clean Air Act of 1977, as amended. Modeling conducted to date by the WDEQ does not indicate that air quality is likely to exceed any limits specified by the Clean Air Act in the near future.

Various state and federal agencies monitor air pollutant concentrations, visibility, and atmospheric deposition throughout Wyoming, and there are four monitors in the Lander planning area (Lander, South Pass, South Pass City, and Sinks Canyon). T he WDEQ operates a $PM_{2.5}$ monitor as part of the State and Local Monitoring Site (SLAMS) network in Lander. The SLAMS monitor at South Pass measures ozone, nitrous oxides, PM_{10}, and SO_2. A new air quality monitoring station is being established in the Frenchie Creek area. The USFS operates an IMPROVE monitor in the North Absaroka Wilderness Area in Park County and another IMPROVE monitor is operated at Pinedale in neighboring Sublette County. The Sinks Canyon and South Pass City monitors, which the BLM operates as part of the National Acid Deposition Program (NADP), measure atmospheric deposition (wet) of NH_4+, sulfate (SO_4), and various metals.

A monitoring station is being established in the Frenchie Creek 1 area. Air quality, visibility, and atmospheric deposition are monitored throughout Wyoming, including adjacent planning areas.

The WDEQ operates a PM_{10} monitor as part of the State and Local Monitoring Site (SLAMS) network in Cody, Wyoming (Park County). Additional SLAMS and Special Purpose Monitoring (SPM) sites operate in nearby counties. Nearby monitoring sites include several IMPROVE monitors and BLM administered sites that are part of the Wyoming Air Resource Monitoring System (WARMS). Atmospheric deposition (wet) measurements of ammonium, sulfate, and various metals are taken at the Sinks Canyon, South Pass and Yellowstone Park sites, which the BLM operates as part of the National Acid Deposition Program (NADP).

There are two existing air quality monitors in the Cody area (Cody/PM_{10} and North Absaroka/IMPROVE). Air quality, visibility, and atmospheric deposition are monitored throughout Wyoming, including adjacent planning areas.

The examination of these data indicates that the current air quality for criteria pollutants in the planning area is considered good overall. Based on measurements within the area, visibility in the planning area is considered excellent.

Climate Change

The climate in the WRBBDO is designated as a combination of Intermountain Semi-desert and Southern Rocky Mountain Steppe. With the exception of the mountain areas, the local climate of this area can be described as a semiarid, continental cold desert climate. The mountains have a sub humid continental climate. Temperatures can range from winter lows of almost -50° Fahrenheit (F) to summertime highs of in excess of 100° (F) with annual air temperatures on the sagebrush-covered rangelands average 33 to 45° (F) and, on forested mountain areas, 33 to 38° (F). The Big Horn Basin is bounded on the northeast by the Pryor Mountains, on the east by the Big Horn Mountains, on the south by Owl Creek and Bridger and Washakie Ranges, on the west by the Absaroka Mountains, and open to the north into Montana. Summers are generally hot and short, and winters long and cold. Precipitation is generally low, though greater at higher elevations, and is generally evenly distributed across the year, with the exception of the drier summer months. Wind speeds are variable and generally strong.

Climate change refers to any significant change in measures of climate (e.g., temperature or precipitation) lasting for an extended period of time (decades or longer). Climate change may result from natural processes, such as changes in the sun's intensity; natural processes within the climate system (such as changes in ocean circulation); human activities that change the atmosphere's composition (such as burning fossil fuels) and the land surface (such as urbanization) (IPCC 2007).

Greenhouse gases that are included in the US Greenhouse Gas Inventory are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). CO_2 and methane (CH_4) are typically emitted from combustion activities or are directly emitted into the atmosphere. On-going scientific research has identified the potential impacts of greenhouse gas emissions (including CO_2; CH_4; nitrous oxide (N_2O), water vapor; and several trace gasses) on global climate. Through complex interactions at regional and global scales, these greenhouse gas emissions cause a net warming effect of the atmosphere (which making makes surface temperatures suitable for life on Earth), primarily by decreasing the amount of heat energy radiated by the Earth back into space.

Although greenhouse gas levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning of fossil carbon sources have caused CO_2 concentrations to increase dramatically, and are likely to contribute to overall climatic changes, typically referred to as global warming. Increasing CO_2 concentrations also lead to preferential fertilization and growth of specific plant species.

Global mean surface temperatures have increased nearly 1.0°C (1.8°F) from 1890 to 2006 (Goddard Institute for Space Studies, 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Data indicates that northern latitudes (above 24° N) have exhibited temperature increases of nearly 1.2°C (2.1°F) since 1900, with nearly a 1.0°C (1.8°F) increase since 1970 alone. It also shows temperature and precipitation trends for the conterminous United States. For both parameters we see varying rates of change, but overall increases in both temperature and precipitation. Without additional meteorological monitoring systems, it is difficult to determine

the spatial and temporal variability and change of climatic conditions, but increasing concentrations of greenhouse gases are likely to accelerate the rate of climate change.

In 2001, the Intergovernmental Panel on Climate Change (IPCC) indicated that by the year 2100, global average surface temperatures would increase 1.4 to 5.8°C (2.5 to 10.4°F) above 1990 levels. The National Academy of Sciences (2006) has confirmed these findings, but also indicated that there are uncertainties regarding how climate change may affect different regions. Computer model predictions forecasts indicate that increases in temperature will not be evenly or equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures.

Currently, the WDEQ does not have regulations regarding greenhouse gas emissions, although these emissions are regulated indirectly by various other regulations. Some greenhouse gases such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The primary greenhouse gases that enter the atmosphere as a result of anthropogenic activities include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), and fluorinated gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. These synthetic gases are powerful GHGs that are emitted from a variety of industrial processes.

Ongoing scientific research has identified the potential impacts of anthropogenic greenhouse gas (GHG) emissions and changes in biological sequestration due to land management activities on global climate. Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sinks cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused CO_2 concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The IPCC recently concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations."

Several activities contribute to the phenomena of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildfires and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales. For example, recent emissions of carbon dioxide can influence climate for 100 years. In contrast, black carbon is a relatively short-lived pollutant, as it remains in the atmosphere for only about a week. It is estimated that black carbon is the second greatest contributor to global warming behind CO_2 (Ramanathan and Carmichael, 2008). The lack of scientific tools designed to predict climate change at regional or local scales limits the ability to quantify potential future impacts. However, potential impacts to air quality due to climate change are likely to be varied. Several activities occur within the planning area that may generate greenhouse gas emissions: oil, gas, and coal development, large fires, livestock grazing,

and recreation using combustion engines which can potentially generate CO_2 and CH_4. Some activities within the WRBBDO generate greenhouse gas (GHG) emissions. Oil and gas development activities can generate CO_2 CH_4. CO_2 emissions result from the use of combustion engines, while methane can be released during processing. Wildland fires also are a source of other GHG emissions, while livestock grazing is a source of methane. Other activities in the area with the potential to contribute to climate change include soil erosion from disturbed areas and fugitive dust from roads, which have the potential to darken snow-covered surfaces and cause faster snow melt. A description of the potential greenhouse gas emissions associated with the proposed leasing activities is included in Chapter 4.

There are several National Parks, National Forests, recreation areas, and wilderness areas in or adjacent to the Big Horn Basin. National Parks, Monuments and some state designated Wilderness Areas are designated as Class I. The Clean Air Act "declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas . . . from manmade air pollution." 42 U.S.C. § 7491(a) (1).25. Under the BLM Manual Section 8560.36, BLM lands, including wilderness areas not designated as Class I, are managed as Class II, which provides that moderate deterioration of air quality associated with industrial and population growth may occur.

3.3.2 Socioeconomics

Local communities depend heavily upon oil, gas, and mining activities. Agriculture and tourism also support local economies. The State of Wyoming receives a percentage of the lease sales receipts as well as a portion of the royalties should a lease begin production. Furthermore, the county where the lease is located receives monies from the State of Wyoming's allocation.

3.3.3 Cultural Resources

In accordance with the Wyoming State Protocol Appendix B.2, issuance of leases is exempt from Class III inventory. Prior to considering surface disturbance on these parcels a Class III cultural resource inventory would be completed. Cultural resource studies indicate that the general area has been occupied for at least 12,000 years and additional cultural resource sites should be anticipated within the parcels.

Generally, cultural resources can be grouped into three categories: prehistoric resources, historic resources, and spiritual/sacred/Traditional Cultural Properties (TCPs).

Prehistoric cultural resources are sites, structures, objects, or materials deposited or left behind prior to the entry of non-American Indian (European) explorers and settlers into an area. In this part of Wyoming, the prehistoric stage spanned from approximately 11,500 years Before Present (BP) to approximately 250 years BP.

Historic cultural resources are sites, structures, objects, or materials deposited or left behind after the European presence was established.

Spiritual/sacred/TCPs can include prehistoric or historic resources, structures, topographic features, habitats, plants, wildlife, and/or minerals that Native Americans or other groups consider essential for the preservation of traditional culture.

The Wind River / Bighorn Basin District archaeologists have evaluated existing cultural and historic resource data and determined there are a few cultural features identified that would require Native American consultation as directed in BLM Handbook H-8120 for Native American Consultation.

Trails

In 1968, the National Trails System Act (NTSA; Public Law 90-543) provided for the development of a national system of trails in urban, rural, and wilderness settings. Originally, the NTSA specified three categories of national trails: NSTs, recreation trails, and connecting or side trails. In 1978, historic trails were added as another category. Today, only Congress can designate NHTs and NSTs. The NTSA provides for the designation of NSTs "so located as to provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas through which such trails may pass" (Section 3(a)(2)). After passage of the NTSA, the Bureau of Outdoor Recreation (in accordance with the NTSA) performed a study that endorsed designation of the Continental Divide Trail as an NST.

The Oregon, Mormon Pioneer, California, and Pony Express NHTs are nationally significant historic trails that traverse the southern portion of the WRBB district. These trails mark the mid-1800s period of mass migration for pioneering Americans who headed West. The Congressional designation of these trails as NHTs reflects their nationally recognized status as symbols of one of the most important and influential movements of people in United States history.

The Nez Perce (Nee-me-poo or Nimi'ipuu) National Historic Trail was congressionally designated in 1986; this trail was the general path taken by some members of the Nez Perce Tribe when they fled their homeland in Oregon in 1877 due to an ultimatum to relocate onto designated reservations. These bands of the Nez Perce Tribe, known as "nontreaty," recognized that because of acts of vengeance by several young warriors they would not be able to relocate peacefully.

Routes from the historic period include the Rawlins-Fort Washakie Stage Trail and the Casper to Lander Road. Each of these historic trails were routes that accessed the Wind River Basin from the railroad heads in Rawlins and in Casper. The Rawlins-Fort Washakie Stage Trail was established in the 1870's, and freighters, stagecoach lines, and military troops all used this route to travel from the Union Pacific station at Rawlins into settlements in the Sweetwater Valley and Wind River Basin, including Rongis, Meyersville, Lander, Fort Washakie, Dubois, and the even the Bighorn Basin. The Casper to Lander Road was established a little later in the 1880's and was a freight and stagecoach route from the Chicago and Northwestern railhead in Casper to the Wind River Basin. This road had two routes, a more northerly one that followed Poison Creek for a ways, and a southerly route that paralleled Beaver Rim. Both of these historic trails stopped being used for the most part in 1906, when a railroad was built from Casper into Lander.

Other regionally important routes from the historic period include the Bridger Trail, which Jim Bridger created in 1864 to connect with the Oregon Trail to the south. The route was an important alternative to the Bozeman Trail, which crossed the Powder River Country. Before the railroad was constructed, the Bridger Trail was an important freight route for wagons carrying supplies during the early settlement of the Bighorn Basin in the 1880s and 1890s. The trail connected the Bighorn Basin with Billings, Montana, to the north and Casper, Wyoming, to the southeast. Portions of the Bridger Trail along Kirby Creek were used on the later stage route connecting Thermopolis and Lost Cabin with Casper (Woods 1997). The BLM has installed interpretive signage along the Bridger Trail.

In 1881, Meeteetse became a terminus of the old Meeteetse Trail, which the military built as a stage and freight road. The Fort Washakie to Meeteetse to Red Lodge trail originally ran north from Fort Washakie to Meeteetse. Freight was shipped north from the Union Pacific Railroad to Fort Washakie and then on to Meeteetse; when the railroad reached Red Lodge the traffic pattern reversed, from north to south. The trail was the first road built in the Bighorn Basin. Red Lodge Road was later extended to Lander and Rawlins.

3.3.4 Livestock Grazing Management

The BLM administers livestock grazing on 997 allotments covering 5.5 million acres of BLM-administered surface lands within the WRBB district. Cattle are the primary livestock grazers on public lands, but grazers also include sheep, domestic horses, and small numbers of bison. Goats and sheep are sometimes authorized for the purpose of suppressing weeds.

Livestock grazing is authorized under permits and leases which stipulate the seasons of use, number and kind of livestock and amount of forage use that may occur. These stipulations are developed in coordination with the grazing operator, state agencies and interested publics to provide sustain use for livestock and provide for the stability and improvement of the resources on the range including the vegetation, wildlife and their habitat, riparian habitat and water shed function. Monitoring is conducted in these allotments to determine the success of the grazing management plans and provide guidance for changes that may be necessary to reach resource objectives. Adjustment to timing and stocking rates may be made on an annual basis based on climate, forage production and degree of use on key forage species.

Stock driveways were authorized under the Stock Raising Homestead Act of 1916, and created by a Secretarial Order for the specific purpose of creating trailing routes and reserving water sources for trailing livestock. Stock driveway withdrawals prohibit disposal of these lands.

3.3.5 Vegetation (Including Invasive Species and T&E Plant Species)

Forest

Forests and woodland communities in the district include aspen woodlands, Douglas-fir, Englemann spruce stands, juniper woodlands, lodge pole pine, limber pine, spruce-fir, whitebark pine, and ponderosa pine. Forests in the district provide important habitat for flora and fauna,

including several threatened or endangered species, such as Canada lynx, and species currently considered to be candidate or BLM sensitive species. Forest and woodland areas in the District provide seasonal habitat for numerous songbirds, small mammals, predators, and big game, with concentrations of elk in winter. Forests also play an important role in the ecological processes and functions of ecosystems, such as energy flow, water, and nutrient cycling.

The western slope of the Big Horn Mountains in the WFO includes substantial mixed-age stands of ponderosa pine. These stands are generally confined to dryer, poorer quality sites. Douglas-fir, Engelmann spruce, sub-alpine fir, and lodgepole pine grow on north-facing slopes in both the Big Horn and Absaroka Mountains. Forestlands also are found on Rattlesnake Mountain, the West Slope of the Big Horn Mountains, Carter Mountain, and on isolated public land parcels adjacent to Shoshone National Forest in the South and North Fork Shoshone River, Wood River, and Newmeyer Creek watersheds.

Grasslands

Grasslands, which include lowland, foothill, mountain, and alpine types, are mostly found in valley bottoms, uppermost south-facing slopes, and scattered patches on windswept ridges. Grasslands are split into four plant communities − mixed grass prairie, Great Basin foothills grassland, meadow tundra, and subalpine meadow.

