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Chapter 1

1.1 Introduction

This environmental assessment (EA) has been prepared to disclose and analyze the environmental consequences beyond those already addressed in the Buffalo, Casper and Newcastle Field Offices' Resource Management Plans (RMP) and to address new information and policy for the Bureau of Land Management's (BLM) High Plains District (HPD) portion of the First Quarter 2018 Competitive Oil and Gas Lease Sale of which 84 parcels were nominated for leasing within the HPD.

EAs assist the BLM in project planning and compliance with the National Environmental Policy Act of 1969 (NEPA), as amended (Public Law 91-190, 42 U.S.C. 4321 et seq.). EAs also assist the authorized officer in making an informed determination as to whether any significant impacts could result from the analyzed actions. Significance is defined by the Council on Environmental Quality and is found in 40 CFR 1508.27.

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 that 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 may be signed approving the selected alternative which could be the proposed action, another alternative, or a combination thereof.

1.2 Background


As required under the MLA, the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOOGLRA), 43 CFR 3120.1-2(a) and BLM Instruction Memorandum (IM) No. WO-2010-117, the BLM Wyoming State Office (WSO) conducts quarterly competitive lease sales to sell available oil and gas lease parcels. A Notice of Competitive Oil and Gas Lease Sale listing parcels to be offered at the auction is published by the WSO typically 90 days before the auction is held. Lease stipulations applicable to each parcel are specified in the sale notice. 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. Surface management of non-BLM administered land overlaying Federal minerals is determined by the

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1 Since the RMP EISs have already evaluated potentially significant impacts arising from the BLM's land use planning decisions, the BLM anticipates a "finding of no new significant impacts." See 43 CFR 46.140(c).
BLM in consultation with the appropriate surface management agency or the private surface owner.

As part of the First Quarter 2018 Competitive Oil and Gas Lease Sale process the WSO submitted the preliminary parcel list to the HPD, which includes the Buffalo Field Office (BFO), the Casper Field Office (CFO) and the Newcastle Field Office (NFO), for review and processing.

The RMPs for the CFO and the NFO have undergone amendment as part of the Wyoming Greater Sage-Grouse Land Use Plan Amendment. The Proposed Amendments and Final EIS were released on May 28, 2015. On September 21, 2015, the BLM signed a Record of Decision (ROD) and Approved Resource Management Plan Amendments (ARMPA) for the Rocky Mountain Region, including the Casper and Newcastle RMPs, and on September 24, 2015, these documents were published in the Federal Register (80 FR 57639). On September 21, 2015, the BLM signed a ROD for the Buffalo Field Office Approved Resource Management Plan (ARMP), and on September 24, 2015, these documents were published in the Federal Register (80 FR 57639).

The respective field office staffs, in coordination and consultation with the HPD staff, reviewed the parcels to determine if they are in areas open to leasing. Each field office made recommendations to the HPD. These recommendations were reviewed, and where appropriate, RMP based stipulations were included or additional RMP stipulations added; determined if new information is available since the land use plan was approved; determined if appropriate consultations have been conducted or if additional consultations are needed; and if there were special resource conditions of which potential bidders should be made aware. This single comprehensive EA was prepared by the HPD to document this review, as well as to disclose the affected environment, the anticipated impacts, the mitigation of impacts, and the recommended lease parcel disposition for all field offices. This EA will be available to the public for review for 30 days. Substantive comments and responses to those comments will be found in Appendix F of this document, once public comments are received and addressed. Public comments will be reviewed and taken into consideration in the completion of the decision record. A Notice of Competitive Oil and Gas Lease Sale listing parcels with stipulations to be offered at the auction is made available to the public typically 90 days before the auction is held.

This EA documents the HPD, the BFO, the CFO and the NFO review of 84 parcels nominated for the First Quarter 2018 Competitive Oil and Gas Lease Sale, containing 48,754 Federal mineral acres and 4,678 Federal surface acres as depicted in Table 1.1 below (see also Appendix C, Preliminary Parcel List).

<table>
<thead>
<tr>
<th>Field Office</th>
<th>Number</th>
<th>Federal Mineral Acres</th>
<th>Federal Surface Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalo Field Office</td>
<td>30</td>
<td>15,355</td>
<td>1,652</td>
</tr>
<tr>
<td>Casper Field Office</td>
<td>48</td>
<td>32,358</td>
<td>2,985</td>
</tr>
<tr>
<td>Newcastle Field Office</td>
<td>6</td>
<td>1,041</td>
<td>81</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>84</strong></td>
<td><strong>48,754</strong></td>
<td><strong>4,678</strong></td>
</tr>
</tbody>
</table>

A portion of one parcel, WY-181Q-050, in the BFO is deferred because it is Forest Service surface (Table 1.2). This partial parcel is deferred until completion of a BLM/Forest Service Leasing EA.
One parcel, WY-181Q-003, in the CFO is deferred because it is located entirely within the Springer/Bump-Sullivan Wildlife Habitat Management Area (Table 1.3). This parcel is deferred until Casper FO RMP decisions are further evaluated.

Based on BFO RMP Decisions Coal-2002, O&G-2004 and O&G-2008, 2 entire parcels in the BFO will be deferred due to conflicts with existing coal leases (Table 1.4). Conflicts between oil and gas leases in areas where there is a WDEQ coal mine permit have arisen. These parcels will be deferred until the WSO develops a policy on how to proceed in light of these conflicts.
One parcel, WY-181Q-062, in the BFO has 40 acres added because there is unleased Federal minerals within the parcel (Table 1.5).

Table 1.5 BLM Additions due to Unleased Federal Minerals within Parcel

<table>
<thead>
<tr>
<th>Parcel Number</th>
<th>Reason Acres Addition</th>
<th>Field Office</th>
<th>Partial or Entire Addition</th>
<th>Addition Acres/Legal Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WY-181Q-062</td>
<td>Unleased Federal Minerals in Parcel</td>
<td>BFO</td>
<td>Partial Addition</td>
<td>T.0560N, R.072W, 06th PM, WY Sec. 029 NENW 40.00 acres</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total Acres Added</td>
</tr>
</tbody>
</table>

One parcel in Greater Sage-grouse core area, WY-181Q-054, was recommended for deferral by the Buffalo Field Office ID team in accordance with Instruction Memorandum No. 2016-143, Implementation of Greater Sage-Grouse Resource Management Plan Revisions or Amendments – Oil & Gas Leasing and Development Sequential Prioritization. The BLM received no additional direction on parcels located in Greater Sage-grouse habitat. It is the position of HPD and the State of Wyoming that the stipulations applied to Parcel WY-181Q-054 would be sufficient to conserve sage-grouse and their habitats, and therefore this parcel will be offered in the First Quarter 2018 Competitive Oil & Gas Lease Sale.

In total, 84 parcels containing 48,754 acres located within the field offices in the HPD were nominated through expressions of interest (EOI) for the First Quarter 2018 Competitive Oil and Gas Lease Sale. One entire parcel is deferred because it is in a Wildlife Habitat Management Area. One partial parcel is deferred because it contains Forest Service surface. Two entire parcels are deferred due to conflicts with coal leases. One parcel has 40 acres added by the BLM because it has unleased Federal minerals within it. As a result of these deferrals and additions, this EA analyzes 81 parcels containing 45,003 Federal mineral acres and 4,077 Federal surface acres located within the HPD as depicted in Table 1.6 below.

Table 1.6 Federal Mineral Acres & Federal Surface Acres Remaining for EA Analysis

<table>
<thead>
<tr>
<th>Field Office</th>
<th>Number of Parcels</th>
<th>Federal Mineral Acres</th>
<th>Federal Surface Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalo Field Office</td>
<td>28</td>
<td>12,124</td>
<td>1,531</td>
</tr>
<tr>
<td>Casper Field Office</td>
<td>47</td>
<td>31,838</td>
<td>2,465</td>
</tr>
<tr>
<td>Newcastle Field Office</td>
<td>6</td>
<td>1,041</td>
<td>81</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>45,003</td>
<td>4,077</td>
</tr>
</tbody>
</table>

This EA also serves to verify conformance with the approved Buffalo, Casper and Newcastle RMPs and provides the rationale for attaching stipulations to specific parcels, offering a parcel for lease, deferring a parcel or deleting a parcel from the competitive oil and gas lease sale.
1.3 Purpose and Need

The purpose of the competitive oil and gas lease sale is to meet the growing energy demands of the United States public through the sale and issuance of oil and gas leases. Continued sale and issuance of leases is necessary to maintain economical production of oil and gas reserves owned by the United States.

The need for the competitive oil and gas lease sale is established by the FOOGLRA to respond to EOI's, the FLPMA and the MLA. The BLM's responsibility under the MLA is to promote the development of oil and gas on the public domain, and to ensure that deposits of oil and gas owned by the United States are subject to disposition in the form and manner provided by the MLA under the rules and regulations prescribed by the Secretary of the Interior, where applicable, through the land use planning process.

Decision to be Made: The BLM will decide whether or not to offer and lease the nominated parcels of the HPD portion at the First Quarter 2018 Competitive Oil and Gas Lease Sale and if so, under what terms and conditions.

1.4 Conformance with BLM Land Use Plans

Pursuant to 40 CFR 1508.28 and 1502.21, this EA tiers to and incorporates by reference the information and analysis contained in the following plans:

The Proposed Resource Management Plan (RMP) and Final Environmental Impact Statement for the Buffalo Field Office (May 2015) and the ARMP/ROD signed on September 21, 2015.


Buffalo RMP/ROD: According to Buffalo RMP/ROD, page 90-91, Goal MR 3 states: "Leasable fluid mineral resources are available to support domestic needs." Decision #O&G-2002 states "Open all oil and gas mineral estate to leasing, unless specifically identified as closed to mineral leasing. These open areas will be managed on a project-specific basis."

Casper RMP/ROD: According to the Casper RMP/ROD, page 2-15, Goal MR: 2.1 states, "Maintain oil and gas leasing, exploration, and development, while minimizing impacts to other resource values;" decision 2002, "Parcels nominated for potential oil and gas leasing will be reviewed. Any stipulations attached to these parcels will be the least restrictive needed to protect
other resource values;” and decision 2004, “The Casper Field Office is open to mineral leasing, including solid leasables and geothermal, unless specifically identified as administratively unavailable for the life of the plan for mineral leasing. These open areas will be managed on a case-by-case basis.”

Newcastle RMP/ROD: According to the Newcastle RMP/ROD, page 12, “Management Actions: Federal oil and gas leases will be issued with appropriate stipulations for protection of other resource values.”

The Buffalo, Casper and Newcastle RMPs (as revised and amended) provide specific stipulations that would be attached to new leases offered in certain areas or affecting particular resources. These stipulations will be detailed further in this EA.

1.5 Relationship to Statutes, Regulations, or Other Plans

Purchasers of oil and gas leases are required to obey all applicable Federal, state, and local laws and regulations including obtaining all necessary permits required should lease development occur.

BFO, CFO and NFO wildlife biologists reviewed each parcel during the individual field office review. Individual parcels may contain threatened, endangered, candidate, or BLM sensitive species (EA Section 3.0, Affected Environment; Appendix A, Affected Environment Tables). The administrative act of offering and subsequent issuance of oil and gas leases is consistent with the decisions in the Buffalo, Casper and Newcastle RMPs, including decisions relating to threatened, endangered, candidate, and BLM sensitive species. The proposed action of offering and issuing oil and gas leases is also consistent with the biological assessments and biological opinions for these RMPs. No further consultation with the U. S. Fish and Wildlife Service (FWS) is required.

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of their undertakings on historic properties (sites that are listed on or eligible for listing on the National Register of Historic Places). Oil and gas leasing is a Federal undertaking which requires compliance with Section 106. Fluid mineral leasing implies surface disturbance which could adversely affect historic properties when parcels are developed, although the exact nature of that disturbance is not known until a site-specific plan is submitted to the BLM, which can occur several years after the parcel is leased. Typically, the HPD meets its compliance with Section 106 of the NHPA for oil and gas leasing and development through a phased approach, which has three distinct decisions – land use planning, leasing, and development. At each phase the BLM narrows its focus as relevant to the action being analyzed, going from large land use areas potentially subject to leasing, to particular parcels to be leased, and then to the site-specific development decisions in which surface-disturbing activities may be approved.

In relation to fluid mineral leasing, the first phase of Section 106 compliance takes place during the land use planning process. RMP creation and land use planning decisions are made in consultation with the SHPO, tribes, cooperating agencies, and other interested parties. During the land use planning process, the BLM seeks to identify and inventory historic properties, including TCPs significant to tribes, through consultation. The RMP for each field office describes and
analyzes, on a very broad scale, potential impacts to known historic properties and includes management decisions that may protect historic properties through closures of certain areas to leasing or the formulation of protective lease stipulations. Surface use restrictions such as timing limitation stipulations (TLS), controlled surface use (CSU) or no surface occupancy (NSO) lease stipulations are also delineated in RMPs. The analysis performed during the RMP process is intended to identify and protect known historic properties that cannot be readily mitigated and due to its wide-ranging scale, does not include an intensive site-specific field inventory component.

The second phase takes place as part of the BLM’s process of deciding whether to include individual fluid mineral lease parcels in competitive lease sales in areas that are designated as “open” through the RMP process. This analysis is often done in the context of a NEPA document, such as this EA, and in consultation with the SHPO, tribes, cooperating agencies, and other interested parties. The HPD analyzes available information, including but not limited to, information gathered and considered during the RMP process, for each parcel to consider whether the sale will result in “adverse effects” and to ensure that adequate lease stipulations are included. In some cases, the analyses in the RMPs may be dated or may not have considered new information on historic properties or recent changes to law, regulation or policy. The analysis in the second phase also considers any new information related to historic properties in the potential lease parcels. This phase, in part, is intended to identify historic properties that cannot be readily mitigated and to identify parcels that the BLM may need to defer or delete from leasing lists. Depending on the particular resources identified, this analysis may not require intensive field inventory, especially in light of the uncertainty regarding the type and extent of surface disturbance associated with oil and gas development associated with a parcel. The BLM will include the following cultural resource stipulation (Lease Stipulation No. 1) on any parcel it decides to offer:

This lease may be found to contain 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, Executive Order 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 (e.g., State Historic Preservation Officer (SHPO) and tribal consultation) 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.

The third phase involves the approval process for an Application for Permit to Drill (APD) or other site-specific activities related to oil and gas development. At this stage, a project proponent submits a site-specific plan to the field office detailing all proposed activities. The BLM must analyze the potential effects that such activities could have on historic properties. Utilizing historic property information gathered through the two previous stages, the BLM will seek to conduct, as appropriate, site-specific cultural resource inventories, gather additional information through consultation with SHPOs, tribes, and other interested parties, as well as the public, make eligibility determinations, analyze the potential effects and make adverse effect determinations, and seek to resolve any adverse effects through consultation. Completion of the Section 106 process may conclude through the execution of a Memorandum of Agreement or Programmatic Agreement.
Additionally, the BLM would retain the ability to modify or disapprove any activity with potential adverse effects that cannot be successfully avoided, minimized, or mitigated as provided for in the cultural resource stipulation attached to the lease.

BLM field offices must base site-specific lease stipulations (such as TLS, CSU or NSO) and decisions to withdraw areas from leasing on decisions made within an RMP. RMPs are updated every 5 to 30 years and may not contain current information. If a decision maker determines a cultural 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.

1.6 Identification of Issues

Analysis required by NEPA was conducted by field office resource specialists who relied on site visits where access was available, personal knowledge of the areas involved, and/or review of existing databases and file information to determine if appropriate stipulations should be attached to specific parcels prior to being made available for lease.

The HPD is predominantly split estate (private surface and Federal minerals). Of the total 84 parcels nominated for leasing (a total of 48,794 Federal mineral acres and 4,718 Federal surface acres), 24 parcels include some Federal surface (4,645 Federal mineral acres), while the other 60 parcels are Federal minerals underlying state or private surface (44,149 Federal mineral acres).

Field visits were performed on those parcels to which the BLM had access or access was allowed by the surface owners. Fifty-one (51) parcels were visited using public access such as county or state roads. Photographs were taken of each parcel visited by respective field offices. Geographical information system (GIS) data and digital orthophoto quads were used regardless of whether or not the field teams could visit the parcels, but were predominantly relied on for review of the 33 parcels that were not visited.

Offering and issuing oil and gas leases is strictly an administrative action, which, in and of itself, does not cause or directly authorize any surface disturbance. After a lease has been issued, the lessee has the right to use as much of the leased lands as is necessary to explore, drill for, mine, extract, remove, and dispose of the oil and gas resources (see 43 CFR 3101.1-2, Surface use rights). These post-leasing actions can result in surface disturbance.

As part of the lease issuance process, nominated parcels are reviewed against the appropriate land use plans, and stipulations are attached to mitigate known environmental or resource conflicts that may occur on a given lease parcel. As stated above, on-the-ground impacts would potentially occur when a lessee applies for and receives approval to explore, occupy, and drill on the lease. The BLM cannot determine whether a parcel offered for sale will be leased, or if it is leased, whether the lease will be explored or developed, or how the parcel may be explored or developed. According to one estimate by the BLM Wyoming State Office Reservoir Management Group (RMG), from 1960 through 2011, 75,192 leases were issued in Wyoming. Of those, 4,920 leases produced some type of oil or gas in sufficient quantities that the lease was held by production. Therefore, 6.5 percent of the leases sold and 5.3 percent of the acreage was actually developed into
production. Also, according to the Tenth Circuit Court of Appeals, site-specific NEPA analysis is not possible absent concrete proposals. Filing an APD is the initial point at which a site-specific environmental appraisal can be undertaken (Park County Resource Council, Inc. v. U.S. Department of Agriculture, 10th Cir., April 17, 1987). Before the lessee files a notice of staking (NOS), an APD or a field development plan, the BLM cannot reasonably determine where companies propose to develop wells on a given lease or even if a lease will be developed at all. Accordingly, additional separate NEPA analysis will be required at the development stage to analyze project-specific impacts associated with exploration and development of the lease. That site-specific environmental documentation would address the site-specific analysis for each proposed well location. Additional conditions of approval (mitigation) may be applied at that time.

Interdisciplinary (ID) teams consisting of a multi-disciplinary group of resource specialists for each field office as well as the HPD were formed to review the parcels proposed for sale and subsequent leasing. ID Teams from each field office reviewed all resources within the given field office and determined whether the resource is present, present but not impacted, or present with the potential for impact. Those resources that were not present or not impacted were eliminated from further analysis as stated in section 1.7 below. Issues that were identified as present with the potential for impact and further discussed in this EA are air resources (including air quality, greenhouse gases (GHG) and visibility), coal, heritage resources, lands and realty, socioeconomics, special management areas, soils, vegetation/riparian, visual resource management (VRM), water resources and wildlife resources (including threatened and endangered (T&E) and BLM sensitive species). In some cases the RMP added stipulations for these resources and those stipulations are detailed in Chapter 4. Only those issues that were not addressed sufficiently in the tiered RMP EISs, where there is new information or BLM policy has changed, are analyzed further in Chapter 4 of this EA. The specifics of that new information or BLM policy change is explained in Chapter 3 of this document.

