United States Department of the Interior
Bureau of Land Management

Environmental Assessment for the Little Snake Field Office February 2015 Competitive Oil & Gas Lease Sale

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Little Snake Field Office
455 Emerson Street
Craig, CO 81625

DOI-BLM-CO-N010-2014-0031-EA

August 2014

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CHAPTER 1 - INTRODUCTION

1.1 IDENTIFYING INFORMATION

BACKGROUND:

It is the policy of the Bureau of Land Management (BLM) as derived from various laws, including the Mineral Leasing Act of 1920 (MLA) and the Federal Land Policy and Management Act of 1976 (FLPMA), to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs.

The BLM's Colorado State Office conducts quarterly competitive lease sales to sell available oil and gas lease parcels. A Notice of Competitive Lease Sale, which lists lease parcels to be offered at the auction, is published by the Colorado State Office at least 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. Constraints on leasing and any future development of split estate parcels are determined by the BLM in consultation with the appropriate surface management agency or the private surface owner.

In the process of preparing a lease sale, the Colorado State Office sends a draft parcel list to each field office where the parcels are located. Field Office staff then review the legal descriptions of the parcels to determine if they are in areas open to leasing and that appropriate stipulations have been included; verify whether any new information has become available that might change any analysis conducted during the planning process; confirm that appropriate consultations have been conducted; and identify any special resource conditions of which potential bidders should be made aware. The nominated parcels are posted online for a two week public scoping period. This posting also includes the appropriate stipulations as identified in the relevant Resource Management Plan (RMP). The BLM prepares an analysis consistent with the National Environmental Policy Act (NEPA), usually in the form of an Environmental Assessment (EA). Comments received from the public are reviewed and incorporated into the NEPA document, as applicable.

After the Field Office completes the draft parcel review and NEPA analysis and returns them to the State Office, a list of available lease parcels and associated stipulations is made available to the public through a Notice of Competitive Lease Sale (NCLS). Lease sale notices are posted on the Colorado BLM website at: http://www.blm.gov/co/st/en/BLM_Programs/oilandgas/oil_and_gas_lease.html. On rare occasions, the BLM may defer or withhold additional parcels prior to the day of the lease sale. In such cases, the BLM prepares an addendum to the sale notice.

If the parcels are not leased at the February 2015 lease sale, then they will remain available to be leased for a period of up to two years to any qualified lessee at the minimum bid cost. Parcels obtained in this way may be re-parceled by combining or deleting other previously offered lands. Mineral estate that is not leased within a two-year period after an initial offering will no longer be available, and must go through a competitive lease sale process again prior to being leased.

The act of leasing does not authorize any development or use of the surface of lease lands, without further application by the lessee and approval by the BLM.

In the future, the BLM may receive Applications for Permit to Drill (APDs) for those parcels that are leased. If APDs are received, the BLM conducts additional site-specific NEPA analysis before deciding whether to approve the APD, and what conditions of approval (COAs) should apply.

112 parcels comprising **86,423.66 acres** within the Little Snake Field Office (LSFO) were nominated for the February 2015 Competitive Oil and Gas Lease Sale. This figure is comprised of **23,115.56 acres** of federal land and **63,308.100 acres** of split estate land. The legal descriptions of the nominated parcels are in Attachment A.

This EA documents the review of the nominated parcels under the administration of the Little Snake Field Office. It serves to verify conformance with the approved land use plan, and provides the rationale for the field office's recommendation to offer or to defer particular parcels from a lease sale.

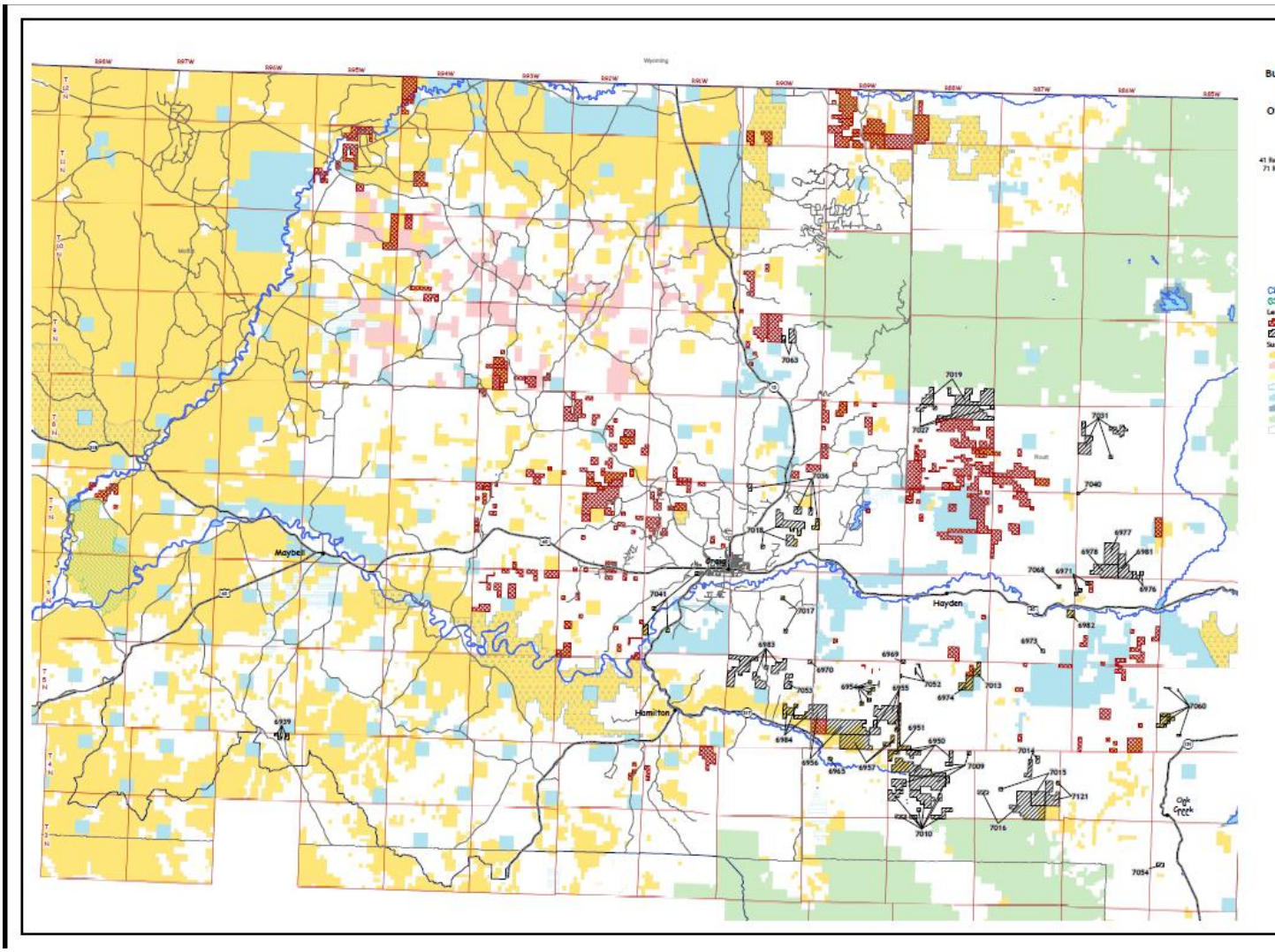
In accordance with Colorado BLM Instruction Memorandum No. CO-2012-027 and BLM IM-2010-117, this EA will be released for 30 days of public comment. Any comments received within the 30-day timeframe will be considered and incorporated into the EA as appropriate.

PROJECT NAME: February 2015 Competitive Oil and Gas Lease Sale

PLANNING UNIT: Little Snake Field Office

1.2 PROJECT LOCATION AND LEGAL DESCRIPTION

LEGAL DESCRIPTION: Please see Attachments A, B and C and Attachment E for Maps in addition to Map 1 below:



1.3 PURPOSE AND NEED

The purpose of the Proposed Action is to consider opportunities for private individuals or companies to explore and develop oil and gas resources on specific public lands through a competitive leasing process.

The need for the action is to respond to the nomination or expression of interest for leasing, consistent with the BLM's responsibility under the Mineral Leasing Act (MLA), as amended, to promote the development of oil and gas on the public domain. Parcels may be nominated by the public, the BLM or other agencies. The MLA establishes 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 consistent with FLPMA and other applicable laws, regulations, and policies.

1.3.1 Decision to be Made

The BLM will decide whether to lease the nominated parcels and, if so, under what terms.

1.4 PUBLIC PARTICIPATION

1.4.1 Scoping

The principal goal of scoping is to identify issues, concerns, and potential impacts that require detailed analysis. The BLM uses both internal and external scoping to identify potentially affected resources and associated issues.

Internal scoping was conducted through meetings of an interdisciplinary (ID) team of resource specialists and discussion of the nominated parcels. The following issues were identified by BLM specialists: BLM sensitive species, T&E species (plant and animal), fragile soils, and riparian concerns, visual resources.

External scoping was conducted by posting the nominated lease parcels, stipulations from the RMP, for two weeks from May 16 to May 30, 2014. Stipulation summaries, GIS shapefiles, and maps were posted on the BLM Colorado State Office website:

http://www.blm.gov/co/st/en/BLM_Programs/oilandgas/oil_and_gas_lease/2015/february_2015_lease_sale.html.

This external scoping process gave the public an opportunity to provide comments, which the BLM considered and incorporated into the EA as appropriate. The BLM sent letters to surface owners whose land overlies federal minerals proposed for leasing.

The BLM received the following during this period:

- One letter from Colorado Parks and Wildlife (CPW) advising that additional stipulations be applied to protect wildlife and habitat.
- One letter from a private land owner concerned about the impacts to private property.
- One letter from the Colorado Rural Water Association expressing concerns about ground water protection.
- A memo from the National Park Service concerning potential for air quality impacts to Dinosaur National Monument.
- One letter from Trapper Mining Inc., concerning potential conflicts with encroachment within the coal mine permit boundary.

Issues Identified:

Protection of municipal water supply
Air Quality impacts to NPS
Impacts to existing coal mines
Impacts to private property

The BLM considered several issues raised during project scoping. After review of available information, the ID Team determined that the following issues did not have the potential to be significantly impacted by any of the alternatives analyzed in detail and therefore are dismissed from detailed analysis:

Wild Horses
Realty Authorizations
Wilderness Study Areas
Lands with Wilderness Characteristics
Forestry
Fire Management
Environmental Justice
Areas of Critical Environmental Concern
Wild and Scenic Rivers
Threatened, endangered or BLM sensitive plant species

1.4.2 Public Comment Period

The preliminary EA and the unsigned Finding of No Significant Impact (FONSI) are available for a 30-day public review and comment period beginning August 5 and ending September 5, 2014. The document is available online at:

http://www.blm.gov/co/st/en/BLM_Programs/oilandgas/oil_and_gas_lease/2015/february_2015_lease_sale.html

and in the public room at the Little Snake Field Office. Comments received from the public were reviewed and incorporated into the EA as appropriate.

CHAPTER 2 - ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the alternatives analyzed in detail. Alternatives considered but not analyzed in detail are also discussed.

2.2 ALTERNATIVES ANALYZED IN DETAIL

2.2.1 No Action Alternative

The BLM NEPA Handbook (H-1790-1) states that for EAs the No Action Alternative generally means that the Proposed Action would not take place. In the case of a lease sale, the leasing of particular parcels would not take place.

Under the No Action Alternative, the BLM would defer all nominated lease parcels from the February 2015 lease sale. The parcels could be considered for inclusion in future lease sales. Surface management would remain the same and ongoing oil and gas development would continue on surrounding private, state, and federal leases.

2.2.2 Preferred Alternative

Under the preferred alternative, the BLM would offer **39** parcels, **28,078.93 acres,** for lease and defer **73** parcels, or **58,344.73 acres** from the sale. Attachment B lists all parcels or portions of parcels that would be deferred from the lease sale under the preferred alternative. Attachment C lists all parcels determined by this analysis to be available for lease from the preferred alternative with applied stipulations. Attachment D contains descriptions of the applicable stipulations, and Attachment E contains maps of the parcels.

Justification for deferrals: The deferral process for nominated parcels was established to address situations in which legitimate questions or controversy arises over the leasability of a parcel. The deferral process does not necessarily withdraw a parcel from the leasing arena, but merely indicates that further analysis is needed before possibly being reintroduced in a future lease sale. **71** parcels, **55,198.26** acres, would be deferred due to the concern that Preliminary Priority Habitat for Greater Sage Grouse (an ESA candidate species) as identified by CPW is identified within the parcels. The BLM is currently amending the Little Snake RMP to address the management of Greater Sage Grouse habitat, including areas identified as Preliminary Priority Habitat. The leasing of the deferred parcels could be analyzed in a future leasing EA when these resource concerns have been addressed.

2 additional parcels, 7015 and 7121, and a portion of 6983 have been deferred pending further review.

2.3 Alternatives Considered but not Analyzed in Detail

2.3.1 Lease All Nominated Parcels in Conformance with the RMP

The BLM considered, but dismissed from detailed analysis, an alternative that would lease Federal mineral estate in all nominated parcels available for leasing in the resource area in accordance with the LSFO RMP (October 2011). The current lease sale includes 57 parcels in Moffat County and 55 parcels in Routt County. Those lands proposed for lease under this alternative total 86,423.66 acres of federal mineral estate and include a combination of federal and private surface (see Attachment A). The lands have been grouped into appropriate lease parcels for competitive sale as oil and gas leases in accordance with the 43 CFR 3100 regulations. The leases would include the standard lease terms and conditions for development of the surface of oil and gas leases provided in 43 CFR 3100. Stipulations to protect other surface and subsurface resources would apply, as prescribed by the RMP. These stipulations are described in Attachment A.

This alternative is eliminated from further analysis due to inconsistency with existing policy in connection with ongoing planning efforts. The BLM CO has identified a need to defer leasing in Preliminary Priority Habitat for Greater Sage Grouse and initiated a Greater Sage Grouse RMP Amendment to analyze the potential impacts land management activities on the ESA candidate species. **71** parcels were identified as being located in Preliminary Priority Habitat for Greater Sage-Grouse, as identified by Colorado Parks and Wildlife (CPW). As explained in BLM CO IM 2010-028 “BLM Colorado will continue to defer fluid mineral lease nominations in core sage-grouse habitat until management prescriptions and strategies outlined in species conservation plans and potential impacts to local sage-grouse populations as summarized in recent/existing

research studies have been evaluated and/or adopted through RMP revisions or amendments. It is the policy of the BLM Colorado State Office to defer leasing of core Sage Grouse habitats until Field Office Plan Revisions have been completed, as these documents detail significant new information on Sage Grouse not addressed in our current plans. Deferral is necessary not to affect decisions related to future management actions."

2.4 PLAN CONFORMANCE REVIEW

The proposed action was reviewed for conformance (43 CFR 1610.5, BLM 1617.3) with the following plan:

Name of Plan: Little Snake Record of Decision and Resource Management Plan (RMP)

Date Approved: October 2011

Decision Language: The 2011 Little Snake RMP identified areas open for oil and gas leasing, and specified stipulations that would apply to leases (pages 2-61through 2-77 and Appendix B in the Record of Decision). The proposed lease parcels are within the areas identified as open to leasing. Based on the RMP, specific stipulations are attached to each lease parcel.

CHAPTER 3 – AFFECTED ENVIRONMENT AND EFFECTS

3.1 INTRODUCTION

The CEQ Regulations state that NEPA documents "must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1(b)). While many issues may arise during scoping, not all of the issues raised warrant analysis in an EA. Issues will be analyzed if: 1) an analysis of the issue is necessary to make a reasoned choice between alternatives, or 2) if the issue is associated with a significant direct, indirect, or cumulative impact, or where analysis is necessary to determine the significance of the impacts.

The following resources were determined to not be present or not expected to be impacted by the proposed action and alternatives: lands with wilderness characteristics, Areas of Critical Environmental Concern, Wilderness Study Areas, Wild and Scenic Rivers, Special Status Plant Species, Wild Horses, Forestry, Fire Management, Realty Authorizations and Land Tenure.

3.2 ENVIRONMENTAL CONSEQUENCES OF THE NO ACTION ALTERNATIVE

The No Action Alternative is used as the baseline for comparison of the alternatives. Under the No Action Alternative, the **112** parcels totaling **86,423.66 acres** would not be leased. There would be no subsequent impacts from oil and/or gas construction, drilling, and production activities on these parcels at this time. The No Action Alternative would result in the continuation of the current land and resource uses in the proposed lease areas.

The BLM assumes that the No Action Alternative (no lease option) may result in a slight reduction in domestic production of oil and gas. This reduction would diminish federal and state

royalty income, and increase the potential for federal lands to be drained by wells on adjacent private or state lands. The public's demand for oil and gas is not expected to change; oil and gas consumption is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demographics, and weather or climate. If the parcels are not leased, energy demand would continue to be met by other sources such as imported fuel, alternative energy sources (e.g., wind, solar), and other domestic fuel production. This displacement of supply could offset any reductions in emissions and disturbance achieved by not leasing the subject tracts in the short term.

3.3 PAST, PRESENT AND REASONABLY FORESEEABLE ACTIONS

NEPA requires federal agencies to consider the cumulative effects of proposals under their review. Cumulative effects are defined in the Council on Environmental Quality (CEQ) regulations 40 CFR §1508.7 as "the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency . . . or person undertakes such other actions." In its guidance, the CEQ has stated that the "cumulative effects analyses should be conducted on the scale of human communities, landscapes, watersheds, or airsheds" using the concept of "project impact zone" (i.e., the area that might be influenced by the proposed action).

Offering and issuing leases for the subject parcels, in itself, would not result in cumulative impacts to any resource. Nevertheless, future development of the leases could be an indirect effect of leasing. The RMP/EIS, provides the BLM's analysis of cumulative effects of oil and gas development based on the reasonable, foreseeable oil and gas development scenario. This analysis is hereby incorporated by reference and is available at:
http://www.blm.gov/co/st/en/fo/lsfo/plans/rmp_revision.html

The cumulative impacts analysis in the RMP/EIS accounted for the potential impacts of development of lease parcels in the planning area as well as past, present and reasonably foreseeable actions known at that time. This analysis expands upon the RMP/EIS analysis by incorporating new information.