The average composition of the grass vegetative type is 48 to 80 percent grass species, 10 percent forbs, and 10 to 42 percent shrubs. Grasses are important to wildlife, livestock, and wild horses and contribute to the diversity of the area. The standard habitat types included in this vegetative type are mixed grass prairie, great basin foothills grassland, meadow tundra, subalpine, highland short grass, sagebrush mixed grass, lowland short grass, and sagebrush mixed shrub.

Shrublands

These communities are generally diverse in plant composition and provide important forage and cover for wildlife and livestock. Shrublands are split into seven plant communities − mesic upland shrub, xeric upland shrub, mountain big sagebrush, Wyoming big sagebrush, desert shrub, saltbush fans and flats, and greasewood fans and flats.

Riparian/Wetland

Riparian-wetland areas are the transition zones between terrestrial and aquatic ecosystems and are often the key sites in arid and semi-arid environments. These communities are found in areas along perennial or intermittent drainages, seeps, and springs, and make up a relatively small, but productive portion of the landscape. Wetlands are comprised of aquatic vegetation with unique soil characteristics that have developed under the influence of perennial water.

The BLM defines wetlands as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that normally supports, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Riparian-wetland areas include marshes, shallow swamps, lakeshores, bogs, and wet meadows, along with lands adjacent to or contiguous with perennial and intermittent flowing rivers and streams, lakes, and reservoirs with stable water levels. Ephemeral streams that do not exhibit the presence of vegetation that depends on free water in the soil are usually not considered riparian-wetland areas.

Forest Dominated Riparian-Wetlands
Cottonwood is the most common riparian-wetlands tree species, but aspen, boxelder, and a variety of conifer species are also present in the district. Cottonwood regeneration depends on the presence of bare, moist soil for seedling germination, so stands tend to occur on ephemeral systems or perennial systems where the channel is braided. Cottonwood stands are invariably the product of systems that feature highly variable streamflows that periodically scour potential germination sites, and move the stream channel laterally across the floodplain. The introduced species of salt cedar (tamarisk) is starting to show up in many riparian-wetland zones that formerly featured willows and cottonwoods.

Shrub Dominated Riparian-Wetlands
Systems with persistent water availability and moderate gradients generally form shrub dominated riparian-wetland areas. Several species of willow are the main shrub component of riparian-wetland zones, but other species such as water birch and alder are common.

Herbaceous Dominated Riparian-Wetlands
Herbaceous dominated communities represent the largest percent of riparian-wetland areas in the district. Wetlands and riparian-wetland areas with low gradients are typically dominated by grasses, sedges, rushes, bulrushes, and forbs. Herbaceous dominated riparian-wetland areas typically do not include woody species, but are dominated by herbaceous wet meadow complexes that are grazed by wildlife. The presence of wet meadow areas within this community can result in hummocking which may be interpreted as an indication of riparian-wetland degradation.

Invasive Species

Invasive and noxious plant species are common impediments to management objectives in the WRBB district. Invasive species are, for the most part, nonnative species whose introduction into an environment where they did not evolve causes, or is likely to cause, economic or ecological harm. These species make efficient use of local natural resources difficult and often interfere with achieving management objectives for the site. Noxious species are species designated by federal, state (State of Wyoming Noxious Weed List), or county government (Weed Control Districts) as injurious to public health.

The primary species targeted on public lands include cheatgrass, Russian knapweed, spotted knapweed, diffuse knapweed, leafy spurge, Dalmatian toadflax, Canada thistle, scotch thistle, musk thistle, houndstongue, hoary cress (whitetop), field bindweed, puncture vine, Russian olive, and Tamarisk. These plants are typically found in sagebrush/grassland, desert shrub, and

riparian/wetland community types. The present goal is to contain and reduce densities of invasive species populations.

3.3.6 Paleontology and Geology

The BLM utilizes the Potential Fossil Yield Classification (PFYC) system to classify the potential to discover or affect important paleontological resources. The PFYC system is intended to help determine proper mitigation approaches for surface-disturbing activities, disposal or acquisition actions, recreation possibilities or limitations, and other BLM-approved activities. The PFYC system also highlights areas likely to be a focus of paleontological research efforts or illegal collecting. There are five classes of potential fossil yield, ranging from Class 1, "No Potential," to Class 5, "Very High Potential," for vertebrate or scientifically important paleontological resources.

Lander

The planning area is in the regional geologic provinces of the Wyoming plains and the Rocky Mountains. Igneous, metamorphic, and sedimentary rocks of all geologic periods, except the Silurian, are present and represent a span from 3 billion years ago to the very recent – 10,000 years ago. The geologic setting consists of basins separated and surrounded by mountain ranges, including the Owl Creek, Washakie, Absaroka, Wind River, Granite, and Rattlesnake. Basins include most of the Wind River and the northern portion of the Great Divide Basin. Most of the planning area is in the Wind River Basin, with less than 150,000 acres in the Great Divide Basin.
The geologic setting contributes to the formation of numerous important geologic resources such as Red Canyon, Beaver Rim, Lander Slope and Table Mountain, Sweetwater Canyon, and Sweetwater Rocks. There also are unique geologic settings responsible for hosting certain mineral resource types and occurrences such as oil and gas, hard rock and placer gold, uranium, phosphate, and bentonite.

Cody/Worland

The Bighorn Basin is an intermontane basin in the Middle Rocky Mountain Foreland geologic province. It is an asymmetric, northwest-trending topographical and structural basin with an elliptical shape, bounded on the northeast by the Pryor Mountains, on the east by the Big Horn Mountains, on the south by the Owl Creek, Bridger and Washakie Ranges, on the northwest by the Beartooth Mountains, and open to the north into Montana. The basin is also bounded on the west by volcanic rocks of the Absaroka Mountains which were erupted and deposited atop older Laramide uplifts. The north end of the Bighorn Basin is considered to terminate structurally along a low -lying folded and faulted zone known as the Nye-Bowler lineament in Montana (Thomas 1965).

The topography of the Planning Area varies from rolling plains, flat mesas, and badlands to alluvial valleys, benches, foothills, and mountains (BLM 1993). Many pronounced anticlinal and synclinal folds, some of which have considerable structural relief (Pierce and Andrews 1941) occupy the foothills or "flank" areas of the basin. Riparian corridors, badlands, and

benches/upland topography dominate the central basin. The paragraphs that follow further address geologic structure in the Bighorn Basin.

3.3.7 Recreation, VRM, Lands with Wilderness Characteristics, and Special Designations

Recreation

Federal lands within the WRBB District provide a broad spectrum of outdoor opportunities that afford visitors the freedom of recreational choice with minimal regulatory constraints. Recreational opportunities are offered to the public on all BLM-administered lands within the District. Parcels may be located on BLM-administered public lands managed under Recreation Management Area objectives (Special Recreation Management Area – SRMA, or Extensive Recreation Management Areas-ERMAs), or custodial recreational management. BLM management within a SRMA elevates recreational related resources and associated uses and opportunities to a high priority to meet the objectives to maintain and enhance the desired recreational settings, opportunities, experiences, and beneficial outcomes. ERMA objectives manage recreational resources and uses while maintaining other land use objectives. Areas not managed under RMA objectives address public health and safety, user conflicts, and resource protection.

South Pass Historic Mining Area: The South Pass Historic Mining Area is a SRMA, with emphasis on recreational opportunities in rustic, open-space settings.

National Historic Trail: The existing plan establishes a SRMA for the NHTs (which in 1987 included only the Oregon/Mormon Pioneer Trail; subsequent action expanded the NHTs to include the California and Pony Express Trails. Together, these four trails are referred to as the NHTs.). The management prescriptions for the NHTs are very general, with particular focus on preventing over utilization of the NHT and the contributing historic sites, whether by trekkers or hunters. Subsequent actions have refined the kind of BLM monitoring and prescriptions that are required to protect the historic resources. Detailed SRMA plans have not been adopted.

Continental Divide National Scenic Trail: The existing plan recognizes the Continental Divide National Scenic Trail as a SRMA but does not provide detailed management prescriptions.

Absaroka Mountain Foothills SRMA – Goals and objectives for the 72,177-acre Absaroka Mountain Foothills are to enhance semi-primitive motorized and non-motorized recreational opportunities in this scenic area.

Badlands SRMA – Goals and objectives for the approximately 214,099-acre Badlands SRMA are to provide for interpretive opportunities and to display the scenic qualities of the area. There are three Recreation Management Zones (RMZ) proposed for the Badlands SRMA − Tour de Badlands, Wild Badlands, and Tatman Mountain.

Bighorn River SRMA – Goals and objectives for this approximately 15,417-acre SRMA are to provide for and enhance public access to the Bighorn River so as to enhance recreational

opportunities and wildlife management. Recreational uses of public lands along the Bighorn River include fishing, hunting, and float boating.

Historic Trails SRMA – This 12,083-acre SRMA includes segments of the Nez Perce NHT, Bridger Trail, and the Fort Washakie Trail to Red Lodge Stage Route.

The Rivers SRMA – This SRMA includes about 18,278 acres of public land along the Clarks Fork of the Yellowstone River, the north and south forks of the Shoshone River, and the main stem of the Shoshone River.

West Slope SRMA – The west slope of the Big Horn Mountains is popular for dispersed recreational activities due to scenic qualities; a variety of recreational resources, activities, opportunities, and experiences; access to the Bighorn National Forest, and accessibility in the area. The area provides recreation opportunities such as hunting, fishing, camping, hiking, backpacking, horseback riding, driving for pleasure, sightseeing, and spelunking. This SRMA contains several caves rated as significant. The West Slope SRMA is approximately 373,755 acres.

Worland Caves SRMA – The goals of this cave-focused SRMA are to provide protection for the fragile cave resources, promote ethical uses, and help educate the public on proper management and recreational use.

Developed Recreation Sites

Management and maintenance will be provided at existing developed recreational sites (in both ERMAs, SRMAs, and areas not managed as RMAs), including Atlantic City, Big Atlantic Gulch, and Cottonwood campgrounds; Split Rock and Devil's Gate interpretive sites; and Wild Horse Point overlook and Castle Gardens picnic areas, Beaver Creek Nordic ski area, Steamboat Lake interpretive site, and the Martins Cove interpretive trail. Additonal developed recreational sites include: Five Springs Falls Campground; Cottonwood Creek Trailhead/Campground; Hogan/Luce Trailhead/Campground; Four Bear, Twin Creek, and Bobcat/Houlihan Trailheads, and the North Fork Shoshone River Access site.

Visual Resource Management

Visual Resource Management objectives (VRM Class) are determined during the land use planning period, which analyzes the visual resource inventory (VRI) classes derived from inventorying and rating the scenic quality, sensitivity levels, and distance zones against all BLM management actions.

Class I objectives are to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. It would be very difficult to get a new project approved in this class, unless it is completely shielded from view.

VRM Class II objectives are to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

VRM Class III objectives are to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

VRM Class IV objectives are to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Lands with Wilderness Characteristics

Wilderness Characteristics are resource values that include naturalness, outstanding opportunities for solitude, and outstanding opportunities for primitive and unconfined recreation. Areas evaluated for wilderness characteristics generally occur in undeveloped locations 5,000 contiguous acres and greater, or of sufficient size to be practical to manage for these characteristics.

The BLM Land Use Planning Handbook (H.1601-1) states that the BLM must consider the management of lands with wilderness characteristics during the land use planning process. The criteria used to identify these lands are essentially the same criteria used for determining wilderness characteristics for wilderness study areas (WSA). However, the authority set forth in Section 603(a) of FLPMA to complete the three part wilderness review process (inventory, study, and report to Congress) expired on October 21, 1993; therefore, FLPMA does not apply to new WSA proposals and consideration of new WSA proposals on BLM-administered public lands is no longer valid. As mandated by FLPMA, Section 201, the BLM is still required to maintain and inventory of BLM-administered public lands to determine whether they possess wilderness characteristics, and analyzed for wilderness management as per FLPMA Section 202.

Wilderness Study Areas (WSAs)

WSAs are managed according to the non-impairment standard. Under this standard, these lands are managed in a manner so as not to impair the suitability of such areas for preservation as wilderness. At present, the BLM manages these lands in accordance with the Cody, Lander, Grass Creek and Washakie RMPs, and the Interim Management Policy for Lands Under Wilderness Review until Congress either designates each WSA as “wilderness” or releases it from consideration and the land reverts to multiple-use management.

Wild and Scenic Rivers (WSRs)

At present, there are no designated WSRs in the District. However, the BLM manage lands along 29 waterways that have been found eligible for WSR designation. All contain outstandingly remarkable values (ORV), including remarkable vistas due to the steep vertical canyon walls (some areas are more than 1,200 feet deep), immense spires, and riparian valley bottoms. These waterways were identified during a review of all BLM-administered public lands along waterways within the Planning Area. This review was done to determine eligibility, assign a tentative classification, and screen for suitability factors, as identified in the Wild and Scenic Rivers Act of 1968, as amended. Along the 29 eligible waterways, 16 waterway segments were found to meet the suitability factors and are currently managed under interim management prescriptions to maintain and enhance the identified ORVs until they are determined as suitable for inclusion into the Wild and Scenic River System.

ACECs

FLPMA Section 103(a) defined an ACEC as an area within public lands where special management attention is required to protect and prevent irreparable damage to important and relevant historical, cultural, and scenic values, fish and wildlife and other natural systems or processes, and to protect life and safety from natural hazards. BLM regulations for implementing FLPMA ACEC provisions are at 43 CFR 1610.7-2(b).

The BLM manages eighteen ACECs in the District − Carter Mountain, Five Springs Falls, Little Mountain, Sheep Mountain Anticline, Brown/Howe Dinosaur Area, Upper Owl Creek Area, Spanish Point Karst, Red Gulch Dinosaur Tracksite, and Big Cedar Ridge; Lander Slope, Red Canyon, Dubois Badlands, Whiskey Mountain, East Fork, Beaver Rim, Green Mountain, South Pass Historic Mining District, National Historic Trails.

3.3.8 Wildlife and Fish

Lands in the WRBBD contain a variety of habitats that possess the biological and physical attributes important in the life-cycles of many wildlife species. The diversity of habitats and landscapes provide important areas for breeding, birthing, foraging, wintering, and migration. Wildlife and their habitats is representative of Great Basin fauna and flora. Wildlife habitat is best characterized by vegetation types, water resources, geology, and topography. Vegetation types are characterized as successional stages, commonly influenced by disturbance regimes like fire, grazing, and drought. Just as a diversity of vegetation types is important to wildlife, so are these successional stages within types. Habitats in the WRBBD include sagebrush-steppe shrublands, coniferous forests, juniper woodlands, aspen stands, mountain shrub, canyons and rim rock, badlands, grasslands, and riparian/wetland areas.

Big Game

Big game species in the WRBBD include pronghorn, deer (mule deer and white-tailed deer), elk, moose, bighorn sheep, and mountain goat.

Both mule deer and white-tailed deer occur in the district. Mule deer generally prefer habitat types in the early to mid-stages of plant succession with numerous shrubs. They use the woody

riparian, shrublands, juniper woodland, and aspen woodland habitat types extensively during spring, summer, and fall. These habitat types provide adequate forage areas with succulent vegetation for lactating females and adequate cover for security and fawning. During winter, mule deer move to lower elevations to avoid deep snow that covers their forage. They are often found in juniper and limber pine woodlands, big sagebrush/rabbitbrush, sagebrush steppe, and riparian habitat types. White-tailed deer use woody riparian habitats (willow and cottonwood) along major creeks and rivers for both forage and cover.