TCPs, sacred sites, or other areas that are of concern to Native American tribes have the potential to be impacted by oil and gas development. The HPD took part in general discussions related to oil and gas leasing in November of 2010, May of 2011, June of 2011, February of 2012, May of 2012 and June of 2012 with representatives from the Cheyenne River Sioux, Rosebud Sioux, Crow Creek Sioux, Lower Brule Sioux, Oglala Sioux, Sisseton Wahpeton Oyate, Yankton Sioux, Flandreau Santee, Fort Peck, Three Affiliated, Crow, Northern Arapaho and Northern Cheyenne Tribes. The tribes suggested that the BLM consider their concerns with oil and gas leasing and any of their comments on this EA separately from comments received by the public, and they voiced concern with the potential of the BLM revealing sensitive information in relation to sacred sites. The BLM must consider all comments on this EA regardless of the source, but the BLM is also required to make additional efforts to hear the concerns of tribes and to keep sensitive information confidential. Letters were sent to each tribe in an effort to gather any information that they are willing to share on this EA. The tribes also suggested the BLM address potential impacts to TCPs and sacred sites prior to issuance of oil and gas leases. The tribes contended that inventories performed by tribal surveyors are necessary to identify all resources that are important to tribes prior to leasing any parcel. They indicated that sites which archeologists interpret as stone circles or cairns may have spiritual significance that non-Native Americans cannot properly identify. The tribes pointed out that an NSO stipulation may not be an adequate site-specific protection since they consider the subsurface minerals to be a part of that site. Native American
burials were pointed out as especially sensitive sites that should be avoided by all surface disturbing activities. The tribes also argued that mitigation may be impossible for certain TCPs or sacred sites, and it is counterintuitive to lease oil and gas without prior knowledge of such sites.

However, the HPD has made a reasonable effort to identify known TCPs and sacred sites in consultation with the SHPO and tribes during the land use planning process and during the analysis for this document. Intensive field inventories covering entire lease parcels for this proposed competitive oil and gas lease sale are unnecessary to satisfy the BLM’s Section 106 obligations. Additionally, the BLM’s obligation to comply with the NHPA, the standard terms and conditions of the Federal lease (BLM Form 3100-11), and the limitation on surface use rights for oil and gas leases (43 CFR 3101.1-2) gives BLM decision makers the discretion to modify or deny any project-specific proposals that could potentially disturb TCPs or sacred sites.

The BLM published final regulations on hydraulic fracturing on March 26, 2015 (80 FR 16128). These regulations became effective June 24, 2015. The final rule seeks to address three key goals: (1) ensure that wells are properly constructed to protect water supplies; (2) make certain that the fluids that flow back to the surface as a result of hydraulic fracturing operations are managed in an environmentally responsible way; and (3) provide public disclosure of the chemicals used in hydraulic fracturing fluids. Without a discrete development proposal, the use of hydraulic fracturing in the oil and gas development process cannot be predicted. However, this EA incorporates by reference, in its entirety, a Hydraulic Fracturing White Paper included in Appendix E. This document provides a general discussion of the hydraulic fracturing process and issues associated with its use.

1.7 Issues Considered but Eliminated from Further Analysis

The following issues were identified but eliminated from further analysis as described. The act of offering for sale these Federal mineral leases produces no direct, indirect, or cumulative impacts, except where noted above in Section 1.6 and in Chapter 4, to the following resources beyond those detailed within the respective field office RMP: environmental justice, farmlands, floodplains, fuels and fire management, invasive species and noxious weeds, access, livestock grazing and rangeland health, wastes, wild and scenic rivers, or woodland and forestry. The subsequent development of the lease would require an APD and/or sundry notice and, in some cases a right-of-way application to access and transport production to or from the lease, which would all require more site-specific review. Therefore, these resources will not be discussed further in this document.

The proximity to existing and proposed renewable energy development, specifically wind development was considered by the BLM. There are 6 wind turbines on Parcel WY-181Q-074 in the CFO, with several wind turbines adjacent. Conflicts with private wind development were eliminated from further analysis due to the fact that the oil and gas lessee would be required to enter into good-faith negotiations in order to seek a surface access agreement with the surface owner. Thus, if any conflicts were to occur, they would be addressed by the lessee, the landowner.

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2 Implementation of the hydraulic fracturing regulations was temporarily stayed on June 23, 2015, by the United States District Court for the District of Wyoming. The Court preliminarily enjoined enforcing the rule by decision dated September 30, 2015. On June 21, 2016, the Court issued its Order setting aside the BLM’s final rule on hydraulic fracturing.
and the surface managing agency in coordination with the BLM and the wind development company at the time of proposed exploration, development and drilling.

The field offices screened each parcel for wilderness, wilderness study areas, and lands with wilderness characteristics. Screening criteria and the results are listed in Appendix D, Wilderness Characteristics field office screens, by respective field offices. The BFO, CFO and NFO found that all of their parcels do not meet the first criteria of the screen “more than 5,000 acres of roadless land”, and therefore do not qualify. All parcels remain available for oil and gas leasing under their respective RMPs.

1.8 Public Participation

Upon receipt of the First Quarter 2018 Competitive Oil and Gas Lease Sale preliminary parcel list, an informal scoping letter was sent to affected split estate surface owners advising them of the nominations and to solicit their input concerning the competitive oil and gas lease sale. One comment was received in response to the notification letters. The commenter supports oil and gas development, but expressed concerns with steep slopes and sensitive soils on parcel WY-181Q-084.

Informal scoping letters were also sent to Native American tribal contacts known or identified as having interest or concerns with oil and gas leasing in the area. A tribal contact from the Flandreau Santee Sioux Tribe noted they had no concerns with the parcels in this competitive oil and gas lease sale. A tribal contact from the Cheyenne and Arapaho Tribes indicated no properties of concern to the tribes were identified. A tribal contact from the Northern Cheyenne Tribe had no specific concerns, but does want to continue participation in the NEPA process for this competitive oil and gas lease sale.

Notice letters were sent to the Forest Service, Douglas Ranger District and to units of the National Park Service in this regional area. The superintendent of the Fort Laramie National Historic Site identified concerns with oil and gas development in proximity to the Historic Site. Those concerns include activities within the visual setting of the area, effects on visitor experience, and impacts to air quality, water quality and night skies. These are impacts associated with lease development, and will be addressed site specifically if a development proposal is submitted. No new issues were identified that would suggest the need to consider alternatives beyond those being addressed in this EA.

In accordance with the BLM/WGFD Memorandum of Understanding WY131, Appendix 5G, the WSO sent the preliminary parcel list to the WGFD. Each BLM field office sent a revised preliminary parcel list to WGFD field personnel. WGFD field personnel had 3 weeks to review the revised preliminary parcel list and send their comments back to the BLM field office. If WGFD field personnel did not have any comments or concerns with the revised preliminary parcel list, they sent an email/letter to the BLM field office that they have reviewed the revised preliminary parcel list, and the WGFD concerns have been met and they have no additional concerns. WGFD’s Gillette wildlife biologist expressed concerns with leasing parcel WY-181Q-054 because it falls within Greater Sage-grouse core area, and recommended it be deferred from leasing. As noted previously, the HPD determined that the stipulations applied to Parcel WY-
181Q-054 would be sufficient to conserve sage-grouse and their habitats, and the parcel will be offered for lease sale. The BLM field office reviewed WGFD field personnel concerns and addressed their comments. See Table 5.1 for a list of all Persons, Agencies and Organizations consulted for purposes of this EA.

Under procedures outlined in a memorandum of understanding, the BLM requested comments from the Bureau of Reclamation as the surface management agency on parcel WY-181Q-006. The Bureau of Reclamation has no objection to leasing this parcel with the Reclamation Special Stipulations GP-135 and their Standard Stipulations (Form 3109-1) included as terms and conditions on the lease.

A press release announcing the availability of the EA for comments was e-mailed to local media July 24, 2017. The press release stated the comment period for the EA would run until August 23, 2017. Letters were mailed to Native American tribes, advising of the availability of the EA and the comment period. As required by BLM leasing policy, where parcels are split estate, notification of the EA review and possibility to comment is sent to the surface owner based on the surface owner information provided by the party submitting the EOI. Informational postcards were mailed to affected split estate landowners, advising them the EA was available for review and comment.

All substantive comments on the EA are addressed in Appendix F.

1.9 Summary

This chapter presents the purpose and need for sale of those parcels within the HPD portion of the First Quarter 2018 Competitive Oil and Gas Lease Sale, as well as relevant issues. Those issues are elements of the human environment that could be affected by the administrative actions of offering and issuance of leases that were not previously addressed in the tiered RMP EISs, for which new BLM policy has changed or for which new information exists. In order to meet the purpose and need of the HPD portion of the First Quarter 2018 Competitive Oil and Gas Lease Sale in a way that resolves the issues, the BLM has considered a range of alternatives. These alternatives are presented in Chapter 2. Chapter 3 gives a description of the affected environment for each resource where a stipulation has been attached as dictated under the pertinent RMP. The potential environmental impacts or consequences to any resource affected resulting from implementation of each alternative considered in detail are analyzed in Chapter 4.
Chapter 2

Proposed Action and Alternatives

2.1 Introduction

The HPD received nominations of 84 parcels (48,794 Federal mineral acres and 4,718 Federal surface acres) for the First Quarter 2018 Competitive Oil and Gas Lease Sale. Out of those 84 parcels, 3 entire parcels and one partial parcel were deferred in Chapter 1 for the reasons described therein (see Appendix B, HPD Deferral Table). Therefore, the remaining 81 parcels will be analyzed in the remainder of this EA. Out of those remaining 81 parcels, 28 parcels are administered by the BFO, 47 parcels are administered by the CFO and 6 parcels are administered by the NFO. Federal mineral and Federal surface acres for parcels considered in Alternatives A and B are shown in Table 2.1 below.

Table 2.1 Parcels Offered for Alternatives A and B

<table>
<thead>
<tr>
<th>Offered</th>
<th>Number Parcels</th>
<th>Federal Mineral Acres</th>
<th>Federal Surface Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative A</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Alternative B</td>
<td>81</td>
<td>45,003</td>
<td>4,077</td>
</tr>
</tbody>
</table>

In some cases, the field office recommended stipulations or deferrals that the HPD determined were not in conformance with previous leasing decisions or the pertinent RMP. Therefore, changes were made by the HPD in accordance with those determinations and are reflected throughout the rest of this document.

2.2 Common to All Alternatives

Lease stipulations will be applied to each parcel uniformly across all alternatives by field office to conform with each RMP (as revised or amended). Please see Chapter 4, Common to All Alternatives section for the details.

2.3 Alternative A – No Action

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 the case of a lease sale, this would mean that an EOI to lease (parcel nomination) would be deleted. The No Action alternative would delete all 81 parcels from the HPD portion of the First Quarter 2018 Competitive Oil and Gas Lease Sale.

Any ongoing oil and gas development as well as any other land uses would continue on surrounding Federal, private, and state leases. Selection of the No Action Alternative would not preclude the re-nomination of a deleted parcel from future sale as long as the area remains open to fluid mineral leasing.
2.4 Alternative B – Proposed Action

Alternative B would offer all 81 parcels currently analyzed in this EA for the HPD portion of the First Quarter 2018 Competitive Oil and Gas Lease Sale (Table 2.2). Under Alternative B, 45,003 Federal mineral acres and 4,077 Federal surface acres would be offered for lease, while 3,792 Federal mineral acres and 641 Federal surface acres would be deleted or deferred.

Table 2.2 Federal Acres Offered and Deleted/Deferred in Alternative B

<table>
<thead>
<tr>
<th>Alternative B</th>
<th>Number Parcels</th>
<th>Federal Mineral Acres</th>
<th>Federal Surface Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offered</td>
<td>81</td>
<td>45,003</td>
<td>4,077</td>
</tr>
<tr>
<td>Deleted/Deferred</td>
<td>0</td>
<td>3,792</td>
<td>641</td>
</tr>
</tbody>
</table>

2.5 Alternatives Considered, but Eliminated from Further Analysis

No other action alternatives were considered by the three field office ID teams or the HPD.
Chapter 3

Affected Environment

3.1 Introduction

This Chapter presents the affected environment (i.e., the physical, biological, social, and economic values and resources) identified by the three field offices, and presented as issues in Chapter 1 (Section 1.6) of this EA. This Chapter provides the baseline for comparison of alternatives for impacts and consequences described in Chapter 4. Refer to Appendix A, Affected Environment Tables which provides a HPD summary of stipulations applied by parcel.

3.2 General Setting

The HPD encompasses lands in Campbell, Converse, Crook, Goshen, Johnson, Natrona, Niobrara, Platte, Sheridan and Weston Counties in Wyoming. The area is characterized by somewhat flat rolling prairie with breaks and steep gullies near major hydrologic features. The proposed competitive oil and gas lease sale parcels are located in Campbell, Converse, Crook, Goshen, Johnson, Natrona, Niobrara, Platte and Weston Counties.

3.3 Resources/Issues Identified for Analysis

3.3.1 Air Resources

In addition to the air quality information in the RMPs, new information about GHGs and their effects on national and global climate conditions has emerged. On-going scientific research has identified the potential impacts of GHG emissions such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and several trace gases on global climate. Through complex interactions on a global scale, GHG emissions 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 (along with corresponding variations in climatic conditions), industrialization and burning of fossil carbon sources have caused GHG concentrations to increase measurably, and may contribute to overall climatic changes.

This EA incorporates an analysis of the contributions of the proposed action to GHG emissions and a general discussion of potential impacts to climate. Air Resources include climate, climate change, air quality, air quality-related values (including visibility and atmospheric deposition) and smoke management. Therefore, NEPA requires that the BLM must consider and analyze the potential effects of BLM and BLM-authorized activities on air resources as part of the planning and decision-making process.

3.3.1.1 Air Quality

The U.S. Environmental Protection Agency (EPA) establishes air quality standards (NAAQS) for criteria pollutants. Criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO₂),...
ozone (O₃), particulate matter 2.5 microns or less in diameter (PM2.5), particulate matter 10 microns or less in diameter (PM10), sulfur dioxide (SO₂) and lead (Pb). Air pollutant concentrations greater than the NAAQS would represent a risk to human health.

The EPA has delegated regulation of air quality to the State of Wyoming and is administered by the Wyoming Department of Environmental Quality (WDEQ). Wyoming Ambient Air Quality Standards (WAAQS) and NAAQS identify maximum limits for concentrations of criteria air pollutants at all locations to which the public has access. The WAAQS and NAAQS are legally enforceable standards. Concentrations above the WAAQS and NAAQS represent a risk to human health that, by law, require public safeguards be implemented. State standards must be at least as protective of human health as Federal standards, and may be more restrictive than Federal standards, as allowed by the Clean Air Act.

For the most part, the counties that lie within the jurisdictional boundaries of the HPD (Natrona, Converse, Platte, Goshen, Niobrara, Weston, Crook, Campbell, Sheridan and Johnson) are classified as in attainment for all state and national ambient air quality standards as defined in the Clean Air Act. The one exception is the City of Sheridan, which was designated as nonattainment for PM10 in 1991 (56 FR 11101). All monitoring sites operated by the WDEQ Air Quality Division (AQD) and the BLM in the HPD, including the City of Sheridan, are currently in compliance with the NAAQS and WAAQS.

Various state and Federal agencies monitor air pollutant concentrations and visibility throughout Wyoming. Table 3.1 lists the available air quality monitoring sites within the HPD and relevant sites nearby. The WDEQ operates PM10 monitors as part of the State and Local Monitoring Site (SLAMS) network. Other sites include several Interagency Monitoring of Protected Visual Environments (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 Newcastle Site, which the BLM operates as part of the National Acid Deposition Program (NADP).

### Table 3.1 Air Quality Monitoring Sites within the HPD

<table>
<thead>
<tr>
<th>County</th>
<th>Site Name</th>
<th>Type of Monitor Type</th>
<th>Parameter</th>
<th>Operating Schedule</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campbell</td>
<td>Thunder Basin</td>
<td>SPM</td>
<td>O₃, NOₓ and Met</td>
<td>Hourly</td>
<td>-105.3000 44.6720</td>
</tr>
<tr>
<td></td>
<td>South Campbell</td>
<td>SPM</td>
<td>O₃, NOₓ, PM10 and Met</td>
<td>1/3 (PM10) and hourly (NOₓ and O₃)</td>
<td>-105.5000 44.1470</td>
</tr>
<tr>
<td></td>
<td>Belle Ayr Mine</td>
<td>SPM</td>
<td>NOₓ and PM2.5</td>
<td>1/3 (PM2.5) and hourly (Ox)</td>
<td>-105.3000 44.0990</td>
</tr>
<tr>
<td></td>
<td>Gillette</td>
<td>SLAMS</td>
<td>PM10</td>
<td>1/6</td>
<td>-105.5000 43.7580</td>
</tr>
<tr>
<td></td>
<td>Black Thunder Mine</td>
<td>SPM</td>
<td>PM2.5</td>
<td>1/3</td>
<td>-105.2000 43.6770</td>
</tr>
<tr>
<td></td>
<td>Buckskin Mine</td>
<td>SPM</td>
<td>PM2.5</td>
<td>1/3</td>
<td>-105.6000 44.4720</td>
</tr>
</tbody>
</table>
The BLM assessed recent air quality conditions within the HPD boundary by examining data collected by monitors in the area, supplemented by various monitors in neighboring planning areas, as summarized in Table 3.2. The examination of these data indicates that the current air quality for criteria pollutants in the HPD is in compliance with applicable NAAQS and WAAQS. Based on measurements in the area, visibility in the HPD is considered very good.