The following activities will be considered in the cumulative impacts analysis of each alternative:

Past Actions
Prior activities on federal land on the offered parcels include grazing, recreation (primarily hunting), agriculture, and minimal energy and realty development. Activities on the private land appear to include grazing, hunting and seasonal residences.

There have been 276 wells drilled in the last 20 years at an average of 13.8 wells a year across the planning area. Four wells were drilled on the parcels being offered in this sale; all wells were plugged and abandoned.

Present Actions
The LSFO encompasses 4.2 million acres of federal, state and private lands in Moffat, Routt, and Rio Blanco counties. Of the total area, 1.3 million acres are public lands administered by the

BLM and 1.1 million acres of the private and state lands are underlain by federal mineral estate. 2.8 million acres are currently open to leasing with Timing Limitations (TL), Controlled Surface Use (CSU), and No Surface Occupancy (NSO) stipulations.

Throughout the LSFO there are many activities currently occurring that have a varying range of impact on physical, biological, and heritage resources as well as the human environment. These activities include: mineral resource development, residential development, grazing, mining, and recreation. A register of proposed and permitted activities can be viewed on the LSFO website at http://www.blm.gov/co/st/en/BLM_Information/nepa/lsfo.html.

There are currently 836 oil and gas leases in the LSFO, totaling 670,176 acres.

Reasonably Foreseeable Future Actions

The reasonably foreseeable development (RFD) scenario analyzed in the LSFO RMP (October 2011) considered the drilling and development of 3,031 wells in the coming 20 years This projection was based on historical oil and gas development and production activities, leasing, and economic factors.

The LSFO is co-authoring the Hiawatha Regional Energy Development EIS with the adjacent Rock Springs Field Office that is analyzing energy development on 157,361 acres of mixed federal, state, and private lands. Approximately 1/3rd of this project area is in the LSFO.

The BLM is preparing the Northwest Colorado Greater Sage-Grouse RMP Amendment/EIS to analyze incorporating new conservation measures into the RMPs of the five NW CO BLM field offices (of which, LSFO is one), as well as the Routt National Forest. The LSFO has been deferring the leasing of parcels that could be affected by this planning effort.

The BLM and the Western Area Power Administration (Western) are co-lead agencies in preparing an environmental impact statement under the National Environmental Policy Act (NEPA) for the TransWest Express Transmission Project..

The TransWest Express Transmission Project would provide transmission infrastructure and capacity to deliver approximately 3,000 megawatts (MW) of electric power from renewable and other energy resources in south-central Wyoming to a substation hub in southern Nevada. The proposed project would consist of an approximately 725-mile-long, 600-kilovolt (kV), direct current (DC) transmission line, a northern terminal located near Sinclair, Wyoming, and a southern terminal approximately 25 miles south of Las Vegas, Nevada. A ground electrode system (required for transmission line emergency shutdown) would be installed within 100 miles of each terminal.

The routes under consideration for the proposed transmission line would cross northwest Colorado including lands administered by the BLM.

PacifiCorp (doing business as Rocky Mountain Power) a regulated public utility, has filed an application for a right-of-way (ROW) to construct, operate and maintain a 500 kV overhead, alternating current transmission line to cross public and private lands for the Energy Gateway

South Transmission Line Project. When completed, the Project would transmit about 1,500 megawatts of electricity generated from renewable and thermal sources at planned facilities in Wyoming.

The proposed project begins in south central Wyoming near Medicine Bow, at the planned Aeolus Substation, and would traverses from northeast to southwest across northwestern Colorado to the planned Clover Substation near Mona, Utah.

3.4 Environmental Consequences of Leasing and Potential Development

3.4.1 Physical Resources

3.4.1.1 Air Quality and Climate

Affected Environment: The U.S. Environmental Protection Agency (EPA), as directed by the Clean Air Act (CAA), has established national ambient air quality standards (NAAQS) for criteria pollutants. Criteria pollutants are air contaminants that are commonly emitted from the majority of emissions sources and include carbon monoxide (CO), lead (Pb), sulfur dioxide (SO_2), particulate matter smaller than 10 and 2.5 microns (PM_{10} and $PM_{2.5}$, respectively), ozone (O_3), and nitrogen dioxide (NO_2). Ozone is not directly emitted from oil and gas related sources, but is chemically formed in the atmosphere via interactions of oxides of nitrogen (NO_X) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NO_X and VOCs are ozone precursors). Exposure to air pollutant concentrations greater than the NAAQS has been shown to have a detrimental impact on human health and the environment. The EPA regularly reviews the NAAQS (every five years) to ensure that the latest science on health effects, risk assessment, and observable data such as hospital admissions are evaluated, and can revise any NAAQS if the data supports a revision. The current NAAQS levels are shown in Table 3-1 below.

The CAA established two types of NAAQS:
Primary standards: Primary standards set limits to protect public health, including the health of "sensitive" populations (such as asthmatics, children, and the elderly).
Secondary standards: Secondary standards set limits to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

In addition to the criteria pollutants, regulations also exist to control the release of hazardous air pollutants (HAPs). HAPs are chemicals that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. EPA currently lists 188 identified compounds as hazardous air pollutants, some of which can be emitted from oil and gas development operations, such as benzene, toluene, and formaldehyde. Ambient air quality standards for HAPs do not exist; rather these emissions are regulated by the source type, or specific industrial sector responsible for the emissions.

The EPA has delegated regulation of air quality to the State of Colorado (for approved State Implementation Plan (SIP) elements). The Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD) administers Colorado's air quality control programs, and is responsible for enforcing the state's air pollution laws.

The Federal Land Policy and Management Act of 1976 (FLPMA) requires the BLM to provide for compliance with applicable pollution control laws, including federal and state air quality standards and regulations [Section 202(b)(8)]. FLPMA further directs the Secretary of the Interior to take any action necessary to prevent unnecessary or undue degradation of the lands [Section 302 (b)], and to manage the public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" [Section 102 (a)(8)]. [A statement about the (relatively limited) requirements of the CAA for BLM could be added here (conformity in nonattainment and maintenance areas, and the review of impacts from "major emitting facilities" on class I areas that BLM manages).]

Table 3-1 Ambient Air Quality Standards

Pollutant [final rule citation]		Standard Type	Averaging Period	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		Primary and secondary	Rolling 3-month average	0.15 µg/m3	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010]		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
[61 FR 52852, Oct 8, 1996]		Primary and secondary	Annual	53 ppb	Annual mean
Ozone [73 FR 16436, Mar 27, 2008]		Primary and secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter [73 FR 3086, Jan 15, 2013]	PM2.5	Primary	Annual	12 µg/m3	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m3	Annual mean, averaged over 3 years
		Primary and secondary	24-hour	35 µg/m3	98th percentile, averaged over 3 years
	PM10	Primary and secondary	24-hour	150 µg/m3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010]		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Colorado (State Only)		Primary and Secondary	3-hour	267 ppb	Not to be exceeded in any 12 month period
[38 FR 25678, Sept 14, 1973]		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: National – 40 CFR 50, Colorado – 5 CCR 1001-14.

µg/m3 = micrograms per cubic meter, ppb = parts per billion, ppm = parts per million.

Existing Regional Air Quality

Air quality for any area is generally influenced by the amount of pollutants that are released within the vicinity and up wind of that area, and can be highly dependent upon the contaminants' chemical and physical properties. Additionally, an area's topography or terrain (such as mountains and valleys) and weather (such as wind, temperature, air turbulence, air pressure, rainfall, and cloud cover) will have a direct bearing on how pollutants accumulate or disperse. Ambient air quality in the affected environment is demonstrated by monitoring for ground level

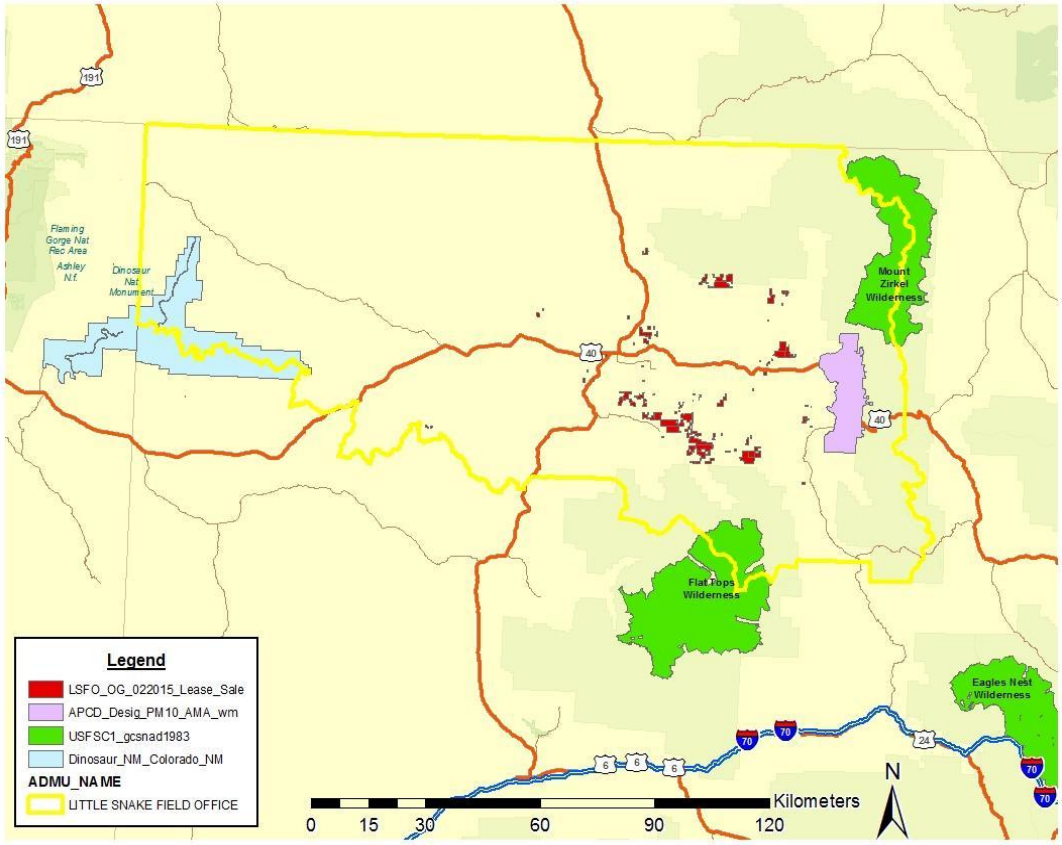
atmospheric air pollutant concentrations to verify compliance with the NAAQS. The APCD monitors ambient air quality at a number of locations throughout the state. The data is summarized by monitoring regions and CDPHE prepares an annual report (Annual Air Quality Reports) to inform the public about air quality trends within these regions. Similarly, several Federal Land Managers (FLMs) like the BLM, FS, and NPS, also monitor air quality for NAAQS and Air Quality Related Values (AQRVs). Table 3-2 below presents three years of monitoring data for criteria pollutants (with the exception of lead) for each of the counties containing nominated parcels (or adjacent / representative county monitors where no monitoring exists in the parcel counties). The maximum monitoring value is presented where multiple monitors exist within a single county that monitor for the same pollutant. Concentrations are in units of the standards form (see the "Level" column in Table 3-1 above), with the exception of the ozone data, which is shown as the 4th highest 8-hour average. To compute the ozone design value (3 year average of the 4th highest 8-hour max), sum all three years of data (if available) and divide by three.

Although the project area is currently designated as attaining the NAAQS, area monitors (Rio Blanco County - Rangley, Colorado) have recorded exceedances of the NAAQS for ozone. Exceedances by themselves do not necessarily mean that the area will be designated as nonattainment (which would be determined by CDPHE and EPA). The form of the NAAQS must be considered along with the monitored value. However, changes in ambient conditions may have implications for future project-level analysis (APD processing) and any COA used to support authorization, when and if any lease development is ever proposed.

Table 3-2 Ambient Air Quality Monitoring Data

County	Pollutant	Standard	2011	2012	2013
Moffat	O3 (ppm)	8-hour	0.06	0.066	0.065
Rio Blanco	NO2 (ppb)	1-hour	23	19	24
Rio Blanco	O3 (ppm)	8-hour	0.073	0.069	0.091
Rio Blanco	PM2.5 (ug/m3)	24-hour	21.5	33.4	26.7
Rio Blanco	PM2.5 (ug/m3)	Annual	9.9	9.9	9.1
Routt	PM10 (ug/m3)	24-hour	79	93	77

Figure 3-1 Project Area and Designated Air Boundary Intersections



AQRVs are metrics for atmospheric phenomena like visibility and deposition impacts that may adversely affect specific scenic, cultural, biological, physical, ecological, or recreational resources. Visibility changes can occur when excessive pollutant contaminants (mostly fine particles) scatter light such that the background scenery becomes hazy. Deposition can cause excess nutrient loading in native soils and acidification of the landscape, which can lead to declining buffering capacity changes in sensitive stream and lake water chemistries (commonly referred to as acid neutralization change (ANC)). Air pollutants are deposited by wet deposition (precipitation) and dry deposition (gravitational settling). The chemical components of wet deposition include sulfate (SO_4), nitrate (NO_3), and ammonium (NH_4); the chemical components of dry deposition include sulfate, sulfur dioxide (SO_2), nitrogen oxides (NO_X), nitrate, ammonium, and nitric acid (HNO_3). The NPS *Technical Guidance on Assessing Impacts on Air Quality in NEPA and Planning Documents* suggests that cummulative critical load values above 3 kg/ha-yr (and lower in some sensitive areas) may result in moderate impacts to the landscape. AQRVs are important to FLMs because they have a mandate to ensure their Class I and sensitive Class II areas meet scientific (landscape nutrient loading) and congressionally mandated goals (i.e. regional haze). Class I areas are generally pristine landscapes such as national parks, national forests, and wilderness areas that are specifically provided the highest levels of air quality protection under the CAA. Sensitive Class II areas are usually afforded additional protection under state specific rule making for one or more pollutants. This status elevates them above ordinary Class II areas which account for every other area of the country that is not explicitly designated as Class I or Sensitive Class II.

The following sensitive Class I/Class II areas are within or just outside the LSFO: Mount Zirkel (northeast LSFO boundary) and Flat Tops (southeast LSFO boundary) Wildernesses. The figure(s) below provide current trend data for visibility and deposition at Rocky Mountain National Park which is approximately 60 km east of LSFO boundary.

In general, trends with a negative slope indicate better atmospheric conditions for each potentially affected area. If leases for these parcels are issued, and development is proposed at some point in the future, the BLM may consider analyzing Class I or Sensitive Class II areas at greater distances (than the initial 50 km screening assessment) for the NEPA analysis to be conducted during the project permitting / development phase, provided the proposed intensity warrants such analysis. Since leasing alone does not authorize any emissions, nor guarantee future development will occur, or occur at significant intensities, no further discussion or analysis of AQRVs will be provided.