Pronghorn are a unique animal of the western plains and are the only living species in their taxonomic family (Antilocapridae). Wyoming is the center of the pronghorn's range. Pronghorn inhabit a variety of open rangeland habitat types throughout the district and forage primarily on shrubs, especially on sage species.

Elk are common year-round throughout the district. In summer, elk use aspen and conifer woodlands for security and thermal cover, ranging out into upland meadows, sagebrush/mixed grass, and mountain shrub habitat types to forage. In winter, elk move to lower elevations, foraging especially in sagebrush/mixed grass and mountain shrub habitat types, especially in windswept areas where snow depth is less.

Moose are found primarily in the riparian-wetland habitats. Moose are distributed in low densities throughout the Absaroka, Owl Creek, and Big Horn Mountains, especially along the river and stream corridors adjacent to these mountains and in areas of higher elevation that have forest or woodland cover; and along the Sweetwater River, Wind River, and Popo Agie River corridors in the WRBB district. In summer and fall, moose use willow, aspen, and mixed conifer forests for forage and security. Moose are primarily browsers and feed on woody species like willow, aspen, and some young conifer species. In winter, moose in the Big Horn Mountains seem to concentrate primarily in riparian corridors and mixed conifer habitats, while in the Absaroka Mountains they tend to move up in elevation to forage in mixed conifer and spruce/fir forest habitat types. Occasionally, severe winter snows push moose to lower elevations.

Bighorn sheep are present predominantly in the Whiskey Mountain and East Fork areas near Dubois, although there are small populations in the Sinks and North Fork Canyons near Lander and on Green Mountain. They also are present in the Absaroka Mountains, Owl Creek Mountains, and the Devil's Canyon and Shell Canyon areas of the Big Horn Mountains. Bighorn sheep typically occur in steep, high mountain terrain. Ridges and slopes, which are normally free of snow, provide forage, while steep rims and canyon walls provide escape cover. They prefer herbaceous forage and typically use alpine slopes and meadows and mountain shrub habitat types, primarily foraging on forbs and grasses and converting to browsing on shrubs when snow depths dictate.

There are mountain goats on BLM-administered lands near Clarks Fork of the Yellowstone River canyon, predominantly in high, steep and rocky habitat. This habitat provides escape cover and shelter from the wind and storms coming off the Beartooth Plateau. It also is lower in elevation than predominantly spring and summer habitat that is higher on the Beartooth Plateau.

Trophy Game

The WGFD classifies cougar, black bear, grizzly bear, and gray wolves as trophy animals. Cougars are typically found in remote areas with dense cover and rocky, rugged terrain. They are found in most habitats where deer, their primary prey base, are present. Black bear are found throughout both the foothills and mountains of the Absaroka front and the Big Horn Mountains, with occasional occurrences along riparian corridors such as the Greybull, Bighorn, and Nowood rivers. They are typically associated with forested and riparian habitats in higher precipitation zones. Grizzly bear are found in the Absaroka and Beartooth mountain areas and have been observed along the western part of the Owl Creek Mountains.

Mountain lions are present in habitats with dense cover and rocky, rugged terrain habitats where deer, their primary prey, are present. Mountain lions have been observed throughout the district, but are mainly observed along the Wind River front, in the Dubois area, and the Bridger, Rattlesnake, and Green Mountains.

Migratory Game Birds

There are many waterfowl species in the WRBBD, including ducks, geese, coots, snipe, and rails. The area within the district is part of the Central Flyway (one of four major north-south routes for migratory birds, generally avoiding mountain ranges or areas with limited food availability). Natural lakes, streams, and human-made reservoirs are important resting areas for a variety of ducks, geese, and shorebirds.

Nongame

Nongame species include raptors, neotropical migrants, non-migratory songbirds, mammals, and reptiles and amphibians. Such species are numerous and diverse, especially given the diversity of habitats present in the WRBBD.

Raptors
Raptor species in the district include turkey vultures, osprey, red-tailed hawk, Swainson's hawk, northern harrier, Cooper's hawk, sharp-shinned hawk, rough-legged hawk, golden eagle, merlin, American kestrel, prairie falcon, and numerous owls, including great-horned, long-eared, short-eared, great gray, barn, western screech, northern pygmy, boreal, and northern saw-whet. These species are found in a variety of habitats throughout the district.

The nesting season is considered the most critical period in the raptor life-cycle because it determines population productivity, short-term diversity, and long-term trends. Most species have specific nest site requirements that are key factors in nest site selection and in reproductive success. These include nesting strata, available prey base, and nest site disturbance. Raptors build nests in a myriad of habitats, including steep cliffs and rock ledges, trees, and on the ground. Raptors also use human-made structures such as barns, utility poles, and tanks as nesting habitat. Golden eagles and prairie falcons usually build their nests on steep cliffs and rock ledges, but other species, such as red-tailed hawks and great-horned owls, often build on these sites. Turkey vultures will nest on cliffs, but may also use caves or hollow stumps. Golden eagle populations have increased.

Several species of raptors typically nest in trees and most known raptor nests in the district are located in cottonwood trees. Swainson's hawks, red-tailed hawks, American kestrels, great horned owls, and screech owls prefer the more open plains and usually nest in trees along drainages. Cooper's hawks, sharp-shinned hawks, long-eared owls, and northern saw-whet owls usually nest in lodgepole pine stands, mixed conifer forests, or aspen woodlands. Because of the dense canopy cover, these nests are difficult to find. Consequently, intensive inventories of these species have been limited to areas targeted for habitat alteration.
Several species of raptors are ground nesters. Short-eared owls typically nest in tall grasslands with sparse sagebrush or shrubland cover. Northern harriers generally nest on the ground in riparian-wetland or marsh habitats.

Neotropical Migrants
Neotropical migrants include shorebirds, water birds, and songbirds found throughout the district. Every vegetative community type supports various bird species, with riparian-wetland communities having the most diverse array of species. There are no population estimates for many of these species; however, the WGFD has been conducting breeding bird surveys that provide limited information.

Fish

Within the Bighorn Basin, BLM-administered lands contain fisheries resources that include cold-water streams draining the Big Horn Mountains to the east and the Absaroka Range to the west; the tail-water trout fishery at Thermopolis; the cool-water fishery of the lower Bighorn, Shoshone, Greybull, and Nowood rivers; and the warm-water fisheries of several small lakes or ponds. There are no natural lakes or ponds in the Bighorn Basin that support fisheries.

Fisheries in the Bighorn Basin occur in the Bighorn River and Clarks Fork of the Yellowstone watersheds and include several major perennial tributaries − Owl Creek, Cottonwood Creek, Grass Creek, Gooseberry Creek, Greybull River, Wood River, Shoshone River, Kirby Creek, Nowater Creek, Nowood River, Shell Creek, Porcupine Creek, and Dry Creek. Most fish populations occur in the larger rivers and their tributaries, although there are several WGFD-stocked reservoirs and ponds.

The WGFD manages most cold-water streams for brook, brown, cutthroat, and rainbow trout. In addition, management on some streams is focused on mountain whitefish, Snake River cutthroat trout, and Yellowstone cutthroat trout. Many lower-elevation waters in the Bighorn Basin are managed for cool- and warm-water native game fish, such as sauger and channel catfish, along with the native nongame species, such as numerous minnow and sucker species that provide forage for sport-fish species. There are four nongame species on WGFD list of Species of Greatest Conservation Need in the Cody/Worland FO − sturgeon chub, mountain sucker, and plains and western silvery minnow.

Fish habitats in the Lander FO include perennial and intermittent streams that support fish through at least part of the year. The Wind River and North Platte watersheds are the two major drainages in the planning area. The condition of fish habitat is related to hydrologic conditions of the upland and riparian-wetland areas associated with or contributing to a specific stream or

waterbody. Aquatic habitat quality varies by location and orientation to geographic landforms and vegetation.

No federally listed fish species are known to occur in the Lander FO. The Yellowstone cutthroat trout is the only BLM sensitive fish species and only native trout in the Lander field area. This species is found in the Wind River drainage near Dubois. This drainage lies in the southern extent of the Yellowstone ecosystem. The species is found in relatively clear, cold streams such as the East Fork of the Wind River and its tributaries.

Special Status Species

Special status wildlife species in the district occupy a variety of habitat types, including sagebrush shrublands, grasslands, and riparian-wetland and wetland habitats. There are no comprehensive data on population numbers and distribution in the WRBBD for most special status species. Unless otherwise noted, specific information on distribution and occurrences for each of the species is not available.

Common Name	Habitat	Status
Trophy Game		
Grizzly bear	Woodlands, forests and alpine.	Threatened
Game Birds		
Greater sage-grouse	Sagebrush habitats.	Candidate for listing
Nongame Raptors		
Bald eagle	Large bodies of open water such as lakes, marshes, and rivers where there is an abundance of fish and tall trees to roost.	BLM sensitive species
Burrowing owl	Open, dry grasslands, agricultural lands, rangelands, and desert habitats often associated with burrowing animals.	BLM sensitive species
Ferruginous hawk	Arid and semiarid grassland regions with open, level, or rolling prairies. Foothills or middle elevation plateaus largely devoid of trees, and cultivated shelterbelts or riparian corridors.	BLM sensitive species
Northern goshawk	Forested areas and open areas near forested areas.	BLM sensitive species
Peregrine falcon	Found in a variety of habitats, most with cliffs for nesting and open areas for foraging.	BLM sensitive species
Nongame Neotropical Migrants		
Baird's sparrow	Native mixed-grass and fescue prairie.	BLM sensitive species
Brewer's sparrow	Northern Rocky Mountains including sagebrush and alpine meadows.	BLM sensitive species
Loggerhead shrike	Grasslands interspersed with scattered trees and shrubs that provide nesting and perching sites.	BLM sensitive species
Long-billed curlew	Plains, grasslands, and prairies.	BLM sensitive species
Mountain plover	Short-grass prairie dominated by the blue grama (*Bouteloua gracilis*). Also can be found in taller grasses that have been grazed or associated with prairie dog colonies.	Proposed threatened; BLM sensitive species
Sage sparrow	Sagebrush flats, alkaline flats with saltbush, and semi-desert shrublands in the lowlands.	BLM sensitive species
Sage thrasher	Open, shrub-steppe country dominated by sagebrush or bitterbrush, with native grasses intermixed, generally avoiding cheatgrass dominated landscapes.	BLM sensitive species
Trumpeter swan	Ice-free water in estuaries and sheltered coastlines. Rocky	BLM sensitive species

Common Name	Habitat	Status
	Mountain flock concentrate in the Greater Yellowstone Ecosystem, where geothermal activity prevents freezing.	
White-faced ibis	Shallow lake waters, muddy ground of wet meadows, marshes, ponds, lakes, rivers, flooded fields, and estuaries.	BLM sensitive species
Yellow-billed cuckoo	Woodlands with clearings and dense scrubby vegetation, often along water.	BLM sensitive species
Nongame Mammals		
Black-footed ferret	Shortgrass and midgrass prairies in close association with prairie dog colonies	Endangered
Canada lynx	Coniferous forests at higher elevation, with substantial winter snow accumulations.	Threatened
Gray wolf	The gray wolf has thrived in many different environments, but primarily forested areas	BLM sensitive species
Pygmy rabbit	dense, tall stands of sagebrush in deep soil	BLM sensitive species
Long-eared myotis	Coniferous forests in mountain areas. Roosts in small colonies incaves, buildings, and under tree bark.	BLM sensitive species
Spotted bat	Prominent rock features in extreme, low desert habitats to high elevation forests.	BLM sensitive species
Townsend's big-eared bat	Mines, caves, and structures in woodlands and forests to elevations above 9,500 feet amsl.	BLM sensitive species
White-tailed prairie dog	Altitudes ranging between 4,000 to 8,000 feet amsl in desert grasslands and shrub grasslands.	BLM sensitive species
Black-tailed prairie dog	Inhabits dry, flat, open, shortgrass and mixed-grass grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle.	BLM sensitive species
Nongame Amphibians		
Boreal toad	Marshes, springs, creeks, small lakes, meadows, woodlands, forests, and desert riparian areas.	BLM sensitive species
Columbia spotted frog	Marshes, springs, creeks, small lakes, and meadows	BLM sensitive species
Great basin spadefoot toad	Arid or semiarid regions usually with open habitats such as desert brush and grasslands.	BLM sensitive species
Northern leopard frog	Permanent ponds, swamps, marshes, and slow-moving streams throughout forest, open, and urban areas. Waterbodies with abundant aquatic vegetation.	BLM sensitive species

Sage-grouse Core

The greater sage-grouse is a candidate species for listing under provisions of the ESA (USFWS 2010). Greater sage-grouse are distributed in sagebrush habitat throughout the Bighorn Basin, where habitat fragmentation and degradation has not reduced habitat to unsuitable. Greater sage-grouse leks are generally at mid elevations within sagebrush habitat. Nesting and brood-rearing habitat is sometimes associated with the lek and sometimes found at a distance from the lek in sagebrush habitat. The WGFD has identified core areas, which represent these relatively productive areas, and has suggested special management for these areas (Wyoming Office of the Governor 2008).

There are five nongame special status raptor species in the WRBB district − bald eagle, burrowing owl, ferruginous hawk, northern goshawk, and peregrine falcon − all BLM sensitive species.

There are ten BLM sensitive neotropical migrants in the district − Baird's sparrow, Brewer's sparrow, loggerhead shrike, long-billed curlew, yellow-billed cuckoo, sage sparrow, sage thrasher, trumpeter swan, white-faced ibis, and mountain plover; the mountain plover is also a proposed threatened species under the ESA. These species occur throughout a variety of habitats in the district.

3.3.9 Soils

Soils in the areas proposed for leasing are diverse and highly variable. Soil characteristics can differ over relatively short distances, reflecting differences in parent material, position on the landscape, elevation, aspect, and climatic variables such as precipitation and temperature. The plant communities supported by such a wide diversity of soils are equally diverse, ranging from sparsely vegetated desert saltbush and sagebrush-bunchgrass communities to conifer woodlands. Low annual precipitation, salinity, alkalinity, and shallow depths have the greatest effect on soil productivity and reclamation potential.

Soils commonly found in the lease area include those with moderately fine to fine textures (clay loam, sandy clay loam, silty clay loam, sandy clay, silty clay, clay) that formed over shale or were influenced by shale parent material. The soils that formed over sandstone or were influenced by sandstone parent material generally have medium to moderately coarse textures (sandy loam, fine sandy loam, very fine sandy loam, loam). Coarse-textured soils (loamy sand, sand) where present in the lease area are generally associated with windblown soils derived from sandstone parent material. Those soils formed over limestone or derived from limestone parent materials are high in carbonates and have medium to moderately coarse textures. The soils characterized by reddish hues often are referred to as red bed soils. The formation of these highly productive soils was strongly influenced from the red sandstone common to the Chugwater formation. These soils have high gypsum content and generally have medium textures (very fine sandy loam, loam fine sandy loam). As a result, they are highly susceptible to erosion following surface disturbance or vegetation reduction.