Table 3.2 Primary Standards and Representative Concentrations (Air Quality Conditions)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Time</th>
<th>NAAQS (WAAQS if different)</th>
<th>Representative Concentrations</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>1 hour</td>
<td>35 ppm</td>
<td>0.5 ppm</td>
<td>Cheyenne NCore Air Quality Monitoring Station. 2015 Design Value. Data source: <a href="https://www.epa.gov/air-trends/air-quality-design-values">https://www.epa.gov/air-trends/air-quality-design-values</a></td>
</tr>
<tr>
<td></td>
<td>8 hour</td>
<td>9 ppm</td>
<td>0.5 ppm</td>
<td></td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO₂)</td>
<td>1 hour</td>
<td>100 ppb</td>
<td>34 ppb</td>
<td>Belle Ayr BA-4 Air Quality Monitoring Station, Campbell County. 2015 Design Value. <a href="https://www.epa.gov/air-trends/air-quality-design-values">https://www.epa.gov/air-trends/air-quality-design-values</a></td>
</tr>
<tr>
<td>Pollutant</td>
<td>Averaging Time</td>
<td>NAAQS (WAAQS if different)</td>
<td>Representative Concentrations</td>
<td>Data Source</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------</td>
<td>-----------------------------</td>
<td>-------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>53 ppb</td>
<td>6 ppb</td>
<td>South Campbell County Monitoring Site. 2015 Design Value. Data source: <a href="https://www.epa.gov/air-trends/air-quality-design-values">https://www.epa.gov/air-trends/air-quality-design-values</a></td>
</tr>
<tr>
<td>Ozone</td>
<td>8 hour</td>
<td>0.070 ppm</td>
<td>0.059 ppm</td>
<td>Thunder Basin National Grassland Monitoring Site. 2013-2015 Design Value. Data source: <a href="https://www.epa.gov/air-trends/air-quality-design-values">https://www.epa.gov/air-trends/air-quality-design-values</a></td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>24 hour</td>
<td>150 $\mu$g/m$^3$</td>
<td>135 $\mu$g/m$^3$</td>
<td>2015 Maximum PM10 concentration at the Campbell County Monitoring Site. Data Source: <a href="https://www.epa.gov/air-trends/air-quality-design-values">https://www.epa.gov/air-trends/air-quality-design-values</a></td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>50 $\mu$g/m$^3$</td>
<td>12 $\mu$g/m$^3$</td>
<td>2015 Annual Mean for the Campbell County Monitoring Site. Data Source: <a href="http://deq.wyoming.gov/media/attachments/Air%20Quality/Monitoring/Annual%20Network%20Plans/Annual-Network-Plan_2016">http://deq.wyoming.gov/media/attachments/Air%20Quality/Monitoring/Annual%20Network%20Plans/Annual-Network-Plan_2016</a></td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>24 Hour</td>
<td>35 $\mu$g/m$^3$</td>
<td>14 $\mu$g/m$^3$</td>
<td>Casper SLAMS Site. 2013-2015 Design Value. Data Source: <a href="https://www.epa.gov/air-trends/air-quality-design-values">https://www.epa.gov/air-trends/air-quality-design-values</a></td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>12.0 $\mu$g/m$^3$</td>
<td>4.6 $\mu$g/m$^3$</td>
<td>Casper SLAMS Site. 2012-2014 Design Value. Data Source: <a href="http://deq.wyoming.gov/media/attachments/Air%20Quality/Monitoring/Annual%20Network%20Plans/Annual-Network-Plan_2016">http://deq.wyoming.gov/media/attachments/Air%20Quality/Monitoring/Annual%20Network%20Plans/Annual-Network-Plan_2016</a></td>
</tr>
<tr>
<td>Sulfur Dioxide (SO$_2$)</td>
<td>1 hour</td>
<td>75 ppb</td>
<td>31 ppb</td>
<td>Sinclair Monitoring Station, Casper.2013-2015 Design Value. Data source: <a href="https://www.epa.gov/air-trends/air-quality-design-values">https://www.epa.gov/air-trends/air-quality-design-values</a></td>
</tr>
</tbody>
</table>

3.3.1.2 Climate and Greenhouse Gas Emissions

"Climate change" refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer. "Global warming" refers to the recent and ongoing rise in global average temperature near Earth's surface. It is caused mostly by increasing concentrations of greenhouse gases in the atmosphere. Global warming is causing climate patterns to change. However, global warming itself represents only one aspect of climate change. Climate is both a driving force and limiting factor for ecological, biological, and hydrological processes, and has great potential to influence resource management.

It is accepted within the scientific community that global temperatures have risen at an increased rate and the likely cause is gases that trap heat in the atmosphere, referred to as GHGs. The Intergovernmental Panel on Climate Change (IPCC) (2007) concluded that "warming of the climate system is unequivocal" and "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in
anthropogenic GHG concentrations." Extensive research and development efforts are underway in the field of carbon capture and sequestration (CCS) technology, which could help direct management strategies in the future. The IPCC has identified a target worldwide "carbon budget" to estimate the amount of CO2 the world can emit while still having a likely chance of limiting global temperature rise to 2°C above pre-industrial levels. The international community estimates this budget to be 1 trillion tonnes of carbon (IPCC, 2016).

CEQ's first Annual Report in 1970 referenced climate change, indicating that “[m]an may be changing his weather.” It is now well established that rising global atmospheric GHG emission concentrations are significantly affecting the Earth’s climate. These conclusions are built upon a scientific record that has been created with substantial contributions from the United States Global Change Research Program (USGCRP). Studies have projected the effects of increasing GHGs on many resources normally discussed in the NEPA process, including water availability, ocean acidity, sea-level rise, ecosystem functions, energy production, agriculture and food security, air quality and human health.

Based primarily on the scientific assessments of the USGCRP, the National Research Council, and the IPCC, in 2009 the EPA issued a finding that the changes in our climate caused by elevated concentrations of greenhouse gases in the atmosphere are reasonably anticipated to endanger the public health and public welfare of current and future generations.

GHGs are composed of molecules that absorb and reradiate infrared electromagnetic radiation. When present in the atmosphere the gas contributes to the greenhouse effect. Some GHGs such as CO2 occur naturally and are emitted to the atmosphere through natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The primary GHGs that enter the atmosphere as a result of anthropogenic activities include carbon dioxide (CO2), methane (CH4), nitrous oxide (N20), and fluorinated gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Fluorinated gases are powerful GHGs that are emitted from a variety of industrial processes including production of refrigeration/cooling systems, foams and aerosols. Fluorinated gases are not primary to the activities authorized by the BLM and will not be discussed further in this document.

GHGs are often presented using the unit of Metric Tons of CO2 equivalent (MT CO2e) or Million Metric Tons (MMT CO2e), a metric to express the impact of each different greenhouse gas in terms of the amount of CO2 making it possible to express greenhouse gases as a single number. For example, 1 ton of methane would be equal to 25 tons of CO2 equivalent, because it has a global warming potential (GWP) 25 times that of CO2. As defined by EPA, the GWP provides "ratio of the time-integrated radiative forcing from the instantaneous release of one kilogram of a trace substance relative to that of one kilogram of CO2." The GWP of greenhouse gas is used to compare global impacts of different gases and used specifically to measure how much energy the emissions of one ton of gas will absorb over a given period of time (e.g. 100 years), relative to the emissions of one ton of CO2. The GWP accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere. The GWP provides a method to quantify the

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cumulative effects of multiple GHGs released into the atmosphere by calculating carbon dioxide equivalent for the GHGs.

- Carbon dioxide (CO₂), by definition, has a GWP of 1 regardless of the time period used because it is the gas being used as the reference. CO₂ remains in the climate system for a very long time; CO₂ emissions cause increases in the atmospheric concentrations of CO₂ that will last thousands of years (EPA, 2016h).
- Methane (CH₄) is estimated to have a GWP of 28-36 times that of CO₂ over 100 years. CH₄ emitted today lasts about a decade on average, which is much less time than CO₂. But CH₄ also absorbs much more energy than CO₂. The net effect of the shorter lifetime and higher energy absorption is reflected in the GWP. The methane GWP also accounts for some indirect effects, such as the fact that methane is a precursor to ozone, and ozone is in itself a greenhouse gas (EPA, 2016h).
- Nitrous Oxide (N₂O) has a GWP of 265-298 times that of CO₂ for a 100-year timescale. N₂O emitted today remains in the atmosphere for more than 100 years, on average (EPA, 2016h).

Table 3.3 contains GHGs regulated by EPA and global warming potentials.

The Center for Climate Strategies (CCS) prepared the Wyoming Greenhouse Gas Inventory and Reference Case Projection 1990-2020 (Inventory) for the WDEQ through an effort of the Western Regional Air Partnership (WRAP). This inventory report presents a preliminary draft GHG emissions inventory and forecast from 1990 to 2020 for Wyoming. This report provides an initial comprehensive understanding of Wyoming’s current and possible future GHG emissions. The information presented provides the state with a starting point for revising the initial estimates as improvements to data sources and assumptions are identified.

The CCS inventory report discloses that activities in Wyoming accounted for approximately 56 million metric tons (MMt) of gross carbon dioxide equivalent (CO₂e) emissions in 2005, an amount equal to 0.8% of total U.S. gross GHG emissions. These emission estimates focus on activities in Wyoming and are consumption-based: they exclude emissions associated with electricity that is exported from the state. Wyoming’s gross GHG emissions increased 25% from 1990 to 2005, while national emissions rose by only 16% from 1990 to 2004. Annual sequestration (removal) of GHG emissions due to forestry and other land-uses in Wyoming are estimated at 36 MMtCO₂e in 2005. Wyoming’s per capita emission rate is more than four times greater than the national average of 25 MtCO₂e/yr. This large difference between national and state per capita emissions occurs in most of the sectors – Wyoming’s emission per capita significantly exceed national emissions per capita for the following sectors: electricity, industrial, fossil fuel production, transportation, industrial process and agriculture. The reasons for the higher per capita intensity in Wyoming are varied but include the state’s strong fossil fuel production industry and other industries with high fossil fuel consumption intensity, large agriculture industry, large distances, and low population base. Between 1990 and 2005, per capita emissions in Wyoming have increased, mostly due to increased activity in the fossil fuel industry, while national per capita emissions have changed relatively little.

Globally, anthropogenic carbon emissions reached about 7,000,000,000 MT per year in 2000 and an estimated 9,170,000,000 MT per year in 2010 (Boden, Marland, & Andres, 2013). Oil and gas production contributes to GHGs such as CO₂ and methane. Natural gas systems were the
The largest anthropogenic source category of CH₄ emissions in the United States in 2014 was domestic livestock, with 176.1 MMTCO₂e of CH₄ emitted into the atmosphere. Those emissions have decreased by 30.6 MMTCO₂e (14.8 percent) since 1990 (EPA, 2016).

Global mean surface temperatures have increased nearly 1.8°F from 1890 to 2006. Models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24°N) have exhibited temperature increases of nearly 2.1°F since 1900, with nearly a 1.8°F increase since 1970 alone. Temperatures in western Wyoming are expected to increase by 0.25 to 0.40 degrees Fahrenheit per decade while temperatures in surrounding locations in Utah, Wyoming, and Colorado are expected to increase by 0.40 to 1.2 degrees Fahrenheit per decade with the largest decrease expected in southwestern Wyoming (Figure 3-11). Precipitation across western Wyoming is expected to decrease by 0.1 to 0.6 inches per decade with the largest decrease expected in southwestern Wyoming.

Specific modeling and/or assessments of the potential effects for the Buffalo planning area and for the State of Wyoming currently do not exist; however, there are downscaled models that can be applied such as the Northwestern Plains Rapid Ecoregional Assessment (REA) and the 2014 National Climate Assessment (http://nca2014.globalchange.gov/report/regions/great-plains).

In 2012, the Northwestern Plains Rapid Ecoregional Assessment (REA) presented the results of the climate change analysis for this ecoregion. The analysis is presented as a series of figures generated using the RegCM3 15-km pixel regional climate change model data. The figures that are included depict the current or baseline period (1980 to 1999).

The general precipitation pattern is presented on Figure 1. The general annual average precipitation pattern for the Northwestern Plains ecoregion is a trend of increasing precipitation from the northwest to the southeast. This trend is not present in the November to February period and is less apparent during the warm rainy season in May and June. The Powder River Basin southwest of the Black Hills is another exception as it is relatively drier than the southeastern area of the ecoregion.
The mean annual temperature for existing climate pattern in the Northwestern Plains is presented on Figure 2. The climate change model indicates that the southeastern corner of the Northwestern Plains is generally warmer than the rest of the ecoregion. The model shows an exception as an area in south central Montana that is slightly warmer than the surrounding areas during the November to February season.
The National Climate Assessment (NCA) released on May 5, 2014 updates the baseline period (1981-2010) for precipitation and temperature. The NCA portrays similar baseline conditions that the REA shows.
Figure 3-15. Long-term Temperature (top) and Precipitation (bottom) Trends in the United States from NOAA Climate Prediction Center

Rate of Long-Term Trend Temperature Change (top; °F per decade) & Precipitation Change (bottom; inches per decade) - FULL YEAR

Based on 1941-2005 data
Trend begins 1976

Rate of Change:
-1.0 to -1.5
-0.5 to -1.0
-0.0 to -0.5
+0.0 to +0.5
+0.5 to +1.0
+1.0 to +1.5
+1.5 to +2.0

Based on 1931-2005 data
Trend begins 1976

Rate of Change:
-1.0 to -1.5
-0.5 to -1.0
-0.0 to -0.5
+0.0 to +0.5
+0.5 to +1.0
+1.0 to +1.5
+1.5 to +2.0

(http://www.cpc.ncep.noaa.gov)
Figure 3-16 below, taken from the IPCC’s Fourth Assessment Report, indicates varying responses of the natural world to increasing temperatures as a result of increasing global temperatures.

**Figure 3-16 Examples of Impacts Associated with Global Average Temperature Change**

(Impacts will vary by extent of adaptation, rate of temperature change and socio-economic pathway).

A number of the existing authorized activities within the Buffalo, Casper and Newcastle field offices generate GHG emissions. Oil and gas development activities can generate CO₂ and NH₄ (during processing). Carbon dioxide emissions result from the use of combustion engines for OHV and other recreational activities. Wildland fires also are a source of CO₂ and other GHG emissions, and livestock grazing is a potential source of methane. Other activities in the Buffalo, Casper and Newcastle field office areas 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.

This EA includes a qualitative and quantitative analysis of possible greenhouse gas emissions that could occur as a result of reasonably foreseeable oil and gas development associated with the parcels being offered for lease. Additional information about potential emissions would also be available and calculated as part of subsequent site-specific reviews at the APD stage.
3.3.1.3 Visibility

There are several National Parks, National Forests, recreation areas, and wilderness areas within and surrounding the HPD. Table 3.3 lists areas designated as Class I or Class II Areas. National Parks, National 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)(I). Under BLM Manual Section 8560.36, BLM-administered 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.

Table 3.3 National Parks, Wilderness Areas, and National Monuments

<table>
<thead>
<tr>
<th>Area Name</th>
<th>Closest Distance to High Plains District (miles)</th>
<th>Direction from the High Plains District</th>
<th>Clean Air Act Status of the Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badlands National Park</td>
<td>&gt;100</td>
<td>East</td>
<td>Class I</td>
</tr>
<tr>
<td>Bridger Wilderness Area</td>
<td>90</td>
<td>West</td>
<td>Class I</td>
</tr>
<tr>
<td>Cloud Peak Wilderness Area</td>
<td>within</td>
<td>---</td>
<td>Class II</td>
</tr>
<tr>
<td>Devils Tower National Monument</td>
<td>within</td>
<td>---</td>
<td>Class II</td>
</tr>
<tr>
<td>Fitzpatrick Wilderness Area</td>
<td>100</td>
<td>West</td>
<td>Class I</td>
</tr>
<tr>
<td>Grand Teton National Park</td>
<td>&gt;100</td>
<td>West</td>
<td>Class I</td>
</tr>
<tr>
<td>Jewel Cave National Monument</td>
<td>&lt;20</td>
<td>East</td>
<td>Class II</td>
</tr>
<tr>
<td>North Absaroka Wilderness Area</td>
<td>&gt;100</td>
<td>Northwest</td>
<td>Class I</td>
</tr>
<tr>
<td>Teton Wilderness Area</td>
<td>&gt;100</td>
<td>Northwest</td>
<td>Class I</td>
</tr>
<tr>
<td>Washakie Wilderness Area</td>
<td>&gt;100</td>
<td>Northwest</td>
<td>Class I</td>
</tr>
<tr>
<td>Wind Cave National Park</td>
<td>&lt;50</td>
<td>East</td>
<td>Class I</td>
</tr>
<tr>
<td>Yellowstone National Park</td>
<td>&gt;100</td>
<td>Northwest</td>
<td>Class I</td>
</tr>
</tbody>
</table>

Source: NPS 2006

Regional haze is visibility impairment caused by the cumulative air pollutant emissions from numerous sources over a wide geographic area. Visibility impairment is caused by particles and gases in the atmosphere that scatter, distort, or absorb light. The primary cause of regional haze in many parts of the country is light scattering resulting from fine particles (i.e., PM2.5) in the atmosphere. Additionally, coarse particles between 2.5 and 10 microns in diameter can contribute to light extinction. Coarse particles and PM2.5 can be naturally occurring or the result of human activity. The natural levels of these species result in some level of visibility impairment, in the absence of any human influences and will vary with season, daily meteorology, and geography (Malm 1999).

The EPA and other Federal land managers monitor visibility in national parks and wilderness areas. Observations over time have shown that visibility is not as good as it could be compared to natural background conditions (i.e., visibility is impaired relative to natural background conditions). In 1999, the EPA issued a Regional Haze Rule to protect visibility in over 150 national parks and wilderness areas. The Regional Haze Rule requires states to establish Reasonable
Progress Goals for improving visibility, with the overall goal of attaining natural background visibility conditions by 2064.

Visibility impacts are expressed in deciviews (dv), which is a measure for describing perceived changes in visibility. Deciview values are calculated from either measured or estimated light extinction values in units of inverse megameters (Mm\(^{-1}\)). A dv value of zero indicates a pristine atmosphere.

Visibility from monitoring sites operated by the IMPROVE program are shown in Figures 3.1-3.3 for three of the nearest IMPROVE sites over the period from 2002 to 2014. Thunder Basin National Grassland does not have data for 2003 and from 2006 through 2011. Federal land managers have estimated natural background visibility conditions for Wind Cave National Park, which is a federally designated Class I area. Natural background visibility conditions are not available for Thunder Basin National Grassland and Cloud Peak Wilderness Area because they are not federally protected Class I areas. For Wind Cave National Park, the estimated natural background visibility conditions for the 20 percent best and 20 percent worst days are 2.1 dv and 7.2 dv, respectively.

The figures show the most recent 20 percent best days at the IMPROVE sites generally have visibility values less than 6 dv, while the 20 percent worst days typically have visibility values greater than 8 dv. When comparing the current visibility at Wind Cave National Park to the estimated natural background conditions, both the 20 percent worst and 20 percent best days are higher than natural background conditions.