Figure 3-2 AQRV Visibility Data for Rocky Mountain National Park

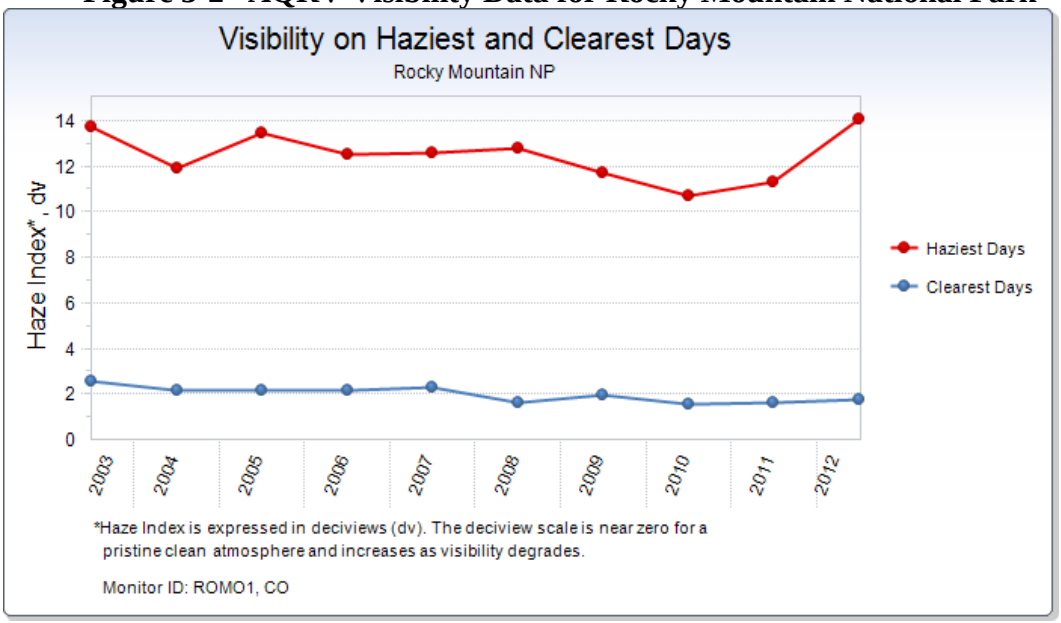
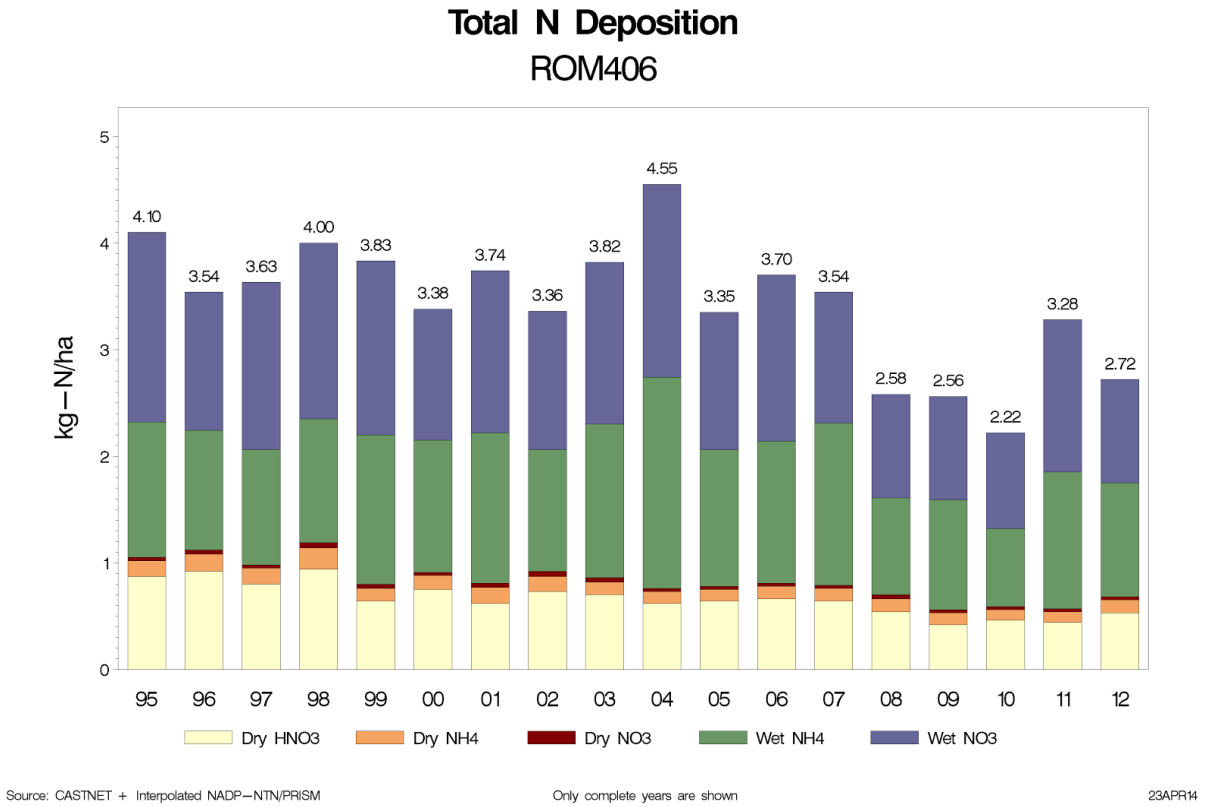
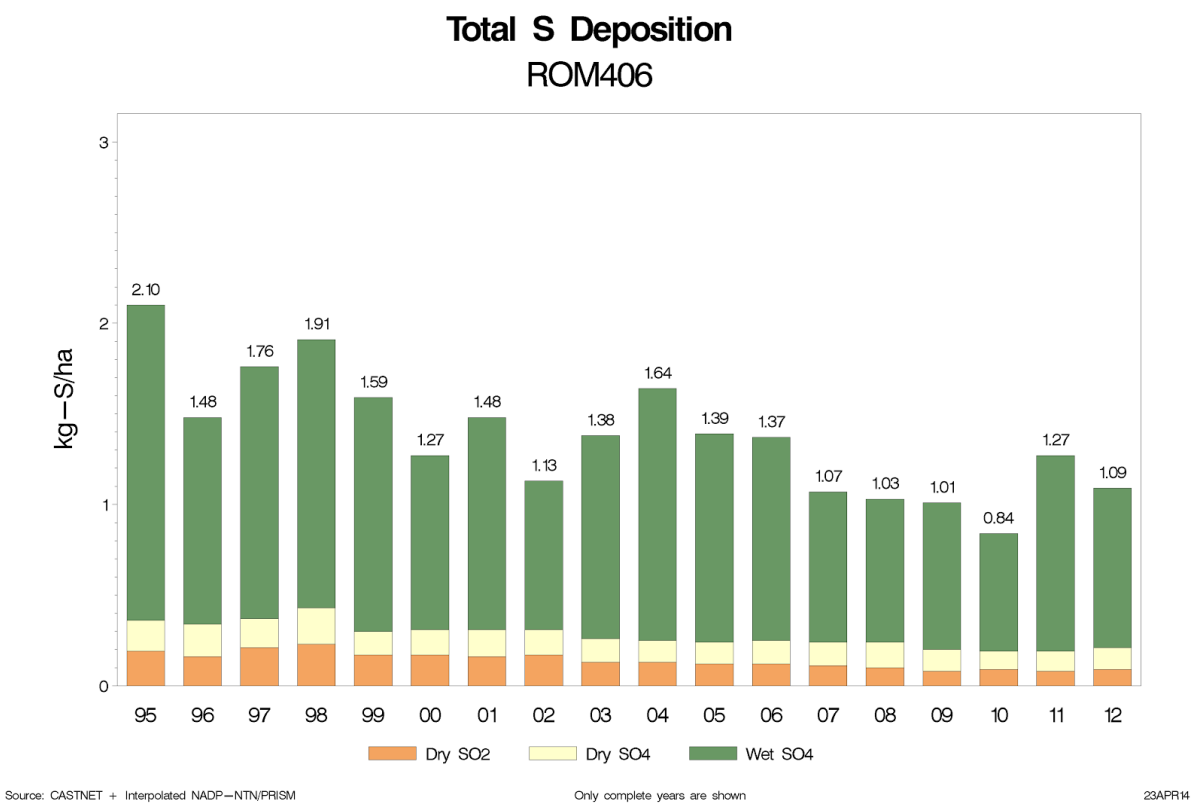


Figure 3-3 AQRV Deposition Data for Rocky Mountain National Park





Greenhouse Gases and Climate Change

There is broad scientific consensus that humans are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs) such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several industrial gases in the Earth's atmosphere. An increase in GHG emissions is said to result in an increase in the earth's average surface temperature, primarily by trapping and thus decreasing the amount of heat energy radiated by the Earth back into space. The phenomenon is commonly referred to as global warming. Global warming is expected in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, which is collectively referred to as climate change. The Intergovernmental Panel on Climate Change (IPCC) has predicted that the average global temperature rise between 1990 and 2100 could be as great as 5.8°C (10.4°F), which could have massive deleterious impacts on the natural and human environments. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and the burning of fossil carbon fuel sources have caused GHG concentrations to increase measurably, from approximately 280 ppm in 1750 to 400 ppm in 2014 (as of April). The rate of change has also been increasing as more industrialization and population growth is occurring around the globe. This fact is demonstrated by data from the Mauna Loa CO_2 monitor in Hawaii that documents atmospheric concentrations of CO_2 going back to 1960, at which point the average annual CO_2 concentration was recorded at approximately 317 ppm. The record shows that approximately 70% of the increases in atmospheric CO_2 concentration since pre-industrial times occurred within the last 54 years.

Parcel County Oil and Gas Production

The table below shows the nominated parcel summary data and current oil and gas production statistics on a per county basis (well counts and production numbers are for both federal and fee minerals) for counties containing nominated parcels: Moffat and Routt. The oil and gas data is from the Colorado Oil and Gas Conservation Commission (COGCC) database and is provided to convey the current level of intensity for oil and gas development within the vicinity of the parcels.

Table 3-3 Parcel County Production Data (2013)

County	No. of Producing Wells	Oil Produced (bbl)	Gas Produced (mcf)	Water Produced (bbl)
Moffat	746.5	39,739.75	1,411,513.33	765,495.58
Routt	40.42	5,104.08	10,287.42	473.83

National Emissions Inventory Data (2011)

As previously stated, air quality is generally a function of emissions loading within any particular region. With respect to the parcel counties (Moffat and Routt in northwest Colorado)

the following emissions inventories are provided to describe the affected environment in terms of current cumulative emissions intensities.

Table 3-4 2011 County NEI Data (tons)

Moffat	PM10	PM2.5	VOC	CO	NOX	SO2	CO2	CH4	N2O	NH3	HAPs
Agriculture	295.32	59.06	.	.	.	.	.	.	.	620.41	.
Biogenics	.	.	29,532.4	6,013.21	684.91	.	.	.	.	.	4,915.57
Bulk Gasoline Terminals	.	.	12.95	.	.	.	.	.	.	.	.23
Commercial Cooking	4.58	4.24	.61	1.78	.	.	.	.	.	.	.22
Dust	2,359.91	365.51	.	.	.	.	.	.	.	.	.
Fires	136.65	112.8	255.29	1,183.21	24.78	10.63	16,113.35	52.21	.	17.15	35.57
Fuel Comb	293.09	187.08	222.29	3,226.03	14,244.15	3,957.08	.	.	.	87.25	127.13
Gas Stations	.	.	32.7	.	.	.	.	.	.	.	.61
Industrial Processes	2,140.8	594.88	4,063.42	695.08	418.38	18.89	.	.	.	.	343.93
Miscellaneous	.	.	5.23	.	.	.	.	.	.	.	.39
Mobile	29.25	25.36	304.49	2,322.61	491.28	2.66	87,189.01	6.34	2.7	4.49	76.7
Solvent	.	.	93.11	.	.	.	.	.	.	.	53.75
Waste Disposal	3.35	3.32	7.36	.16	.59	.08	.	.	.	.05	.91
Sum Totals:	**5,262.94**	**1,352.25**	**34,529.85**	**13,442.08**	**15,864.1**	**3,989.34**	**103,302.36**	**58.55**	**2.7**	**729.34**	**5,555.**
Routt	**PM10**	**PM2.5**	**VOC**	**CO**	**NOX**	**SO2**	**CO2**	**CH4**	**N2O**	**NH3**	**HAPs**
Agriculture	244.73	48.94	.	.	.	.	.	.	.	393.53	.
Biogenics	.	.	26,888.2	2,440.82	143.76	.	.	.	.	.	1,547.4
Commercial Cooking	21.74	20.16	2.8	8.09	.	.	.	.	.	.	1.09
Dust	5,766.67	817.51	.	.	.	.	.	.	.	.	.
Fires	1,061.99	899.32	2,500.61	10,657.19	118.3	71.6	110,221.91	514.06	.	173.81	218.89
Fuel Comb	131.63	127.89	119.54	1,095.08	6,453.77	2,163.19	.	.	.	31.28	22.94
Gas Stations	.	.	53.93	.	.	.	.	.	.	.	1.11
Industrial Processes	534.12	143.39	223.81	31.59	18.03	.07	.	.	.	.	4.24
Miscellaneous	.	.	15.92	.	.	.	.	.	.	.	1.17
Mobile	70.93	61.82	604.48	5,046.19	1,030.94	7.89	185,391.59	16.1	6.32	10.27	153.83
Solvent	.	.	150.76	.	.	.	.	.	.	.	88.73
Waste Disposal	17.28	9.94	2.3	.17	.21	.13	.	.	.	.09	.21
Sum Totals:	**7,849.09**	**2,128.97**	**30,562.35**	**19,279.14**	**7,765.01**	**2,242.87**	**295,613.49**	**530.17**	**6.32**	**608.98**	**2,039.6**

<u>Environmental Consequences of Leasing and Potential Development -Direct and Indirect Impacts:</u> The decision to offer the identified parcels for lease would not result in any direct emissions of air pollutants. However, the future development of any leases sold would result in both short and longer term emissions of criteria, HAP and GHG pollutants. Developmental air impacts will be addressed in a subsequent analysis when lessees file an Application for Permit to Drill (APD). The analysis will determine if any contemporaneous incremental increases from project emissions cause significant impacts at the local and regional scales. All proposed activities including, but not limited to, exploratory drilling activities would be subject to applicable local, State, and Federal air quality laws and regulations.

Subsequent development activity could include soil disturbances resulting from the construction of well pads, access roads, pipelines, power lines, and drilling. Any disturbance is expected to cause increases in fugitive dust and potentially inhalable particulate matter (specifically PM_{10} and $PM_{2.5}$) in the project area and immediate vicinity. Particulate matter, mainly dust, may become airborne when drill rigs and other vehicles travel on dirt roads to drilling locations. Air

quality may also be affected by exhaust emissions from engines used for drilling, transportation, gas processing, compression for transport in pipelines, and other uses.

These sources will contribute to potential short and longer term increases in the following criteria pollutants: carbon monoxide, ozone (a secondary pollutant, formed via photochemical reactions between VOC and NO_X emissions), nitrogen dioxide, and sulfur dioxide. Non-criteria pollutants (for which no national standards have been set) such as carbon dioxide, methane and nitrous oxide (GHGs), air toxics (e.g., benzene), and total suspended particulates (TSP), as well as impacts to visibility, and atmospheric deposition, may also increase as a result of exploration and development.

Ozone formation and prediction is complex, and generally results from a combination of significant quantities of VOCs and NO_X emissions from various sources within a region, and has the potential to be transported across long ranges.

During exploration and development, 'natural gas' may at times be flared and/or vented (for safety) from conventional, coal bed methane, and shale wells (depending on the resources present on the lease). The gas is likely to contain volatile organic compounds that could also be emitted from reserve pits, produced water disposal facilities, and/or tanks located at the site. The development stage may likely include the installation of pipelines for transportation of raw product. New centralized collection, distribution and/or gas processing facilities may also be necessary.

Research has identified the general potential impacts of anthropogenic GHG emissions and their effects on global climatic conditions. Anthropogenic GHGs differentially absorb and emit thermal radiation in the atmosphere and therefore may contribute incrementally to climate change. Changes in global temperatures and climate vary significantly with time, and are subject to a wide range of driving factors and complex interrelationships. Research on climate change impacts is an emerging and rapidly evolving area of science, but given the lack of adequate analysis methods it is not possible to identify specific local, regional, or global climate change impacts based on potential GHG emissions from any specific project's incremental contributions to the global GHG burden. In the coming decades climate change may lead to changes in the Mountain West and Great Plains, such as increased drought and wildland fire potential. The BLM will continue to evaluate the impacts of oil and gas exploration and development on the global climate as the science and tools for providing appropriate analysis evolve, and apply appropriate adaptive management techniques and BMPs to address changing conditions.

At a minimum, operators must construct at least one producing well (unless the parcel is included in a unit as some point in the future) in order to continue to hold the lease beyond the preliminary 10 year lease period. With that in mind, the BLM has developed an estimated average per well emissions inventory (table 3-5) based on current resource recovery methods (i.e. conventional oil and gas vs. coal bed methane) and our knowledge of development for areas similar to those parcels that have been nominated for lease. The emissions inventory is only useful for estimating the minimum indirect impacts of leasing. Since it is unknown if the parcels would be explored and/or developed, or the extent of any subsequent exploration and development on either a temporal or spatial scale, it is not possible to reasonably assess detailed

air quality impacts (such as through dispersion modeling) at this time. However, the BLM will request or develop an actual exploration / development emissions inventory with project-specific information at the time that BLM receives a development proposal and performs a site-specific NEPA analysis.

Table 3-5 Typical Per Well Emissions (Well Type - Tons)

Phase	PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	SO_2	CO_2	CH_4	N_2O	HAP
Conventional Construction	5.21	0.64	0.05	0.23	0.72	0.02	108.1	0.00	0.00	0.01
CBM Construction	3.37	0.44	0.03	0.12	0.36	0.01	56.58	4.06	0.00	0.00
Conventional Production	1.15	0.15	6.67	1.30	0.73	0.00	251.9	17.14	0.00	0.43
CBM Production	2.25	0.25	13.10	1.13	0.62	0.00	181.6	19.05	0.00	1.31

Environmental Consequences of Leasing and Potential Development -Cumulative Impacts: This lease sale, when combined with the past, present, and reasonably foreseeable future actions may have the potential (during future development) to contribute incrementally to the deterioration of air quality in the region. At present, any future potential cumulative impact is speculative, given that the pace, place, and specific equipment configurations of such development are unknown. Development of fluid minerals on these leases would result in additional surface and subsurface disturbances and emissions during drilling, completion, and production activities. The severity of these incremental impacts could be elevated based on the amount of contemporaneous development (either federal or private) in surrounding areas.

In consideration of disclosing cumulative and regional air quality impacts, the BLM has initiated the Colorado Air Resources Management Modeling Study (CARMMS). The study includes assessing statewide impacts of projected oil and gas development (both federal and fee (i.e. private)) out to year 2021 for three development scenarios (low, medium, and high). Projections for development are based on either the most recent Reasonably Foreseeable Development[1] (RFD) document (high) for each field office, or by projecting the current 5 year average development paces forward to 2021 (low[2]). The medium scenario included the same well count projections as the high, but assumed restricted emissions, where the high assumed current development practices and existing emissions controls and regulations (2012). Each field office was modeled with the source apportionment option, meaning that incremental impacts to regional ozone and AQRVs from Federal oil and gas development in these areas are essentially tracked to better understand the significance of such development on impacted resources and

[1] RFD based on O&G Industry 20-year projections for the LSFO.

[2] Future O&G development projections based on recent 5 years (2008-2012) of O&G development data for the LSFO.

populations. The CARMMS project leverages the work completed by the WestJumpAQMS, and the base model platform and model performance metrics are based on those products (2008).

Cumulative / regional air quality impacts are not directly applicable at the leasing stage to correlate projected impacts associated with the proposed parcels, since oil and development is speculative in terms of actual contemporaneous development timing (i.e., what year will the development take place?) and intensity (i.e., what will be the development emissions inventory, both short and long term?). The modeling results will be more useful when and if actual exploration and development proposals are submitted in the future and are provided here because CARMMS provides a broad hypothetical estimate of possible air quality impacts due to potential oil and gas development in the LSFO. Based on the CARMMS projections, the BLM will determine which projection path (low, medium, high) would be most appropriate to estimate impact correlations based on the cumulative development that has occurred since the base emissions inventory year (2011). Although the impacts will be based on future results (2021), the relative changes in the impacts between the scenarios will provide insight into in understanding how mass (total regional) emissions impact the atmosphere / air shed on a relative basis.

CARMMS O&G Development and Emissions Tables

The following Table provides the LSFO oil and gas development and projected production rates modeled for the CARMMS RFD (High) and 5-year Average (Low) modeling scenarios.

Table 3-6: CARMMS Future O&G Development / Projections Modeled - LSFO

Parameter	**RFD (High) Scenario[1]**	**5-year Average (Low) Scenario[2]**
Federal Wells Per Year	78	11
Cumulative Wells Per Year	138	20
Wells Per Pad (assumed for analysis)	4	4
2021 Cumulative Active Well Counts	1,873	692
% 2021 Cumulative Wells that Are Federal	57%	68%
Cumulative Average Annual No. Drill Rigs Operating	6	1
Cumulative 2021 Gas Production (MMscf/yr)	91,681	15,175
Cumulative 2021 Oil / Condensate Production (Mbbl/yr)	472	87

The following Table provides baseline year 2011 and projected year 2021 Federal oil and gas emissions for the LSFO. The emissions change from baseline year 2011 to year 2021 is reflective of the CARMMS 10-year change in Federal O&G development and production for the LSFO.