Biological soil crusts, often referred to as cryptobiotic, cryptogamic, and microbial soil crusts, are found on all soil types throughout the lease area. Biological soil crusts are an intimate association between soil particles and cyanobacteria, mosses, lichens, microfungi, and algae (Rosentreter et al. 2007).

There are area in the lease area where the native plant communities have retained a healthy stand of perennial grasses and shrubs, the soils are relatively intact and stable and not prone to excessive runoff or accelerated erosion. In these plant communities erosion indicators are (e.g., water flow patterns pedestals/terracettes, bare ground, and gullies) are not strongly expressed and water is being captured and safely released. Other plant communities in the planning area have been impacted by past land uses. In these communities the ecological sites have shifted to a less desirable community state where the erosion indicators are a common feature on the landscape.

Past land uses in have resulted in a network of incised gullies extending into the uplands, often replacing what are thought to have been broad grass-covered swales. This gully network is not restricted to any particular ecological site or plant community and is present throughout the

uplands in the 5- to 9-inch precipitation zone and 10- to 14-inch precipitation zone. As a result, peak runoff discharges are of greater intensity and shorter duration, and water is not being retained on the watersheds as it appears to have been in the past. Based on qualitative rangeland health assessments, most gullies are in the process of healing and stabilizing. However, a few gullies still continue to creep farther into the uplands.

Soil susceptibility to damage and reclamation potential is a combination of soils physical and chemical properties and annual precipitation. Soil physical properties include depth, texture, water holding capacity, slope, and aspect. The most important chemical properties are soil reaction (pH) and salinity.

3.3.10 Water Resources

Surface Water Hydrology:

The available lease parcels have been subdivided for the district to a HUC 8 and a HUC 10 level as shown in Table 3-2 below. All of the lease parcels in the Worland and Cody Field Office areas are found in the Bighorn River (10080007), Nowood River (10080008), Greybull River (10080009), Big Horn Lake (10080010), Shoshone River (10080014), Dry Creek (10080011), South Fork Powder River (10090203) or Clarksfork of Yellowstone River watersheds (10070006).

Within the Lander field office area are the Wind River and other tributaries (10080002), Continental Divide Closed Basin (14040200) and Sweetwater (10180006), Muskrat (10080004), Badwater (10080006), Upper Wind River (10080001), Lower Wind River (10080005) watersheds and their associated sub-watersheds.

The Wind River and Big Horn Basins are part of the Upper Yellowstone River Basin. The Clarksfork of Yellowstone is in the northwest corner of the Cody Field office area and drains directly into the Yellowstone River in Montana. The Sweetwater River flows from west to east into Alcova reservoir in the southern portions of the Lander field office area. The Continental Divide Closed Basin is in the center of the state with no major outlets from the watershed.

The affected watersheds vary greatly depending on watershed size, topography, climate, soils, flow patterns, and existing land uses. The precipitation amounts vary, with the majority of the parcels occurring within 5-9 inches of precipitation per year annually. Other parcels are within 10-14 inches or 15-19 inches per year along higher elevations.

The Watershed Table 3-1 identifies the amount of lease acres in each HUC 8 watershed, the total number or acres for the HUC 8 watershed, and each lease parcel within the potentially affected HUC 8 watershed if leasing of the parcels occurs. Other factors such as existing development, historic impacts, and other uses within the watershed contribute to the health of the surface water hydrology of the watershed.

Table 3-1 – Watersheds

HUC 8	HU 8 Name	2013 Lease Parcel Acres (US)	Total Watershed Acres (US)	Percent of watershed of leased parcels
WORLAND				
10080007	Upper Bighorn	311947	2222390	14.0%
10080008	Nowood	136333	1288268	10.6%
CODY				
10080010	Big Horn Lake	2581	1153111	0.2%
10080011	Dry Creek	23	278932	0.0%
10080014	Shoshone River	18190	950137	1.9%
10070006	Clarks Fork Yellowstone	11266	1787197	0.6%
10080009	Greybull River	4087	735702	0.6%
LANDER				
10080001	Popo Agie	26576	514105	5.2%
10080002	Little Wind	64200	713780	9.0%
10180006	Sweetwater	25000	1800050	1.4%
10080004	Muskrat	79976	470653	17.0%
10080001	Upper Wind River	14500	1631388	0.9%
10080006	Badwater	3632	547943	0.7%
10080005	Lower Wind River	64200	1094688	5.9%
10090203	South Fork Powder River	6810	785200	0.9%

Groundwater:

The groundwater resources in the lease area are dependent upon the geologic outcrops that are present in each watershed. The groundwater resources and their protection are administered by the Wyoming Department of Environmental Quality under authority from the US Environmental Protection Agency. In addition to other agencies requirements, ground water protection restrictions would be applied according to the most recent applicable BLM Resource Management Plan for each field office. Common aquifers encountered in the district include shallow unconfined surficial aquifers, which are those regionally that are the most susceptible to surface contamination. These aquifers are generally located within alluvial deposits along the major tributaries and rivers in each watershed. Other confined aquifers that are encountered are from various sandstone and limestone formations of the Tertiary, Cretaceous, and Paleozoic periods. All fresh water zones that are encountered during drilling are isolated for protection and reported to the BLM.

Riparian/Floodplains: (WFO)

There are 65 lease parcels within the Worland Field Office that contain or are within a 1000 foot buffer from riparian areas on public lands (Table 3-2). These parcels would be subject to

conditions of approval that would be applied at the APD stage. The following table is a list of the segments and their current condition using the BLM Technical Reference Manual 1737-17 for the Assessment of Proper Functioning Condition for Lotic Riparian Areas. Increased development surrounding these parcels would have the potential to impact the functionality of these riparian areas. These riparian areas consist of sedges, rushes, with cottonwood canopy with occasional Tamarisk and Russian Olives in various segments. The flow regimes are intermittent and perennial lotic systems.

Table 3-2- Worland Field Office lease parcels that contain riparian habitat and vegetation

PARCEL#	Riparian area	Riparian area	Hydrolgic Unit	HUC#8	function	Stream (mi of habitat)
101	BROKENBACK CK	BROKENBACK CK	Nowood River	10080008	PFC	4.27
101	BROKENBACK CK TR	BROKENBACK CK TR	Nowood River	10080008	PFC	0.69
101	SALT TROUGH CK	SALT TROUGH CK	Nowood River	10080008	PFC	2.46
102	BROKENBACK CK	BROKENBACK CK	Nowood River	10080008	PFC	4.27
102	S FK BROKENBACK CK	S FK BROKENBACK CK	Nowood River	10080008	PFC	3.89
102	S FK BROKENBACK CK TR	S FK BROKENBACK CK TR	Nowood River	10080008	FAR	0.12
102	SALT TROUGH CK	SALT TROUGH CK	Nowood River	10080008	PFC	1.26
103	S FK BROKENBACK CK	S FK BROKENBACK CK	Nowood River	10080008	PFC	2.72
105	LUMAN CK	LUMAN CK	Nowood River	10080008	PFC	1.46
106	LADDIE CK	LADDIE CK	Nowood River	10080008	FAR	0.24
106	LUMAN CK TR	LUMAN CK TR	Nowood River	10080008	PFC	0.67
116	E FK BUFFALO CK	E FK BUFFALO CK	Nowood River	10080008	PFC	0.48
116	W FK BUFFALO CK	W FK BUFFALO CK	Nowood River	10080008	PFC	0.6
117	BUFFALO CK (nr BigTrails)	BUFFALO CK (nr BigTrails)	Nowood River	10080008	FAR	0.1
118	BUFFALO SPRINGS CK	BUFFALO SPRINGS CK	Nowood River	10080008	FAR	0.41
119	BLUE BANK DRAW	BLUE BANK DRAW	Nowood River	10080008	FAR	0.85
120	BUFFALO CK (nr BigTrails)	BUFFALO CK (nr BigTrails)	Nowood River	10080008	PFC	1.4
121	BUFFALO CK (nr BigTrails)	BUFFALO CK (nr BigTrails)	Nowood River	10080008	PFC	1.39
122	BLUE BANK DRAW	BLUE BANK DRAW	Nowood River	10080008	FAR	0.85
154	BUFFALO CK (nr Ten Sleep)	BUFFALO CK (nr Ten Sleep)	Nowood River	10080008	PFC	0.8
156	DRY MEDICINE LODGE CK	DRY MEDICINE LODGE CK	Nowood River	10080008	PFC	1.5
158	PAINT ROCK	PAINT ROCK	Nowood	10080008	PFC	0.84

PARCEL#	Riparian area	Riparian area	Hydrolgic Unit	HUC#8	function	Stream (mi of habitat)
	CK	CK	River			
168	MUD CK	MUD CK	Bighorn River	10080007	FAR	1.05
174	BLUE BANK DRAW	BLUE BANK DRAW	Nowood River	10080008	FAR	0.85
175	NOWATER CK	NOWATER CK	Bighorn River	10080007	FAR	0.85
180	NOWATER CK	NOWATER CK	Bighorn River	10080007	FAR	0.22
181	NOWATER CK	NOWATER CK	Bighorn River	10080007	FAR	0.22
201	NOWOOD R	NOWOOD R	Nowood River	10080008	PFC	0.36
205	ALKALI CK (of Paint Rock)	ALKALI CK (of Paint Rock)	Nowood River	10080008	PFC	1.18
226	MUD CK TR	MUD CK TR	Bighorn River	10080007	FAR	0.33
230	NOWATER CK	NOWATER CK	Bighorn River	10080007	FAR	1.73
241	NOWOOD R TR	NOWOOD R TR	Nowood River	10080008	PFC	1.32
262	MAJOR BASIN DRAW TR	MAJOR BASIN DRAW TR	Bighorn River	10080007	PFC	0.42
282	Hazen Draw	Hazen Draw	Bighorn River	10080007	FAR	0.56
284	Hazen Draw	Hazen Draw	Bighorn River	10080007	FAR	0.56
285	ROCK SPRINGS DRAW	ROCK SPRINGS DRAW	Bighorn River	10080007	FAR	0.35
287	ROCK SPRINGS DRAW	ROCK SPRINGS DRAW	Bighorn River	10080007	FAR	0.49
288	BLUE SPRINGS DRAW	BLUE SPRINGS DRAW	Bighorn River	10080007	PFC	0.74
311	BIGHORN R	BIGHORN R	Bighorn River	10080007	FAR	0.17
315	FIFTEENMILE CK	FIFTEENMILE CK	Bighorn River	10080007	NF	1.44
341	COTTONWOOD CK	COTTONWOOD CK	Bighorn River	10080007	FAR	0.81
342	COTTONWOOD CK	COTTONWOOD CK	Bighorn River	10080007	NF	0.98
343	COTTONWOOD CK	COTTONWOOD CK	Bighorn River	10080007	NF	1.25
345	COTTONWOOD CK	COTTONWOOD CK	Bighorn River	10080007	FAR	1.57
347	LITTLE SAND DRAW	LITTLE SAND DRAW	Bighorn River	10080007	FAR	4.52
348	SAND DRAW (nr Kirby)	SAND DRAW (nr Kirby)	Bighorn River	10080007	FAR	3.27
365	LITTLE SAND DRAW	LITTLE SAND DRAW	Bighorn River	10080007	FAR	0.09
365	LOWER SAND DRAW	LOWER SAND DRAW	Bighorn River	10080007	PFC	1.34
366	LOWER SAND DRAW	LOWER SAND DRAW	Bighorn River	10080007	PFC	3.2
368	S FK COAL DRAW	S FK COAL DRAW	Bighorn River	10080007	U	0.4
372	GRASS CK	GRASS CK	Bighorn River	10080007	PFC	0.21

PARCEL#	Riparian area	Riparian area	Hydrolgic Unit	HUC#8	function	Stream (mi of habitat)
372	GRASS CK	GRASS CK	Bighorn River	10080007	PFC	0.05
372	GRASS CK	GRASS CK	Bighorn River	10080007	PFC	0.08
373	COTTONWOOD CK	COTTONWOOD CK	Bighorn River	10080007	FAR	1
374	COTTONWOOD CK	COTTONWOOD CK	Bighorn River	10080007	FAR	0.3
374	SAND DRAW (nr Kirby)	SAND DRAW (nr Kirby)	Bighorn River	10080007	FAR	2.17
375	COTTONWOOD CK	COTTONWOOD CK	Bighorn River	10080007	PFC	0.64
376	LITTLE SAND DRAW	LITTLE SAND DRAW	Bighorn River	10080007	FAR	1.5
376	SAND DRAW (nr Kirby)	SAND DRAW (nr Kirby)	Bighorn River	10080007	FAR	2.9
384	FIFTEENMILE CK	FIFTEENMILE CK	Bighorn River	10080007	FAR	2.1
384	ROCK WATERHOLE CK	ROCK WATERHOLE CK	Bighorn River	10080007	FAR	1.47
415	COTTONWOOD CK TR	COTTONWOOD CK TR	Bighorn River	10080007	E	0.32
416	OWL CK TR	OWL CK TR	Bighorn River	10080007	E	0.22
419	PROSPECT CK	PROSPECT CK	Bighorn River	10080007	FAR	1.56
420	COTTONWOOD CK	COTTONWOOD CK	Bighorn River	10080007	FAR	0.95
420	WAGONHOUND CK	WAGONHOUND CK	Bighorn River	10080007	PFC	1.32
426	GRASS CK	GRASS CK	Bighorn River	10080007	PFC	0.11
426	GRASS CK	GRASS CK	Bighorn River	10080007	PFC	0.12
429	GOOSEBERRY CK	GOOSEBERRY CK	Bighorn River	10080007	PFC	1.29
448	PROSPECT CK	PROSPECT CK	Bighorn River	10080007	PFC	3.5
450	KESTER COULEE	KESTER COULEE	Bighorn River	10080007	PFC	0.11
450	PROSPECT CK	PROSPECT CK	Bighorn River	10080007	FAR	2.5
451	WAGONHOUND CK TR	WAGONHOUND CK TR	Bighorn River	10080007	FAR	0.65
471	WAGONHOUND CK	WAGONHOUND CK	Bighorn River	10080007	NF	1.16
472	WAGONHOUND CK TR	WAGONHOUND CK TR	Bighorn River	10080007	NF	0.74
473	LEFT HAND CK	LEFT HAND CK	Bighorn River	10080007	PFC	0.17
474	ENOS CK	ENOS CK	Bighorn River	10080007	PFC	0.07
475	COAL MINE DRAW	COAL MINE DRAW	Bighorn River	10080007	FAR	0.3
478	BUFFALO CK (nr Hillberry Rim	BUFFALO CK (nr Hillberry Rim	Bighorn River	10080007	PFC	0.56
480	BUFFALO CK (nr Hillberry Rim	BUFFALO CK (nr Hillberry Rim	Bighorn River	10080007	PFC	0.38

PARCEL#	Riparian area	Riparian area	Hydrolgic Unit	HUC#8	function	Stream (mi of habitat)
481	BUFFALO CK (nr Hillberry Rim	BUFFALO CK (nr Hillberry Rim	Bighorn River	10080007	PFC	3.28
483	GOOSEBERRY CK	GOOSEBERRY CK	Bighorn River	10080007	PFC	0.13
483	LEFT HAND CK	LEFT HAND CK	Bighorn River	10080007	PFC	0.08
490	LEFT HAND CK	LEFT HAND CK	Bighorn River	10080007	FAR	0.88
491	IRON CK	IRON CK	Greybull River	10080009	PFC	2.21
PFC= Proper Functioning Condition FAR= Functioning at Risk NF= Non Functioning- Per BLM Manual 1737-16						

4 Environmental Impacts

4.1 Introduction

This chapter describes the environmental effects (direct, indirect and cumulative) that would result from the alternatives. This analysis is tiered to the environmental impact statements for the Cody RMP, the Washakie RMP, Grass Creek RMP and Lander RMP. The analysis contained within those environmental impact statements remains adequate, except for those issues disclosed in the following analysis. These RMPs determine which areas are available for oil and gas leasing and under what conditions those leases are to be offered and sold.