Figure 3.1 Visibility Index for the Thunder Basin IMPROVE site

Source: Federal Land Manager Environmental Database (http://views.cira.colostate.edu/fed/AqryMenu.aspx)
3.3.1.4 Deposition

Atmospheric deposition refers to the processes by which air pollutants are removed from the atmosphere and deposited on terrestrial and aquatic ecosystems, and it is reported as the mass of material deposited on an area per year (kg/ha/yr). Air pollutants are deposited by wet deposition.
(precipitation) and dry deposition (gravitational settling of pollutants). The chemical components of wet deposition include sulfate ($\text{SO}_4^-$), nitrate, and ammonium; the chemical components of dry deposition include sulfate, sulfur dioxide, nitrate, ammonium, and nitric acid.

The NADP and the National Trends Network (NTN) station monitors wet atmospheric deposition and the CASTNET station monitors dry atmospheric deposition. The effects of atmospheric deposition of nitrogen and sulfur compounds on terrestrial and aquatic ecosystems are well documented and have been shown to cause leaching of nutrients from soils, acidification of surface waters, injury to high elevation vegetation, and changes in nutrient cycling and species composition. High elevation aquatic ecosystems in the west, including those in Wyoming, are often sensitive to acidification, to which both nitrogen and sulfur deposition contribute. Background total nitrogen and sulfur deposition data are collected at the NADP National Trends Network (wet deposition) and CASTNet (dry deposition) monitoring locations near Wind Cave National Park in South Dakota and Newcastle, Wyoming. The most recent available background nitrogen and sulfur deposition data for monitoring year 2013 are shown in Table 3.4.

<table>
<thead>
<tr>
<th>Site Location</th>
<th>Nitrogen Deposition (kilograms/hectare/year)</th>
<th>Sulfur Deposition (kilograms/hectare/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wet$^1$</td>
<td>Dry$^1$</td>
</tr>
<tr>
<td>Wind Cave National Park, SD</td>
<td>4.08</td>
<td>0.128</td>
</tr>
<tr>
<td>Newcastle, WY</td>
<td>2.91</td>
<td>-</td>
</tr>
</tbody>
</table>

$^1$NADP 2017a, 2017b.
$^2$EPA 2017b.

To assess atmospheric deposition impacts to sensitive waterbodies, the change in the acid neutralizing capacity (ANC) of sensitive lakes is evaluated. The most current ANC values available for lakes in the Cloud Peak Wilderness area and the number of samples used in the calculation of the lowest 10th percentile ANC values are provided in Table 3.5.

<table>
<thead>
<tr>
<th>Wilderness Area</th>
<th>Lake</th>
<th>Latitude (Deg-Min-Sec)</th>
<th>Longitude (Deg-Min-Sec)</th>
<th>10th Percentile Lowest ANC Value Reported ($\mu$eq/l)</th>
<th>Number of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud Peak</td>
<td>Florence Lake</td>
<td>44°20'53&quot;</td>
<td>107°10'50&quot;</td>
<td>70</td>
<td>40</td>
</tr>
<tr>
<td>Cloud Peak</td>
<td>Emerald Lake</td>
<td>44°27'26&quot;</td>
<td>107°18'11&quot;</td>
<td>34.4</td>
<td>42</td>
</tr>
</tbody>
</table>

Source: USFS 2011

There is substantial peer-reviewed evidence that suggests nitrogen deposition is a significant concern for high alpine ecosystems. A risk assessment evaluating the sensitivity of NPS areas to nutrient enrichment effects from nitrogen deposition ranked these ecosystems as highly sensitive to nitrogen impacts. Further, Pardo et al. (2011) synthesized, evaluated, and extrapolated nitrogen critical loads values for ecoregions across the United States and concluded that the cumulative critical load necessary to protect shrublands and lichen communities is 3 kg/ha/year total.
deposition. As deposition approaches and/or exceeds the critical load, these ecosystems are at risk of changes in plant communities, including loss of native species, invasions of unwanted species like cheatgrass, changes in nutrient cycling, loss of biodiversity, and other negative effects.

3.3.2 Coal

Wyoming produces approximately one-third of all coal produced in the United States. The Powder River Basin in northern Wyoming contains some of the largest low-sulfur coal deposits in the world. New coal lease applications are processed by the BLM using the coal-screening process. Exploration on Federal mineral lands is subject to the requirements and conditions of the coal exploration license process, the result being a set of project-specific stipulations and conditions designed to limit impacts from exploration on other resources. Before the area can be considered for leasing, the amount of overburden, volume and quality of coal, and other information needed to plan a mine is gathered (BLM 2015b).

Coal in Wyoming generally is extracted using surface mining methods, although in the past, some coal was mined underground. Surface mining involves the use of large equipment, such as draglines, shovels, and haul trucks. Small drill rigs are used for exploration to determine the location and thickness and to obtain cores (for determining quality). Extracting coal using surface mining methods often results in large areas of surface disturbance from road construction, removal of topsoil and overburden, and stock piling of these materials. Once an area is mined out, reclamation begins and includes recontouring as closely to the original landscape as possible, reconstruction of drainages, and reseeding and monitoring to ensure the habitats are useable (BLM 2015b).

The BLM Casper Solid Minerals group reviewed the First Quarter 2018 Competitive Oil and Gas Lease Sale preliminary parcel list and GIS for the BFO, the CFO and the NFO. A number of parcels have a coal CSU stipulation applied based on Buffalo RMP Decision #O&G-2008 or Casper RMP Decision #2001. Parcels with a coal CSU stipulation are listed in Appendix A, Affected Environment Tables, Column C, Coal.

3.3.3 Heritage Resources

All parcels addressed in this EA have the potential to contain historic properties including prehistoric and historic archaeological sites, TCPs, and sacred sites. File searches performed by individual field offices revealed that portions of the parcels have been previously inventoried for cultural resources, but there are many areas that have not been inventoried. Prior inventories in or near the parcels located site types that include prehistoric habitations, lithic scatters, stone circle sites, cairns, prehistoric quarries and workshops, prehistoric rock art, historic trash scatters, trash scatters, homesteading sites, historic trails, and historic inscriptions. The majority of the sites are not eligible, although numerous historic properties are present. Reviews of individual RMPs revealed that protective stipulations were applied to historic properties within proposed competitive oil and gas lease sale parcels as described below.
Traditional Cultural Properties (TCPs)

Pumpkin Buttes is approximately 45 miles southwest of Gillette, rising approximately 800 feet above the surrounding landscape. The buttes consist of five flat-topped mesas referred to as North Butte, North Middle Butte, South Middle Butte, South Butte, and Indian Butte. In 2006 the BLM, in consultation with the Wyoming SHPO and Native American tribes, determined that Pumpkin Buttes is a TCP. Consultations with tribes revealed that the buttes were utilized for many types of traditional, religious and ceremonial purposes. Indications of such traditional and religious uses (e.g., stone circles, eagle traps, and cairns) remain on most of the buttes. Although the buttes themselves are considered to be significant, there are likely numerous undocumented sacred sites significant to tribes, such as burials and offering sites, on and around the buttes. Tribes have informed the BLM that the setting or viewshed that can be observed from sacred sites such as the Pumpkin Buttes are important aspects of those sites.

Historic Trails

Four National Historic Trails (NHT) and other historic trails of regional and national significance cross the CFO and the HPD. The four NHTs are formally known as the “Oregon-California-Mormon Pioneer-Pony Express Trail,” but generically as the Oregon Trail because the routes overlap in many areas. The NHTs are associated with sites such as Fort Caspar and Fort Laramie. These routes were major thoroughfares for westward expansion, military campaigns, and to the gold fields of California, Idaho, and Montana. John Bozeman’s shorter route to the Montana mining area was one of the catalysts of the Plains Indian wars in the latter half of the nineteenth century. Additionally, the Texas Trail, the Cheyenne-Deadwood Stage Road, and other historic roads were routes important at a regional level, opening central Wyoming to settlement, commerce, agriculture, industry, and travel. Congress designated the Oregon and Mormon Pioneer trails as NHTs in November 1978 under Public Law 95-625 (92 Stat. 3512; 16 U.S.C. 1244). The purpose of that Act was to identify and protect the trails, along with their historic remnants and artifacts, for public use and enjoyment.

In 1863 John Bozeman scouted a route through the Powder River Basin that would provide a direct overland route for freight traffic and immigrants to the gold fields in western Montana. The later establishment of the Bozeman Trail and the efforts of the United States Army to protect travelers along the route led to “Red Cloud’s War” between the United States Army and a combined force of Sioux, Cheyenne, and Arapaho. Although the U.S. Army established several forts along the Bozeman Trail, it never fully succeeded in protecting travelers along the trail. The Fetterman Battle near Fort Phil Kearney resulted in the worst defeat of the U.S. Army at the hands of the Plains Indians as Fetterman and his entire command of 80 soldiers were killed. The Army eventually abandoned its occupation of the region with the signing of the second Treaty of Fort Laramie in 1868, which closed the Bozeman trail and ceded the area to the Sioux.

Along the Texas Trail passed the greatest migration of men and cattle from Texas to replace the fast vanishing buffalo in Wyoming and Montana. Used from 1876 to 1897, the trail entered Wyoming where the town of Pine Bluffs now sits. It extended north through eastern Wyoming on a line parallel to today’s U.S. Highway 85, connecting to the current I-90 corridor at Moorcroft,
then up the Little Powder River into Montana. Much of the trail paralleled the Cheyenne-
Deadwood Stage Route.

In the NFO, areas within 0.25 mile, or the visual horizon, whichever is closer, of significant
segments of historic trails that are listed on the NRHP, or that are eligible for listing on the NRHP,
are avoidance areas for surface-disturbing activities. This includes Black and Yellow Trail, Sawyer
Expedition Trail, and Indian Trail.

Cultural NSO and CSU stipulations have been applied to parcels in the First Quarter 2018
Competitive Oil and Gas Lease Sale. See Appendix A, Affected Environment Table, Column D,
Cultural Sites/NHT for parcels with cultural and historical stipulations.

3.3.4 Lands and Realty

The BLM Lands and Realty program is aimed at managing the underlying land base that hosts and
supports all resources and management programs. Key activities of field office lands and realty
programs include (1) land use authorizations (e.g., rights-of-way, leases and permits, airport
leases); (2) land tenure adjustments (e.g., sales, exchanges, donations, purchases); and (3)
withdrawals, classifications and other segregations. The BLM works cooperatively to manage the
lands and realty program with other Federal agencies, the State of Wyoming, counties and cities,
and other public and private landholders.

A number of parcels nominated in the First Quarter 2018 Competitive Oil and Gas Lease Sale are
on lands defined as split estate, where a private surface owner has Federal minerals underlying
private surface. As required by BLM leasing policy, where parcels are split estate, a notification
letter notifying them of the EA review and possibility to comment is sent to the surface owner
based on the surface owner information provided by the party submitting the EOI. Approximately
102 split estate landowners were notified of the competitive oil and gas lease sale. If development
should be proposed after leasing, the operator is responsible for complying with the requirements
of Onshore Oil and Gas Order No. 1, including the requirement to make a good-faith effort to
reach a Surface Access Agreement with the private surface owner. The BLM will generally offer
the surface owner the same level of surface protection that the BLM provides on Federal surface.
Parcels offered for sale are subject to stipulations, which include protections on split estate lands
under standard Lease Notice No. 1. Wyoming has issued policy (IM WY-2015-054) to address
setbacks from occupied structures that will be implemented at the development stage.

In the BFO, two (2) parcels have single (or multiple) unplugged wellbores(s) and/or other facilities
located on the parcels. See Appendix A, Affected Environment Table, Column Y, Existing Wells,
for specific affected parcels. The following Special Lease Notice is applied to these 2 parcels:
There is a single (or multiple) unplugged wellbore(s) and/or other facilities located on this parcel.
For more information, please contact a Petroleum Engineer at the Buffalo Field Office at (307)
684-1100.

3.3.5 Paleontology

Fossils generally are considered scientifically noteworthy if they are unique, unusual, rare,
diagnostically or stratigraphically important, or add to the existing body of knowledge in a specific area of science. Most paleontological resources occur in sedimentary rock formations. Although experienced paleontologists generally can predict which formations may contain fossils and what types of fossils may be found based on the age of the formation and its depositional environment, predicting the exact location where fossils may be found is not possible. The BLM utilizes the Potential Fossil Yield Classification (PFYC) system to classify the potential to discover or impact important paleontological resources. The PFYC is based on the likelihood of geologic formations to contain important paleontological resources using a scale of 1 (very low potential) to 5 (very high potential). The PFYC is intended to help determine management and mitigation approaches for leasing and surface-disturbing activities. The potential for mitigation efforts is typically aimed at higher-potential formations (class 4 and 5).

The Upper Cretaceous Lance Formation (PFYC Class 5) can contain a diverse extinct fauna including tyrannosaurs and other theropods, ankylosaurs, hadrosaurs and other ornithopods, ceratopsians, and pachycephalosaurs, and pterosaurs, as well as a variety of mammals, reptiles, amphibians, birds, and fish. Portions of the formation are exposed within each of the three field offices and there have been numerous significant finds within the NFO.

There are several parcels in the First Quarter 2018 Competitive Oil and Gas Lease Sale in which identified paleontological resources occur. See Appendix A, Affected Environment Table, Column E, Paleo PFYC Class 4 or 5, for specific affected parcels.

3.3.6 Recreation and Special Management Areas

Recreational use of the available parcels and the surrounding areas is typically for hunting, fishing, camping, sightseeing, driving for pleasure, off-highway vehicle use, and other recreational activities. In the national survey of fishing, hunting and wildlife-associated recreation for activities in 2006, expenditures from fishing and hunting significantly increased. In Wyoming, more than 320,000 people participated in fishing and hunting in 2006. Additionally, 716,000 people participated in some form of wildlife watching (USFWS 2006 National Survey of Fishing, Hunting, and Wildlife Associated Recreation). The total number of hunting and fishing recreation use days in Wyoming in 2008 was 3,683,371. Based on the number of recreation days and average expenditure per day, hunters, anglers, and trappers expended approximately $685 million in pursuit of their sport (WGFD Annual Report 2008). Non-consumptive users provided about $420 million through wildlife watching, wildlife photography, etc. In total, wildlife associated recreation accounted for over $1 billion dollars in income to the state for the year 2008 (WGFD Annual Report 2008).

Special Management Areas elevate resources and associated uses and opportunities to a high priority to meet the objectives to maintain and enhance those specific resources. In accordance with the BLM’s Land Use Planning Handbook, the BLM has identified Special Recreation Management Areas (SRMA) to manage important recreational resources in the planning area. The primary objective of establishing SRMAs under recreation management zone guidance is to direct recreation program priorities toward areas with high resource values, elevated public concern, or large amounts of recreational activity.
One parcel, WY-181Q-003, is inside the Springer/Bump-Sullivan Wildlife Habitat Management Area, and has been deferred in Chapter 1.

3.3.7 Socioeconomic Resources, Environmental Justice, and Public Health and Safety

In addition to the social and economic assessments and impact analyses located in the earlier referenced RMPs, this section will provide some updated data for the counties in the HPD. As mentioned previously the social and economic analysis area (analysis area) includes the following counties: Campbell, Converse, Crook, Goshen, Johnson, Natrona, Niobrara, Platte, Sheridan and Weston Counties. The below information provides a brief local context for this competitive oil and gas lease sale EA. Please refer to the referenced RMPs for additional discussion on social and economic aspects of these counties.

The culture and community identities across the analysis area have been influenced by the opportunities that local natural resources provide for, especially for agricultural, energy development, and recreational opportunities. Across the analysis area, 99 to 100 percent of the land area is categorized as rural; however, a majority of the population is categorized as urban for Campbell, Goshen, Natrona and Sheridan Counties (Table 1) (U.S. Census, 2010a). In Natrona County the urban population is located in an urbanized area4 whereas for the urban populations in the other counties, the urban population is scattered across urban clusters5. Crook and Niobrara Counties have 100 percent of their populations categorized as rural6, while there is a majority of the population categorized as rural for Converse, Platte and Weston Counties. Excepting Platte County, all of the counties of the analysis area have seen an increase in population from 2000 to 2010, with the largest increase occurring in Campbell County and the smallest increase occurring in Niobrara County. Platte County realized a small decrease in population over this same time period (Table 2) (U.S. Census, 2010b).

<table>
<thead>
<tr>
<th>County</th>
<th>Population</th>
<th>Area (square meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent Urban</td>
<td>Percent Rural</td>
</tr>
<tr>
<td>Campbell County</td>
<td>70.9%</td>
<td>29.1%</td>
</tr>
<tr>
<td>Converse County</td>
<td>44.6%</td>
<td>55.7%</td>
</tr>
<tr>
<td>Crook County</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Goshen County</td>
<td>54.0%</td>
<td>46%</td>
</tr>
<tr>
<td>Johnson County</td>
<td>50.9%</td>
<td>49.1%</td>
</tr>
<tr>
<td>Natrona County</td>
<td>85.6%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Niobrara County</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Platte County</td>
<td>41.4%</td>
<td>58.7%</td>
</tr>
<tr>
<td>Sheridan County</td>
<td>64.5%</td>
<td>35.5%</td>
</tr>
<tr>
<td>Weston County</td>
<td>45.5%</td>
<td>54.6%</td>
</tr>
</tbody>
</table>

Table 3.6 Urban and Rural Population and Area

1U.S. Census 2010a

4 Urbanized areas refer to areas of 50,000 or more people (U.S. Census 2012a).
5 Urban clusters are areas of at least 2,500 people and less than 50,000 people (U.S. Census 2012a).
6 All other population, housing, and areas are not included.
### Table 3.7 Analysis Area Counties Population and Median Age

<table>
<thead>
<tr>
<th>County</th>
<th>2000 Census</th>
<th>2010 Census</th>
<th>% Change in Population 2000 to 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Median</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Population</td>
<td>Age</td>
<td>Population</td>
</tr>
<tr>
<td>Campbell County</td>
<td>33,698</td>
<td>32.2</td>
<td>46,133</td>
</tr>
<tr>
<td>Converse County</td>
<td>12,052</td>
<td>37.5</td>
<td>13,833</td>
</tr>
<tr>
<td>Crook County</td>
<td>5,887</td>
<td>40.2</td>
<td>7,083</td>
</tr>
<tr>
<td>Goshen County</td>
<td>12,538</td>
<td>40.0</td>
<td>13,249</td>
</tr>
<tr>
<td>Johnson County</td>
<td>7,075</td>
<td>43.0</td>
<td>8,569</td>
</tr>
<tr>
<td>Natrona County</td>
<td>66,533</td>
<td>36.4</td>
<td>75,450</td>
</tr>
<tr>
<td>Niobrara County</td>
<td>2,407</td>
<td>42.8</td>
<td>2,484</td>
</tr>
<tr>
<td>Platte County</td>
<td>8,807</td>
<td>41.2</td>
<td>8,667</td>
</tr>
<tr>
<td>Sheridan County</td>
<td>26,560</td>
<td>40.6</td>
<td>29,116</td>
</tr>
<tr>
<td>Weston County</td>
<td>6,644</td>
<td>40.7</td>
<td>7,208</td>
</tr>
<tr>
<td>Total Analysis Area</td>
<td>127,221</td>
<td>na</td>
<td>152,191</td>
</tr>
</tbody>
</table>

1U.S. Census 2010b

The HPD provides productive rangelands for grazing thus contributing to the agricultural industry in the area. Additionally, agricultural opportunities are reflected by statistics on the acreage of land in farms and value of agricultural products sold. Across the analysis area there are 4,600 farms, 34,603,832 acres of land in farms and $546,370,000 in the market value of agricultural products sold (Table 3) (NASS, 2007). Goshen and Platte Counties rank at or near the top in the market value of agricultural products sold, at 1st and 3rd, respectively. Crook, Campbell and Sheridan Counties rank high in the market value of agricultural products sold, at 9th, 10th and 11th respectively. This information helps convey the importance of agriculture to the analysis area and to the State of Wyoming as a whole.