Table 3-7: CARMMS Baseline and Projected Year 2021 Annual Emissions (TPY) - LSFO Federal O&G

Field Office	PM10	PM2.5	NOX	VOC	CO	SO2	CO2	CH4	N2O
Baseline - 2011	140	36	741	1,493	591	6	256,390	7,335	5
RFD (High) Scenario - 2021	287	99	2,320	3,334	1,769	14	828,987	19,247	15
Emissions Change (2021 minus 2011)	148	63	1,579	1,841	1,178	8	572,597	11,913	10

CARMMS Modeling Results for RFD (High) Scenario

As described above, cumulative / regional air quality impacts are not directly applicable at the leasing stage to correlate projected air quality impacts associated with the proposed parcels, primarily because oil and development is speculative in terms of actual oil and gas development timing and intensity. The 5-year average (Low) CARMMS modeling scenario for the LSFO likely provides a realistic estimate of year 2021 cumulative (aggregate total for projected LSFO oil and gas development) impacts for new Federal oil and gas development considering the current economic status and other factors. The RFD (High) modeling scenario provides an upper-bound estimate of impacts from all potential oil and gas development based on aggressive development forecasts.

The following table provides a quasi-cumulative summary of ozone, visibility and nitrogen deposition impacts for all of the projected LSFO Federal oil and gas emissions associated with the CARMMS RFD (High) modeling scenario. These impacts show the relative contribution to full cumulative (all world-wide emissions sources) impacts for the projected year 2021 LSFO oil and gas emissions associated with the RFD (high) modeling scenario.

Table 3-8: CARMMS - LSFO Federal O&G Contribution to Modeled AQRV Impacts

Source Group - Modeling Scenario	Number of Annual Days Above 0.5 dv Change	Maximum Modeled Annual Nitrogen Deposition (kg/ha-yr)	Maximum 4th High Daily 8-hour Ozone Contribution (ppb)

LSFO - RFD (High) Year 2021	0	0.0174	1.0

* maximum modeled concentrations / values for any Class I / sensitive Class II area (AQRV) or grid cell (ozone).

As shown in the table above, there are no days that the projected LSFO year 2021 Federal oil and gas emissions have a significant (~ 0.5 dv) visibility change impact at any Class I or sensitive Class II area and the maximum modeled nitrogen deposition contribution is minimal with respect to the cumulative critical nitrogen deposition load of 1.5 kg/ha-yr value. The maximum contribution to 4th high daily maximum 8-hour concentration is minimal with respect to the 75 ppb 8-hour ozone standard. The information above shows that the predicted air quality impact contributions associated with an aggressive 10-year oil and gas development scenario for the entire LSFO are minimal, and it is reasonable to conclude that project-level O&G development (based on actual development plans) would have even lower contributions to the overall cumulative air quality.

The following table provides a full cumulative summary of ozone, visibility and nitrogen deposition impacts for all (i.e. world-wide) emissions sources associated with the CARMMS RFD (High) modeling scenario.

Table 3-9: CARMMS Modeled AQRV Impacts - High 2021 Scenario - Full Cumulative Emissions Inventory

Class I Area	Best 20% Days Visibility Metric (dv) - 2021 High Improvement from 2008	Worst 20% Days Visibility Metric (dv) - 2021 High Improvement from 2008	Maximum Modeled Annual Nitrogen Deposition (kg/ha-yr)
Mount Zirkel Wilderness	0.20	0.84	3.34
Flat Tops Wilderness	0.04	0.61	2.39

* positive visibility related values mean overall visibility improvement and deposition values are average for all grid cells making up the Class I area.

For full cumulative ozone design value projections at regional ozone monitoring sites, the maximum current year 8-hour ozone design concentration (DVC; based on 2006-2010 observations) is 82.0 ppb at the Rocky Flats North (CO_Jefferson_006) monitor that is projected to be reduced to 79.5 ppb for the CARMMS 2021 High Development Scenario. For the ozone design value projection unmonitored area analysis (analysis for areas with no monitors), the geographical extent (i.e. size) of the overall area of ozone design value exceedances is reduced (from 2008 to 2021) and CARMMS plots show the largest ozone reductions in the Denver and Salt Lake City areas and ozone increases in Garfield County, Colorado.

Overall, the CARMMS full cumulative modeling results show an overall improvement to air quality in the region from year 2008 to year 2021. The BLM will take a closer look at actual potential or contemporaneous cumulative / regional effects at the time we receive a development proposal and perform a site-specific NEPA analysis.

Potential Future Mitigation: Oil and gas resources may be developed and produced subsequent to the proposed lease sale and may ultimately be utilized to produce energy. The BLM will evaluate potential impacts of emissions of regulated air pollutants (including GHGs) associated with the development of the oil and gas resources in a subsequent NEPA analysis at the lease development / APD processing stage.

Project specific GHG emissions can generally be quantified and compared to overall sector, regional, or global estimates to provide some estimate of the level and significance of any potential impacts. The BLM will continue to evaluate climatic variability and change in the future, and apply appropriate management techniques and approved policy to address changing conditions as developments occur.

At a minimum, all future development operations must comply with applicable local, State, and Federal air quality laws and regulations. As described in the Lease Notice attached to the leases in the proposed action, BLM may require additional analyses (such as air dispersion modeling assessments) or impose specific mitigation measures within its authority as a COA, based on the review of site-specific proposals or new information about the impacts of exploration and development activities in the region.

3.4.1.2 Flood Plains

Affected Environment: Based on USDA NRCS Web Soil Survey data, 24 parcels contain FEMA-identified 100-year floodplains. Flooding is the temporary inundation of an area caused by overflowing streams or by runoff from adjacent slopes (water standing for short periods after rainfall or snowmelt is not considered flooding). Flooding frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. Parcels proposed for lease have floodplains that flood rarely (primarily ephemeral or intermittent drainages) to frequently (perennial drainages).

Parcel IDs that have a FEMA-identified 100-year floodplain present somewhere within the parcel, regardless of surface ownership: 6950, 6955,6956,6957,6974, 6976,6977, 6978, 6981,6983,6984, 7010,7013,7015,7019,7027,7036,7041,7052,7053, 7060. Stipulation #CO-48 would be applied; No ground-disturbing activities or structure development will occur within FEMA-identified 100-year floodplain (per Executive Order 11988 on Floodplain Management).

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Development as a result of leasing within identified floodplains could result in the removal or compression of vegetation, as well as soil compaction, depending on moisture content of the soils at the time of disturbance. Prohibiting development activities within the 100-year floodplain boundaries may eliminate a very small amount of area that is proposed for exploration and development, but would also limit or prevent impacts to overall floodplain function.

Environmental Consequences,-Cumulative Impacts: The potential for cumulative impacts to floodplains as a result of implementing the proposed action combined with past, present, and reasonably foreseeable future actions is negligible, since modification of identified floodplains is prohibited.

Potential Future Mitigation: At the APD stage, the field office will need to evaluate if development location stipulations are sufficient to protect floodplain resources. Environmental analysis will assist the BLM in determining whether, in addition to the location modification stipulation, additional protective measures are necessary. Additional protective BMPs or COAs would be incorporated to development designs.

3.4.1.3 Hydrology/Ground

Affected Environment: The LSFO is underlain primarily by the Sand Wash (geologic) basin and contains both alluvial (Yampa River) and sedimentary bedrock aquifers (Wasatch-Fort Union, Mesa Verde, Dakota). *Excerpted from Topper et al. 2003*

Yampa River Alluvial Aquifer

Unconsolidated alluvial aquifers can be the most highly productive aquifers in an area and are defined as narrow, thin deposits of sand and gravel formed primarily along stream courses, in this case, along the Yampa River and its tributaries. The alluvium in the Yampa River basin typically consists of unconsolidated deposits of clay, silt, sand, and gravel. The saturated thickness of the Yampa River alluvium ranges from 10 to 100 feet. In the tributary valleys, such as along the Williams Fork River, the saturated portion of the alluvium is generally less than 20 feet thick. Alluvium can be thin or absent where the streams cross hard, resistant bedrock such as sandstone, and thick and wide where the streams cross less resistant bedrock such as shale. Recharge of the alluvial aquifer occurs mainly from bank storage during spring runoff, leakage of irrigation ditches and laterals, and underflow from sedimentary rock aquifers. The Browns Park and Fort Union Formations (Tertiary age) discharge to the alluvium where the alluvium overlies these formations. Published water levels in alluvial wells range from 0 (at land surface) to 41 feet below ground surface, averaging about 10 feet. The alluvium is generally a water table aquifer and water levels will fluctuate seasonally with stages in the adjacent surface water courses.

Alluvial groundwater resources in this basin are used for domestic, livestock, and low demand commercial purposes. Yields from alluvial wells in this basin have been reported from five to several hundred gallons per minute, with the highest yields from the Yampa River alluvium near Steamboat Springs, Hayden, and Craig. A close inspection of alluvial wells in the Yampa River basin indicates that the majority of domestic water supply wells yield of 15 gpm or less. Alluvial ground water in the Yampa River basin is generally a calcium and sodium bicarbonate type when the alluvial material is derived from the erosion of sandstone or granitic rocks. The water is a calcium sulfate type when the alluvium is composed of reworked Fort Union Formation or where the Fort Union discharges into the alluvium. A summary of the hydraulic characteristics and water quality for the Yampa River alluvial aquifers follows:

TABLE 3.4-1

Yampa River Basin Alluvial Aquifer characteristics	Typically unconsolidated deposits of clay, silt, sand, and gravel
Primary uses	Domestic, agricultural
Water levels	2-150 feet
Well data	90% <140 feet deep mean depth = 63 feet
Yield	5 to 900 gpm 90% <21 gpm mean yield = 21 gpm
Hydraulic Conductivity	1.9 to 28.8 feet/day
Water quality	Potable in most areas. Drinking water standards are exceeded locally for arsenic, iron, manganese, nitrate, selenium, TDS, and sulfate.

Sedimentary Aquifers of the Sand Wash Basin

Sedimentary rocks of Paleozoic, Mesozoic, and Cenozoic age are represented within the Sand Wash Basin. Tertiary-age geologic formations lie at or near the surface throughout most of the basin, and as such the Wasatch-Fort Union aquifer is the uppermost regional aquifer in the Sand Wash Basin. The thickness of Tertiary rocks in the Sand Wash Basin increases from a feather edge at the margins to about 12,000 feet in the center of the basin. The Wasatch-Fort Union aquifer overlies a group of rocks composing the Mesaverde aquifer, and then the Dakota aquifer (lower Cretaceous). Because of the extensive outcrop area of Cretaceous rocks in the Sand Wash Basin, the Mesaverde and Dakota are likely to be the principal aquifers along the southern, southeastern, and eastern margins of the basin. In these areas, the Cretaceous-age target aquifers exist at depths less than 2,000 feet and their outcrop areas are exposed to recharge from precipitation, resulting in good water quality.

The principal regions of groundwater recharge in the Sand Wash Basin are the outcrop areas of each aquifer unit. Groundwater discharge from the basin is thought to be through the alluvium of the Little Snake River. Wells in the valley bottoms, west of the Little Snake River, indicate that water levels in the Wasatch-Fort Union aquifer are at or near land surface. East of the Little Snake, water levels in the Wasatch zone are generally below the land surface by several to 100 feet.

A summary of the hydraulic characteristics and water quality for the sedimentary aquifers follows:

TABLE 3.4-2

Sedimentary Rock Aquifer Characteristics	
Primary uses	Mining, Irrigation
Water levels	Wasatch-Fort Union aquifer: 0-100 feet
Well data	90% <500 feet deep mean depth = 245 feet deepest well = 3000 feet
Yield	<1 to 2700 gpm 90% <18 gpm
Hydraulic Conductivity	Wasatch-Fort Union aquifer: 0.02 to 938 ft/day
Water quality	Minimal published data

Reference: Topper, R., K.L. Spray, W.H. Bellis, J.L. Hamilton, and P.E. Barkmann. 2003. Groundwater Atlas of Colorado. Colorado Geological Survey. 210 pp.
http://geosurvey.state.co.us/water/GroundwaterAtlas/Pages/GroundwaterAtlasofColorado.aspx

Environmental Consequences of Leasing and Development-Direct and Indirect Impacts: The act of leasing the parcels for oil and gas development would have no direct impact on water resources; however activities at the exploration and development stage could have impacts to water quality. The magnitude and location of direct and indirect effects cannot be predicted until the site-specific APD stage of development.

The eventual drilling of the proposed parcels would most likely pass through useable groundwater. Potential impacts to groundwater resources could occur if proper cementing and casing programs are not followed. This could include loss of well integrity, surface spills, or loss

of fluids in the drilling and completion process. It is possible for chemical additives used in drilling activities to be introduced into the water producing formations without proper casing and cementing of the well bore. Changes in porosity or other properties of the rock being drilled through can result in the loss of drilling fluids. When this occurs, drilling fluids can be introduced into groundwater without proper cementing and casing. Site specific conditions and drilling practices determine the probability of this occurrence and determine the groundwater resources that could be impacted. In addition to changing the producing formations' physical properties by increasing the flow of water, gas, and/or oil around the well bore; hydraulic fracturing can also introduce chemical additives into the producing formations. Types of chemical additives used in drilling activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives that are operator and location specific. These additives are not always used in these drilling activities and some are likely to be benign such as bentonite clay and sand. Concentrations of these additives also vary considerably since different mixtures can be used for different purposes in oil and gas development and even in the same well bore. If contamination of aquifers from any source occurs, changes in groundwater quality could impact springs and residential wells that are sourced from the affected aquifers. Onshore Order #2 requires that the proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones.

Known water bearing zones in the lease area are protected by drilling requirements and, with proper practices, contamination of ground water resources is highly unlikely. Casing along with cement is extended well beyond fresh-water zones to insure that drilling fluids remain within the well bore and do not enter groundwater.

Potential impacts to ground water at site specific locations are analyzed through the NEPA review process at the development stage when the APD is submitted. This process includes geologic and engineering reviews to ensure that cementing and casing programs are adequate to protect all downhole resources.

All water used would have to comply with Colorado state water rights regulations and a source of water would need to be secured by industry that would not harm senior water rights holders

Environmental Consequences of Leasing and Development - Cumulative Impacts: Throughout the lease areas there are many activities currently occurring, along with historic impacts, which affect water quality and quantity. These activities include: oil and gas development, residential development, grazing, mining, and recreation. At the 5th level watershed scale, the leasing and subsequent development of these parcels would add an additional impact to water resources into the future. Most of this impact would be phased in and lessened as individual wells are completed and older wells are plugged. Overall, it is not expected that the leasing and possible future development of the parcels would cause long term degradation of water quality below State standards.

Potential Future Mitigation: Site-specific mitigation measures, including the requirement to use BLM approved Best Management Practices (BMPs); to protect water quality and hydrologic resources would be analyzed and added at the APD stage.

3.4.1.4 Minerals/Fluid

Affected Environment: These parcels are located within Moffat County and Routt County and are in areas of historical drilling activity. The lease parcels fall within favorability zone 4 (highest for oil and gas potential). The leasing of federal oil and gas reserves is governed by the Mineral Leasing Act of 1920, as amended, which authorized specific minerals to be disposed of through a leasing system. There are currently 836 authorized leases within the LSFO resource area. 670,176 acres of the federal mineral estate is currently leased.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Leasing of the parcels would allow for the development and recovery of oil and natural gas resources. Leasing alone presents no direct impacts to the environment. Future exploration and production is thoroughly analyzed through the APD process. Operators are required to adhere to methods and practices contained in the BLM "Gold Book of Surface Operating Standards and Guidelines for Oil and Gas Development" and with the "Oil and Gas Onshore Orders." The LSFO ensures the operator's proposed casing and cementing program is adequate to protect all existing resources, minerals, and fresh water zones, 43 CFR §3162.5-2(d).

Environmental Consequences of Leasing and Development - Cumulative Impacts: The reasonably foreseeable development (RFD) scenario analyzed in the LSFO RMP (October 2011) considered the drilling and development of 3,031 wells in the coming 20 years This projection was based on historical oil and gas development and production activities, leasing, and economic factors.

The LSFO is co-authoring the Hiawatha Regional Energy Development EIS with the adjacent Rock Springs FO that is analyzing energy development on 157,361 acres of mixed federal, state, and private lands. Approximately ⅓ of this project area is in the LSFO. As leases expire or are terminated, they would be re-evaluated prior to being offered for future sales.

If the leases are issued and developed, fluid minerals would potentially be drained from the lease parcels, however, future potential cumulative impacts to fluid minerals are somewhat unpredictable and speculative, given that the pace, place, and specific equipment configurations of such development are unknown.

3.4.1.5 Minerals/Solid

Affected Environment: Four proposed parcels are located within permitted active coal mining operations: Parcels 6973, 6983, 6974, and 7041. CSU and NSO stipulations to protect surface and underground coal mines the four proposed lease parcels will be applied to the four proposed lease parcels.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Leasing of the parcels would have no impact on coal mining operations. Development of the leases could conflict with the orderly and economic development of the coal resource and operation of the mine. Development of the leases where there are underground coal mines could endanger the safety of workers and could prevent the economic recovery of the coal seam if a

drill hole is located in an area where a coal seam would be mined. Development of a lease within a surface mine permit boundary could conflict with the economic recovery and operations of the surface mine.

Environmental Consequences of Leasing and Development - Cumulative Impacts: This lease sale when combined with past present and reasonably foreseeable could prevent the future development of coal leases if oil and gas leasing and development occur on coal leases that would be offered for sale in the future.

Potential Future Mitigation: At the APD stage, the field office will need to evaluate if development location stipulations are sufficient to protect the solid mineral resource. Environmental analysis will assist the BLM in determining whether, in addition to the location modification stipulation, additional protective measures are necessary. Additional protective BMPs or COAs would be incorporated to development designs.