It is important to remember that the deferral or partial deferral of some parcels in this document is due to ongoing Land Use Planning efforts in the Lander Field Office and the combined Cody and Worland Field Offices. Deferral or partial deferral of parcels is not considered a mitigation measure but a delay in the issuance of parcels until such time the Bureau of Land Management issues a record of decision for the Lander Draft RMP EIS and the Bighorn Basin Draft RMP EIS. The result is identifying nominated parcels in this document and recommending the action be deferred. By deferring actions during Land Use Planning inititives, the agency avoids approving actions which would limit the choice of reasonable alternatives in the Draft RMP EIS's.

4.2 General Analysis Assumptions and Data Limitations

4.2.1 Assumptions

Direct effects of leasing are the creation of a valid existing right and those related to the revenue generated by the lease sale receipts. All other effects would only occur if and when the leases were developed. Such development requires additional analysis and decision making. For purposes of impact analysis, BLM assumes each parcel would be sold and development of the lease would occur.

4.2.2 Data Limitations

The level of development that might occur is unknown. Knowing the level of development that would occur would enable more precise description of environmental effects. However, any estimation of development is determined by BLM to be too speculative for this environmental assessment. Such information would likely not change BLM's decision as adequate information is available to make a reasoned choice between the alternatives.

Existing data is used to determine resource presence on each parcel. Resource presence may change after this analysis and prior to development. Such information would likely not change BLM's decision as site specific surveys and data gathering would occur prior to development and conditions of approval are added as necessary to protect resources.

4.3 Direct and Indirect Impacts

Direct effects are caused by the action and occur at the same time and place.

Indirect effects are caused by the action and occur later in time or farther removed in distance.

Cumulative effects are those which result from incremental impact of the of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions.

4.4 Alternative 1 - No Action Alternative

4.4.1 Common to all Resources

Due to demand for oil and gas, it is expected that these parcels may be re-nominated in the future consistent with appropriate land use planning decisions and may be offered for sale with additional stipulations. There is no way to accurately predict what level of restrictions future leasing may require, but it can be assumed that a substantial portion of the development that would occur under Alternative 1 would still be permitted under future leases. Future nominations for lease would be screened for consistency with the land use plan in effect at the time, and the appropriate environmental review would be conducted to determine associated impacts. Effects from leases issued from any future sales would be analyzed in the appropriate environmental documents for those sales.

4.4.2 Air Quality and Climate Change

Development of oil and gas resources cannot occur without a lease. Under this alternative a lease would not be offered for sale, so no development would occur on the nominated parcels. No impacts to air quality or climate change would result from this alternative.

4.4.3 Socioeconomics

Under this alternative, no leases would be issued and no development under those leases would occur. As primarily rural communities that rely heavily on energy development revenue and agricultural uses, the communities in the leasing areas are likely to be negatively impacted by loss of potential revenue from subsequent development of these parcels. It is an assumption that the No Action Alternative (no lease option) may result in a slight reduction in domestic production of oil and gas. This would likely result in reduced Federal and State royalty income, and the potential for Federal land to be drained by wells on adjacent private or state land.

4.4.4 Cultural Resources

Under the No Action Alternative, the Proposed Action would not occur. No resulting effects on cultural resources would be expected to occur beyond the current situation.

4.4.5 Livestock Grazing Management

Under the No Action Alternative, the Proposed Action would not occur. No impact to livestock grazing management under this alternative is expected.

4.4.6 Vegetation

No change from current existing probability for new invasive/noxious weed infestations to occur, or for increase of existing populations. No resulting effects on vegetation would be expected to occur beyond the current situation.

4.4.7 Paleontology and Geology

Under the No Action Alternative, the Proposed Action would not occur. No resulting effects on paleontolical and geological resources would be expected to occur beyond the current situation.

4.4.8 Recreation, Visual Resources and Special Designations

Under this alternative, an expression of interest to lease (parcel nomination) would be denied or rejected, and a lease would not be offered for that parcel. No resulting effects on recreation, visual resources, LWCs or special designations would be expected to occur beyond the current situation.

4.4.9 Wildlife and Fish

Under this alternative, these parcels would not be leased. There would be no resulting surface disturbing or disruptive activities to the wildlife or their habitats. No resulting disturbing or disruptive activities to fish or their habitat.

4.4.10 Soils

No parcels would be leased under this alternative. There would be no impacts to the soil beyond the current situation.

4.4.11 Water Resources

No parcels would be leased under this alternative. There would be no impacts to the water resources beyond the current situation.

4.5 Alternative 2 - Proposed Action

4.5.8 Common to all Resources

This EA tiers to and incorporates by reference the information and analysis contained in the Grass Creek Resource Management Plan (RMP) 1998 (BLM 1998a); Washakie RMP 1988 (BLM 1988b); Cody RMP 1990 (BLM 1990); Lander RMP 1987 (BLM 1987) and Final Environmental Impact Statement and Record of Decision for each RMP. As appropriate, the parcels nominated for the lease sale have been identified as available for leasing in each RMP. Application of stipulations to nominated parcels is directed by these RMPs. Any additional

information identified through site visits or through consulation is added as a stipulation to the parcel as directed by the above mentioned RMPs.

4.5.9 Air Quality and Climate Change

Air Quality
Issuing leases for the subject tracts would have no direct impacts to air quality. Any potential effects to air quality would occur if and when the leases were developed. Potential impacts of development could include increased air borne soil particles associated with the construction of new well pads, pipelines, or roads, exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as potential releases of GHG and volatile organic compounds during drilling or production activities. The amount of increased emissions cannot be quantified at this time since it is unknown how many wells might be drilled, the types of equipment needed if a well were to be completed successfully (e.g. compressor, separator, dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of impact will also vary according to the characteristics of the geologic formations from which production occurs. Emissions of all regulated pollutants (including GHGs) and their impacts will be quantified and evaluated at the time that a specific development project is proposed.

For impact analysis, acreage is used as the impact indicator. Alternative 2 proposes the most amount of land available for leasing and subsequent exploration and development and would therefore have the greatest impact to air resources among the three alternatives.

Climate Change
Subsequent development of any leases issued, would contribute a small incremental increase in overall hydrocarbon emissions, including GHGs. When compared to total national or global emissions, the amount released as a result of potential production from the proposed lease tracts would not have a measurable effect.

Previous environmental analysis (BLM 2011) estimated each well that may be drilled on these parcels, if issued, could emit approximately 0.00059 mt of CO_2. It is unknown what the drilling density may be for these parcels, if they were developed; therefore, it is not possible to predict at this stage what level of emissions would occur.

4.5.10 Socioeconomics

Under this alternative all parcels would be offered for lease. This would allow the most revenue for the Federal and State government. In addition, subsequent development and production is anticipated to be highest under this alternative. This would result in the greatest amount of royalties among the three alternatives.

4.5.11 Cultural Resources

Cultural resource sites are known to occur within the parcels. Sale of the lease will have no effect on known or unknown cultural properties. However, construction as a result of the lease sale could damage or destroy surface and buried cultural sites. A Class III cultural resource inventory

would be completed prior to surface disturbance at the APD or right-of-way application stage. Avoidance/mitigation measures would be developed once the site-specific inventory is completed.

Trails are managed under the current Land Use Plans for protection of National Histroric Trails and regionally significant trails. A review of the parcels in accordance with current Land Use Plans has been conducted and applicable stipulations added to the appropriate parcel. Refer to Appendix A for applicable stipulations attached to individual parcels that would mitigate impacts to the affected resource in accordance with current Land Use Plans.

4.5.12 Livestock Grazing Management

At the leasing stage there are no identified impacts to livestock grazing. Indirect impacts to grazing would occur through development-related vegetative disturbance with construction of access roads, well sites or pipelines. However, should development occur, impacts associated with surface disturbance would be monitored and adjustments to allotment management would be considered on a case-by-case basis.

4.5.13 Vegetation

Native Vegetation – There are no direct impacts from leasing parcels. Indirect impacts would be associated with any future development occurring should the proposed leases be issued. Leasing Terms and Conditions; in addition to laws, regulations, and policy, require that reclamation be completed in a timely manner that best represents pre-disturbance conditions. Best Management Practices would be implemented upon site-specific development to ensure proper reclamation is occurring that supports land management goals and objectives.

Invasive Species – Any surface disturbance can increase the probability of establishment of new populations of invasive non-native species, or increase of an existing weed population. At the APD stage, BLM requirements for use of weed control strategies would minimize the potential for spread of these species.

Threatened, Endangered, and BLM Sensitive Species – There are no direct impacts from leasing parcels. Indirect impacts would be associated with any future development occurring should the proposed leases be issued.

Stipulations and site-specific COAs requiring avoidance would minimize any impacts to those habitats. A review of the parcels in accordance with current Land Use Plans has been conducted and applicable stipulations added to the appropriate parcel. Refer to Appendix A for applicable stipulations attached to individual parcels that would mitigate impacts to the affected resource in accordance with current Land Use Plans.

4.5.14 Paleontology and Geology

Sale of the parcels under review in this document will have no direct effect on paleontological or geological resources. However, construction as a result of the lease sale could damage or

destroy surface and buried paleontological resources. Effects on paleontological and geological resources would be minimal to moderate, as this alternative would lead to leasing of the parcels, with potential for future surface disturbance if an APD was submitted for development of the parcel. Potential effects are reduced through BLM's requirement for additional analysis, which may include prework paleontological resource surveys prior to approval of surface disturbing activities and/or paleontological monitoring during construction of roads, well pads, and other proposed activities.

A review of the parcels in accordance with current Land Use Plans has been conducted and applicable stipulations added to the appropriate parcel. Refer to Appendix A for applicable stipulations attached to individual parcels that would mitigate impacts to the affected resource in accordance with current Land Use Plans.

4.5.15 Recreation, Visual Resource, Lands with Wilderness Characteristic, and Special Designations

Leasing the Federal minerals will not directly impact recreation/VRM/special designations, but the subsequent development of the leases may generate impacts to resource conditions. Alternative 2 will have more potential to impact the resources if the lease is developed. Mitigation measures may reduce impacts on a project by project basis.

A review of the parcels in accordance with current Land Use Plans has been conducted and applicable stipulations added to the appropriate parcel. Refer to Appendix A for applicable stipulations attached to individual parcels that would mitigate impacts to the affected resource in accordance with current Land Use Plans.

4.5.16 Wildlife and Fish

Wildlife would generally be negatively affected by oil and gas development resulting from these lease sales and subsequent development through habitat fragmentation, degradation, and reduction. Sources of mortality would be developed from operational activity and infrastructure like power lines, settling ponds, and roads etc. As more areas are leased and developed, Sensitive Species populations are likely to decline further. There would be no effect on species listed under the Endagered Species Act.

Stipulations attached to the leases would minimize impacts to wintering big game, raptor nesting, and give the BLM flexibility to apply stipulations as necessary for any species which are covered under the ESA through consultation with USFWS and through environmental analyses at the APD stage.

These stipulations would reduce most direct short-term impacts on the resource and may minimize long-term impacts depending on the environmental analysis at the APD stage.

A migratory bird stipulation would be applied to leases identified to contain potential habitat, therefore there would be no take on migratory birds and this stipulation would result in mitigation during the APD stage resulting from these leases being sold.

Indirect impacts to fish and fish habitat resulting from surface disturbance from well pads, roads, and other facilities could result in stream sedimentation. Sediment adversely affects many species of fish including trout by silting in spawning gravel, smothering trout eggs and filling in spaces between gravel and cobble where young fish overwinter. Higher velocity and sediment loads could erode stream banks and reduce cover for fish.

Eagle nests would be buffered at the APD stage spatially and temporally to avoid long-term disturbance to the nest, which if unmitigated would cause "take" under the Bald and Golden Eagle Protection Act. One half or more miles are generally required at a minimum for a disturbance and disruption free zone mitigation. Power lines would be built to APLIC standards to not cause take from electrocution.

Parcels identified to support fish habitat would be subject to conditions of approval that would be applied at the APD stage. The direct impacts would be analyzed and mitigated at the APD level on a site specific basis. BLM specialists would verify the presence/absence of surface water and/or riparian habitat within 500 feet of any proposed oil or gas well location(s) and would determine the need for any location adjustments or additional stipulations/BMPs if and when APDs are submitted.

Current science indicates the restrictions under Alternative 2 do not provide the level of protection desired for Greater sage-grouse habitat within Greater Sage-grouse Core Habitat Areas (also known as BLM's Key Habitat Areas). The Lander and BB RMP and Draft EIS analyze the restrictions of current management. The Preferred Alternative in the Draft EIS incorporates restrictions that science indicates to be necessary (Management Action 4120). In the event these parcels are leased and APDs are pursued, Instruction Memorandum WY-2012-019, Greater Sage-Grouse Habitat Management Policy on Wyoming BLM Administered Public Lands Including the Federal Mineral Estate, or similar guidance updated and modified over time, would apply to reduce surface disturbing and disruptive APD activities.

Screening of parcels for Greater Sage-grouse Core Areas is contained in Appendix D.

A review of the parcels in accordance with current Land Use Plans has been conducted and applicable stipulations added to the appropriate parcel. Refer to Appendix A for applicable stipulations attached to individual parcels that would mitigate impacts to the affected resource in accordance with current Land Use Plans.

4.5.17 Soils

The act of leasing these parcels would have no impacts to the soil resource. Assuming exploration and development were to occur, surface disturbance would not be allowed on slopes greater than 25 percent without extensive mitigation requirements. Geophysical activities would be prohibited on wet soils or when watershed damage would be likely to occur. Surface disturbance such a road building and well pad construction would be prohibited on frozen soils, or when watershed damage would be likely to occur. Where development and production does occur, the on-site impacts to the soil resource cannot be predicted until the site-specific APD

development stage. Soils vary in their suitability for cross country travel associated with geophysical activities, for well pad and road development, and following disturbance, in their reclamation potential. Subsequent development of the lease would physically disturb the soil. The direct impact from the construction of well pads, access roads, reserve pits, and dry cutting pits includes the removal of vegetation, exposing the soil to the erosive forces of rain drop impact and overland flow, mixing of horizons, compaction, loss of topsoil productivity, destruction of soil structure and increased susceptibility to runoff and erosion. Indirect impacts could include off-site sedimentation and blowing sands or dust. Contamination of the soil from drilling and production chemicals, wastes or petroleum products, either spilled or mixed into the soil, could cause short-term or long-term reduction in site productivity. Some impacts can be avoided or reduced through proper design, construction techniques, maintenance, and implementation of Best Management Practices (BMPs), or required site specific Conditions of Approval (COAs). Upon abandonment of well pads or when access roads are no longer in service, the Authorized Officer would issue instructions for the surface reclamation and restoration of the disturbed areas as described in the COA.