### Table 3.8 Analysis Area Agricultural Statistics

<table>
<thead>
<tr>
<th>County</th>
<th>Land in Farms (acres)</th>
<th># of Farms</th>
<th>Market Value of Agricultural Products Sold</th>
<th>State Rank of Total Value of Agricultural Products Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campbell County</td>
<td>2,345,915</td>
<td>633</td>
<td>$40,140,000</td>
<td>10</td>
</tr>
<tr>
<td>Converse County</td>
<td>2,366,020</td>
<td>435</td>
<td>$34,753,000</td>
<td>15</td>
</tr>
<tr>
<td>Crook County</td>
<td>1,569,912</td>
<td>457</td>
<td>$43,983,000</td>
<td>9</td>
</tr>
<tr>
<td>Goshen County</td>
<td>1,368,342</td>
<td>815</td>
<td>$157,512,000</td>
<td>1</td>
</tr>
<tr>
<td>Johnson County</td>
<td>1,946,1997</td>
<td>319</td>
<td>$27,987,000</td>
<td>18</td>
</tr>
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<td>$48,662,000</td>
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<td>4,620</td>
<td>$546,370,000</td>
<td>na</td>
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</tbody>
</table>

1NASS, 2007

Energy development is also important to the analysis area. In 2011 the HPD produced 37 percent of the total amount of oil produced in Wyoming and 7 percent of the gas (WOGCC, 2012).
Furthermore, the mining sector\(^7\) accounted for 25 percent of the private non-farm employment\(^8\) in 2011 (BEA, 2012a). The revenue generated from oil and gas production as well as the associated employment contributes to the local economies. In addition to revenues from oil and gas production, the sale of oil and gas leases also provides revenue for local economies. The money from the sales of leases goes to the Office of Natural Resources Revenue, which manages all revenue from onshore and offshore mineral leases. The Federal government retains a percentage of the revenues and the remainder is disbursed back to the state in which the leases were sold. Each state determines the amount to retain and how much to disburse to the counties in which the leases were sold. This data is retained by the Office of Natural Resources Revenue and the Wyoming Department of Revenue and has been requested; however, we have not yet received this data.

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.

Oil and gas development, as well as other industrial use such as mining has occurred in the HPD for many decades. Due to the industrial safety programs, standards, and state and Federal regulation, offering these parcels is not expected to increase health or safety risks to humans, wildlife, or livestock. There are no identified hazardous or solid waste sites on the parcels addressed in this EA.

### 3.3.8 Soils

Soils within the HPD are generally considered to be highly erodible from both wind and water action regardless of slope. Soils in Wyoming are especially dependent on vegetative cover to prevent erosion; ground cover and root systems anchor the soil, recycle nutrients, and add scarce organic matter. Extraction of minerals generally involves surface-disturbing activities, including road building, well pad construction, pipeline installation and vegetation treatments. Soil compaction resulting from surface-disturbing activities and associated development can reduce infiltration, increase runoff and hamper reclamation. Protection of soil resources is accomplished through the application of use restrictions or preferred management practices intended to limit soil erosion and loss of soil productivity by conserving topsoil, minimizing erosion and reestablishing vegetation on disturbed areas.

Soil characteristics and slope information for the First Quarter 2018 Competitive Oil and Gas Lease Sale were reviewed and stipulations applied. NSO stipulations for slopes greater than 50 percent were applied to parcels. CSU stipulations for soils with severe erosion hazard, slopes greater than 25 percent, and soils with limited reclamation potential were applied to parcels. See

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\(^7\) The mining sector as defined for the North American Industry Classification System (NAICS) comprises "establishments that extract naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas" (U.S. Census, 2012c).

\(^8\) Private non-farm employment is wage and salary employment excluding farm employment and government employment (BEA, 2012b).

### 3.3.9 Vegetation/Riparian Area

Riparian and wetland areas occur throughout the HPD. Riparian and wetland communities have persistent water or obligate vegetation (e.g., sedges, rushes, and willows) reflecting the availability of surface water or groundwater. Due to the importance of riparian and wetland areas, the BLM performs assessments of the functional condition of these areas. The BLM goal for riparian and wetland areas is to maintain, rehabilitate, and improve riparian ecosystems to achieve maximum long-term benefits. Management challenges for riparian and wetland communities include balancing the sometimes conflicting demands of livestock grazing and wildlife habitats; protecting water quality; avoiding improper livestock grazing, especially during dry summer months without sufficient alternative water supplies; and fencing or other livestock exclusion options along riparian areas and wetlands. Livestock grazing is the most widespread activity that influences riparian habitat conditions. Energy development, roads, forest management, dispersed recreation, and localized wildlife impacts affect the functional capability of riparian-wetland areas. The cumulative impacts of overlapping uses complicate the effectiveness of applying management constraints to a single activity to achieve riparian objectives.

CSU stipulations requiring a 500 foot buffer around riparian/aquatic habitat have been applied to parcels in the First Quarter 2018 Competitive Oil and Gas Lease Sale. See Appendix A, *Affected Environment Table*, Column W, *Vegetation/Riparian* for parcels with riparian stipulations.

### 3.3.10 Visual Resource Management (VRM)

Visual Resource Management (VRM) involves applying methodologies for evaluating landscapes and determining appropriate techniques and strategies for maintaining visual quality and reducing adverse impacts. The inventory process evaluates landscapes based on scenic quality, public perception (sensitivity), and location from key observation points (distance). VRM class recommendations were made based on the inventory process, with final class determinations being set by respective RMPs.

The BLM VRM Class objectives are as follows:

**Class I**: to preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.

**Class II**: to retain the existing landscape character and the level of change to the characteristic landscape should be low. Management activities should not attract the attention of the casual observer. Changes would be required to repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. Modification to a proposal would be required if the proposed changes cannot be adequately mitigated to retain the character of the landscape.
Class III: to partially retain existing landscape character. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate a casual observer's view. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV: to provide the management activities which require major modification of the existing landscape character. Every attempt, however, should be made to reduce or eliminate activity impacts through careful location, minimal disturbance, and repeating the basic landscape elements.

VRM Classifications only apply to BLM-administered surface estate, and therefore do not apply to non-BLM surface within the VRM classification areas. Several parcels in the First Quarter 2018 Competitive Oil and Gas Lease Sale are managed under VRM Class I or Class II objectives. See Appendix A, Affected Environment Table, Column G, VRM Class I or II, for specific parcels affected.

### 3.3.11 Water Resources

Surface water hydrology within the area is typically determined by geology, soil characteristics, precipitation, and water erosion. Factors that affect surface water resources include livestock grazing management, private, commercial and industrial development, recreational use, drought, and vegetation control treatments. Ephemeral drainages that discharge into perennial waters are located within various parcels available in the First Quarter 2018 Competitive Oil and Gas Lease Sale. Perennial streams with associated riparian habitat areas are present for many parcels, as identified in Appendix A, Affected Environment, Column W, Vegetation/Riparian.

Groundwater hydrology within the HPD is influenced by geology and recharge rates. Groundwater quality and quantity can be influenced by precipitation, water supply wells and various disposal activities, and are dependent upon the geologic outcrops that are present in each watershed. The groundwater resources and their protection are administered by the WDEQ under authority from the EPA. In addition to other agencies' requirements, ground water protection restrictions would be applied according to the most recent applicable BLM RMP for each field office. Common aquifers encountered in the district include shallow unconfined surficial aquifers, which regionally are those 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. Information contained in Appendix E, Hydraulic Fracturing White Paper, Section II, Operational Issues/Water Availability and Consumption (page 4 and Attachment 1), is incorporated by reference. The information contained there indicates that throughout the state, approximately 15 million acre feet of surface and/or groundwater are available for use. The largest user of groundwater in the state is the industrial water use sector which includes electric power generation, coal mining, conventional oil and gas production, uranium mining, trona mining and soda ash production, bentonite mining, gypsum mining, coaled methane (CBNG) production, manufacturing of aggregate, cement and concrete, and road and bridge construction. Total current industrial surface water use for Wyoming is...
estimated to be 125,000 acre feet per year and total current groundwater use is estimated to be 246,000 acre feet per year. Parcels on split estate lands (private surface overlaying Federal minerals) have the potential to contain private residences and associated facilities such as domestic water supply wells. Where parcels contain areas of perennial surface water, riparian and wetland areas, stipulations have been added through Lease Notice No. 1 to limit occupancy within 500 feet. Based upon site-specific analysis at the time of development, this offset could be increased. Onshore Order #1 requires that Operators identify all existing wells, and their status, within 1 mile of their proposed development.

Water disposal for conventional oil and gas must conform with 43 CFR 3160, Onshore Oil and Gas Operations and Onshore Oil and Gas Order No. 7, Disposal of Produced Water. For water management under this order, the operator must submit a sundry request which identifies the water quality to be disposed, type of disposal facility (well, pit, evaporation pond, etc.), method of transport to the disposal facility, and proof of authorization for that facility through the pertinent state agency (Wyoming DEQ or WOGCC). Under both FLPMA and the CWA, the BLM cannot authorize any activity which does not comply with all applicable local, state, tribal, and Federal air quality laws, statues, regulations, standards, and implementation plans.

See Appendix A, Affected Environment, Column X, Waters, for parcels that contain stipulations requiring restriction and prohibition of operator surface use until approval of an acceptable plan for mitigation of anticipated impacts.

3.3.12 Wildlife and Special Status Species (Plants and Animals)

Threatened and Endangered and BLM Sensitive Species

Section 7 of the Endangered Species Act (ESA) requires BLM land managers to ensure that any action authorized, funded, or carried out by the BLM is not likely to jeopardize the continued existence of any threatened or endangered species and that it avoids any appreciable reduction in the likelihood of recovery of affected species. Consultation with the FWS is required on any action proposed by the BLM or another Federal agency that affects a listed species or that jeopardizes or modifies critical habitat.

The BLM's Special Status Species Policy outlined in BLM Manual 6840, Special Status Species Management, is to conserve listed species and the ecosystems on which they depend, and to ensure that actions authorized or carried out by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list any of these species. The BLM's policy is intended to ensure the survival of those plants and animals that are rare or uncommon, either because they are restricted to specific uncommon habitat or because they may be in jeopardy due to human or other actions. The policy for Federal candidate species and BLM sensitive species is to ensure that no action that requires Federal approval should contribute to the need to list a species as threatened or endangered.

Other management direction is based on RMP management objectives, activity level plans, and other aquatic habitat and fisheries management direction, including 50 CFR 17, and the BLM's Land Use Planning Handbook, Appendix C, Part E, Fish and Wildlife.
Federally-listed species that may be present are:

**Black-Footed Ferret**

The black-footed ferret (*Mustela nigripes*) was first listed as endangered on March 11, 1967, as a precursor to the ESA of 1973. Black-footed ferrets are almost exclusively associated with prairie dogs and prairie dog towns. In addition to using prairie dogs as a food source, black-footed ferrets utilize prairie dog burrows for shelter, breeding, and brood-rearing. The size and density of prairie dog towns may be the most important factors comprising suitable habitats for black-footed ferrets. Black-footed ferrets are not normally found in black-tailed prairie dog towns or complexes less than 80 acres in size, or in white-tailed prairie dog towns or complexes less than 200 acres in size (BLM 2005a).

On March 6, 2013, the FWS issued a letter acknowledging 'block clearance' for the State of Wyoming in response to a request from the WGFD. This letter provides acknowledgement that the likelihood of identifying wild ferrets in Wyoming, outside of those resulting from reintroductions, is distinctly minimal. Consequently, the Service no longer recommends surveys for the black-footed ferret in either black- or white-tailed prairie dog towns in the State of Wyoming. The Service recommends that project proponents and Federal land management agencies protect all prairie dog towns or complexes for their value to the prairie ecosystem and the many species that rely on them.

**Blowout Penstemon**

The blowout penstemon is endangered at the Federal level based on its restricted distribution to open, early-successional habitat and regional endemic range in the Nebraska Sandhills Prairie and the Great Divide Basin in Wyoming. Habitat for blowout penstemon consists of early successional sand dunes and blowouts. Critical habitat for the blowout penstemon is not designated within the HPD.

**Colorado Butterfly Plant**

The Colorado butterfly plant is a member of the Evening primrose family and is currently listed as threatened under the ESA. The plant is found in southeastern Wyoming, north-central Colorado, and extreme western Nebraska. The Colorado butterfly plant is typically found in wetlands habitats along meandering stream channels on the high plains. Critical habitat in Wyoming has been designated in Platte and Laramie Counties.

**Northern Long-Eared Bat**

The Northern long-eared bat was listed as threatened under the ESA on May 4, 2015. Northern long-eared bats are found throughout eastern and central North America and occur in the extreme northeast of Wyoming (Campbell, Crook, and Weston counties). Primary threats to the species include white-nose syndrome (WNS), alterations to access and climate of hibernacula, human disturbance, and loss of forest habitat for summer roosts. Critical habitat has not yet been proposed.
Preble’s Meadow Jumping Mouse

The Preble's meadow jumping mouse is a subspecies of meadow jumping mouse, endemic to Colorado and Wyoming. It is listed as threatened under the ESA in Colorado, but was removed from ESA protections in Wyoming on July 10, 2008. On August 4, 2011, its protection under the ESA was reinstated in Wyoming. However, no critical habitat has been designated in Wyoming. In the HPD, it is known to occur in Platte, Goshen, and Converse counties. Typical habitat for Preble's is comprised of well-developed plains riparian vegetation with adjacent, relatively undisturbed grassland communities and a nearby water source. These riparian areas include a relatively dense combination of grasses, forbs, and shrubs. Preble's are known to regularly range outward into adjacent uplands to feed and hibernate.

Species Affected by North Platte River Drainage

Several threatened and endangered species listed under the ESA rely on habitats found within the Platte River System. Platte River species include the whooping crane, least tern, piping plover, pallid sturgeon, and western prairie fringed orchid. Impacts to these species should be considered when proposed actions may lead to consumptive use of water or affect water quality downstream in the Platte River. Platte River Species Critical Habitat has been delineated in Converse, Goshen, Natrona, Niobrara, and Platte counties within the HPD.

Ute Ladies'-Tresses

The Ute ladies'-tresses is an ESA threatened species. The Ute ladies'-tresses is a local endemic orchid known to occur in Converse, Goshen, and Niobrara counties. More than 50 percent of the continental range of this species occurs in Wyoming. Habitat for this perennial orchid includes riparian and wet meadow habitats. Critical habitat has not been designated for this species.

Greater Sage-grouse

The Greater Sage-grouse was a candidate species for listing under provisions of the ESA as determined by the FWS and documented in a March 5, 2010, Federal Register notice declaring that listing of the Greater Sage-grouse was warranted but precluded by higher priorities. On September 22, 2015, the FWS determined the Greater Sage-grouse no longer required protection under the ESA. However, the species is still on the BLM Sensitive Species List. The State of Wyoming has developed the Greater Sage-grouse Core Area Strategy to help conserve sage-grouse populations and associated habitats. The State of Wyoming and the WGFD, in conjunction with land management agencies and subject matter experts, have identified sage-grouse core areas throughout the state which represent relatively productive areas for sage-grouse, and have suggested special management for these areas. Within the HPD there are approximately 3,624,598 acres of sage-grouse core areas (version 3), also referred to as Priority Habitat Management Areas (PHMA), that occur on public, private, state, and Federal lands. The RMPs for the CFO and the NFO have undergone amendment as part of the Wyoming Greater Sage-Grouse Land Use Plan Amendment (ARMPA). These RMP amendments and portions of the Buffalo Approved Resource Management Plan (ARMP) have been developed to provide additional protections for PHMAs and further limit degradation and fragmentation from human activity in sage-grouse habitat.
**Prairie Dog Colonies**

Black-tailed prairie dogs are stocky ground squirrels that are usually buff brown with a black tipped tail. These are the most widely distributed species of prairie dog and are thought to have once occurred from southern Canada to northern Mexico, covering a continuous 400-mile wide band from the foothills of the Rockies to the central lowlands of the Great Plains. Currently, this species still occurs over its entire range (except Arizona) in small, fragmented colonies. However, they are a BLM Wyoming sensitive species and provide habitat for other sensitive species. Black-tailed prairie dogs affect rangeland habitats by influencing plant species diversity and composition and creating habitat preferred by other wildlife species. Well known obligates of prairie dog colonies include black-footed ferrets and burrowing owls, both of which depend on prairie dogs for burrow structures and/or food. Mountain plovers also tend to use prairie dog colonies for nesting.

**Bald Eagle**

In 1978, the bald eagle (*Haliaeetus leucocephalus*) was federally listed as endangered under the ESA in all of the continental United States except for Minnesota, Wisconsin, Michigan, Oregon, and Washington. In those states, the bald eagle was listed as threatened. In 1995, the eagle’s status was changed to threatened throughout the United States. Species-wide populations have recovered from earlier declines, and the bald eagle was proposed for de-listing in 1999 and de-listed in 2007. The bald eagle is currently protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668) and the Migratory Bird Treaty Act (16 U.S.C. 703). It is currently listed as a sensitive species for the BLM in Wyoming. Bald eagle nesting and winter roosting habitat can be found throughout the HPD.

**Big Game**

Winter range is a crucial factor in the health and survival of big game herds. The availability of good winter range where big game can find shelter and adequate food means the difference between strong populations or a herd weakened by starvation and at increased risk for disease and predation. Disturbance of animals on winter range by humans and motor vehicles and the loss of winter range due to development can heavily impact big game animals during the winter.