3.4.1.6 Soils

Affected Environment: The type and classification of soils, as well as the magnitude and location of direct and indirect effects on soil resources cannot be predicted until site-specific proposals are made, should exploration and development be authorized. All but three of the parcels proposed for lease have the potential for fragile soils based on the presence of slopes >35% and/or because soil types are rated as highly or severely erodible by wind or water (see LSFO RMP's criteria/definition for fragile soils below). Because many of the parcels contain private surface ownership, the nature and condition of soils there would not be known until a field visit can be conducted.

Parcel IDs that are NOT likely to contain fragile soils somewhere within the parcel, regardless of surface ownership: 6970,7052,7079.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: There are no direct impacts to soils as a result of this lease sale. However, indirect impacts to soil form and function as a result of the development of parcels offered in this sale could occur. Exploration and development include activities which would physically disturb soils (e.g., building well pads, reserve pits, access roads, installation of pipelines, etc.). The size of well pads would depend on the number of wells and the type of drilling that is being done.

Impacts resulting from the construction of related infrastructure would include removal of vegetation, exposure of the soil, mixing of horizons, compaction, loss of topsoil productivity, susceptibility to wind and water erosion, and possible contamination of soils with petroleum constituents. These impacts could result in increased indirect impacts such as surface water runoff; sheet, rill or gully erosion; and off-site sedimentation in areas downstream/down gradient of this disturbance, especially following rain and snow melt events.

Decreased soil productivity as a result of the loss of topsoil has the potential to hinder revegetation efforts and leave soils further exposed to erosion. Grading, trenching, and backfilling activities may cause mixing of the soil horizons which could diminish soil fertility and reduce the potential for successful revegetation. Segregation and reapplication of surface soils would result in the mixing of shallow soil horizons, resulting in a blending of soil

characteristics and types. This blending would modify physical characteristics of the soils, including structure, texture, and rock content, which could lead to reduced permeability and increased runoff from these areas.

Impacts to soils would depend on the type and purpose of infrastructure constructed. For example, single-well pads are smaller in size than multiple-well sites, but result overall in greater soil disturbance since many more pads and access roads are required. More vehicle trips for single-well pad services are also required since wells are spread out, increasing the potential for dust creation, erosion, and soil compaction.

Contamination of surface and subsurface soils can occur from leaks or spills of oil, produced water, and condensate liquids from wellheads, produced water sumps, and condensate storage tanks. Leaks or spills of drilling and hydraulic fracturing chemicals, fuels, and lubricants could also result in soil contamination. Such leaks or spills could compromise the productivity of the affected soils. Depending on the size and type of spill, the impact to soils would primarily consist of the loss of soil productivity. Typically, contaminated soils would be removed and disposed of in a permitted facility or would be bioremediated in place using techniques such as excavating and mulching to increase biotic activities that would break down petrochemicals into inert and/or common organic compounds.

Within the proposed parcels, the overall erosion potential for soil types present and likely to be disturbed ranges from slight to very high. Impacts are directly related to the wind and water erosion potential of soils and the steepness of the slopes in the proposed lease areas.

According to USDA data, most of the proposed lease parcels have areas with slopes that are greater than 35%. Construction and use of roads, structures, and drill pad locations in areas with slopes that are greater than 35% would likely destabilize soils, would result in severe cut and fill slopes, and would be extremely difficult to reclaim. These direct impacts would result in increased likelihood of soil instability, leaving these areas subject to slumping and mass movement even after reclamation. However, the LSFO RMP has lease CSU stipulations for the protection of soils occurring on slopes 35% or greater and fragile soils, which are reviewed and applied to parcels based on data from the USDA Soil Surveys for Moffat and Routt Counties. This stipulation should prevent these impacts from occurring.

The LSFO RMP also applies a CSU stipulation for fragile soils, defined as areas rated as highly or severely erodible by wind or water (as described in NRCS soil survey reports) or as determined by onsite inspection. Proposed lease parcels are likely to have soils classified as such. Fragile soil criteria include slopes greater than 35%, particularly if they have one of the following characteristics: a) a surface texture that is sand, loamy sand, very fine sandy loam, fine sandy loam, silty clay, or clay; b) a depth to bedrock that is < 20 inches; c) an erosion hazard rating of high or very high; and d) a K (soil erodibility potential) factor>0.32. Surface disturbing activities can still occur on isolated sites that meet fragile soil criteria, but only when performance standards and objectives can be met. Site-specific engineered designs are likely to be required in these circumstances since construction and maintenance of these facilities based solely in accordance with guidelines established in The Gold Book likely would not be adequate to prevent soil erosion, slumping, and structural failure. Prior to locating new structures/

infrastructure, particularly structures highly sensitive to movement, site-specific geologic hazard studies, movement monitoring, and mapping may also be required.

Because indirect impacts to soil community form and function could occur, this sale would lease parcels with stipulations to protect soil resources. Steep slope and fragile soils CSUs (LS-110 and LS-111) are protective of sensitive soils that could contribute to surface water quality degradation if disturbed. The success or failure of stipulations and BMPs (see Potential Future Mitigation) designed to manage storm water and reduce erosion during construction and operation of oil and gas facilities would determine much of the impact with regard to surface waters (see Surface Water Quality). Collectively, these stipulations will improve reclamation potential, maintain soil stability and productivity of sensitive areas, minimize contributions of salinity, selenium, and sediments likely to affect downstream water quality, fisheries and downstream riparian and aquatic habitat, as well as protect human health and safety (from landslides, mass wasting, etc.).

Environmental Consequences of Leasing and Development - Cumulative Impacts: This lease sale, when combined with the past, present and reasonably foreseeable actions would elevate the *potential* for the deterioration of soil health. Increased development of fluid minerals would result in a cumulative increase in surface disturbances as well as increase potential for leaks or spills during drilling and completion activities. The type of impacts would be the same as described under environmental impacts associated with the proposed action. However, the severity of the impacts would be elevated with an increase in mineral development.

Potential Future Mitigation: Please refer to the following website for a list of BLM suggested Best Management Practices and Gold Book design standards:
http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/technical_information.html

3.4.1.7 Surface Water Quality

Affected Environment: The following table summarizes the only proposed lease parcel that, if developed, has the potential to influence surface water quality and conditions of perennial waters that are currently identified by the State of Colorado Department of Public Health and Environment (CDPHE) as having impairments (Clean Water Act 303(d) List).

TABLE 3.4-3
Surface water quality issues associated with proposed lease sale parcels

Parcel ID	Waterbody ID	Segment Description	Portion	Clean Water Act Section 303(d) Impairment
7052	COUCYA13	Dry Creek, including all tributaries and wetlands from source to the Yampa River	all	Iron (total recoverable) during snowmelt season; low priority

Reference: Colorado Department of Public Health and Environment Water Quality Control Commission. 2013. Regulations #33, 37, and 93.
http://www.colorado.gov/cs/Satellite/CDPHE-WQ/CBON/1251596876811

See Wetland and Riparian Zones discussion for a list of proposed lease parcels with known or potential perennial surface waters.

Site-specific stipultations and BMP measures may be implemented at the APD stage based on the submitted Surface Use and Drilling Plans. Examples of BMPs that may be applied include:

For soil stabilization:

- Consistent with lease rights granted, surface occupancy and any related disturbance activities will exclude all fragile soils within municipal watersheds and public water supplies to minimize risk of mass wasting, sedimentation, and reduced reclamation costs. Strict enforcement of Gold Book standards, Army Corp of Engineers 404 and State stormwater permit regulations is necessary to protect drinking water.

For riparian resource protection:

- Fresh water used for drilling and dust suppression would be acquired from commercial and private sources with valid existing rights.
- Surface occupancy and any related disturbance activities will exclude stream channels, stream banks, and the area 2,500 horizontal feet either side of the ordinary high-water mark (bank-full stage) of major river corridors.
- Surface occupancy and any related disturbance activities will not occur within a minimum buffer distance of 325 horizontal feet for all perennial waters, including fens and wetlands, streams, springs and seeps. For perennial streams, the buffer will be measured from ordinary high water mark (bankfull stage), whereas for wetland features, the buffer will be measured from the edge of the mapped extent. For unmapped wetlands, the vegetative boundary (from which the buffer originates) will be determined in the field. Where the riparian zone extends beyond 325 feet, the NSO would be extended to include the entire riparian zone. From 325 to 500 horizontal feet from the perennial water body, controlled surface use restrictions will apply. No surface occupancy of 50 horizontal feet as measured from the top of the stream bank for all intermittent or ephemeral streams. If riparian vegetation extends beyond the top of the stream bank, the buffer will be measured from the extent of the riparian vegetation. Controlled surface use restrictions will apply from the edge of NSO buffer to 100 horizontal feet.If development in riparian areas cannot be avoided then design, construction, and reclamation activities should be professionally engineered and may require additional federal permits. Site-specific mitigation is developed during the NEPA review of APDs.

For water quality protection:

- Surface occupancy and any related disturbance activities will exclude lands within 1,000 horizontal feet of either side of a classified surface water supply stream segment (as measured from the average high water mark of a water body) for a distance of five (5) miles upstream of a public water supply intake with the classification "Water Supply"[2] by the State of Colorado used as a public (municipal) water supply. For all domestic water supplies using a groundwater well or spring, no surface occupancy will be allowed within a minimum distance of 1000 horizontal feet.

- Surface occupancy or use is subject to the following special operating constraints: Oil and Gas operations located greater than 1,000 horizontal feet but less than 2300 horizontal feet of a classified surface water supply stream segment (as measured from the average high water mark of a water body) for a distance of five (5) miles upstream of a public water supply intake with the classification "Water Supply" by the State of Colorado will require the following protective measures. The buffer may be extended beyond 2,300 horizontal feet if site-specific conditions warrant it. This also applies to domestic wells and springs:

- Pitless drilling systems
- Flowback and stimulation fluids contained within tanks that are placed on a well pad or in an area with down-gradient berming.
- Use green fracing fluids only.
- Berms or other containment devices shall be constructed in compliance with rule 603.e. (12) around crude oil condensate and produced water storage tanks.
- Notification of potentially impacted Public Water Systems 15 miles downstream.
- The use of evaporation ponds for means of disposing of produced water shall not be permitted on the BLM administered lands or split estate within the municipal watershed.
- Collection of baseline water quality data (surface and/or groundwater) consisting of a pre drilling sample collected within a 100 feet of well pad, or where sufficient water exists to collect a sample per EPA or USGS collection methods. Additional sampling must be conducted during drilling operations and immediately following well completion. Each sample should analyze at a minimum: pH, alkalinity, specific conductance, major cations, major anions, total dissolved solids, BTEX/GRO/DRO, TPH, PAH's (including benzo (a) pyrene; and metals (arsenic, barium, calcium, iron, magnesium, manganese, lead, and selenium. For municipal watersheds, a coordinated water resources monitoring plan must be developed with the Bureau of Land Management and municipality. Each office will determine the sampling site, intensity, and need for groundwater sampling, depending on site-specific geology and risk. Results must be submitted to the BLM within 3 months of data collection per Section 317b of the Colorado Oil and Gas Conservation Commission regulations.
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Reference: Colorado Oil & Gas Conservation Commission. 2012. http://cogcc.state.co.us/

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: The magnitude of the impacts to surface water resources from future development activities depends on the proximity of disturbances to drainage channels, slope aspect and gradient, degree and area of soil disturbance, soil characteristics, duration of construction activities, and the timely implementation and success/failure of mitigation measures. Natural factors which attenuate the transport of sediment into creeks include water available for overland flow, the texture of the eroded material, the amount and kind of ground cover, the slope shape, gradient, and length, and surface roughness. Impacts would likely be greatest shortly after the start of construction activities and would likely decrease in time due to stabilization, reclamation, and revegetation efforts.

Clearing, grading, and soil stockpiling activities associated with exploration and development actions would alter overland flow and natural groundwater recharge patterns. Potential direct impacts include surface soil compaction caused by construction equipment and vehicles, which would reduce the soil's ability to absorb water, thereby increasing the volume and rate of surface runoff. New oil and gas roads and pads could intersect the movement of shallow groundwater along cut slopes and alter channel and floodplain characteristics at drainage crossings. The combination of increased surface runoff, decreased infiltration, and changes in drainage features could result in increased peak flows and an increase in the frequency and extent of flooding

downstream in proportion to the amount of area in a watershed that is impacted by oil and gas development activity.

Runoff associated with storm events would increase sediment/salt loads in surface waters down gradient of the disturbed areas. Sediment may be deposited and stored in minor drainages where it would be readily moved downstream during heavy rain. Some sediment from future development activity may eventually be carried into perennial tributaries where water quality classifications would limit the amount of sediment and salts that could be present and meet standards. The distance to impacted surface waters would have an attenuating effect on the amount of sediment contributed by lease exploration and development activities.

There are no direct impacts to water quality as a result of this lease sale. However, indirect impacts to water quality as a result of the development permitted in this sale could occur. Therefore, this sale would lease parcels with stipulations to protect surface water resources, including any that have municipal and domestic uses. The perennial water source NSO (LS-105) identifies measures to protect water resources. Steep slope and fragile soils CSUs (LS-110 and LS-111) protect sensitive soils that could contribute to surface water quality degradation if disturbed. CO-28 protects both perennial streams and perennial/ephemeral riparian zones. Collectively, these stipulations are designed to protect areas from excessive erosion and subsequent sedimentation that could impact surface water quality, however, the success or failure of these measures, including BMPs (see Potential Future Mitigation), will largely depend on the operator's choice of infrastructure design and implementation.

Environmental Consequences of Leasing and Development - Cumulative Impacts: This lease sale, when combined with the past, present and reasonably foreseeable actions, would elevate the *potential* for the deterioration of surface water quality in the greater Yampa River watershed. Increased development of fluid minerals would result in a cumulative increase in surface and subsurface disturbances as well as increase potential for leaks or spills during drilling and completion activities. The type of impacts would be the same as described under environmental impacts associated with the proposed action. However, the severity of the impacts would be elevated with an increase in mineral development within the respective watershed.

Potential Future Mitigation: Please refer to the following website for a list of BLM suggested Best Management Practices and Gold Book design standards:
http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/technical_information.html

3.4.2 Biological Resources

3.4.2.1 Invasive/Non-Native Species

Affected Environment: Invasive species and noxious weeds occur within the affected areas. Most of these species are on the Colorado Department of Agriculture noxious weed lists. Downy brome (cheatgrass), bulbous bluegrass, yellow alyssum, blue mustard and other annual weeds are common along roadsides and in other disturbed areas. The primary perennial species in the LSFO include hoary cress (white top), leafy spurge, Russian knapweed, hound's tongue, Dalmatian toadflax, Canada thistle and several species of biennial thistles (including musk, bull and Scotch). Other species of noxious weeds can be introduced by vehicle traffic, livestock and

wildlife. The LSFO, Moffat County, livestock operators, and oil and gas companies collaborate to control weeds and find the best integrated approaches to achieve positive results.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: If drilling were to occur on these parcels, subsequent activities would create an environment and provide a mode of transport for invasive species and other noxious weeds to become established. Construction equipment and any other vehicles or equipment brought onto the site can introduce weed species. Wind, water, recreation vehicles, livestock, and wildlife would also assist with the distribution of weed seed into the newly disturbed areas. The annual invasive weed species (downy brome, yellow alyssum, bulbous bluegrass and other annual weeds) that occur on adjacent rangelands would occupy the disturbed areas. The bare soils and the lack of competition from a perennial plant community would allow these weed species to grow unchecked and can affect the establishment of seeded plant species. Establishment of perennial grasses and other seeded plants as part of interim reclamation is expected to reduce the presence of invasive annual weeds.

The perennial and biennial noxious weeds in the area less frequently establish on the uplands, but some potential exists for their establishment in draws and swales or areas that would collect additional water. The largest concern in the project area would be for these species to become established and not be detected, providing seed which can move onto adjacent rangelands. At the APD stage the operator would be required to control any invasive and/or noxious weeds that become established within the disturbed areas involved with drilling and operating the well.

Environmental Consequences of Leasing and Development - Cumulative Impacts: The proposed action would not add substantially to existing or proposed disturbances in the LSFO, as there would be no surface disturbing activities due to the sale of the lease. A more site-specific analysis would be done at the APD stage to identify any populations or vectors. Invasive species would be treated as COAs require and populations would be kept in check or even eradicated through timely pesticide application and reclamation procedures. These COAs may include power washing or air blasting of construction equipment to remove soil and vegetative parts and requirements for using certified weed-free seed and weed-free hay, mulch, and straw. In addition, any actions that result in the introduction or spread of invasive non-native or noxious weeds would be mitigated by standard weed management guidelines under the direction of the LSFO.

Potential Future Mitigation: Mitigation attached to the APD as COAs to minimize disturbance and obtain successful reclamation of the disturbed areas, as well as weed control utilizing integrated practices, including herbicide applications, would help to control noxious weeds. A Pesticide Use Proposal (PUP) is required prior to application of herbicide on BLM land. All principles of Integrated Pest Management would be employed to control noxious and invasive weeds on public lands.

3.4.2.2 Migratory Birds

Affected Environment: Migratory bird habitats on the proposed lease parcels are comprised primarily of sagebrush stands, oakbrush/mixed mountain shrublands with small areas of pinyon-juniper (PJ) woodlands. Aspen woodlands and mixed coniferous forests can be found on parcels

in higher elevations. A variety of migratory birds may utilize these vegetation communities during the nesting period (May through July) or during spring and fall migrations. The proposed lease parcels provide potential habitat for several species on the USFWS's Birds of Conservation Concern (BCC) List. Those species associated with the BCC list and the proposed lease parcels are presented by habitat affiliation below.

The primary BCC species associated with shrubland habitats in the LSFO is Brewer's sparrow. Brewer's sparrows are a summer resident in Colorado and nest in sagebrush stands. Nests are constructed in sagebrush and other shrubs in denser patches of shrubs. This species would likely be nesting in the proposed lease area from mid-May through mid-July.

BCC species associated with PJ woodlands include pinyon jay and juniper titmouse. Pinyon jays are loosely colonial nesters and can be found in most PJ woodlands within the LSFO. Juniper titmouse are cavity nesters, and also utilize most of the PJ woodlands within the field office. Both species can be found within Colorado year-round.

BCC species that utilize mixed conifer and aspen stands include Cassin's finch and flammulated owl. Cassin's finch are a year round resident of Colorado. This species nests in higher elevation forests and move to lower elevations for the winter. Flammulated owls nest in tree cavities and inhabit higher elevation aspen and conifer forests during the summer months.