A review of the parcels in accordance with current Land Use Plans has been conducted. Applicable Notice 1 is attached to each parcel. Refer to Appendix A for applicable Notice or stipulation attached to individual parcels that would mitigate impacts to the affected resource in accordance with current Land Use Plans.

4.5.18 Water Resources

Hydrology

While the act of leasing a parcel would produce no impacts, subsequent development of the lease would result in long term and short term changes to the hydrologic regime. Because of reduced water infiltration rates on well pads and roads, surface flows would move more quickly to stream channels, causing peak flow to occur earlier and to be higher than normal. Such an increase in runoff volumes and magnitude of the peak flow has the potential cause bank erosion, channel widening, downward incision, and disconnection from the floodplain. These potential effects would be dependent on the density of pad and road development within a watershed. Low density development may only affect the smaller tributary streams but not the larger ones, whereas more concentrated development within a watershed or catchment would tend to create potential effects further downstream to larger channels. Increased runoff volumes of water to streams and washes may actually increase groundwater recharge volumes. Long-term direct and indirect impacts to the watershed and hydrology would continue for the life of wells and would decrease once all well pads and road surfacing material has been removed and reclamation of well pads, access roads, pipelines, and power lines has taken place. Short-term direct and indirect impacts to the watershed and hydrology from access roads that are not surfaced with material would occur and would likely decrease in time due to reclamation efforts.

The direct impacts would be analyzed and mitigated at the APD level on a site specific basis. BLM specialists would verify the presence/absence of surface water and/or riparian habitat within 500 feet of any proposed oil or gas well location(s) and would determine the need for any location adjustments or additional stipulations/BMPs if and when APDs are submitted. The

presence of surface water and/or riparian habitat will be considered by the BLM when reviewing proposals for lease development.

The parcels may have existing ground water rights in the vicinity that are used for municipal purposes, including drinking water. Any development and subsequent operation of oil or gas wells within any of these parcels would be done in as responsible a manner as possible to minimize potential impacts to drinking water sources, surface and ground water resources, riparian-wetland habitat, and other associated resources.

Watershed

Site specific watershed analysis has not been analyzed at this stage however; the environmental effects to hydrology are from surface disturbance from well pads, constructed roads, placement of culverts, and produced discharge water from facilities. The amounts of bare ground are increased along with compaction and re-routing of storm water around facilities. Effects generally include changes to runoff timing and increased peak runoff following storm events.

Increased sedimentation likely occurs from disturbed areas. Higher velocity and sediment loads from developed areas likely will occur.

The general impacts to hydrology are from surface disturbance from well pads, constructed roads, placement of culverts, and produced discharge water from facilities. The amounts of bare ground are increased along with compaction and re-routing of storm water around facilities.

Water Quality

In the WRBBD, there is commonly produced water in association with oil and gas development. All produced water from federal leases must be disposed of in accordance with Onshore Oil and Gas Order Number 7 utilizing injection into the subsurface, into pits, or other acceptable methods approved by the authorized officer, including surface discharge under Natural Pollutant Discharge Elimination System (NPDES) permit. Injection is generally the preferred method of disposal. No surface water or ground water problems have been identified on the proposed parcels.

While the act of leasing the parcels would produce no impacts, subsequent development of the lease could lead to surface disturbance from the construction of well pads, access roads, pipelines, and power lines and could result in degradation of surface water quality and groundwater quality from non-point source pollution, especially from potentially increased soil erosion and sedimentation. Potential direct impacts could be brought about by soil disturbance due to construction of well pads, access roads, pipelines, and power lines, and may include increased surface water runoff, erosion, and off-site sedimentation and dissolved constituents (salt loading) to downstream waters. Such hydrologic effects may cause changes in downstream channel morphology such as bed and bank erosion or accretion. The magnitude of these potential impacts to water resources would depend on the proximity of the disturbance to the drainage channel, slope aspect and gradient, degree and area of soil disturbance, soil character, duration and time within which construction activity would occur, and the timely implementation and success or failure of mitigation measures. Direct impacts would likely be greatest shortly after the start of construction activities and would decrease in time due to proper implementation

of Best Management Practices (BMP's) that would include proper design of facilities along with effective temporary stabilization measures that would promote permanent natural vegetative stabilization and reclamation of disturbed areas. Construction activities would occur over a relatively short period, and therefore the majority of the disturbance would be evident but short lived. Impacts to surface water quality could be managed (minimized) through the implementation, monitoring, and necessary adjustment of BMP's prescribed. However, short-term and minor impacts may occur during storm flow events. Petroleum products and other chemicals, accidentally spilled, could result in surface and groundwater contamination. Similarly, possible leaks from reserve and evaporation pits could degrade surface and ground water quality. Authorization of development projects would require compliance with BLM directives and stipulations that relate to surface and groundwater protection.

Groundwater

Any development and subsequent operation of oil or gas wells within any of these parcels would be done in as responsible a manner as possible to minimize potential impacts to drinking water sources, surface and ground water resources, riparian-wetland habitat, and other associated resources. No beneficial use impairment or other water quality degradation of ground water resources would be permitted under all alternatives. Other groundwater and aquifer protection measures would be implemented following Wyoming Oil and Gas Commission, WYDEQ and EPA requirements as applicable.

Riparian/Floodplains

The direct impacts would be analyzed and mitigated at the APD level on a site specific basis. BLM specialists would verify the presence/absence of surface water and/or riparian habitat within 500 feet of any proposed oil or gas well location(s) and would determine the need for any location adjustments or additional stipulations/BMPs if and when APDs are submitted. Construction or development within a designated 100 year floodplain area will also be analyzed and mitigated appropriately. The presence of surface water and/or riparian habitat will be considered by the BLM when reviewing proposals for lease development.

4.6 Alternative 3- Modified and Deferred

4.6.1 Common to all Resources

Rationale for deferral includes management actions from the Bighorn Basin Resource Management Plan (BB RMP) Draft Environmental Impact Statement (EIS) (BLM 2011b) and the Lander Field Office Resource Management Plan (LFO RMP) Draft Environmental Impact Statement (EIS). Areas deferred may be offered for lease in the future. Should they be offered and sold, a lease would be issued. This would have the effect of creating smaller leases, which may increase the level of surface disturbance.

4.6.2 Air Quality and Climate Change

Air Quality

Under this alternative, fewer acres would be offered for lease and thereby few acres available for oil and gas development, than Alternative 2. Therefore, fewer impacts to air quality would result. However, since the level of development is unknown, the reduction in effects be quantified.

Climate Change
As fewer acreage is available for oil and gas development, fewer wells are anticipated, therefore, less greenhouse gas emissions are expected than under Alternative 2. However, since the level of development is unknown, the reduction in greenhouse gas emissions cannot be quantified.

4.6.3 Socioeconomics

Under this alternative, not all parcels would be offered for lease. This would result in a reduction in revenue compared to Alternative 2 for the Federal and State government. The actual amount of the reduction is not known. Development and production fewer parcels recommended for sale would result in less royalties income than Alternative 2.

4.6.4 Cultural Resources

Cultural resource sites are known to occur within the parcels. Sale of the parcels would have no effect on known or unknown historic properties. However, construction as a result of the lease issuance could damage or destroy surface and buried cultural sites, as well as cause visual impacts to sites where setting is an important aspect of integrity. A Class III cultural resource inventory would be completed prior to surface disturbance at the APD or right-of-way application stage. Avoidance or mitigation measures would be developed once the site specific inventory is completed.

There are also potential conflicts with high tribal interest sites that may be determined to be sacred under Executive Order 13007. Tribal consultation for these sites will be accelerated to determine if additional protections are necessary to avoid adverse impacts to these sites. Due to these potential conflicts, the parcels will be deferred or partially deferred under Alternative 3. Therefore, impacts to cultural resources would be less than Alternative 2 but more than the no action alternative.

Cody/Worland
Due to potential conflicts with Alternative D of the Bighorn Basin RMP revision, the following parcels will be deferred or partially deferred under Alternative 3. Recent BLM analysis includes different constraints for protection of cultural resources. The following parcels would be deferred until these various protections can be analyzed. Therefore, impacts to cultural resources would be less than Alternative 2 but more than the no action alternative.

Parcel # 1302-	Defer/Partially Defer	Reason for Deferral
Cody FO		
432	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193

433	Partially Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
434	Partially Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision, BB RMP Record #7193
435	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
436	Partially Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
437	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
455	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
456	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
457	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
458	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
459	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
460	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
461	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
462	Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
463	Partially Defer	Regionally Important Historic Trail (Bridger) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
495	Partially Defer	Regionally Important Historic Trail (Fort Washakie to Meeteetse to Red Lodge) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
496	Partially Defer	Regionally Important Historic Trail (Fort Washakie to Meeteetse to Red Lodge) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
498	Partially Defer	Regionally Important Historic Trail (Fort Washakie to Meeteetse to Red Lodge) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193
499	Partially Defer	Regionally Important Historic Trail (Fort Washakie to Meeteetse

		to Red Lodge) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193 .
500	Partially Defer	Regionally Important Historic Trail (Fort Washakie to Meeteetse to Red Lodge) Due to potential conflict of more restrictive management in Alternative D of the Bighorn Basin RMP revision. BB RMP Record #7193

Parcel # 1302 -	Defer/Partially Defer	Reason for Deferral
Worland FO		
127, 128, 129, 130, 143, 197, 224, 226, 227, 262, 292, 293, 295, 308, 309, 311, 313, 329, 335, 336, 337, 344, 346, 362, 363, 416, 420, 445, 449, 451, 453, 466, 468, 473, 482	Partially Defer	Under Alternative D of BB RMP, Manage rock art, as well as other prehistoric and historic archeological sites and districts associated with specific time periods or cultures, for scientific, public, and socio-cultural use. Manage general areas for research, with emphasis on interpreting former ecosystems. Preserve specific sites or areas for future study and use. Avoid surface-disturbing activities and protect the foreground of important cultural sites (defined in Glossary) up to 3 miles where setting is an important aspect of the integrity for the site. Use BMPs to avoid or mitigate adverse effects. BB RMP Record #7189.
131, 141, 142, 268, 285, 290, 291, 310, 312, 314, 315, 330, 331, 332, 333, 334, 339, 340, 366, 367, 368, 369, 370, 415, 446, 474, 476, 483, 491, 492, 494	Defer All	Same Reason as state above.

Lander

Due to potential conflicts with Alternative D of the Lander RMP revision, the following parcels will be deferred or partially deferred under Alternative 3. Recent BLM analysis includes different constraints for protection of cultural resources. The following parcels would be deferred until these various protections can be analyzed. Therefore, impacts to cultural resources would be less than Alternative 2 but more than the no action alternative.

Parcel # 1302 -	Defer/Partially Defer	Reason for Deferral
Lander FO		
93	Partially Defer	Partially defer due to high tribal interest site 48NA1254; depending on results of Native American consultation, this site could be considered for NSO. LFO RMP Record #5019
160	Partially Defer	Partially defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
161	Partially Defer	Partially defer due to high tribal interest site 48FR5667; depending on results of Native American consultation, this site could be considered for NSO. LFO RMP Record #5019.
165	Defer	Defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137

Parcel # 1302 -	Defer/Partially Defer	Reason for Deferral
Lander FO		
210	Partially Defer	Partially defer due to high tribal interest site 48FR631; depending on results of Native American consultation, this site could be considered for NSO. LFO RMP Record #5019
211	Partially Defer	Partially defer due to high tribal interest site 48FR1742; depending on results of Native American consultation, this site could be considered for NSO. LFO RMP Record #5019
215	Defer	Defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
216	Defer	Defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
217	Defer	Defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
218	Partially Defer	Partially defer due to high tribal interest site 48FR1742; depending on results of Native American consultation, this site could be considered for NSO. LFO RMP Record #5019 Also, partially defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
220	Partially Defer	Partially defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
254	Defer	Defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
255	Defer	Defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
256	Defer	Defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
257	Partially Defer	Partially defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
258	Partially Defer	Partially defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP
279	Partially Defer	Partially defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
317	Partially Defer	Partially defer due to high tribal interest site FR531; depending on results of Native American consultation, this site could be considered for NSO. LFO RMP Record #5019
325	Partially Defer	Partially defer due to high tribal interest site FR528; depending on results of Native American consultation, this site could be considered for NSO. LFO RMP Record #5019
326	Partially Defer	Partially defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
327	Partially Defer	Partially defer due to historic Casper to Lander Road; would be

Parcel # 1302 -	Defer/Partially Defer	Reason for Deferral
Lander FO		
		considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
397	Partially Defer	Partially defer due to historic Rawlins-Fort Washakie Stage Trail; would be considered for NSO in Alt D of the new Lander RMP. LFO RMP Record #7137
400	Partially Defer	Partially defer due to historic Casper to Lander Road; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
438	Defer	Defer due to historic Rawlins-Fort Washakie Stage Trail; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
439	Partially Defer	Partially defer due to historic Rawlins-Fort Washakie Stage Trail; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
440	Defer	Defer due to historic Rawlins-Fort Washakie Stage Trail; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
441	Partially Defer	Partially defer due to historic Rawlins-Fort Washakie Stage Trail; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
442	Partially Defer	Partially defer due to high tribal interest site FR104; depending on results of Native American consultation, this site could be considered for NSO. LFO RMP Record #5019. Also, partially defer due to historic Rawlins-Fort Washakie Stage Trail; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
443	Defer	Defer due to high tribal interest site FR3901; depending on results of Native American consultation, this site could be considered for NSO. LFO RMP Record #5019. Also, defer due to historic Rawlins-Fort Washakie Stage Trail; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #7137
444	Partially Defer	Partially defer due to high tribal interest sites FR104, FR3901, FR3644, FR6837, FR2359, and FR2492; depending on results of Native American consultation, these sites could be considered for NSO. LFO RMP Record #5019.

4.6.5 Livestock Grazing Management

Under this alternative, fewer acres would be offered for lease and thereby fewer acres available for oil and gas development than Alternative 2. However, since the level of development is unknown, the reduction in effects cannot be quantified.

4.6.6 Vegetation

Native Vegetation and Invasive Species

For those areas offered for sale, there would be no additional effects beyond those discussed in Alternative 2. For those areas to be deferred there would be no change from current probability for new invasive/noxious weed infestations to occur or for existing populations to increase.

Threatened, Endangered, and BLM Sensitive Species
No effects beyond those identified in Alternative 2 would be associated with Threatened, Endangered, and BLM Sensitive Species. However, a CSU would be added to identify that the parcel may contain BLM sensitive species and special site specific mitigation may be required for future development.

4.6.7 Paleontology and Geology

Surface formations within the lease parcels in the WRBHBD have produced paleontological localities. Under this alternative, modification to the nominated lease parcels are recommended to include stipulations to address the protection of paleontological resources for parcels identified as having Class 4 and Class 5 PFYC rating. Although the amount and location of direct and indirect effects cannot be predicted until the site-specific APD stage of development, an inventory may be necessary prior to construction, and additional mitigation measures may be developed at the site specific APD or right-of-way application stage. The exposure of previously unknown paleontological finds of scientific significant could be a positive impact contributing to the knowledge base of the resources in the WRBHBD. The following parcels would be deferred until these various protections can be analyzed under the Draft RMP revisions.