The availability of parturition areas are also important factors in the health and survival of big game animals. These areas are generally used in the spring and have higher quality vegetation available to meet the greater nutritional demands of pregnant and lactating females. They also tend to have greater amounts of thermal and hiding cover, depending on the species, to protect animals from predation and weather. Disturbance by humans on parturition areas can greatly impact survival of newborn animals.

**Raptors**

Raptors include eagles, hawks, owls, falcons, and vultures. Ten species of diurnal raptors and five species of owls are known or suspected to occur within the HPD. Nine of the 10 diurnal raptor species breed in Wyoming; the remaining species—the rough-legged hawk—is a winter resident...
only. Four of the owl species are year-round residents in the state, while the snowy owl is a winter resident only. Raptors can be found collectively in all vegetative types in the HPD.

Sharp-tailed Grouse

Sharp-tailed grouse is an upland bird species present in the HPD. Sharp-tailed grouse are a lekking and ground-nesting species dependent on grassland and shrubland habitats.

Native and Desirable Non-native Fish

Native and desirable non-native fisheries occur throughout the HPD in various types of water bodies. Threats to fisheries include increased sedimentation due to surface disturbing activities near drainages as well as the introduction of toxic substances into waterways.
Chapter 4

Environmental Impacts

4.1 Introduction

As previously stated, the issuance of oil and gas leases is an administrative action. Nominated leases are reviewed to ensure that leasing is in conformance with the approved land use plan, and stipulations are attached to mitigate any known environmental or resource conflicts that may occur on a given lease parcel. On-the-ground impacts would occur only after a nominated parcel is sold, a subsequent lease is issued, and the lessee applies for and receives approval to conduct activities on the lease.

The BLM cannot determine at the leasing stage whether or not a nominated parcel will actually be sold and, if it is sold and a lease is issued, whether or not the lease would be explored or developed. Because well location(s) cannot be determined at this point, the impacts discussed in this chapter are not site-specific. Additional site-specific NEPA analysis would be conducted at the time an APD or facility application is submitted and would provide site-specific analysis for that well location or facility. Additional conditions of approval (mitigation) may be applied at that time.

According to the Tenth Circuit Court of Appeals, site-specific NEPA analysis at the leasing stage may not be possible absent concrete development proposals. Whether such site-specific analysis is required depends upon a fact-specific inquiry. Often, where environmental impacts remain unidentifiable until exploration can narrow the range of likely drilling sites, filing an APD may be the first useful point at which a site-specific environmental analysis can be undertaken (Park County Resource Council, Inc. v. U.S. Department of Agriculture, 10th Cir., April 17, 1987). In addition, the Interior Board of Land Appeals (IBLA) has ruled that, "BLM is not required to undertake a site-specific environmental review prior to issuing an oil and gas lease when it previously analyzed the environmental consequences of leasing the land..." (Colorado Environmental Coalition, et. al, IBLA 96-243, decided June 10, 1999). However, when site-specific impacts are reasonably foreseeable at the leasing stage, NEPA requires the analysis and disclosure of such reasonably foreseeable site-specific impacts (N.M. ex rel. Richardson v. BLM, 565 F.3d 683, 718-19 (10th Cir. 2009). The BLM has not received any development proposals concerning the lease sale parcels addressed in this EA.

Coal, Lands and Realty, Soils, Vegetation/Riparian, Water Resources, and VRM were found to not have any impacts if the proper stipulations were attached as directed from the appropriate RMP in Section 4.2, Common to All Alternatives. Since the following discussion concerns the deferral or offer of each parcel by alternative and none of these resources affect that determination, these resources will not be analyzed further beyond Section 4.2.

Table 4.1 below is a comparison of the parcels offered by alternative. It is provided here as a reference for the discussions in the rest of this chapter.
Table 4.1 Comparison of Parcels Offered in Alternatives A and B

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<tr>
<td>Alternative B</td>
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</table>

4.2 Common to All Alternatives

The following stipulations will be applied to the noted lease sale parcels in all alternatives. Three categories of stipulations are used in the following sections. NSO is the most stringent. Under an NSO, use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values. CSU is less stringent. Under a CSU, use and occupancy is allowed (unless restricted by another stipulation) but identified resource values require special operational constraints that may modify the lease rights. CSU is used for operating guidance, not as a substitute for the NSO or TLS. TLS prohibits surface use during specified time periods to protect identified resource values. This stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrates the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient.

An applicant may request an exception, modification, or waiver of a stipulation or restriction included in a lease or applied as a condition of approval (COA). An exception is a one-time exemption to a lease stipulation or COA determined on a case-by-case basis. A modification is a change to the provisions of a lease stipulation, either temporarily or for the term of the lease. A waiver is a permanent exemption to a lease stipulation.

4.2.1 Lands and Realty Management

Leasing affords the lessee the exclusive right to explore and develop the leased property. Leases are issued with standard terms and conditions, and are subject also to standard lease stipulations, standard lease notices, and specific lease stipulations derived from the applicable RMP. As noted earlier, leasing is an administrative action and generally does not authorize surface disturbing activities. However, the concerns associated with oil and gas development in proximity to dense residual development warrants a brief summary of the types of impacts that might result if development occurs.

Oil and gas development is initiated by submission of an NOS or APD. Prior to that, the operator has usually initiated land owner or surface management entity contact, surveyed a well location and access route, and developed a surface use plan and drilling plan (components of the NOS or APD), that includes the technical details of the drilling proposal. Construction of the access road and well pad require removal of native vegetation, stockpiling of topsoil for later use in surface reclamation, grading of the road and well pad, and fencing to secure the site. Location size depends on many factors including depth to the target formation, type and size of drilling rig, drilling and completion techniques, and the number of planned well bore completions. Well locations can range from a few acres to as many as 40 acres in size. Rig components are moved to the well
location by large trucks, requiring as many as 50 truckloads. Other equipment and supplies, as well as workers access the location by trucks and pickups. Well site preparation and transportation to and from the rig results in dust, noise and increased activity at and near the well location. Well drilling is a continuous operation resulting in noise, dust, increased activity and lighting impacts 24 hours a day throughout the drilling period, sometimes requiring 30 to 45 days for completion. Deeper wells and multiple well bore completions extend this period of activity accordingly. Once a well is completed, activity levels drop dramatically, and the well is either reclaimed if a dry hole, or put into production. Producing wells require less frequent, but routine access for maintenance, collection and transportation of produced oil, and other activities. Pipelines, powerlines and other production related activities are authorized by sundry notice or rights-of-way, and result in surface disturbing impacts similar to those for well pad and road construction. Typical industry practices as well as BLM regulations and policies provide measures to mitigate these impacts. Setbacks reduce the severity of impacts on residential users by providing a buffer between homesites and development activities like noise, light, and dust.

Drilling by its nature crosses geologic formations, some of which are water bearing zones. Some of those water bearing formations serve as potable water sources for residential or livestock uses. BLM regulations require well bore casing to isolate the well bore and drilling fluids from aquifers. Setbacks also increase protections for potable water sources.

Following submission of the APD with a discreet development proposal, the BLM undertakes an environmental review of the proposal to discern site-specific resource impacts, and appropriate mitigation measures.

4.2.2 Coal

Parcels in the First Quarter 2018 Competitive Oil and Gas Lease Sale have coal CSUs applied based on Buffalo RMP Decision #O&G 2008 or Casper RMP Decision #2001.

These parcels have a CSU stipulation that does not allow the lessee or operator to conduct any oil and gas operation unless a plan for mitigation of anticipated impacts is developed and approved. This protects the first in time valid existing rights of specific coal leases, ensures the orderly development of the coal resource, coal mine worker safety, and/or production rates or recovery of the coal resource.

Parcels with a coal (CSU) stipulation as referenced in Appendix A, Affected Environment Tables, Column C, Coal, can be located in Appendix C, HPD Parcel Lease Lists for legal descriptions of parcels with exact wording of coal stipulations applied.

4.2.3 Heritage Resources

Reviews of individual RMPs revealed that protective stipulations need to be applied to historic properties. A number of parcels in the First Quarter 2018 Competitive Oil and Gas Lease Sale have a NSO stipulation applied to contributing and unevaluated segments of the Bozeman Trail.
A number of parcels in the First Quarter 2018 Competitive Oil and Gas Lease Sale have a CSU stipulation that requires a mitigation plan be submitted prior to surface disturbance within three miles of identified historic properties. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions after consultation with the SHPO, applicable Indian tribes, and other interested parties. The Plan must demonstrate that there will be no adverse effects to NRHP eligible or listed historic properties (i.e., the infrastructure will either not be visible or will result in a weak contrast rating).

Parcels with cultural or historical NSO and CSU stipulations as referenced in Appendix A, Affected Environment Tables, Column D, Cultural Sites/NHT, can be located in Appendix C, HPD Parcel Lease Lists for legal descriptions of parcels with exact wording of cultural stipulations applied.

4.2.4 Special Management Areas

Only one parcel, WY-181Q-003, in the Casper FO, is located inside a Special Management Area. However, that parcel has been deferred in Chapter 1 of this EA, and has not been further analyzed.

4.2.5 Soils

After review of soil characteristics and slope information for the First Quarter 2018 Competitive Oil and Gas Lease Sale parcels, NSO stipulations for slopes greater than 50 percent were applied to parcels. Also, CSU stipulations for soils with severe erosion hazard, slopes greater than 25 percent and soils with limited reclamation potential were applied to a number of parcels. Parcels with highly erodible soils stipulations as referenced in Appendix A, Affected Environment Table, Column I, Soils, can be located in Appendix C, HPD Parcel Lease Lists for legal descriptions with exact wording of highly erodible soils stipulations.

4.2.6 Vegetation/Riparian

CSU stipulations requiring a 500 foot buffer around riparian/aquatic habitat that have been applied to parcels in the First Quarter 2018 Competitive Oil and Gas Lease Sale as referenced in Appendix A, Affected Environment Table, Column W, Vegetation/Riparian can be located in Appendix C, HPD Parcel Lease Lists for legal descriptions with exact wording of Riparian stipulations.

4.2.7 Visual Resource Management (VRM)

Several parcels in the First Quarter 2018 Competitive Oil and Gas Lease Sale are managed under VRM Class I or Class II objectives. Parcels with VRM stipulations as referenced in Appendix A, Affected Environment Table, Column G, VRM Class I or II, can be located in Appendix C, HPD Parcel Lease Lists for legal descriptions with exact wording of Visual Resource Management stipulations.
4.2.8 Water Resources

Parcels that contain stipulations requiring restriction and prohibition of operator surface use until approval of an acceptable plan for mitigation of anticipated impacts, as referenced in Appendix A, Affected Environment Table, Column X, Water, can be located in Appendix C, HPD Parcel Lease Lists, for legal descriptions with exact wording of water stipulations. This ensures protection of surface waters and associated riparian habitats by meeting the standards outlined in Chapter 6 of the BLM’s Oil and Gas Gold Book, as revised, and the respective RMPs.

4.2.9 Wildlife and Special Status Species (Plants and Animals)

The current RMPs have evaluated the need to protect habitat necessary for the success of species identified through applicable laws, regulations and policies.

Threatened and Endangered and BLM Sensitive Species

The following Lease Stipulation No. 2 is applied to all parcels to protect known and unknown populations of special status species:

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. The BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. The BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. The BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.

A number of parcels also have a CSU stipulation applied to protect special status amphibians, bats, and/or reptiles and their respective habitats. These parcels are referenced in Appendix A, Affected Environment Table, Column V, Special Status Species Amphibians, Reptiles, Bats, and can be located in Appendix C, HPD Parcel Lease List, for legal descriptions with exact wording for these stipulations.

Greater Sage-grouse

Fourteen parcels located within designated PHMAs have NSO, CSU, and/or TLS stipulations applied to protect sage-grouse and their seasonal habitats. These parcels are referenced in Appendix A, Affected Environment Table, Column S, Greater Sage-grouse NSO, CSU, TLS (in
PHMAs), and can be located in Appendix C, *HPD Parcel Lease List*, for legal descriptions with exact wording for PHMA sage-grouse stipulations.

Twenty-three parcels located outside of designated PHMAs in General Habitat Management Areas (GHMA) for sage-grouse have NSO, CSU, and/or TLS stipulations applied to protect sage-grouse and their seasonal habitats. These parcels are referenced in Appendix A, *Affected Environment Table*, Column T, *Greater Sage-grouse NSO, CSU, TLS (outside PHMAs)*, and can be located in Appendix C, *HPD Parcel Lease List*, for legal descriptions with exact wording for sage-grouse stipulations outside of PHMAs.

There are no parcels that include both PHMA and GHMA habitat. Forty-seven parcels are outside of Greater Sage-grouse habitat.

Alternative B would offer 45,003 acres of Federal minerals for lease sale in the First Quarter 2018 Competitive Oil and Gas Lease Sale. Table 4.2 summarizes the affected Greater Sage-grouse habitat.

**Table 4.2 Sage-Grouse Habitat Summary**

<table>
<thead>
<tr>
<th>Field Office</th>
<th>Parcels</th>
<th>Acres</th>
<th>Acres PHMA</th>
<th>% in PHMA</th>
<th>Acres GHMA</th>
<th>% in GHMA</th>
<th>Acres GSG</th>
<th>% GSG Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>BFO</td>
<td>28</td>
<td>12,124</td>
<td>360</td>
<td>2.4</td>
<td>11,765</td>
<td>97.0</td>
<td>12,124</td>
<td>100</td>
</tr>
<tr>
<td>CFO</td>
<td>47</td>
<td>31,838</td>
<td>7,227</td>
<td>22.7</td>
<td>1,007</td>
<td>3.2</td>
<td>8,234</td>
<td>25.9</td>
</tr>
<tr>
<td>NFO</td>
<td>6</td>
<td>1,041</td>
<td>0</td>
<td>0</td>
<td>996</td>
<td>95.7</td>
<td>996</td>
<td>95.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>81</strong></td>
<td><strong>45,003</strong></td>
<td><strong>7,587</strong></td>
<td><strong>16.9</strong></td>
<td><strong>12,868</strong></td>
<td><strong>28.6</strong></td>
<td><strong>21,354</strong></td>
<td><strong>47.5</strong></td>
</tr>
</tbody>
</table>

**Prairie Dog Colonies**

Parcels with known prairie dog colonies have a CSU stipulation applied to protect special status species and their habitat. These parcels are referenced in Appendix A, *Affected Environment Table*, Column U, *Prairie Dog Colonies*, and can be located in Appendix C, *HPD Parcel Lease List*, for legal descriptions with exact wording for the stipulations.

**Bald Eagle**

Parcels with known bald eagle nests or winter roosts have NSO, CSU, and/or TLS stipulations applied to protect important habitat. These parcels are referenced in Appendix A, *Affected Environment Table*, Column Q, *Bald Eagle Winter Roosts/Nesting (NSO, CSU, TLS)*, and can be located in Appendix C, *HPD Parcel Lease List*, for legal descriptions with exact wording for the stipulations.
**Big Game**

Parcels within designated big game crucial winter range have a CSU and/or TLS stipulation applied to protect this important habitat. These parcels are referenced in Appendix A, *Affected Environment Table*, Column M, *Big Game Crucial Range CSU, TLS*, and can be located in Appendix C, *HPD Parcel Lease List*, for legal descriptions with exact wording for the stipulations.

**Raptors**

Parcels that have been identified as having raptor nests and habitat have NSO, CSU, and/or TLS stipulations applied to protect raptors and nest productivity. These parcels are referenced in Appendix A, *Affected Environment Table*, Column P, *Raptor Nesting NSO, CSU, TLS*, and can be located in Appendix C, *HPD Parcel Lease List*, for legal descriptions with exact wording for the stipulations.

**Sharp-tailed Grouse**

Five parcels have been identified as having sharp-tailed grouse lekking and/or nesting habitat and have CSU and/or TLS stipulations applied to protect these habitats. These parcels are referenced in Appendix A, *Affected Environment Table*, Column O, *Sharp-tailed Grouse CSU, TLS*, and can be located in Appendix C, *HPD Parcel Lease List*, for legal descriptions with exact wording for the stipulations.

**Native and Desirable Non-Native Fish**

Parcels identified as having waters that could impact native and desirable non-native fisheries have a CSU stipulation applied to protect these waters. These parcels are referenced in Appendix A, *Affected Environment Table*, Column L, *Fish CSU*, and can be located in Appendix C, *HPD Parcel Lease List*, for legal descriptions with exact wording for the stipulations.

**4.3 Alternative A – No Action**

Discussion of the no action alternative consequences is consolidated in this section, rather than distributed across each subject matter. Impacts of the no action alternative are relatively similar across topics, because the no action alternative is to not lease the nominated parcels.

Under the No Action Alternative, none of the 81 parcels in the HPD would be offered for sale. No oil and gas development would occur on these parcels. Ongoing oil and gas development would continue on surrounding Federal, private, and state leases. Any ongoing oil and gas development as well as any other land uses would continue on surrounding Federal, private, and state leases. Selection of the No Action Alternative would not preclude the re-nomination of a deleted parcel from future sale as long as the area remains open to fluid mineral leasing.

A decision not to offer the 81 parcels for sale would not affect existing uses of these parcels. The parcels are used primarily for livestock grazing, with some dispersed recreation.
such as hunting and hiking. These uses typically entail vehicle travel for access and that would be expected to continue at current rates.

The proposed competitive oil and gas lease sale parcels are located in Campbell, Converse, Crook, Goshen, Johnson, Natrona, Niobrara, Platte and Weston Counties in Wyoming. As these counties rely heavily on energy development revenue, the communities in the leasing areas are likely to be negatively impacted by loss of potential revenue. It is an assumption that the no action alternative (no lease option) may result in a 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 Alternative B – Proposed Action – Direct and Indirect Effects

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, but are still reasonably foreseeable.

4.4.1 Air Resources

4.4.1.1 Air Quality

For the Casper and Newcastle field offices, refer to Section 4.2 (page 4-5) of the ARMPA FEIS for a discussion of potential impacts to air quality, and related values. Refer to Section 4.2.4 (beginning on page 4-7) for a discussion of potential impacts to air quality resulting from oil and gas development, including potential greenhouse gas emissions.

For the BFO, refer to Section 4.1.1 (beginning on page 650) of the ARMP FEIS for a discussion of potential impacts to air quality and related values, including impacts from oil and gas development.