Raptor species are tied to several different habitat types with in the LSFO. Sagebrush and other shrublands provide open spaces for hunting, while rocky outcrops, woodlands, sporadic trees and cottonwood forests provide nesting substrates. Red-tailed hawk, golden eagle, bald eagle, northern goshawk and ferruginous hawk likely nest and hunt near several of the parcels. Because many of these raptors are also BLM sensitive species, more information is provided in the T&E and Sensitive Animal Section of this EA.

More generally, birds associated with these lease parcels are well distributed in extensive suitable habitats throughout the LSFO and northwest Colorado and habitat-specific bird assemblages appear to be composed and distributed appropriately to the normal range of habitat variability.

<u>Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:</u> The actual lease sale would not directly impact any migratory bird species or their habitat, however, potential future development of the proposed leased parcels may impact migratory birds. Impacts to wildlife species from oil and gas development are discussed in the LSFO RMP. Impacts include, but are not limited to, displacement into less suitable habitat, increased stress and loss of habitat. Indirectly, habitat effectiveness adjacent to potential development would be reduced as a result of noise and human activity during construction, drilling and completion activities. Inglefinger and Anderson (2004) documented 40-60% declines in Brewer's sparrow abundance within 100 meters of well access roads in Wyoming, and it is likely that this effect is similar within the LSFO. Indirect habitat loss attributable to this behavioral response adds substantially to the effects of habitat loss due to long term facility occupation and habitat modification.

If drilling activities occur during the nesting season, there could be negative impacts to migratory bird species through nest destruction or increased stress leading to nest abandonment. Combined NSO and TL lease stipulations for nesting raptors are used to prevent reproductive failures and maintain the integrity of nest substrates for subsequent years' nesting activities. Encouraging the use of BMPs that reduce vehicle traffic, reducing public use of well access roads and promoting clustered development would help reduce impacts to migratory birds. Impacts to specific species would be addressed at the APD level and appropriate mitigation or COAs would be developed.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Development of one or more of these lease parcels would contribute to activity simultaneous with and in addition to ongoing natural gas and mineral development, agriculture, residential development and recreation use (primarily hunting) in the LSFO. Initial disturbance to migratory birds (e.g., construction, drilling, and completion activities), would be relatively localized and temporary. After these initial activities have subsided, human activity and effects of habitat fragmentation would continue throughout the production phase and persist for the life of well or field. The consequences of these behavioral influences on migratory birds would vary according to species-specific response through time as modified by habituation or circumstance.

Potential Future Mitigation: Additional mitigation measures would be developed at the APD stage of development.

3.4.2.3 Special Status Animals

Affected Environment: There are no Endangered Species Act (ESA) listed or proposed species that inhabit or derive important benefit from any of the lease parcels.

All parcels occur within the Little Snake and Yampa River Basins and development on these parcels is expected to result in water depletions to the Colorado River Basin which would indirectly affect critical habitat of the bonytail chub, humpack chub, Colorado pikeminnow and razorback sucker.

Several of the parcels provide habitat for greater sage-grouse, a BLM sensitive species and a candidate for listing under the ESA. Habitat loss and fragmentation resulting from wildfire, energy development, urbanization, agricultural conversion, conversion of sagebrush to other vegetation types (such as PJ woodlands) and infrastructure development are the primary threats to this species (USFWS 2010). Sage-grouse are considered a sagebrush obligate species, depending on sagebrush ecosystems for cover and forage year-round.

The CPW recently completed a map of high-priority greater sage-grouse habitat in Colorado. The map depicts the current distribution of greater sage-grouse in the state and provides a biological basis for land use recommendations that focus conservation efforts on the most important habitat. Areas with the highest conservation value to maintain sustainable greater sage-grouse populations were mapped as Preliminary Priority Habitat (PPH). Sage-grouse occupied habitats outside of PPH were mapped as Preliminary General Habitat (PGH) and Linkage areas. These are primarily areas with lower activity or incidental use. PPH and PGH are very coarsely mapped and often include areas of non-habitat. Because the LSFO RMP was finalized prior to WO IM 2012-043, several recommendations outlined in the IM were not

analyzed; therefore all parcels located in sage-grouse PPH and parcels in PGH that are in close proximity to an active lek are being deferred at this time. Parcels 6969, 7017, 7018, 7036, 7041, 7052 and 7063 are located in greater sage-grouse PGH, but are not being recommended for deferral at this time. A detailed description of sage-grouse habitat on each parcel is located below:

Parcel 6969 – This parcel is 44 acres in size. Vegetation on the parcel consists of sagebrush and agricultural fields. The surrounding landscape consists of sagebrush, agricultural fields and a few residences, with a county road running through the middle of the parcel. The closest active lek is over four miles away and the parcel is not mapped as nesting, brood rearing or winter habitat. The entire parcel is mapped as PGH and although sage-grouse could potentially move through the area, habitat quality is likely reduced due to the amount of non-native vegetation (ag fields).

Parcel 7017 – This parcel is 82 acres in size with 40 acres located in PGH. Vegetation with PGH consists of sagebrush with scattered oakbrush/mixed mountain shrubs. There are several residences, county roads, a rock quarry and a surface mine in close proximity to the parcel. The closest active lek is over four miles away and the parcel is not mapped as nesting, brood rearing or winter habitat. Habitat quality is severely reduced due to the amount of human disturbances in the area.

Parcel 7018 – This parcel is 1336 acres in size and located entirely within PGH. The parcel consists of sagebrush with several large agricultural fields and scattered residences. The parcel is located over five miles from the closest active lek. The northern portion lacks suitable habitat due to human disturbances, however, there is some potential for sage-grouse use in the southern part of the parcel where sagebrush stands are more intact. Since this habitat is separated from larger, more suitable blocks of habitat, the chance of sage-grouse inhabiting the area is low.

Parcel 7036 – This parcel is 484 acres in size and located entirely within PGH. The parcel consists of sagebrush with scattered residences. The parcel is located over five miles from the closest active lek. This parcel is on the periphery of PPH and may provide some habitat for sage-grouse during movements.

Parcel 7041 – This parcel is 288 acres and consists of sagebrush stands. Although the parcel is entirely in PGH, the parcel may only provide limited habitat for grouse due to its proximity to Craig, CO and other human disturbances, including a power plant and a busy highway.

Parcel 7052 - This parcel is 32 acres in size. Vegetation on the parcel consists primarily of sagebrush stands. The surrounding landscape consists of sagebrush, agricultural fields and a few residences, with a county road running near the parcel. The closest active lek is over four miles away and the parcel is not mapped as nesting, brood rearing or winter habitat. The entire parcel is mapped as PGH and although sage-grouse could potentially move through the area, habitat quality is likely reduced due to the amount of non-native vegetation (ag fields).

Parcel 7063 – This parcel is 350 acres in size with 70 acres located in PGH. Vegetation within PGH is a mix of sagebrush and mixed mountain shrublands. This parcel is located on the periphery of sage-grouse habitat and may be used during movements. However, since the area has a high amount of oakbrush, use by sage-grouse would be low or incidental.

A number of additional BLM sensitive animal species are known to inhabit or may be directly influenced from development of the proposed lease parcels, including bald eagle, Columbian sharp-tailed grouse, Brewer's sparrow, northern leopard frog and Great Basin spadefoot.

Bald eagles are known to winter and nest along portions of the Little Snake and Yampa Rivers and their tributaries within the LSFO. Large, mature cottonwood trees along the river are used as nesting, roosting and perching sites. Upland habitats adjacent to these water ways are used as scavenging areas primarily for winter killed big game species. Many of the parcels provide potential upland winter habitat for this species.

Columbian sharp-tailed grouse inhabit sagebrush stands and mixed mountain shrublands in the eastern portion of the LSFO. In general these birds tend to remain within a 1.2 mi (2 km) radius of the lek site throughout the spring and summer months. Winter use typically ranges from 1 to 4 mi (1.6 – 6.4 km) but movements can be in excess of 30 km depending on abundance of winter food resources (Hoffman 2001). Several parcels provide lekking, nesting and winter habitat for this species.

Brewer's sparrows are common in sagebrush stands and mixed brush communities throughout the LSFO. Potential habitat for this species occurs on most parcels that have a sagebrush component.

Northern leopard frogs are found throughout the LSFO and are associated with riparian communities. Leopard frogs have been documented using riparian habitat along streams, springs, wet meadows and stock ponds in several locations scattered throughout the resource area. There are no known occurrences of this species on any of the proposed lease parcels, however, potential habitat does exist on several parcels.

Northwest Colorado lies on the eastern margin of Great Basin spadefoot toad distribution. Several locations have been documented in Moffat County within the LSFO. Spadefoot toads appear to be associated with ephemeral stock ponds in valley and basin terrain. Although seemingly sporadically distributed in the LSFO, it remains possible that toads occupy shrublands and woodlands near some type of water source. Therefore, several parcels provide potential habitat for this species.

<u>Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:</u>

Colorado River Fish - Cumulative water depletions from the Colorado River Basin are considered likely to jeopardize the continued existence of the Colorado pikeminnow, humpback

chub, bonytail and razorback sucker and result in the destruction or adverse modification of their critical habitat. In 2008, the BLM prepared a Programmatic Biological Assessment (PBA) that addressed water depleting activities associated with the BLM's fluid minerals program in the Colorado River Basin in Colorado, including water used for well drilling, hydrostatic testing of pipelines and dust abatement on roads. In response, the USFWS prepared a Programmatic Biological Opinion (PBO) that addressed water depletions associated with fluid minerals development on BLM lands. The PBO included reasonable and prudent alternatives which allowed the BLM to authorize oil and gas wells that result in water depletions while avoiding the likelihood of jeopardy to the endangered fishes and avoiding destruction or adverse modification of their critical habitat. The reasonable and prudent alternative authorized the BLM to solicit a one-time contribution to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) in an amount based on the average annual acre-feet depleted by fluid minerals activities on BLM lands. Development associated with this lease sale would be covered by this agreement and water use would be entered into the LSFO water depletion log that is submitted to the BLM Colorado State Office at the end of each fiscal year.

Greater sage-grouse – All nominated parcels within high value sage-grouse habitat were deferred from leasing at this time. Parcels evaluated under the proposed action are outside of areas with the highest conservation value to maintain sustainable greater sage-grouse populations and although several of the parcels are within PGH, habitat for sage-grouse on many of the parcels is marginal. There may be some impacts to sage-grouse on the few parcels that support potential habitat; however, these impacts would be minimal based on incidental or low use of the habitat. Impacts include, but are not limited to, displacement and loss of habitat. Other impacts, such as habitat fragmentation and the spread of weedy plants can also degrade habitat. Disruptive impacts do not only occur during the drilling phase, but continue during normal operations and maintenance of sites. Sage-grouse may avoid otherwise suitable habitat as density of roads, powerlines or energy development increases (Lyon and Anderson 2003; Holloran 2005; Kaiser 2006; Doherty et al. 2008).

If lease development occurs, impacts may continue during routine maintenance and operations of the wells. Sage-grouse would likely avoid habitat in the vicinity of the producing well, due to human presence and infrastructure located at the well site. Indirect habitat loss attributable to this behavioral response adds substantially to the effects of habitat loss due to long term facility occupation. In addition, noise and an increase in traffic on access roads would disturb and likely displace grouse. The LSFO requires mufflers to be placed on any equipment that produces sound/noise in sage-grouse habitat. Additional BMPs and site-specific COAs developed at the APD stage (e.g. clustering of wells, limiting traffic) would potentially mitigate impacts from habitat losses. CSU stipulations (5% disturbance thresholds) designed to reduce fragmentation in medium priority sagebrush habitat would reduce habitat fragmentation on parcels containing greater sage-grouse PGH.

Columbian sharp-tailed grouse – Impacts to sharp-tailed grouse from oil and gas development include: loss of habitat, habitat fragmentation, disturbance and displacement, increased stress, facilitation of predation, and direct mortality from vehicles (Hoffman and Thomas 2007). Most oil and gas research has focused on greater sage-grouse; however, it is likely that these impacts

would be similar to sharp-tailed grouse. Although timing limitations can limit disturbances to birds during the lekking season from drilling activities, impacts from long term disturbances (e.g. roads and facilities) are more difficult to minimize. BMPs and COAs at the APD stage that limit traffic, encourage clustered development and reduce habitat fragmentation would be needed to minimize impacts to Columbian sharp-tailed grouse if development exceeds one disturbance per section. In addition, controlled surface use stipulations (5% disturbance thresholds) designed to reduce fragmentation in medium priority sagebrush habitat would reduce habitat fragmentation potential in sharp-tailed grouse habitat associated with the majority of the parcels.

Brewer's Sparrow – Impacts to Brewer's sparrow are discussed in the Migratory Bird section.

Sensitive raptor species – Raptor nest surveys would be required prior to project implementation in areas with suitable nesting habitat or with records of nest locations. Information on functional nest sites found in the course of surveys are used as the basis for developing siting alternatives or applying timing limitations that reduce the risk of nest activity disruptions that could result in reproductive failure. In addition, NSOs are used to maintain the integrity of nest substrates for subsequent years' nesting activities. RMP derived TLs and NSOs are also used to protect important bald eagle roosting sites.

Sensitive fish, northern leopard frogs and Great Basin spadefoot – Considering RMP-derived management emphasis on protecting riparian and aquatic habitats (See Riparian and Water Quality, Surface Sections), it is unlikely that lease development would have any substantive consequence on the condition or function of aquatic habitats occupied by special status species. Implementation of State and federally imposed design measures to control erosion and spills would limit the risk of contaminants migrating off-site and degrading water quality in the Yampa River and its contributing tributaries. However, it is likely that populations of fish and amphibians would be subject to water depletion-related effects, to which the development of proposed lease parcels would incrementally contribute.

<u>Environmental Consequences of Leasing and Development - Cumulative Impacts:</u> Development of one or more of these lease parcels would contribute to activity simultaneous with and in addition to ongoing natural gas and mineral development and recreation use (primarily hunting) in the LSFO. Initial disturbance to TES species (e.g., construction, drilling, and completion activities), as conditioned by TL, CSU and COAs would be relatively localized and temporary. After these initial activities have subsided, human activity and effects of habitat fragmentation would continue throughout the production phase and persist for the life of well or field. The consequences of these influences on TES species would vary according to species-specific response through time as modified by habituation or circumstance, such as the use of access restrictions or BMPs that reduce the frequency and duration of well visitation. Development would result in further unavoidable modifications and reductions in habitat. Roads and working surfaces of pads represent incremental accumulation of acreage removed from habitat base for the life of the well or field.

<u>Potential Future Mitigation:</u> Additional mitigation measures would be developed at the APD stage of development.

3.4.2.4 Upland Vegetation

Affected Environment: Because many of the parcels are under mixed public/private or entirely private surface ownership, the type and condition of upland vegetation would not be known unless a field visit is conducted. Where present, the magnitude and location of direct and indirect effects on upland vegetation cannot be predicted until site-specific proposals are made for exploration and development.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: There are no direct impacts to upland vegetation as a result of this lease sale. However, indirect impacts to upland vegetation as a result of the development permitted in this sale could occur. Potential impacts to upland vegetation will be addressed at the site specific proposed development stage.

Environmental Consequences of Leasing and Development - Cumulative Impacts: This lease sale, when combined with the past, present and reasonably foreseeable actions could elevate the *potential* for the deterioration of upland vegetation communities within specific plant commumities.

Potential Future Mitigation: At a minimum BLM suggested Best Management Practices and Gold Book design standards will be implemented. Site specific interim and final reclamation standards will be determined prior to the permitting of any proposed development: http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/technical_information.html

3.4.2.5 Wetlands and Riparian Zones

Affected Environment: Almost all proposed lease parcels have known or the potential for perennial surface waters; all parcels have the potential for ephemeral surface waters. Because many of the parcels are under mixed public/private or entirely private surface ownership, the type and condition of riparian resources there would not be known unless a field visit is conducted. Where present, the magnitude and location of direct and indirect effects on riparian resources cannot be predicted until site-specific proposals are made for exploration and development.

The following table lists the parcels that have identified and/or assessed perennial wetland or riparian resources on BLM-managed surface:

Parcel ID	Riparian Type/Name
6951	Hayden Gulch + springs
6956	Berry Gulch
6957	Hayden Gulch
6974	Sage Creek
7016	N. Fork Middle Creek
7036	springs
7041	springs
7060	Trout Creek

There are no known riparian areas identified on the BLM-managed surface in any of the other proposed parcels.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Although specific influences associated with lease development cannot be predicted at the leasing stage, management direction in the LSFO RMP that land use activity maintain existing riparian acreage and diversity in riparian plant communities. BLM policy and current LSFO RMP decisions allow for the site-specific development of COAs at the APD stage that are effective in substantially reducing direct involvement and indirect influences on riparian vegetation and channel function, including facility relocation of up to 200 meters and provisions for rapid stabilization and restoration in the event of unavoidable involvement (e.g., typically linear alignments).

There would be no direct impacts to riparian resources as a result of this lease sale. However, indirect impacts to these sensitive areas as a result of the development of the parcels offered in this sale could occur. Therefore, this sale would lease parcels with stipulations to protect not only riparian areas, but also the related resources/qualities of surface water and soils. The perennial water source NSO (LS-105) identifies measures to protect water resources. Steep slope and fragile soils CSUs (LS-110 and LS-111) are protective of sensitive soils that could contribute to surface water quality degradation if disturbed. CO-28 protects both perennial streams and perennial/ephemeral riparian zones. Collectively, these stipulations are designed to maintain and protect riparian form and function, including attributes such as water quality, stream stability, aquatic health, fisheries, and downstream sediment processes, however, the success or failure of these measures, including BMPs (see Potential Future Mitigation), will largely depend on the operator's choice of infrastructure design and implementation.

Environmental Consequences of Leasing and Development - Cumulative Impacts: This lease sale, when combined with the past, present and reasonably foreseeable actions could elevate the *potential* for the deterioration of riparian resources within the affected watersheds. However, cumulative effects on riparian zones should be limited due to existing lease stipulations (CO-28), COAs, and BMPs that provide protection to these areas. Some impacts could occur if creek crossings cannot be avoided during oil and gas exploration and development activities.