Parcel # 1302 -	Defer/Partially Defer	Reason for Deferral
Cody FO		
498, 499	Partially Defer	Partially defer for being in direct conflict with portions of Preferred Alternative D in the Bighorn Basin RMP Draft EIS establishing the Paleocene-Eocene Thermal Maximum Area of Critical Environmental Concern (PETM ACEC). Alternative D applies a more restrictive NSO stipulation on the PETM ACEC itself. BB RMP Record #7154

Parcel # 1302 -	Defer/Partially Defer	Reason for Deferral
Lander FO		
161	Partially Defer	Partially defer due to highly significant paleontological locality in the Gas Hills area; would be considered for special CSU stipulations in Alt D of the new Lander RMP. LFO RMP Record #5032.

4.6.8 Recreation, Visual Resources, and Special Designations

Impacts to recreation/VRM/special designations will be the same as those analyzed in Alternative 2, with the exception of the deferred parcels. Deferring parcels will result in

negligible impacts to these resource values because the parcel will not be developed. Deferring the identified parcels will allow the BLM to continue to manage for the resources attained in these areas as expressed by the public until the completion of the Lander/BB RMP revisions.

Parcel # 1302 -	Defer/Partially Defer	Reason for Deferral
Cody FO		
433, 434	Partially Defer	Partially defer for Lands with Wilderness Characteristics inventory area as identified in the Bighorn Basin RMP Draft EIS, Coon Creek LWC unit. BB RMP Record #6258.

Parcel # 1302 -	Defer/Partially Defer	Reason for Deferral
Lander FO		
441,442,443,and 444	Defer	Preferred alternative in the Lander FO RMP, Draft EIS applies NSO to protect recreation resources associated with the Johnny Behind the Rocks SRMA. LFO RMP Record #6081.
209	Defer	The entire lease is within VRM class II as proposed in the new LFO RMP. LFO RMP Record #5036.
444	Defer	The entire lease is within VRM class II as proposed in the new LFO RMP. LFO RMP Record #5036.
248	Partially Defer	This portion of the lease is within VRM class II as proposed in the new LFO RMP. LFO RMP Record #5036.
252	Partially Defer	Portions of these leases are within VRM class II as proposed in the new LFO RMP. LFO RMP Record #5036.
275	Partially Defer	
277	Partially Defer	
298	Partially Defer	
305	Partially Defer	
317	Partially Defer	
439	Partially Defer	
441	Partially Defer	
442	Partially Defer	
443	Partially Defer	

Parcel # 1302 -	Reason for Deferral
Worland FO	
The following parcels are recommended for deferral or partial deferral based on changes made to the BB RMP revision for Recreation/VRM/Special Designations. BB RMP Record #6149, 6171, and 6137.	
101	Brokenback/Logging Road RMZ; VRM/CLASS IV to II
102	Brokenback/Logging Road RMZ; VRM/CLASS IV to II
103	Brokenback/Logging Road RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
104	Brokenback/Logging Road RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
105	Canyons RMZ; VRM/CLASS IV to II
106	Canyons RMZ; VRM/CLASS IV to II
107	Brokenback/Logging Road RMZ; VRM/CLASS IV to II
108	Brokenback/Logging Road RMZ; VRM/CLASS IV to II
144	Brokenback/Logging Road RMZ; VRM/CLASS IV to II
145	Brokenback/Logging Road RMZ; VRM/CLASS IV to II
146	Brokenback/Logging Road RMZ; VRM/CLASS IV to II
147	Brokenback/Logging Road RMZ; VRM/CLASS III to III; VRM/CLASS IV to II

Parcel # 1302 -	Reason for Deferral
Worland FO	
148	Canyons RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
149	Brokenback/Logging Road RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
150	Brokenback/Logging Road RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
151	Brokenback/Logging Road RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
152	Brokenback/Logging Road RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
153	Brokenback/Logging Road RMZ; VRM/CLASS IV to II
154	Brokenback/Logging Road RMZ; VRM/CLASS IV to II
155	WSR/Dry Medicine Lodge Creek; Recreation/Canyons RMZ; VRM/CLASS III to II
156	WSR/Dry Medicine Lodge Creek, Medicine Lodge Creek; Recreation/Canyons RMZ; VRM/CLASS III to II
157	Recreation/Canyons RMZ; VRM/CLASS III to II
158	WSR/Paint Rock Creek; Recreation/Canyons RMZ; VRM/CLASS III to II; VRM/CLASS IV to II; Recreation Site/Paint rock Trail/Lone Tree; Trails/Lone Tree/Paint Rock
159	Canyons RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
202	VRM/CLASS III to II
205	Canyons RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
206	VRM/CLASS IV to II
207	Canyons RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
208	VRM/CLASS III to II
282	VRM/CLASS IV to II
283	VRM/CLASS IV to II
284	VRM/CLASS IV to II
289	VRM/CLASS IV to II
290	VRM/CLASS IV to II
291	VRM/CLASS IV to II
294	VRM/CLASS IV to II
309	VRM/CLASS IV to II
312	VRM/CLASS IV to II
313	VRM/CLASS III to II
314	VRM/CLASS III to II
316	Tour de Badlands RMZ
337	Recreation Site/Gebo
378	Tour de Badlands RMZ
381	Tour de Badlands RMZ; VRM/CLASS III to II
382	VRM/CLASS III to II
385	VRM/CLASS IV to II
388	VRM/CLASS IV to II
391	Tour de Badlands RMZ; VRM/CLASS IV to II
392	Tour de Badlands RMZ; VRM/CLASS IV to II
393	Tour de Badlands RMZ
428	Tour de Badlands RMZ
429	Tour de Badlands RMZ; VRM/CLASS III to II; Recreation Site/Gooseberry Badlands; Trails/Gooseberry Badlands
430	Tour de Badlands RMZ; VRM/CLASS IV to II
431	Tour de Badlands RMZ; VRM/CLASS IV to II
466	Tour de Badlands RMZ; VRM/CLASS III to II; VRM/CLASS IV to II
468	Absaroka Mountain Foothills SRMA; VRM/CLASS III to II; VRM/CLASS IV to II
469	Absaroka Mountain Foothills SRMA; VRM/CLASS IV to II
471	Absaroka Mountain Foothills SRMA; VRM/CLASS IV to II
473	Absaroka ERMA; VRM/CLASS III to II; VRM/CLASS IV to II

Parcel # 1302 -	Reason for Deferral
Worland FO	
474	Absaroka Mountain Foothills SRMA; VRM/CLASS III to II
475	VRM/CLASS III to II
476	Absaroka Mountain Foothills SRMA; VRM/CLASS III to II
488	VRM/CLASS IV to II
489	VRM/CLASS IV to II
490	Absaroka Mountain Foothills SRMA; VRM/CLASS IV to II

Parcel # 1302 -	Defer/Partially Defer	Reason for Deferral
Worland FO		
105, 106, 107, 125, 126, 132, 133, 134, 135, 136, 138, 141, 143, 147, 148, 149, 151, 156, 158, 176, 177, 178, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 231, 232, 234, 235, 237, 238, 239, 290, 292, 341, 342, 343, 344, 345, 346, 347, 348, 373, 374, 378, 382, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 428, 430, 431	Defer and Partially Defer	Partially defer for Lands with Wilderness Characteristics inventory area as identified in the Bighorn Basin RMP Draft EIS, LWC units. BB RMP Record #6258.

Master Leasing Plans

All parcels were reviewed against the Master Leasing Plan (MLP) requirements in WO IM 2010-117 and the approved BLM Wyoming Leasing Reform Implementation Plan. The WRBB District has identified four (4) Master Leasing Plan areas currently being evaluated in the Lander Field Office (LFO) Draft RMP EIS and Bighorn Basin Draft RMP EIS for MLP development. These MLPs are the Beaver Rim MLP in the LFO, and the Absaroka Front MLP, Fifteen Mile MLP, and Big Horn MLP located in the CFO and WFO. Appendix D evaluated all parcels for areas that may be eligible for MLP desigantions and identifies forty four (44) whole and partial parcels that are recommended for deferral until such time the Draft RMPs are completed.

4.6.9 Wildlife and Fish

Any parcel deferred from leasing under Alternative 3 would result in the same impacts to wildlife and wildlife habitats as those described under Alternative 1. For those remaining parcels to be offered for sale and subsequent lease issuance, impacts to wildlife and stipulations would be the same as described in Alternative 2.

All parcels recommended for deferral or partial deferral due to Greater Sage Grouse management objectives have been screened in accordance with Instruction Memorandum WY-2012-019, Greater Sage-Grouse Habitat Management Policy on Wyoming BLM Administered Public Lands Including the Federal Mineral Estate. The screen identifying parcels that are recommended to be offered, deferred, or partially deferred in accordance with this policy is identified as Appendix C of this document.

Cody Field Office did not recommend deferral of any parcels due to wildlife and fish resource concerns other than from the Greater Sage Grouse screen identified in Appendix C.

Lander Field Office

Parcel # 1302	Defer/Partially Defer	Reason for Deferral
093, 109-113	Defer	Defer in accordance with O&G Sage-Grouse Screen
160	Partially Defer	Partially inside sage-grouse Core area with a Lek within 0.6 mile. Parcel does **not** meet Oil and Gas Leasing Screen for Sage Grouse.
165-166	Defer	Defer in accordance with O&G Sage-Grouse Screen
210	Partially defer	Partially defer in accordance with O&G Sage-Grouse Screen.
211	Defer	Defer in accordance with O&G Sage-Grouse Screen.
212	Partially Defer	Partially defer in accordance with O&G Sage-Grouse Screen.
215-219	Defer	Defer in accordance with O&G Sage-Grouse Screen
220	Partially Defer	Partially defer in accordance with O&G Sage-Grouse Screen.
245-253	Defer	Defer in accordance with O&G Sage-Grouse Screen
254	Defer	Defer in accordance with O&G Sage-Grouse Screen. Contains Lek within 0.6 mile.
255	Partially Defer	Partially defer in accordance with O&G Sage-Grouse Screen.
256	Defer	Defer in accordance with O&G Sage-Grouse Screen
257-258	Defer	Defer in accordance with O&G Sage-Grouse Screen and within 0.6 mile of Lek.
271-276	Defer	Defer in accordance with O&G Sage-Grouse Screen
277	Defer	Defer in accordance with O&G Sage-Grouse Screen and within 0.6 mile of Lek.
278-280	Defer	Defer in accordance with O&G Sage-Grouse Screen
296-299	Defer	Defer in accordance with O&G Sage-Grouse Screen and within 0.6 mile of Lek.
300-304	Defer	Defer in accordance with O&G Sage-Grouse Screen
305-306	Defer	Partially defer in accordance with O&G Sage-Grouse Screen.

Parcel # 1302	Defer/Partially Defer	Reason for Deferral
317-318	Partially Defer	Partially defer in accordance with O&G Sage-Grouse Screen. Within 0.6 mile of Lek. Partially within sage-grouse Reference & Education area.
319, 326-327	Partially Defer	Partially defer in accordance with O&G Sage-Grouse Screen.
349-359, 395-414, 438-444	Defer	Defer in accordance with O&G Sage-Grouse Screen and within sage-grouse Core area and within the Sage-grouse Reference and Education area.

Worland Field Office

Parcel # 1302	Sensitive Species SBO=Sagebrush Obligates* PBMP=Prairie dogs, Burrowing Owl, Mountain Plover (P = Partial)	Absaroka Front SMA * Deferral (P = Partial Deferral)	Big game Crucial Winter Range * Deferral (P = Partial Deferral)	Grizzly Bear Habitat* Deferral (P = Partial Deferral)
100	SBO		**X**	
101			**X**	
103			**X**	
105	SBO/P		**X**	
106	SBO/P		**X**	
107	SBO/P		**X**	
108	SBO/P		**X**	
114	SBO/P, PBMP/P		**X**	
115	SBO/P, PBMP/P		**X**	
116	SBO/P, PBMP/P		**X**	
117	SBO		**X**	
118	SBO/P, PBMP/P		**X**	
119	SBO/P, PBMP/P		**X**	
120	SBO/P		**X**	
121	SBO/P		**X**	
122	SBO/P		**X**	
123	SBO/P, PBMP/P		**X**	
124	SBO/P		**X**	
125	SBO		**X**	
126	SBO/P		**X**	
127	SBO/P		**X**	
128	SBO/P		**X**	
129	SBO		**X**	
130	SBO		**X**	
131	SBO		**X**	
132	SBO, PBMP/P		**X**	
133	SBO, PBMP/P		**X**	
134	SBO/P		**X**	
135	SBO, PBMP/P		**X**	
136	SBO/P, PBMP/P		**X**	
137	SBO/P, PBMP/P		**X**	
138	SBO, PBMP/P		**X**	
139	SBO		**X**	
140	SBO, PBMP/P		**X**	
141	SBO/P		**X**	

Parcel # 1302	Sensitive Species SBO=Sagebrush Obligates* PBMP=Prairie dogs, Burrowing Owl, Mountain Plover (P = Partial)	Absaroka Front SMA * Deferral (P = Partial Deferral)	Big game Crucial Winter Range * Deferral (P = Partial Deferral)	Grizzly Bear Habitat* Deferral (P = Partial Deferral)
142	SBO/P		**X**	
143	SBO		**X**	
144	SBO/P			
145	SBO/P			
146	SBO/P			
147	SBO/P		**X**	
148	SBO/P			
149	SBO/P		**X**	
150	SBO/P, PBMP/P			
151	SBO/P			
152	SBO/P			
153	SBO/P			
154	SBO/P			
155	SBO/P		**X**	
156	SBO/P		**X**	
157	SBO/P		**X**	
158	SBO/P		**X**	
159	SBO/P		**X**	
167	SBO/P		**X/P**	
168	SBO/P		**X**	
169	SBO			
170	SBO/P, PBMP/P		**X**	
171	SBO/P		**X**	
172	SBO/P		**X/P**	
173	SBO/P		**X**	
174	SBO/P, PBMP/P		**X**	
175	SBO/P		**X/P**	
176	SBO/P		**X**	
177	SBO/P		**X**	
178	SBO/P, PBMP/P		**X**	
179	SBO/P		**X**	
180	SBO/P		**X**	
181	SBO/P		**X**	
182	SBO/P		**X**	
183	SBO			
184	SBO/P		**X**	
185	SBO/P		**X**	
186	SBO/P		**X**	
187	SBO/P		**X**	
188	SBO/P		**X**	
189	SBO/P		**X**	
190	SBO/P		**X**	
191	SBO/P		**X**	
192	SBO/P		**X**	
193	SBO/P		**X**	
194	SBO/P		**X**	
195	SBO/P			
196	SBO/P			
197	SBO/P			