The air emissions projections within the ARMPA for oil and gas development were calculated using the latest emissions data estimates from the Buffalo and Lander EISs (BLM 2010). There can be limitations associated with a quantitative approach given the uncertainties regarding the number, nature, and specific location of future sources and activities. The estimated emissions in the ARMPA were determined using the following assumptions:

- Emissions from BLM-administered activities for both construction and operations are calculated for year 2020 and year 2031. Year 2020 was chosen because construction emissions would be at its peak during that year due to peak well construction at each location. Year 2031 was chosen because operational emissions would be at the highest level, while construction emissions would be at the lowest; and
- Appropriate RDFs (ARMPA, Appendix B and ARMP Appendix D) will be applied; the ARMPA and ARMP analysis disclose the residual impacts that have the potential to occur after application of the RDFs.
It should be noted that for both of the assumptions that the pace and timing of mineral development activities is dependent on a variety of factors outside the management decisions made by the BLM. These include national and international energy demand and prices, production factors within the planning area, and individual strategic choices made by operators.

The Reasonably Foreseeable Development (RFD) for the CFO and the NFO was updated under the GSG ARMPA (2015), and the RFD for the BFO was updated in BFO ARMP (2015). Together the 3 field offices cumulatively cover over 11 million Federal fluid mineral acres in the HPD.

4.4.1.2 Green House Gas Emissions and Climate Change

Refer to Section 4.2.4 (beginning on page 4-7) of the ARMPA FEIS and Section 4.1.1 (beginning on page 650) of the ARMP for a discussion of potential impacts to Air Quality resulting from oil and gas development, including potential direct greenhouse gas emissions.

The administrative act of leasing all or part of 81 parcels covering 45,003 acres would not result in any direct, indirect, or add to cumulative GHG emissions. Nevertheless, the BLM recognizes that GHG emissions are a potential effect of the subsequent fluid mineral exploration and/or development of any leases that are issued. Oil and gas activities may lead to the installation and production of new wells, which may consequently produce an increase in GHG emissions. The primary sources of GHG emissions include the following:

- Fossil fuel combustion for construction and operation of oil and gas facilities – vehicles driving to and from production sites, engines that drive drill rigs, etc. These produce CO₂ in quantities that vary depending on the age, types, and conditions of the equipment as well as the targeted formation, locations of wells with respect to processing facilities and pipelines, and other site-specific factors;
- Fugitive CH₄ – CH₄ that escapes from wells (both gas and oil), oil storage, and various types of processing equipment. This is a major source of global CH₄ emissions. These emissions have been estimated for various aspects of the energy sector, and starting in 2011, producers are required under 40 CFR 98, to estimate and report their CH₄ emissions to the EPA; and
- Combustion of produced oil and gas – it is expected that future operations would produce marketable quantities of oil and/or gas. Combustion of the oil and/or gas would release CO₂ into the atmosphere. Fossil fuel combustion is the largest source of global CO₂.

In recent years, many states, tribes, and other organizations have initiated GHG inventories, tallying GHG emissions by economic sector. The EPA provides links to statewide GHG emissions inventories (EPA, 2015c). Guidelines for estimating project-specific GHG emissions are available (URS Corporation, 2010), but some additional data, including the projected volume of oil or natural gas produced for an average well, number of wells (as well as other factors described in Section 4.2.1. Air Quality) were used to provide GHG estimates. Wyoming’s total GHG emissions are expected to continue to grow to 69 MMTCO₂e by 2020, 56% above 1990 levels. As shown in Figure 3-12 (from the CCS inventory report), demand for electricity is projected to be the largest contributor to future emissions growth, followed by emissions associated with transportation. Although GHG emissions from fossil fuel production had the greatest increase by sector in the period 1990 to 2005, the growth from this sector is
projected to decline due to decreased carbon dioxide emissions from venting at processing plants. Additional capture of fugitive emissions will likely result in further reductions in emissions at all points in the production and refining processes for oil and gas products.

**Direct Emissions**

The Petroleum Association of Wyoming’s website ([http://www.pawyo.org/facts-figurers.pdf](http://www.pawyo.org/facts-figurers.pdf)) reports that in 2014, there were 35,258 active gas and oil wells in the state, 43 operational gas processing plants, 6 oil refineries, and over 38,600 miles of crude oil, gas and petroleum product pipelines located across all land ownership patterns in the state. There are significant uncertainties associated with estimates of Wyoming’s GHG emissions from this sector. This is compounded by the fact that there are no regulatory requirements to track CO₂ or CH₄ emissions.

However, as reported by the Wyoming GHG Inventory and Reference Case Projection CCS, Spring 2007, emissions from the fossil fuel sector grew 101% from 1990 to 2005 and are projected to increase by a further 10% between 2005 and 2020 (if economic incentives remain). The natural gas industry is the major contributor to both GHG emissions and emissions growth, with CH₄ emissions from coal mining second in terms of overall contribution. That said, it is worth noting that a significant portion of the emissions attributed to the natural gas industry are due to vented gas from processing plants, many of which are used for injection in enhanced oil recovery operations. Additionally, many technological advances in emission control technology have been implemented by the oil and gas industry to reduce emission levels.

The average number of oil and gas wells drilled annually in the HPD 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. *For additional information on projected emissions of GHGs, please see Wyoming Greater Sage-Grouse Land Use Plan Amendment FEIS pages 4-10 thru 4-39, and the Buffalo ARMP FEIS pages 682-701.* As analyzed in the GSG ARMPA, total CO₂e emissions for the full RFD under the GSG ARMPA in 2020 (expected maximum year of construction associated emissions) is projected to be, in metric tonnes (mt), 2,048,154 for natural gas wells, 1,466,658 for CBNG, 59,641 for oil wells, 53,152 from horizontal natural gas wells and 14,358 from horizontal oil wells with a total CO₂e of 3.64 million metric tonnes assuming that all wells projected under the RFD are drilled and producing, and that there are no controls on the waste stream (ARMPA Table 4-4). Annual emissions (tons/year) for activities in the BFO as analyzed in the Buffalo ARMP for 2024 are estimated to be 101,448 for natural gas, 110,721 for coalbed natural gas, 50,099 for oil with a total 262,267 CO₂e metric tonnes (ARMP Table 4.24).

The lands proposed for lease as part of the sale under consideration are within the Buffalo, Casper and Newcastle field offices and only represent a portion of the area covered by the RFD. The 81 proposed parcels, containing approximately 45,003 acres, is 0.01% of the total acreage included in the HPD RFDs. Assuming these lands are leased and developed to the full potential, as projected by the RFDs for the GSG ARMPA and Buffalo ARMP, development to the full RFD in the CFO would produce a total of 386,924 metric tonnes (mt) of CO₂e (ARMPA Table 4-6) and the NFO is projected to produce a total of 20,245 mtCO₂e (ARMPA Table 4-14). Direct GHG emissions resulting from any future development of these parcels is within the projections identified in the GSG ARMPA FEIS and includes all emissions generated from
construction through the production of the wells and are based on the year 2020 estimates. As explained above those represent peak emissions values as 2020 is estimated to be the peak period for well development. The BFO is projected to produce a total of 262,267 mtCO₂e (ARMP Table 4.24). Direct GHG emissions resulting from any future development of these parcels is within the projections identified in the ARMP FEIS and includes all emissions generated from construction through the production of the wells and are based on the year 2024 estimates. For the ARMP analysis, GHG emissions were estimated for a 20-year period, beginning with 2005 as the base year, 2015 as the mid-point interim year, and 2024 as the end of this period.

Any incremental contribution to global GHGs cannot be translated into incremental effects on climate change globally, regionally, or in the area of these site-specific actions. As oil and gas and natural gas production technology continues to improve in the future, it may be feasible to further reduce GHG emissions. Information contained in Appendix E, Hydraulic Fracturing White Paper, Section II Operational Issues/Gas emissions (page 2) is incorporated by reference.

### Indirect Emissions

Information on production of oil and gas was provided by the RMG and BLM field and district office staff to support analysis within the GSG ARMPA and ARMP FEISs. The information used to develop total oil and gas production estimates by year for each alternative and each field office or planning unit, including the number of wells drilled each year by alternative for each field office or planning unit (from the RFD), the percent of wells that were oil versus gas, the percent of wells completed, production decline curves for oil and gas wells, and estimates of cross production from both oil and gas wells.

As discussed in Appendix N, Social and Economic Impact Analysis Methodology, from the ARMPA FEIS, the procedure to determine total production was as follows: for each year, the number of wells completed was broken down into oil and gas wells based on the breakdown assumptions per field office and planning unit provided by BLM staff. For each well type, the average first year production rate (volume) from the annual decline curves for each field office and planning unit (as provided by the RMG) was then applied to determine the total production from first-year wells. In subsequent years, the appropriate average production rates from the decline curves were applied to the number of second year wells, third year wells, and so on. Total production was then summed across all the well age cohorts for each year within the analysis period. Co-production volume was calculated based on the numbers of wells of each type and the co-production rates from the RMG, and added to the total production volume. Using the above projection, and utilizing the EPA GHG Equivalences Calculator, assuming 100% combustion of the produced fluids, estimated indirect emissions are shown in Table 4-3.

<table>
<thead>
<tr>
<th>Year</th>
<th>Gas (MCF)</th>
<th>Oil (BBLs)</th>
<th>Year</th>
<th>Gas (CO₂)</th>
<th>Oil (CO₂)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>2,533,391</td>
<td>1,620,202</td>
<td>2016</td>
<td>138,619.58</td>
<td>696,686.98</td>
<td>835,306.56</td>
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</tbody>
</table>
### Oil and Gas Production (Alternative E Preferred Alternative from Sage Grouse 9-Plan) - Newcastle FO Summary (2016-2020)

<table>
<thead>
<tr>
<th>Year</th>
<th>Gas (MCF)</th>
<th>Oil (BBL)</th>
<th>Year</th>
<th>Gas (CO2)</th>
<th>Oil (CO2)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>2,533,391</td>
<td>1,620,202</td>
<td>2016</td>
<td>138,619.58</td>
<td>696,686.98</td>
<td>835,306.56</td>
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<tr>
<td>2017</td>
<td>3,256,408</td>
<td>1,955,704</td>
<td>2017</td>
<td>178,180.90</td>
<td>840,952.89</td>
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<td>2018</td>
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<td>2,220,832</td>
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<td>239,886.43</td>
<td>954,957.68</td>
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<td>2019</td>
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<td>2019</td>
<td>294,412.24</td>
<td>1,055,510.73</td>
<td>1,349,922.97</td>
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<tr>
<td>2020</td>
<td>6,174,326</td>
<td>2,667,548</td>
<td>2020</td>
<td>337,840.60</td>
<td>1,147,045.73</td>
<td>1,484,886.33</td>
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<tr>
<td><strong>Total:</strong></td>
<td>1,188,939.75</td>
<td>4,695,154.01</td>
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<td></td>
<td></td>
<td>5,884,093.76</td>
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</tbody>
</table>

### Oil and Gas Production (Alternative D Preferred Alternative) - Buffalo FO Summary (2016-2020)

<table>
<thead>
<tr>
<th>Year</th>
<th>Gas (MCF)</th>
<th>Oil (BBL)</th>
<th>Year</th>
<th>Gas (CO2)</th>
<th>Oil (CO2)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>29,200,000</td>
<td>2,300,000</td>
<td>2016</td>
<td>1,597,736.40</td>
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<td>2017</td>
<td>1,712,642.10</td>
<td>989,000.00</td>
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<td>2018</td>
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<td>2019</td>
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<td>3,694,453.60</td>
</tr>
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<td>47,000,000</td>
<td>3,800,000</td>
<td>2020</td>
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<td>1,634,000.00</td>
<td>4,205,699.00</td>
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<td><strong>Total:</strong></td>
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<td>6,364,000.00</td>
<td></td>
<td></td>
<td></td>
<td>16,448,343.10</td>
</tr>
</tbody>
</table>

**Emission Factor Source:** EPA GHG Equivalencies Calculator

https://www.epa.gov/energy/ghg-equivalencies-calculator

- **CO2 emissions generated from oil consumption:** 0.43 metric tons CO2/barrel oil
- **CO2 emissions generated from burning natural gas:** 0.054717 metric tons CO2/MCF

* MCF = one thousand cubic feet
* BBL = barrels

**Emission Estimate Uncertainties**

Although this EA presents quantified estimates of potential direct and indirect GHG emissions associated with the potential for oil and gas development, there is significant uncertainty in GHG emission estimates due to various unknowns with regard to actual production, how produced substances are used, how regulation of the various GHG parameters by the delegated agencies is applied, and whether any Best Available Control Technologies are utilized at the upstream or downstream activity location(s) and the reader is cautioned that, while based on the best available data, these estimates are highly speculative. For example, the RFD reports prepared for the relevant land-use plans disclose variable rates of success over time for wells drilled in these planning areas. Based on both historical and current information, the rate of success for wells being productive range from a low of 13% to upwards of 90% depending upon where you are within the individual field offices, the formations being targeted, price indexes and technological advances. Where discussed in the RFD reports, success rates are expected to decline due to
future exploration of unconventional resources. [See Buffalo RFD (2012) pages 16-17, and Casper RFD (2005) pages 7-9].

Oil and Gas Product End Use Uncertainty
The direct and indirect emission estimates above provide an estimate of the full potential for GHGs released into the atmosphere from initial wellsite construction, well drilling and completion, production, and end use. A rough estimate was possible using full field and unconstrained potential well development prepared for the ARMPA EIS. With respect to the rough estimates of indirect CO2 emissions, it should be noted that it is a difficult to discern with certainty what end uses for the fuels extracted from a particular leasehold are reasonably foreseeable. For instance, some end uses of fossil fuels extracted from Federal leases include: refining for transportation fuels, fuel oils for heating and electricity generation, or production of asphalt and road oil. They may also be used in the chemical industry, for the manufacture of medicines and everyday household items, plastics, military defense and for the manufacture of synthetic materials. The BLM does not exercise control over the specific end use of the oil and gas produced from any individual Federal lease and has no authority to direct or regulate the end use of the produced products. As a result, the BLM can only provide an estimate of potential GHG emissions by assuming that all produced products would eventually be combusted. The uncertainty about end uses is in addition to the significant uncertainty with regard to the actual levels of development and production that may occur at any given well.

4.4.1.3 Climate Change Impacts

The following bullet points summarize potential changes identified by the EPA that are expected to occur at the regional scale, where the proposed action and its alternatives are to take place. The EPA identifies this area as part of the Mountain West and Great Plains region (http://www.epa.gov/Region8/climatechange/pdf/ClimateChange101FINAL.pdf):

- The region is expected to experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow would be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs would be drier.
- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs. Drier conditions would reduce the range and health of ponderosa and lodgepole pine forests, and increase the susceptibility to fire. Grasslands and rangelands could expand into previously forested areas.
- Ecosystems would be stressed and wildlife such as the mountain lion, black bear, longnose sucker, marten, and bald eagle could be further stressed.

Other impacts could include:
- Increased particulate matter in the air as drier, less vegetated soils experience wind erosion.
- Shifts in vegetative communities which could threaten plant and wildlife species.
• Changes in the timing and quantity of snowmelt which could affect both aquatic species and agricultural needs. Projected and documented broad-scale changes within ecosystems of the U.S. are summarized in the Climate Change SIR (2010). Some key aspects include:
  - Large-scale shifts have already occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue (Climate Change SIR 2010). Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to 2 weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.
  - Fires, insect epidemics, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff increase fire risks.
  - Insect epidemics and the amount of damage that they may inflict have also been on the rise. The combination of higher temperatures and dry conditions have increased insect populations such as pine beetles, which have killed trees on millions of acres in western U.S. and Canada. Warmer winters allow beetles to survive the cold season, which would normally limit populations; while concurrently, drought weakens trees, making them more susceptible to mortality due to insect attack.

The Rapid Ecological Assessment for the Wyoming Basin also provides projections of future climatic changes, while cautioning that reasonably foreseeable changes in climate will vary due to natural inter-annual and decadal variability, uncertainty about future GHG emissions, and the range of uncertainties in the existing global climate models. The authors also recognize that there are differences among climate models in how they represent climate processes and therefore produce different climate projections for a given time period and location even when the same future emissions scenario drives the simulation. Global temperatures, however, are expected to increase (Intergovernmental Panel on Climate Change, 2013) such that warmer temperatures in the future can be expected, although the magnitude and consequences of warming is uncertain, but note that summers are projected to warm more than winters (an increase of 4.5 °F versus 3.5 °F) (fig. 5.1 in Lukas and others, 2014) while no statistically significant changes in precipitation are noted, winters may be wetter and summers likely drier. Despite the lack of statistically significant projected changes in precipitation, the temperature increase alone could increase evaporation and plant water demand; thus, even without a decrease in precipitation, water availability for ecosystems could decrease if precipitation remains about average (Carr, 2016).
Figure 4-1. Methane and Fossil Fuel Emissions

Table E2. Methane Emissions and Projections from the Fossil Fuel Industry

<table>
<thead>
<tr>
<th></th>
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The value 0.00 in the above table indicates emissions less than 0.005 MMtCO2e.

Figure E1 displays the CH4 emissions from coal mining and natural gas and oil systems, on an MMtCO2e basis.

4.4.1.4 Visibility

Offering all 81 parcels for competitive sale would have no direct impacts to visibility. Any potential effects to visibility would occur when the leases were sold and subsequently developed particularly during construction. Data collection for visibility would continue.

4.4.1.5 Mitigation Measures for Air Resources

Best management practices (BMP) such as those used to reduce fugitive dust emissions and GHG emissions and to maintain air quality, would help mitigate effects to these resources. Further analysis at the APD and facility application stages of development may examine possible mitigations to alleviate site-specific impacts.

The BLM holds regulatory jurisdiction over portions of natural gas and petroleum systems identified in the EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006
documents. Exercise of this regulatory jurisdiction has led to development of BMPs designed to reduce emissions from field production and operations. Analysis and approval of future development on the competitive oil and gas lease sale parcels would include applicable and reasonable BMPs as COAs in order to reduce or mitigate GHG emissions. Additional measures developed at the project development stage could be incorporated as COAs in the approved APD.

Such mitigation measures may include, but are not limited to:

- Flare hydrocarbon and gases at high temperatures in order to reduce emissions of incomplete combustion through the use of multi-chamber combustors;
- "Green" (flareless) completions;
- Water dirt roads during periods of high use in order to reduce fugitive dust emissions;
- Require that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored;
- Installation of liquids gathering facilities or central production facilities to reduce the total number of sources and minimize truck traffic;
- Use of natural gas fired or electric drill rig engines;
- Use selective catalytic reducers on diesel-fired drilling engines; and,
- Re-vegetate areas of the pad not required for production facilities to reduce the amount of dust.