Potential Future Mitigation: See Potential Future Mitigation for Surface Water Quality.

3.4.2.6 Aquatic Wildlife

Affected Environment: There is potential for ephemeral and perennial riparian resources (including streams, wetlands, seeps, springs and ponds) on several parcels. Water resources and associated riparian vegetation provide potential habitat for aquatic wildlife species. CPW has classified several areas as aquatic habitat recovery and conservation waters. These waters are defined as reaches containing species under management for population conservation and recovery for important fish and amphibians. Parcels 6971 and 7017 are classified as providing habitat or potential habitat for conservation and recovery.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: See discussions in the Special Status Species and Wetland and Riparian Zones sections. Emphasis on riparian and channel avoidance and sedimentation control provide a sufficient range of measures and objectives that, applied to lease development, effectively avoids substantive impact to the condition or function of channel features associated with aquatic habitats (See Riparian 3.4.2.5 and Surface Water Quality 3.4.1.7 Sections). Implementation of State and federally-imposed design measures to control erosion and spills also work to limit the risk of contaminants migrating off-site and degrading water quality in these systems. There are no direct impacts associated with the leasing these parcels. Site-specific impacts associated with the development of the lease parcels would be determined and analyzed through an environmental assessment at the APD stage. With the application of COAs and BMPs, impacts to aquatic habitats can be reduced or avoided.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Cumulative effects to aquatic wildlife species are similar to those described in the T&E and Sensitive Species Section of this EA.

Potential Future Mitigation: Mitigation designed to protect riparian habitats and perennial water would be adequate to protect aquatic wildlife.

3.4.2.7 Terrestrial Wildlife

Affected Environment: A variety of wildlife habitats and their associated species occur within proposed leasing area. Each habitat type provides food, cover and shelter for a variety of mammal, bird and reptile species common to northwest Colorado.

Large ungulates in the area include pronghorn, mule deer and elk, with some parcels providing important winter range for these species. Several parcels are mapped as mule deer critical winter range or are located within elk winter concentration areas and/or elk severe winter habitat. In addition, higher elevation parcels provide habitat for elk calving. Several parcels also provide habitat for pronghorn. Large predators include mountain lion and black bear. Coyotes, bobcats, jackrabbits, cottontail rabbits and a variety of small rodents, reptiles and birds likely inhabit the general area. In addition, Parcels 7010, 7019, 7027 and 7031provide important nesting and staging habitat for greater sandhill cranes.

Small mammals, that are likely to inhabit the lease parcels, display broad ecological tolerance and are widely distributed throughout the region where suitable habitat is available. No narrowly-distributed or highly-specialized species or sub-specific populations are known to inhabit the LSFO.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: The act of leasing the parcels for oil and gas development would have no direct impact on wildlife resources; however, exploration and development of leased parcels would likely impact wildlife. The magnitude and location of direct and indirect effects cannot be predicted until the site-specific APD stage of development.

Impacts to wildlife species from oil and gas development are discussed in the LSFO RMP (Section 4.5.5). Impacts include, but are not limited to, displacement into less suitable habitat, increased stress and loss of habitat. These impacts are more significant during critical seasons, such as winter or reproduction. Big game species are often restricted to smaller areas during the winter months and may expend high amounts of energy to move through snow, locate food and maintain body temperature. Disturbances during the winter can displace big game, depleting much needed energy reserves and may lead to decreased over winter survival. TLs would help protect wildlife during critical time periods, however direct and indirect habitat loss would be more difficult to minimize.

Sawyer et al. (2006) demonstrated an avoidance response by mule deer of well pads and roads in the development of a natural gas field in western Wyoming. The response was immediate (i.e., year 1 of development) and no evidence of acclimation occurred during the course of the 3 year study. However, the indirect habitat loss caused by an avoidance response of mule deer could be reduced by 38-63% with the use of advanced technologies and proper planning that minimize the number of well pads and amount of human activity associated with them (Sawyer et al. 2006). Elk have displayed similar avoidance characteristics as mule deer to oil and gas development. Radio collared elk in the Jack Marrow Hills, Wyoming displayed an avoidance buffer of 1000-m in winter and 2000-m in summer of roads and active well sites (Powell 2003). While habitat between the well sites in the studies listed above and the parcels in the LSFO lease sale may not be equal, a general assumption can be made that oil and gas development activities could alter habitat use of these terrestrial animals. BMPs and site-specific COAs developed at the APD stage (e.g. clustering of wells, limiting traffic) would potentially help mitigate impacts from habitat losses. In addition, CSU stipulations (5% disturbance thresholds) designed to reduce fragmentation in medium priority sagebrush habitat would reduce habitat fragmentation on the majority of the parcels.

Lease development's influence on small mammal populations, at least in the short team, is likely confined to on-site mortality and direct habitat loss attributable to facility occupation and vegetation clearing. Due to relatively small extent of actual surface occupation and large areas of undisturbed lands, development of the proposed lease parcels would have limited impacts to small mammal populations. Impacts to specific species would be addressed at the APD level and appropriate mitigation or COA would be developed.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Cumulative effects to wildlife species are similar to those described in the T&E and Sensitive Species and Migratory Bird Sections of this EA.

Potential Future Mitigation: Addition mitigation measures would be developed at the APD stage of development.

3.4.3 Heritage Resources and Human Environment

3.4.3.1 Cultural Resources

The leasing of federal mineral rights for potential oil and gas exploration and production is considered an undertaking under Section 106 of the National Historic Preservation Act (NHPA). The BLM has the legal responsibility to take into account the effects of its actions on cultural resources located on federal land or affected by federal undertakings. Because the leasing of the oil and gas parcels is not in itself a ground disturbing activity, additional Section 106 compliance will be performed at the APD development stage. The environmental consequences of future development are largely unknown at this time because the majority of the lease parcels have not been inventoried. We do not know the full extent of cultural resources that may exist within the lease parcels.

The Colorado State Protocol (2014) outlines the process by which the BLM meets its Section 106 responsibilities with the State Historic Preservation Office (SHPO). Section 106 of NHPA requires federal agencies to: 1) inventory cultural resources to be affected by federal undertakings, 2) evaluate the importance of cultural resources by determining their eligibility to the National Register of Historic Places (National Register), and 3) consult with the federal and state preservation agencies regarding inventory results, National Register eligibility determinations, and proposed methods to avoid or mitigate impacts to eligible sites. In those cases where site avoidance is impractical or undesirable, the BLM will implement the appropriate mitigation measures after consultation with SHPO, Inidan Tribes and other consulting parties.

Affected Environment: The currently understood prehistory of the LSFO area is discussed in LaPoint (1987) and Reed and Metcalf (1999). The oldest sites in the area are over 11,000 radiocarbon years in age. The most recent Native American sites date to the historic era. Recorded sites date to all the major archaeological time periods, including Paleoindian, Archaic, and post-Archaic. Some of the earlier post-Archaic sites in the western portion of the area are assigned to the Fremont, a prehistoric people that was to some extent reliant on farming of corn, beans, and squash. Some later post-Archaic sites can be categorized as Numic, a term referring to the sites that were likely produced by the historically known tribes of the area or their predecessors. In historic times, the area was inhabited principally by Ute and Shoshone people.

Most archaeological sites include a variety of site types. Lithic scatters and campsites are commonly found. As implied by the name, lithic scatters are often denoted by a scattering of stone tools and stone debris from tool manufacture. Campsites often have such a scattering of stone artifacts but also have some evidence of habitation, such as fire hearths or, less commonly, tipi rings or pithouses. Among the less common kinds of sites are rock art sites, tool stone quarry sites, and burials.

The historical development of northwest Colorado is discussed in Athearn (1976) and Church et al. (2007). These documents present a history of northwest Colorado by historical periods and themes, including the fur trade, exploration, settlement, confrontation with native people, development of the livestock industry, mining, construction of railroads, etc. To date, historic archaeology in the area has been limited to the fur trade era.

On June 19, 2014, BLM archaeologist Brian Naze conducted a literature review of records in the BLM-LSFO database and reviewed relevant information in the COMPASS database maintained by the Colorado Office of Archaeology and Historic Preservation. The area evaluated for cultural resources during the Class I (records search) for this lease sale included all lands within a nominated lease parcel, including those lease parcels that are located on private and state lands. This review determined that within the sale parcels are a number of important sites that are either potentially eligible for the National Register of Historic Places (NRHP) and need further evaluation or are eligible for the NRHP. A summary of these sites, arranged by lease parcels, is presented below.

> Parcel 6951 is located south of Hayden, Colorado in the Hayden Gulch area. A prehistoric lithic scatter is identified as potentially eligible for the NRHP.
>
> Parcel 6954 is located southwest of Hayden, Colorado within the area drained by Dill Gulch. A prehistoric campsite is identified as potentially eligible for the NRHP.
>
> Parcel 6983 is located in the Williams Fork Mountains south of Craig, Colorado. An archaeological site is situated 160 meters outside of one of the tracts of land. This site is likely culturally affiliated with the Utes, Shoshone, or their predecessors and has traditional cultural and religious value to them.
>
> Parcel 7041 is located west and southwest of Craig, Colorado. Two prehistoric campsites are identified that are eligible for the NRHP.

<u>Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:</u>
The leasing of oil and gas parcels has no direct potential for surface disturbance, and no effect to any known historic properties is anticipated from this action. Exploration and development activities that might be proposed as a result of leasing include those which could physically disturb historic properties (e.g., building well pads, access roads, installation of pipelines, etc.). The size of well pads would depend on the number of wells and the type of drilling that is being done. Access roads, pipelines and other infrastructure would be developed during both exploration and development activities.

The BLM is required by statute and regulation to ensure that BLM initiated or BLM authorized actions do not inadvertently harm or destroy cultural resource values. Because most cultural resources are unidentified, irreplaceable, and highly sensitive to ground disturbance, it is necessary that the resources are properly identified, evaluated, and reported prior to any future activity that may affect their integrity or condition.

Before any APDs are approved for exploration or drilling, a Class III cultural resource survey would be undertaken to comply with Section 106 of NHPA. All lands offered for lease are subject to existing federal, state and local laws and regulations and to Exhibit CO-39 to protect cultural resources. Proposed construction or operation activities associated with development of these lease parcels would be relocated to avoid potentially eligible sites by at least 100 meters, or that any related undertaking's Area of Potential Effect (APE) could be situated to avoid such

sites. Mitigation measures would be developed during the NEPA review of individual ground disturbing activities.

The act of leasing oil and gas parcels may have indirect impacts to historic properties. Leasing allows for future development that may impact the setting of sites and may provide more access to the area by the public. A study by Nickens et al. (1981:132) concluded that sites in areas of public land that are easily accessible from a maintained dirt road are much more likely to be visited by artifact collectors. Similarly, rock art and other sites that are vulnerable to vandalism are at higher risk with more public access.

The potential indirect impact of leasing on the archaeological site situated 160 meters outside of one of the tracts of land in Parcel 6983 is currently part of ongoing tribal consultation with the likely culturally affiliated tribes. [Also see Environmental Consequences of Leasing and Development under 3.4.3.2 Native American Concerns]

Environmental Consequences of Leasing and Development - Cumulative Impacts: The cumulative impacts to cultural resources from lease and development of the sale parcels are not expected to be great. Two oil and gas fields are present in the LSFO in the vicinity of Powder Wash Camp and Hiawatha. At these places, the density of wells, storage facilities, pipelines, and access roads is high. In such oil and gas fields, there conceivably could be cumulative impacts to cultural resources. For example, if an eligible historic site is important because it is associated with an event that has made a significant contribution to the broad pattern of U.S. history, the presence of a lot of oil and gas field facilities nearby could detract from the quality of the experience for visitors to the site. Eligible archaeological sites are important because they are likely to yield information important to provide a better understanding of prehistory. Cumulative impacts to archaeological sites from a high density of oil field facilities is therefore less of a concern.

The density of oil and gas development facilities within the sale parcels is not high; therefore, leasing of the sale parcels is not expected to result in more cumulative impacts to cultural resources. The increased utilization of the area also increases the chance of illegal collection of cultural material. Alternatively, the development of the area has resulted in a large amount of cultural resource studies. The information and data gained from these studies would never have been obtained without the presence of energy development.

Potential Future Mitigation: Should future cultural resource inventories conducted in response to APDs identify eligible historic properties and such sites can't be avoided by project redesign, a potential method of mitigating adverse effects is to conduct data recovery of archaeological sites or detailed documentation of structures or buildings, such as the Historic American Buildings Survey and the Historic American Engineering Record.

Archaeological sites are important for their potential to yield information important for providing a better understanding of prehistory, therefore, eligible archaeological sites that can't be avoided by project redesign may be mitigated through conducting excavations intended to retrieve archaeological material and associated information. Reports will then be produced that

summarize the excavations conducted at a site, interpret the activities performed on the site, and explain how investigation of the site has contributed to a better understanding of prehistory.

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3.4.3.2 Hazardous or Solid Wastes

Affected Environment: There are no known hazardous or other solid wastes on the proposed lease sale parcels.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: The act of leasing the parcels for oil and gas development would not involve the use and management of petroleum products or hazardous substances. However, these activities would take place at the exploration and development stage. The magnitude and location of potential direct and indirect effects cannot be understood or analyzed until the site-specific APD stage of development. Possible pollutants that could be stored and accidentally released during the construction, drilling, and production phases could include diesel fuel, hydraulic fluid, and lubricants.

The most pertinent of the Federal laws dealing with hazardous materials are as follows:

- The Oil Pollution Act (Public Law 101-380, August 18, 1990) prohibits discharge of pollutants into waters of the US, which by definition would include any tributary, including any dry wash that eventually connects with the Colorado River.

- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. 9601–9673), provides for liability, risk assessment, compensation, emergency

response, and cleanup (including the cleanup of inactive sites) for hazardous substances. The act requires federal agencies to report sites where hazardous wastes are or have been stored, treated, or disposed of, and requires responsible parties, including federal agencies, to clean up releases of hazardous substances.

- The Resource Conservation and Recovery Act (RCRA), as amended by the Federal Facility Compliance Act of 1992 (42 U.S.C. 6901–6992), authorizes the EPA to manage, by regulation, hazardous wastes on active disposal operations. The act waives sovereign immunity for federal agencies with respect to all federal, State, and local solid and hazardous waste laws and regulations. Federal agencies are subject to civil and administrative penalties for violations and to cost assessments for the administration of the enforcement.

- The Emergency Planning and Community Right-To-Know Act of 1986 (42 U.S.C. 11001–11050) requires the private sector to inventory chemicals and chemical products, report those in excess of threshold planning quantities, inventory emergency response equipment, provide annual reports and support to local and State emergency response organizations, and maintain a liaison with the local and State emergency response organizations and the public.

Environmental Consequences of Leasing and Development - Cumulative Impacts: This action may lead to future operations that would use some type of chemical or petroleum products. However, if mitigation measures are properly applied for this action, then future impacts would be limited.

Potential Future Mitigation: These laws, regulations, standard lease stipulations, and contingency plans and emergency response resources are expected to adequately mitigate any potential hazardous or solid waste issues associated with the proposed action.

3.4.3.2 Native American Concerns

Federal land managing agencies are required to consult with Native Americans when making decisions regarding land management. Consultation is required under several statutes and Executive Orders, namely NHPA, Archaeological Resources Protection Act (ARPA), American Indian Religious Freedom Act (AIRFA) , the Native American Graves Protection and Repatriation Act (NAGPRA), and Executive Order 13007 (Indian Sacred Sites). Under NHPA, tribal consultation is intended to identify sites and areas of traditional cultural and religious concern that have the potential to be affected by the proposed action.

Affected Environment: The LSFO consults with tribes that inhabited the field office area in historic times. The area was principally the home to the Utes and the Shoshone. Ute people now live on the Uintah and Ouray Indian Reservation in Utah and the Southern Ute Indian Reservation and the Ute Mountain Indian Reservation in Colorado. The three reservations are governed by autonomous councils. Descendants of Shoshone people who lived in northwest Colorado now live on the Wind River Indian Reservation in Wyoming. Tribal consultation was initiated by letter on May 19, 2014 regarding this lease sale. The letter requested their input and concerns and invited them into consultation if desired. No responses were received. Additional tribal consultation has been initiated regarding the archaeological site situated 160 meters outside of one of the tracts of land in Parcel 6983. A consultation meeting was held with the Ute tribes on October 15, 2014. Additional consultation is scheduled for spring or summer of 2015.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Leasing and development of oil and gas resources may cause direct impacts to sites of concern to Native Americans. After parcels are leased, specific planned developments (such as an individual well pad and access road) are permitted once oil and gas companies submit an Application to Drill (APD). Upon receipt of an APD, the location of the proposed well pad and access road are examined for cultural resources as required by NHPA. BLM would consult with tribes regarding potential affects to any sites that likely would be of concern to them. If sites of Native American concern are involved in a specific APD, options intended to avoid direct impact, such as redesigning the well pad or access road or establishing a protection area around the site within which oil and gas development may not occur, would be considered and implemented. Unanticipated discovery of sites of traditional cultural and religious value to Native Americans, such as burials, is also a possible direct impact from leasing and development.

The leasing of oil and gas parcels may have indirect impacts to historic properties. Leasing allows for future development that may impact the setting of sites and may provide more access to the area by the public. A study by Nickens et al. (1981:132) concluded that sites in areas of public land that are easily accessible from a maintained dirt road are much more likely to be visited by artifact collectors. Similarly, rock art and other sites that are vulnerable to vandalism are at higher risk with more public access.

The potential indirect impact of leasing on the archaeological site situated 160 meters outside of one of the tracts of land in Parcel 6983 is currently part of ongoing tribal consultation with the likely culturally affiliated tribes. Consultation is ongoing and depending upon the concerns received, stipulations intended to protect the setting of this archaeological site from the potential effects of oil and gas development might be imposed on the lease. Also, potential indirect effects from increased access that may result in vandalism and illegal digging are part of the tribal consultation.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Cumulative impacts from the drilling of larger numbers of wells and construction of more access roads may impact sites of concern to Native Americans. Greater public access into an area could result in more indirect impacts, such as increased vandalism to rock art sites.