Parcel # 1302	Sensitive Species SBO=Sagebrush Obligates* PBMP=Prairie dogs, Burrowing Owl, Mountain Plover (P = Partial)	Absaroka Front SMA * Deferral (P = Partial Deferral)	Big game Crucial Winter Range * Deferral (P = Partial Deferral)	Grizzly Bear Habitat* Deferral (P = Partial Deferral)
199	SBO/P			
201	SBO/P		**X**	
202	SBO/P		**X**	
203	SBO/P, PBMP/P			
204	SBO/P			
205	SBO/P		**X**	
206	SBO/P			
207	SBO/P		**X**	
208	SBO/P			
224	SBO		**X/P**	
225	SBO/P, PBMP/P		**X/P**	
226	SBO/P, PBMP/P		**X/P**	
227	SBO		**X/P**	
228	SBO/P		**X**	
229	SBO/P		**X/P**	
230	SBO/P		**X**	
231	SBO		**X**	
232	SBO/P		**X**	
233	SBO/P		**X**	
236	SBO/P		**X**	
238	SBO/P			
239	SBO/P		**X**	
240	SBO/P, PBMP/P		**X/P**	
241	SBO/P, PBMP/P		**X/P**	
242	SBO/P, PBMP/P			
243	SBO/P, PBMP/P			
244	SBO/P, PBMP/P			
262	SBO		**X**	
263	SBO/P		**X**	
264	SBO/P		**X/P**	
266	SBO/P		**X/P**	
268	SBO/P		**X/P**	
269	PBMP/P			
282	SBO/P		**X**	
283	SBO/P			
284	SBO/P		**X**	
285	SBO		**X**	
286	SBO		**X/P**	
287	SBO		**X**	
288	SBO/P		**X**	
289	SBO/P			
290	SBO/P		**X**	
291	SBO/P		**X**	
292	SBO/P		**X**	
293	SBO/P, PBMP/P		**X**	
294			**X**	
295	SBO/P		**X**	
308	SBO		**X**	
309	SBO/P		**X**	

Parcel # 1302	Sensitive Species SBO=Sagebrush Obligates* PBMP=Prairie dogs, Burrowing Owl, Mountain Plover (P = Partial)	Absaroka Front SMA * Deferral (P = Partial Deferral)	Big game Crucial Winter Range * Deferral (P = Partial Deferral)	Grizzly Bear Habitat* Deferral (P = Partial Deferral)
310	SBO		**X**	
311	SBO/P		**X**	
312	SBO/P		**X**	
313	SBO/P, PBMP/P			
314	SBO/P		**X/P**	
315			**X**	
316			**X**	
329	SBO		**X**	
330	SBO/P		**X**	
331	SBO/P, PBMP/P		**X**	
332	SBO/P, PBMP/P		**X**	
333	SBO/P		**X**	
334	SBO/P		**X**	
335	SBO		**X**	
336	SBO		**X**	
337	SBO/P		**X/P**	
338	SBO			
339	SBO/P		**X/P**	
340	SBO/P, PBMP/P		**X/P**	
341			**X**	
342	SBO/P		**X**	
343	SBO/P		**X**	
344			**X**	
345			**X**	
346			**X**	
347	SBO/P		**X/P**	
348	SBO/P		**X**	
360	SBO/P			
361	SBO/P			
362	SBO/P		**X**	
363	SBO		**X**	
364	SBO			
365	SBO/P			
366	SBO/P, PBMP/P		**X**	
367	SBO/P		**X**	
368	SBO/P		**X/P**	
369	SBO/P		**X**	
370	SBO/P		**X**	
371	SBO/P			
372	SBO/P, PBMP/P		**X**	
373	SBO/P		**X**	
374	SBO/P		**X**	
375	SBO/P		**X/P**	
376	SBO/P		**X/P**	
377			**X**	
378			**X**	
379			**X**	
380			**X**	
381	SBO/P		**X**	

Parcel # 1302	Sensitive Species SBO=Sagebrush Obligates* PBMP=Prairie dogs, Burrowing Owl, Mountain Plover (P = Partial)	Absaroka Front SMA * Deferral (P = Partial Deferral)	Big game Crucial Winter Range * Deferral (P = Partial Deferral)	Grizzly Bear Habitat* Deferral (P = Partial Deferral)
382			**X**	
383	SBO/P		**X**	
384			**X**	
385			**X**	
386			**X**	
387	PBMP/P		**X**	
388	PBMP/P		**X**	
389			**X**	
390	PBMP/P		**X**	
391			**X**	
392			**X**	
393			**X**	
415	SBO/P, PBMP/P		**X/P**	
416	SBO/P, PBMP/P		**X/P**	
417	SBO		**X/P**	
418	SBO		**X/P**	
419	SBO/P		**X**	
420	SBO/P, PBMP/P		**X**	
421	SBO		**X**	
422	SBO		**X/P**	
423	SBO		**X**	
424	SBO/P		**X**	
425	SBO/P		**X/P**	
426	SBO/P		**X/P**	
427	SBO		**X**	
429			**X**	
430	SBO/P			
431	SBO/P			
445	SBO/P, PBMP/P		**X**	
446	SBO		**X/P**	
447	SBO		**X/P**	
448	SBO/P		**X**	
449	SBO, PBMP/P		**X/P**	
450	SBO/P		**X**	
451	SBO/P, PBMP/P		**X**	
452	SBO		**X/P**	
453	SBO, PBMP/P		**X**	
454	SBO/P		**X**	
465	SBO		**X**	
466	SBO/P		**X**	**X/P**
467	SBO		**X**	
468	SBO/P		**X**	
469	SBO/P, PBMP/P		**X**	
470	SBO/P, PBMP/P		**X**	
471	SBO/P, PBMP/P		**X**	
472	SBO/P, PBMP/P		**X**	
473	SBO/P		**X/P**	**X**
474	SBO/P		**X**	**X/P**
475	SBO		**X/P**	

Parcel # 1302	Sensitive Species SBO=Sagebrush Obligates* PBMP=Prairie dogs, Burrowing Owl, Mountain Plover (P = Partial)	Absaroka Front SMA * Deferral (P = Partial Deferral)	Big game Crucial Winter Range * Deferral (P = Partial Deferral)	Grizzly Bear Habitat* Deferral (P = Partial Deferral)
476	SBO/P		**X**	
477	SBO/P		**X**	
478	SBO/P		**X/P**	
479	SBO/P		**X**	
480	SBO/P		**X/P**	
481	SBO/P		**X/P**	
482	SBO/P		**X/P**	
483	SBO/P		**X/P**	**X/P**
488	SBO/P		**X/P**	**X**
489	SBO/P, PBMP/P	**X/P**	**X/P**	**X**
490	SBO/P, PBMP/P	**X/P**	**X/P**	**X**
491	SBO		**X/P**	**X**
492	SBO		**X/P**	**X**
493	SBO		**X/P**	**X**
494	SBO		**X/P**	**X/P**

* Sagebrush Obligate Species are; Sage Thrasher, Brewer's and Sage Sparrow
* Draft BB RMP Record # 4080
* Draft BB RMP Record # 4082
* Draft BB RMP Record #4117

4.6.10 Soils

For parcels deferred from leasing based on new resource information or due to ongoing Land Use Planning efforts under Alternative 3, those impacts to soils described in Alternative 2 would not occur, and therefore on those parcels, the impacts would be the same as those described under Alternative 1.

4.6.11 Water Resources

For parcels deferred from leasing under Alternative 3 for other resource concerns, impacts to water resources described in Alternative 2 would not occur, and therefore on those parcels, the impacts would be the same as those described under Alternative 1.

There are 65 lease parcels that are recommended for deferral due to conflict with new management prescriptions identified in the Bighorn Basing Draft RMP EIS. These parcels are identified in Table 3-2, Worland Field Office lease parcels that contain riparian habitat and vegetation, located in Chapter 3, Part 3.3.10, Riparian/Floodplains. The records are identified in the Draft RMP EIS under Record #4037 which states avoid surface-disturbing activities at least within 500 feet and up to 1/4 mile if needed to protect sensitive resources, of waters of the state, perennial surface water, and riparian/wetland areas and Record #4038 which states apply an NSO restriction on wetland areas greater than 20 acres.

4.7 Cumulative Impact Analysis

There are approximately 887 Federal wells in the Lander Field Office (15 of which are coalbed natural gas), 2,237 wells in the Cody Field Office, and 2,688 Federal wells in the Worland Field Office; there are no producing coalbed methane production wells in Cody or Worland Field Offices.

Analysis of cumulative impacts for reasonably foreseeable development (RFD) of oil and gas wells on public lands in the Worland Field Office is presented in the 1988 Draft Grass Creek and 1998 Washakie Resource Management Plans (RMP). Potential development of all available federal minerals in the field office, including those in the proposed lease parcels, was included as part of the analysis.

As described in the analysis of environmental consequences, the proposed action and/or the alternative may contribute to the effects of climate change to some extent through GHG emissions. However, it is not currently possible to associate any of these particular actions with the creation of any specific climate-related environmental effects. The lack of scientific tools designed to predict climate change at regional or local scales limits the ability to quantify potential future impacts.

The assessment of greenhouse gas (GHG) emissions and climate change is still in its formative phase; therefore, it is not yet possible to know with confidence the net impact on climate. However, the Intergovernmental Panel on Climate Change (IPCC 2007) recently concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations." As the temperatures of the land and sea change, environmental factors such as weather patterns, sea levels, precipitation rates, the timing of the seasons, desert distribution, forest cover, and ocean salinity will also change. These changes influence the world's climate systems and will have different impacts to different areas. Some agricultural regions may become more arid while others become wetter; some mountainous areas will experience greater summer precipitation, yet experience disappearing snowpack.

The average number of oil and gas wells drilled annually in the District and probable GHG emission levels, when compared to the total GHG emission estimates from the total number of Federal oil and gas wells in the State, represent an incremental contribution to the total regional and global GHG emission levels. This incremental contribution to global GHG gases cannot be translated into incremental effects on climate change globally or in the area of these site-specific actions. As oil and gas and natural gas production technology continues to improve in the future, one assumption is that it may be feasible to further reduce GHG emissions.

Regarding the linkage between climate change related warming and associated impacts, an assessment of the IPCC states that difficulties remain in attributing observed temperature changes at smaller than continental scales. Therefore, it is currently beyond the scope of existing science to predict climate change on regional or local scales resulting from specific sources of GHG emissions.

Significant uncertainties remain with respect to the estimates of the current level of emissions and projections of future production of fossil fuels as the oil and gas industry is difficult to forecast with the mix of drivers: economics, resource supply, demand, and regulatory procedures. The assumptions used for the projections, based on recent trends or State production trends in the near-term, and AEO2006 growth rates through 2020, do not include any significant changes in energy prices, relative to today's prices. Large price swings, resource limitations, or changes in regulations could significantly change future production and the associated GHG emissions. Other uncertainties include the volume of GHGs vented from gas processing facilities in the future, any commercial oil shale or coal-to-liquids production, and potential emissions-reducing improvements in oil and gas production, processing, and pipeline technologies.

There are currently no proposals for renewable energy projects in the Cody, Lander, and Worland Field Office.

5 Consultation and Coordination

Parcels that fall within Bureau of Reclamation (BOR) lands are sent to the BOR for review. Where federal minerals have been nominated for leasing underlying private surface, the private land owners have been notified. The BLM also coordinates with the Wyoming Game and Fish Department.

A BLM interdisciplinary team reviewed all parcels in accordance with Washington Office Instruction Memorandum 2010-117. Table 5-1 lists the members of the BLM interdisciplinary team.

Table 5-1 Interdisciplinary Team

Name	Title	BLM Office	Responsible for the Following Section(s) of this Document
Gretchen Hurley	Geologist	CYFO	Geology and Paleontology
Shirley Bye-Jech	Outdoor Recreation Planner	CYFO	Recreation, VRM
Rory Gluechkert	Outdoor Recreation Planner	CYFO	Recreation, VRM
Kierson Crume	Archeologist	CYFO	Cultural
Jerry Jech	NRS	CYFO	Hydrology, Aquatic Resources
Criss Whalley	Range Mgmt Spec.	CYFO	Range
Destin Harrell	Biologist	CYFO	Wildlife
David Seward	NRS	CYFO	All
Jared Oakleaf	Outdoor Recreation Planner	LFO	Wilderness and Recreation
Tim Vosburgh	Wildlife Biologist	LFO	Wildlife, T&E and Sensitive Species
Jared Dalebout	Hydrologist	WFO	Water Resources
Sydney Thielke	GIS Specialist	LFO	GIS data
Craig Bromley	Archaeologist	LFO	Cultural Resources/Paleontological Resources
Debra Larsen	Land Law Examiner	LFO	All
Marit Bovee	Archaeologist	WFO	Cultural Resources/Paleontological Resources
Ted Igleheart	Wildlife Biologist	WFO	Wildlife/T&E Washakie Resource Area
Tim Stephens	Wildlife Biologist	WFO	Wildlife/T&E Grass Creek Resource Area
Paul Rau	Outdoor Recreation Planner	WFO	Recreation/VRM/Special Designations
CJ Grimes	NRS	WFO	Invasive Plant Species
Karen Hepp	Range Management Specialist	WFO	T&E Plants

Name	Title	BLM Office	Responsible for the Following Section(s) of this Document
Steve Kiracofe	NRS	WFO	Soils
Stuart Cerovski	District Resource Advisor	WRBBDO	Preparer
Chris Hite	NRS	WSO	Reviewer

6 References, Glossary

BLM 1987. Lander Resource Management Plan and Final Environmental Impact Statement. Lander, Wyoming.

BLM 1988a Grass Creek Resource Management Plan and Final Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, Wyoming

BLM 1988b. Washakie Resource Management Plan and Final Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, Wyoming

BLM 1990. Cody Resource Management Plan and Final Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, Wyoming.

BLM. 1993. Mineral Potential Report for the Grass Creek Resource Area Resource Management Plan/Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management. Worland District Office, Worland, Wyoming.

BLM 1993. Manual 8351, Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, and Management. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C.

BLM 2008. Handbook 1790-1 National Environmental Policy Act Handbook. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C.

BLM 2010. Instruction Memorandum No. WY 2010-012, Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands including the Federal Mineral Estate. U.S. Department of the Interior, Bureau of Land Management, Wyoming.

BLM 2011. Environmental Assessment August 2011 Lease Parcel Review. DOI-BLM-WY-R000-2011-0001-EA. U.S. Department of the Interior, Bureau of Land Management, Wyoming

BLM 2011b. Bighorn Basin Resource Management Plan Revision Project Draft Resource Management Plan and Draft Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, Wyoming

Goddard Institute for Space Studies. 2007. Annual Mean Temperature Change for Three Latitude Bands. Datasets and Images. GISS Surface Temperature Analysis, Analysis Graphs and Plots. New York, New York. (Available on the Internet: http://data.giss.nasa.gov/gistemp/graphs/Fig.B.lrg.gif.)

National Academy of Sciences. 2006. Understanding and Responding to Climate Change: Highlights of National Academies Reports. Division on Earth and Life Studies. National Academy of Sciences. Washington, D.C. (Available on the Internet: http://dels.nas.edu/basc/Climate-HIGH.pdf.)

IPCC. 2007b. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Core Writing Team, Pachauri, R.K., and Reisinger, A. (Eds.). Geneva, Switzerland. 104 pp. Available on the Internet: http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html

Ramanthan V. and G. Carmichael. 2008. Global and regional climate changes due to black carbon. Nature Geoscience. 1, pp. 221-227.

Woods, L.M. 1997. Wyoming's Big Horn Basin to 1901: A late Frontier. The Arthur H. Clark Foundation, Spokane, Washington.