According to the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006 by the EPA, data shows that adoption by industry of the BMPs proposed by the EPA’s Natural Gas Energy Star program has reduced emissions from oil and gas exploration and development. The BLM would work with industry to facilitate the use of the relevant BMPs for operations proposed on Federal mineral leases where such mitigation is consistent with agency policy.

4.4.1.6 Residual Impacts

No residual impacts would continue from offering and issuing the leases. Any proposed development activities would be reviewed when an APD or other facility application is received. At the time of approval, further mitigation may be applied to reduce adverse impacts.

4.4.1.7 Monitoring and/or Compliance

Monitoring at the stations listed in Chapter 3 would continue, as would data collection at the Thunder Basin National Grassland. Monitoring and compliance are an integral part of lease administration. As development increases, monitoring and compliance increases as future APDs or other facility applications are approved. Site-specific review would help in application of these requirements.

4.4.2 Heritage Resources

Under the proposed action alternative, all 81 parcels would be offered for lease. Known historic properties in the proposed parcels can most likely be avoided by surface disturbance activities. Once the decision is made by the lessee to develop a lease, area-specific cultural records review
would be completed to determine if there is a need for a detailed cultural inventory of those areas that could be affected by the subsequent surface disturbing activities. Generally, a cultural inventory will be required and all identified historic and archaeological sites that are eligible for listing in the National Register of Historic Places or potentially eligible to be listed would either be avoided, or mitigated in consultation with the Wyoming SHPO, tribes and interested parties through compliance with Section 106 of the NHPA. The field offices will consult with interested tribes if potential TCPs or sacred sites are identified during the cultural resource inventory. If a historic property within a lease sale parcel cannot be avoided, the BLM has the discretion to modify or deny the proposal.

4.4.2.1 Mitigation Measures

Lease Notice No. 2 is applied to all parcels offered for leasing. Avoidance measures, including NSO and CSU stipulations, would be imposed wherever eligible cultural and/or paleontological resources, including NHT's, are potentially impacted. Additional mitigation may be required at the APD stage when all cultural resources potentially affected by a project are located, and specific impacts are known.

4.4.2.2 Residual Impacts

No residual impacts would occur from offering the parcels for sale and issuing the leases. The field office may apply mitigation to reduce adverse impacts.

4.4.2.3 Monitoring and/or Compliance

After leasing, when a project is constructed in an area with a high potential for buried cultural material, archaeological monitoring may be included as a condition of approval. Monitoring may also be required if development would occur near a sensitive site. Construction monitoring is performed by a qualified archeologist working in unison with construction crews. If buried cultural resources are located by the archeologist, construction is halted and the BLM consults with the Wyoming SHPO on mitigation or avoidance. Tribes occasionally recommend tribal monitors for construction projects. Individual field offices consider applying such recommendations as COAs to the drilling permits at the APD stage.

4.4.3 Socioeconomic Resources

Refer to Section 4.11 of the ARMPA FEIS (beginning on page 4-134) and Section 4.8 of the ARMP FEIS (beginning on page 1629) for a discussion of potential impacts to Socioeconomics. The RFDs project expected rates of well drilling and the RMG has also estimated completion rates and production decline curves. Together, those parameters allowed for the projection of future oil and gas production volumes which were then used in the economic impact analysis. Actual economic impacts will vary if actual development or production varies from the projections, or if prices change.
4.4.4 Wildlife and Special Status Species (Plant and Animal)

Under the proposed action alternative, all 81 parcels would be offered for sale. Well-pad, road, and pipeline development into areas currently devoid of surface disturbance could result in habitat fragmentation for some species. This habitat impact could affect a variety of species, including Greater Sage-grouse, mule deer, white-tailed deer, antelope, elk, various non-game species, and special status species. Post lease development on the parcels could result in short-term and long-term losses of wildlife habitat. Short-term habitat loss would include all initial surface disturbance associated with the project and typically would be on-going until those portions of a well pad not needed for production operations, road disturbance outside the running surface or ditches, and pipeline disturbance are reclaimed. Long-term habitat loss would include those areas needed for production operations for the life of the well.

Some species of wildlife are more sensitive to noise and disturbance than other species, while other species habituate to types of noise or disruption. On the other hand, certain magnitudes and frequency of noise may interrupt wildlife communication and adversely impact wildlife. Depending on the intensity and frequency of occurrence of the disruption, additional disruption during critical periods (e.g., winter, nesting, parturition) can impact wildlife survival and productivity.

Threatened and Endangered and BLM Sensitive Species

Surface-disturbing activities, such as well pad construction, road construction, and other mechanized disturbance could impact potential habitats for special status plants and animals, including undocumented populations. Such activities fragment habitats and alter plant community characteristics, which can isolate or adversely affect populations of special status species. Long-term impacts such as habitat fragmentation and isolation of populations are difficult to mitigate; however, short-term impacts from surface disturbance are mitigated by reclamation and weed control. If habitat is present, site-specific surveys for all sensitive or T&E species may be required at the APD stage.

Greater Sage-grouse

There are many sources of habitat fragmentation, all of which may affect the Greater Sage-grouse. Industrial development, livestock grazing, mining, gravel pit operations, oil and gas activity, land exchanges and disposal, vegetation manipulation, fuel reduction projects, wildland fire and other activities may disturb and fragment natural habitat conditions. Structures such as power lines, towers, and industrial disruptive activities may cause avoidance and abandonment of habitat. Livestock grazing, fuels treatments, weed infestations and wildland fires are factors which may cause habitat degradation depending upon severity, intensity, and design. West Nile virus, which recently has had lethal effects on Greater Sage-grouse in parts of Wyoming, could cause increased mortality and reduce Greater Sage-grouse survival.

Greater Sage-grouse have been declining across the west. Population levels throughout the HPD declined during the mid-1990s. Population numbers increased to a peak in 2006 and have declined significantly in the HPD since. In the last couple of years, population numbers seem to have
rebounded. Population numbers have varied throughout the HPD based on specific local conditions, with some areas showing little change while other areas have noticed dramatic differences. To promote Greater Sage-grouse conservation, additional restrictions on oil and gas leases are needed to limit potential adverse impacts from any development activities. At the time development activities are proposed, the BLM would conduct a site-specific review of the proposal and potential disturbance within the current Greater Sage-grouse habitat boundaries (such as the Wyoming Governor's core areas). The BLM may require additional avoidance and/or impact minimization measures in order to manage Greater Sage-grouse habitat in support of Wyoming's Greater Sage-grouse conservation strategy and the WGFD's Greater Sage-grouse objectives. These measures may include, but are not limited to, density/disturbance limitations and surface use and timing restrictions in proximity to certain habitats (e.g., severe winter relief habitat, Greater Sage-grouse leks, etc.). New RMP amendments provide restrictions and mitigation for surface use activities for distances and time periods. Such restrictions could be applied as COAs for exploration and development activities associated with the lease. These measures may be necessary to meet BLM policy goals for managing Greater Sage-grouse habitat and populations as special status species as directed in BLM Manual 6840.

As noted in Section 1.2, RODs were signed September 21, 2015, amending the Casper and Newcastle RMPs, and approving the Buffalo RMP revision. These RMP amendments and revision provided for public input including scoping and comments. The goal of the RMP amendments/revision is to implement a Greater Sage-grouse conservation strategy consistent with the Wyoming Governor's Executive Order 2011-5 and BLM policy.

With application of SOPs, applied mitigation, required design features and COAs identified for Greater Sage-grouse under the proposed action and RMP amendments/revision, impacts caused by surface-disturbing and disruptive activities would be minimized.

**4.4.4.1 Mitigation Measures**

Adding stipulations for parcels within the BFO, CFO and NFO for mapped wildlife habitat is recommended to ensure continued RMP population and habitat objectives can be maintained for wildlife species. Additional mitigation and/or COAs for any species would be identified at the development stage to further reduce impacts associated with oil and gas development.

**4.4.4.2 Residual Impacts**

No residual impacts would occur from offering and issuing the leases. If a lease is developed, there would be heavy construction equipment working. Due to the extent of work and the surface disturbance and disruptive activities caused by construction activities, it is possible that wildlife populations and habitats could be impacted by these activities. These activities would be further analyzed during the site-specific review conducted when an APD or other facility application is received. At the time of approval, further mitigation may be applied to reduce adverse impacts.
4.4.4.3 Monitoring and/or Compliance

Continued monitoring and compliance is an integral part of lease administration. When a project is constructed in an area with suitable species' habitat, wildlife and T&E surveys and/or monitoring may be required as a condition of approval. Surveys are performed by a qualified wildlife biologist working in unison with the operator. Coordination with the WGFD on mitigation or avoidance criteria is conducted before surface disturbance or disruptive activities take place, in some instances. Individual field offices may consider applying WGFD recommendations as COAs to the drilling permits at the APD stage.

Consultation with the FWS under section 7 of the ESA would take place at the APD stage, if ESA protected species could be affected by permitted development activities.

4.5 Cumulative Impacts Analysis

The cumulative impacts assessment area for this EA is the HPD which consists of the BFO, the CFO and the NFO. Analysis of cumulative impacts for RFD scenarios of oil and gas wells on public lands is presented in the respective RMPs. Potential development of all available Federal minerals in the field office was included as part of the analysis.

Under Alternative A, the No Action Alternative, there would be no cumulative impacts to any of the resources listed above except for those activities on state and private lands or other BLM authorized activities.

As of 2010, there were over 59,000 producing oil and gas wells in the state and over 39,000 producing wells in the HPD. The BFO had over 31,000, the CFO over 5,000, and the NFO over 3,000. At that same time, over 30,000 producing oil and gas wells in Wyoming were Federal with over 18,000 wells within the HPD. The BFO had over 12,500, the CFO over 4,000, and the NFO with almost 1,500. When compared to the total GHG emission estimates from the number of Federal oil and gas wells in the state, the average number of oil and gas wells drilled annually within the HPD and probable GHG emission levels represent an incremental contribution to the total regional and global GHG emission levels. As oil and natural gas production technology continues to improve in the future, it is possible that GHG emissions may be reduced. Information contained in Appendix E, Hydraulic Fracturing White Paper, Section II Operational Issues/Water Availability and Consumption (page 4 and Attachment 1), is incorporated by reference.

Estimating the current level of emissions and projecting future production of oil and gas is difficult to forecast with the mix of drivers: economics, resource supply, demand and regulatory procedures. The assumptions used for the projections are based on recent trends or state production trends in the near-term, and Annual Energy Outlook 2006 (AEO 2006) growth rates through 2020. These assumptions 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.

Refer to Section 4.22 in the ARMPA FEIS (beginning on page 4-464) and Section 4.9 of the ARMP (beginning on page 1660) for a discussion of potential cumulative impacts to resources within the project area resulting from the full suite of activities that might occur in the project area. As explained above, the proposed action of offering the subject parcels for lease, and the subsequent issuance of leases, in and of itself, would not result in any significant cumulative impacts.

With respect to GHG emissions, as explained above, the BLM has estimated the direct and indirect emission currently foreseeable from the potential development of these leases. Since climate change and global warming are global phenomena, for purposes of this NEPA analysis, the analysis presented above about the direct and indirect effects of GHG emissions from the proposed actions is also an analysis of the cumulative effects of the proposed actions. The BLM has determined that this analysis “adequately addresses the cumulative impacts for climate change from the proposed action and its alternatives, and therefore a separate cumulative effects analysis for GHG emissions is not needed. Additionally, the referenced RMPs/EISs provide cumulative effects analysis for oil and gas development based on the reasonably foreseeable oil and gas development scenario(s).

The offering of the proposed lease parcels is consistent with this analysis. As discussed in Section 1.3, it is assumed that any development on those leases would occur within the RFD level analyzed in the EISs for the governing RMPs, as amended or revised (2015) and that the impacts would also be within the thresholds of identified in the EISs. And as stated in Section 1.1, “The mitigation measures developed through those EISs reduced/minimized the anticipated impacts associated with the projected development to acceptable levels below the significance threshold”; therefore, since the proposed parcels are within areas designated by the RMPs as available for oil and gas leasing and development and as such are a subset of the RMP, it is anticipated that this will also hold evident for the parcels analyzed in this EA.

Within North America, the report specifically forecasts that: Warming in western mountains is projected to cause decreased snowpack, more winter flooding and reduced summer flows, exacerbating competition for over-allocated water resources; in the early decades of the century, moderate climate change is projected to increase aggregate yields of rain-fed agriculture by 5 to 20%, but with important variability among regions; major challenges are projected for crops that are near the warm end of their suitable range or which depend on highly utilized water resources; cities that currently experience heat waves are expected to be further challenged by an increased number, intensity and duration of heat waves during the course of the century, with potential for adverse health impacts and coastal communities and habitats will be increasingly stressed by climate change impacts interacting with development and pollution. Specific modeling and/or assessments of the potential effects for the HPD and for the State of Wyoming currently do not exist.

In 2001, the IPCC pointed out that by the year 2100, global average surface temperatures would increase 2.5 to 10.4° F. above 1990 levels (IPCC 2007). 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 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.

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. 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 cultural resources, wildlife, T&E, and sensitive species resources the cumulative impact of 81 more parcels leased under Alternative B would be an incremental increase to the overall total parcels currently leased in the state. Any development would require APD and facility applications to then analyze the impacts for proposed development. That analysis may include surveys for these resources. Cumulative impacts would be further considered and, if necessary, mitigated.
Chapter 5

Consultation and Coordination

5.1 Introduction

The issues identified in Chapter 1 (Section 1.6) are analyzed in detail in Chapter 4. The ID Team resource issues and the rationale for issues that were considered but not analyzed further (Section 1.7) were identified through the public and agency involvement process described in Sections 5.2 and 5.3.

5.2 Persons, Groups, and Agencies Consulted

Table 5.1 List of Persons, Agencies and Organizations Consulted for Purposes of this EA

<table>
<thead>
<tr>
<th>Name</th>
<th>Purpose and Authorities for Consultation or Coordination</th>
<th>Findings and Conclusions</th>
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<tr>
<td>Lynn Jahnke</td>
<td>Wyoming Game and Fish Department – Wildlife Mgmt Coordinator</td>
<td>See project file</td>
</tr>
<tr>
<td>Dan Thiele</td>
<td>Wyoming Game and Fish Department – Biologist</td>
<td>See project file</td>
</tr>
<tr>
<td>Heather O'Brien</td>
<td>Wyoming Game and Fish Department – Biologist</td>
<td>See project file</td>
</tr>
<tr>
<td>Erika Peckham</td>
<td>Wyoming Game and Fish Department – Biologist</td>
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<tr>
<td>Joe Sandrini</td>
<td>Wyoming Game and Fish Department – Biologist</td>
<td>See project file</td>
</tr>
<tr>
<td>Willow Hibbs</td>
<td>Wyoming Game and Fish Department – Biologist/Habitat Biologist</td>
<td>See project file</td>
</tr>
<tr>
<td>Tim Thomas</td>
<td>Wyoming Game and Fish Department -</td>
<td>See project file</td>
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<tr>
<td>Justin Binfet</td>
<td>Wyoming Game and Fish Department -</td>
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<tr>
<td>Rick Huber</td>
<td>Wyoming Game and Fish Department -</td>
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</tr>
<tr>
<td>Brian Heath</td>
<td>West, Inc.</td>
<td>See project file</td>
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5.3 Summary of Public Participation

Public participation was initiated on May 16, 2017, when this EA was entered into the HPD ePlanning database. Scoping letters were mailed to affected split estate landowners, Native American tribes, and Federal agency contacts in May 2017. In accordance with BLM/WGFD Memorandum of Understanding WY131, Appendix 5G, WGFD headquarters and field staff were provided copies of the competitive oil and gas lease sale preliminary parcel list for review and comment in May 2017.

A press release announcing the availability of the EA for comments was e-mailed to local media on July 24, 2017. The press release states that the comment period for the EA would run until August 23, 2017. In July 2017, Native American tribes were advised by letter the EA was available for review and comment. As required by BLM leasing policy, where parcels are split estate, a notification soliciting EA review and comments was sent to the split estate surface owner based on the surface owner information provided by the party submitting the EOI. This notification was by post cards mailed in July 2017.
Table 5.2 List of Preparers

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Responsible for</th>
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</thead>
<tbody>
<tr>
<td>Randy Sorenson</td>
<td>High Plains District Resource Advisor, Energy, Minerals &amp; Lands</td>
<td>Project Manager</td>
</tr>
<tr>
<td>Andrea Meeks</td>
<td>High Plains District, Solid Mineral Specialist</td>
<td>Coal Group Reviews</td>
</tr>
<tr>
<td>Debby Green</td>
<td>Buffalo Field Office, Natural Resource Specialist (NRS)</td>
<td>Buffalo Field Office Lead, Core Team NRS</td>
</tr>
<tr>
<td>G.L. “Buck” Damone</td>
<td>Buffalo Field Office, Lead Archaeologist</td>
<td>Core Team Archaeologist, Cultural Resources, Paleontology</td>
</tr>
<tr>
<td>Shane Gray</td>
<td>Casper Field Office, Wildlife Biologist</td>
<td>Core Team Wildlife Biologist, Casper Field Office Lead, Wildlife, Threatened and</td>
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<td></td>
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<td>Endangered Species, Casper Field Office Reviews and Special Status Species</td>
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<tr>
<td>Patrick Walker</td>
<td>Casper Field Office, Archaeologist</td>
<td>Cultural Resources, Paleontology</td>
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<tr>
<td>Eric Schnell</td>
<td>Newcastle Field Office, Physical Scientist</td>
<td>Newcastle Field Office Lead</td>
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<td>Alice Tratebas</td>
<td>Newcastle Field Office, Archaeologist</td>
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<tr>
<td>Courtney Frost</td>
<td>Buffalo Field Office, GIS Specialist</td>
<td>GIS and Mapping, Field visits</td>
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<tr>
<td>Wyatt Wittkop</td>
<td>Buffalo Field Office, Wildlife Biologist</td>
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<td>Wade Krist</td>
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<td>Travis Bargsten</td>
<td>Physical Scientist</td>
<td>Coordination and Review</td>
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<tr>
<td>Ryan McCammon</td>
<td>Physical Scientist</td>
<td>Air Quality and Climate Change</td>
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<tr>
<td>Charis Tuers</td>
<td>Physical Scientist</td>
<td>Air Quality and Climate Change</td>
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5.4 References

BEA (Bureau of Economic Analysis), 2012a. Table CA25N: Total full-time and part-time employment by NAICS industry. http://www.bea.gov/iTable/iTable.cfm?Req1D=70&step=1&isuri=1&acrdn=5


U.S. Census 2010b. Table DP-1 Geography-Campbell County, Converse County, Crook County, Goshen County, Natrona County, Niobrara County, Weston County.