Native American groups have expressed a general concern for development in the vicinity of known archaeological sites, especially ones of Ute affiliation. Cumulative effects to Native American Religious Concerns may include visual degradation of a landscape important in traditional cultural and religious practice, interruption of accessibility to a particular site and a change or alteration in the character of a site, place or landscape important to traditional beliefs and practices. If future consultations or investigations reveal the presence of such concerns, said concerns must be mitigated in consultation with the appropriate tribal, state and federal entities. The mitigation of potential impacts and effects to these properties, especially historic properties of a large landscape scale, would be challenging.

Potential Future Mitigation: Stipulations intended to protect the traditional cultural and religious values of sites of concern to Native Americans might be imposed. Pending input from the tribes concerning the archaeological site adjacent to Parcel 6983, stipulations might be imposed on the lease issued for that parcel. Other sites of concern to Native Americans might be found during cultural resource inventories completed prior to approval of specific APDs within existing leases. If so, Native American input will be sought and stipulations intended to protect sites of concern may be imposed on the approval of individual APDs.

3.4.3.3 Paleontological Resources

Affected Environment: The BLM has implemented a Potential Fossil Yield Classification (PFYC) system for classifying paleontological resources on public lands. Under the PFYC system, geologic units are classified from Class 1 to Class 5 based on the relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils and their sensitivity to adverse impacts. A higher classification number indicates a higher fossil yield potential and greater sensitivity to adverse impacts. The lease parcels selected for sale area contain portions of geological formations known to produce a range of fossils, from few scientifically valuable fossils to several scientifically valuable fossils, resulting in PFYCs between Class 1 to Class 5. Bedrock outcrops would be the most sensitive to adverse impacts from the proposed action. Young alluvial deposits or deep soils may cover and obscure sedimentary bedrock. The planned disturbance would pass through the soil layer and could impact a bedrock unit which is known to contain significant fossils elsewhere. To protect paleontological resources, stipulation CO-29 and lease Notices should be applied to the following parcels: 6939, 6950, 6951, 6955, 6956, 6957, 6965, 6969, 6970, 6971, 6973, 6974, 6976, 6977, 6978, 6981, 6982, 6983, 6984, 7009, 7010, 7013, 7014, 7016, 7017, 7018, 7019, 7027, 7031, 7036, 7040, 7041, 7052, 7053, 7054, 7060, 7063, 7068.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Thirty-nine lease sale parcels recommended for sale contain areas mapped as PFYC 3 and PFYC 5. PFYC Class 3, 4, or 5 formations contain potentially fossil-bearing alluvium, or known paleontologically significant localities, which may then suggest the need for field surveys and/or other mitigation measures. Locations for proposed oil or gas well pads, piplines, and associated infrastructure will be subject to further analysis for the protection of palontological resources within these lease sale parcels.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

These lease sale parcels are in areas where the past, present, and reasonably foreseeable actions include: agriculture, grazing, coal mining, coal exploration and recreation. When combined with these past, present and reasonably foreseeable actions, this lease sale could increase the cumulative impacts on paleontologically significant resources. An increase in damage to paleontologically significant resources could occur with increased surface disturbance. Beneficial impacts could result from the increased surface and subsurface disturbance because previously unrecorded sites could be discovered and potentially paleontologically significant resources could be added to the existing regional palontological knowledge. Sites that could not be avoided may require excavation and collection, which would also add to existing paleontological knowledge.

Potential Future Mitigation:
Mitigation would be developed during the NEPA review of individual ground disturbing activities. Prior to APD approval, a paleontological survey of the area of surface disturbance may be required. During construction activities, monitoring surface disturbance to any PFYC 4-5 (formerly named Class II and Class I respectively) areas should take place by a BLM permitted paleontologist. If paleontological resources are discovered during operations, the operator shall immediately cease operations and notify the LSFO Authorized Officer (AO) immediately upon discovery of a fossil during construction activities. Within 5 working days after notification, the LSFO AO shall have a qualified paleontologist evaluate any paleontological resources discovered. Appropriate measures to mitigate adverse effects to significant paleontological resources would be determined by the authorized officer after consulting with the operator. The operator would be responsible for the cost of any investigation necessary for the evaluation and for any mitigation measures. The operator may not be required to suspend operations if activities can avoid further impacts to a discovered site or be continued elsewhere, however, the discovery shall be brought to the attention of the AO as soon as possible and protected from damage or looting (modified from 43CFR3802.3-2(f)(2), 43CFR3809.420(b)(8), and BLM IM 2009-011). An assessment of the significance is made and a plan to retrieve the fossil or the information from the fossil is developed. Ownership of paleontological resources discovered shall be determined in accordance with applicable law. Other notification and reporting requirements may exist for split-estate parcels with privately-owned surface.

If possible, the paleontological resource should be avoided.

3.4.3.4 Social and Economic Conditions

Affected Environment: Existing social and economic factors influence the nature of local economic and social activity. Among these factors are the local population, the presence and proximity of cities or regional business centers, longstanding industries, infrastructure, predominant terrestrial and aquatic landscapes, and unique area amenities. The proposed lease parcels are located in Moffat and Routt County, Colorado. The socioeconomic conditions in Moffat and Routt counties within the Little Snake Field Office areas that concern human communities include towns, cities, rural areas, and the custom, culture, and history of the area as it relates to human settlement, social values, and economic activity. BLM management actions can impact socioeconomic conditions in the study area and in nearby communities.

TABLE 3.4-5

Profile of County Demographics, 2000-2010

	Moffat	Routt	Colorado	US
Population (2010*)	13,519	22,924	5,029,196	303,965,272
Population (2000)	13,184	19,690	4,301,261	281,421,906
Population Percent Change (2000-2010*)	2.5%	16.4%	16.9%	8.0%

* The data in this table are calculated by ACS using annual surveys conducted during 2006-2010 and are representative of average characteristics during this period.
Data Sources: U.S. Department of Commerce. 2012. Census Bureau, American Community Survey Office, Washington, D.C.; U.S. Department of Commerce. 2000. Census Bureau, Systems Support Division, Washington, D.C.

The two-county region has experienced varying degrees of fluid mineral development. Currently there is oil and gas development dispersed roughly equally throughout the counties of the LSFO. Rio Blanco County contains the highest number of active wells, though most of these are in the western portion of the county, outside the boundaries of the LSFO. Employees in the oil and gas sector within these counties earn an average of approximately $76,000 per year (US Department of Labor. 2012. Bureau of Labor Statistics, Quarterly Census of Employment and Wages).

The following table reports the average annual fluid minerals production for each county, including an estimated revenue value, figured using the average state wellhead prices from 2009: Oil at $52.33/bbl and natural gas at $3.21/MCF (IPAA, August 2011 Report http://ipaa.org/reports/docs/2010-2011IPAAOPI.pdf). The production values are averaged over the past ten full years of production (2002-2011); (Colorado Oil and Gas Conservation Commission http://cogcc.state.co.us/).

TABLE 3.4-6
Average Annual Production and Revenue

	Moffat	Routt	Total
Oil Production (Thousand bbl)	279	76.9	4,027
Oil Revenue ($ Thousand)	14,579	4,027	301,673
Gas Production (MMCF)	18,182	35.3	72,209
Gas Revenue ($ Thousand)	58,365	113.4	231,792

Federal oil and gas leases generate a one-time lease bonus bid as well as annual rents. The minimum competitive lease bid is $2.00 per acre. If parcels do not receive the minimum bid they may be leased later as noncompetitive leases that don't generate bonus bids. Within the LSFO, average bonus bids are approximately $170 per acre for oil and gas leases. Lease rental is $1.50 per acre per year for the first five years and $2.00 per acre per year thereafter. Typically, oil and gas leases expire after 10 years unless held by production. During the lease period annual lease rents continue until one or more wells are drilled that result in production and associated royalties. The royalty rate is 12.5 percent of revenue associated with mineral extraction on federal leases.

Federal mineral lease revenue for the State of Colorado is divided thusly: 48.3 percent of all state mineral lease rent and royalty receipts are sent to the State Education Fund (to fund K-12 education), up to $65 million in FY 2009 – FY 2011, and growing at four percent per year thereafter. Any amounts greater than the upper limit flow to the Higher Education Capital Fund. 10 percent of all state mineral lease rent and royalty receipts are sent to the Colorado Water Conservation Board (CWCB), up to $13 million in FY 2009, and growing at four percent per year thereafter. Any amounts greater than the upper limit flow to the Higher Education Capital Fund. 41.4 percent of all state mineral lease rent and royalty receipts are sent to the Colorado Department of Local Affairs, which then distributes half of the total amount received to a grant program, designed to provide assistance with offsetting community impacts due to mining, and the remaining half directly to the counties and municipalities originating the Federal Mineral Lease (FML) revenue or providing residence to energy employees.

Bonus payments are allocated separately from rents and royalties, in the following manner: 50 percent of all state mineral lease bonus payments are allocated to two separate higher education trust funds: the "Revenues Fund" and the "Maintenance and Reserve Fund". The Revenues Fund receives the first $50 million of bonus payments to pay debt service on outstanding higher education certificates of participation (COPs). The Maintenance and Reserve Fund receives 50 percent of any bonus payment allocations greater than $50 million. These funds are designated for controlled maintenance on higher education facilities and other purposes. The remaining 50 percent of state mineral lease bonus payments are allocated to the Local Government Permanent Fund, which is designed to accumulate excess funds in trust for distribution in years during which FML revenues decline by ten percent or more from the preceding year.

Executive Order 12898 requires federal agencies to assess projects to "identify and address the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." There are no environmental justice communities in the study area, either based on race, ethnicity, or income. The areas involved in the lease sale are rural in nature, and small communities and sparsely populated subdivisions exist within variable distances from the proposed lease parcels.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:
The direct effect of the proposed action would be the payments received, if any, from the leasing of all or a subset of the the 29,705.4 acres of federal mineral estate. Indirect effects that might result, should exploration and development of the leases occur, could include increased employment opportunities related to the oil and gas and service support industry in the region as

well as the economic benefits to federal, state, and county governments related to lease payments, royalty payments, severance taxes, and property taxes. Other effects could include the potential for an increase in transportation, roads and noise disturbance associated with development. These effects would apply to all public land users in the project area.

It is speculative to predict the socioeconomic effects of this action, as there are no guarantees that the leases will receive bids, that any leased parcels would be developed, or that any developed parcels would produce any fluid minerals. An APD would result in future NEPA analysis taking place, in which further socio-economic effects would be examined. Likewise, any negative socio-economic effects resulting from disturbance and drilling on leased parcels would also be examined in future site-specific analysis. It is unknown when, where, how, or if future surface disturbing activities associated with oil and gas exploration and development such as well sites, roads, facilities, and associated infrastructure would be proposed. It is also not known how many wells, if any, would be drilled and/or completed, the types of technologies and equipment would be used and the types of infrastructure needed for production of oil and gas. Thus, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors.

No minority or low income populations would be directly affected in the vicinity of the proposed action.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Any possible future development of fluid mineral resources resulting from this lease sale would be in addition to the current level of development, as examined in the affected environment.

3.4.3.5 Visual Resources

Affected Environment: Visual resources are the visible physical features of a landscape to which concerned or visually sensitive publics assign scenic value. Scenic values in the LSFO have been inventoried as Visual Resource Inventory (VRI) conditions, and VRM objectives were established in the LSFO RMP. VRM objectives corresponding to the various management classes provide standards for analyzing compliance with RMP VRM objectives. Projects are evaluated using the Contract Rating System to determine if it meets VRM objectives established by the RMP. VRI conditions, supplemented by site and area analyses of proposed actions, are the basis for evaluating the effects of proposed projects on the human environment.

The majority of the parcels proposed for leasing occur on private surface in areas that have already been modified including roads, houses, oil and gas, and agricultural development and are being managed as Class III. VRM Class III objectives is to partially retain the existing character of the landscape in which the level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Most of the parcels are located in the Foreground-Middleground zone. This zone is composed of areas that are seen from major highways and other primary travelways, rivers, trails, or other

viewing locations that are less than 3 to 5 miles away. Management activities and proposed projects may be viewed in more detail in this zone.

Lease parcel 6939 is private land and an 80 acre section of public land located near County Road 57 in the Danforth Hills in Moffat County. The public land portion is adjacent to State land. For visual resource purposes, the area is identified as the Windy Gulch Unit, which encompasses the western end of the Danforth Hills, from Wapiti Peak east to Pine Tree Gulch. The Windy Gulch Unit has a Scenic Quality rating of B with its large rounded mountain ranges covered with pinyon-juniper with some open sage and grass lands. Parcels 6939 are located in the Sensitivity Level Rating Unit of the Danforth Hills and has a sensitivity level rating of Low Value as access issues limit use. Most of the parcel is surrounded by private land with developments typical of large acreage ranches. There is also a visible mine to the north of the proposed parcel along the cliff line. The parcels are in the Foreground-Middleground zone.

Parcel 6946 is private land and 7079 is 40 acres of public land located in Moffat County. Parcels 6946 and 7079 are approximately 4-5 miles east of County Road 17. For visual resource purposes, the area is identified as the Great Divide Unit. The Unit has a Scenic Quality rating of C. The parcels are located in the Sensitivity Level Rating Unit of Great Divide and has a sensitivity level rating of Low Value. The parcels are in the Foreground-Middleground zone. Depending on location of any oil and gas development, the casual observer would probably not observe portions of any oil and gas development on Parcels 6946 and 7079 as these parcels are unaccessible to the general public, a distance from the County Road, and topography of some butte formations and rolling hills occurring over large areas may obscure any development. There are also numerous routes and agricultural disturbance throughout the area.

Parcels 6950, 6951, 6954, 6955, 6956, 6957, 6965, 6970, 6974, 6983, 6984, 7013, and 7053, are located on private and public lands in Moffat and Routt Counties. The parcels fall within the Williams Fork Unit. The Unit has a Scenic Quality rating of B. The parcels are located in the Sensitivity Level Rating Unit of William Fork and has a sensitivity level rating of Moderate Value because of some public interest, but limited public use. This unit encompasses the Williams Fork Mountains, which has rolling mountains with rounded, angular peaks and ranch/agricultural use in the valleys. The parcels are in the Foreground-Middleground zone, unless otherwise indicated as Background Zone.

Parcels 6950 and 6951 are composed of public and private lands. Public lands are accessible to the general public from CR 53 and CR 29. The terrain is of a rolling topography, which has allowed for more development of the area, including gravel pits, mining, and the Seneca II-W Mine within 5 miles of proposed Parcel 6951. Facilities are all but non-existent except for some ranch houses located along CR 29. Depending on location of any oil and gas development, the casual observer may be able to observe portions of oil and gas disturbance at various points along the county roads, and especially during hunting season since there is access to the public parcels.

Parcel 6954 is composed of individual 40 acre BLM parcels and one small sliver of private land. The BLM parcels are surrounded by private lands and are unaccessible to the general public. The area is relatively untouched by development, other than primitive routes, a catch dam, and

powerline to the northwest. The proposed parcels are located on a long, vegetated ridge. Because the parcels do not have any public access and are remote, any oil and gas development would probably not be visible to the casual observer depending on placement.

Parcels, 6955, 6956, 6957, and 6984 are located near County Road 317. Of these parcels, Parcel 6984 is located in Moffat County. These parcels are much like Parcel 6954 with predominately steep, heavily vegetated terrain with extremely limited access to public lands, and numerous primitive routes throughout the area. Lands south of CR 317 are agricultural lands and associated ranch homes. Parcels 6984 and portions of 6956 are already visually impacted by a major powerline. Any oil and gas development would probably not be visible to the casual observer if facilities are placed off ridge lines and at a greater distance from CR 317.

Parcel 6965 is a small 40 acre landlocked BLM-managed parcel. The parcel is north of County Road 29 and northeast of CR 67. The parcel is on one of the numerous bluffs that run in a north to southwest direction making any development highly visible in the surrounding Pagoda area. In close proximity to the parcel, on the south side of the county road and off of CR 67, is a ranch surrounded by agriculture. Agriculture is the predominate landscape feature along the Williams Fork River, while the north side of the river is relatively untouched other than a few primitive routes through the draws.

Parcels 6970, 6983, 7053 are private lands located in Moffat County. There are numerous primitive routes, small reservoirs, and small parcels of agricultural land near the proposed parcels. A powerline and Trapper Mining are the predominate features to the northwest of the proposed parcels. Because the parcels do not have any public access, any oil and gas development would probably not be visible to the casual observer and would be overpowered by the mining operation.

Parcels 6974 and 7013 are public lands located next to the Seneca II-W mine to the northeast and state land to the southeast and east. CR 37 runs through this large tract of public land, which provides public access. The parcels are relatively untouched, other than some small catch ponds and routes are few. Any disturbance would most likely be noticeable from the county road since there are limited routes into the parcels, and the terrain is steep and terraced. The parcels are located in the Background zone.

Parcel 7009 is private lands located in Routt County. The parcels fall in the Williams Fork Unit and in the Dunkley Pass/Flat Tops Unit. The Dunkley Pass/Flats Tops Unit encompasses mountainous lands from Monument butte east to the east edge of the Little Flat Tops. The unit has high peaks and multiple scaled valleys that provide a wide variety of vegetation from grasses and scrub in the valleys to evergreens, aspens at the higher elevations. There are distant views into Routt National Forest. The Scenic Quality Rating for the unit is rated at B and the Sensitivity Level Rating Unit is the Williams Fork with a maintenance level of visual quality as Moderate Value. The parcels are in the Foreground-Middleground zone.

Parcel 7010 is much like Parcel 7009 in the Dunkley Pass/Flat Tops Unit. Both parcels, are private lands unaccessible to the public, but are located near CR 55 and CR 29. The parcels are heavily vegetated, except along the county roads, with very little route disturbance; therefore,

any disturbance would most likely be noticeable from the county roads since there are limited routes into the parcels.

Parcels 6969, 7017, and 7052 are private and public lands located in the Steamboat Valley/Stokes Gunch/Twenty Mile Park Unit. The Scenic Quality Rating for the unit is B. The parcels are located in the Sensitivity Level Rating Unit of Williams Fork and has a sensitivity level rating of Moderate Value. The unit encompasses flat to gently rolling landforms with agricultural and sage/grass vegetation from Highway 13 north of Hamilton east to Pleasant Valley. Development is concentrated in communities, but scattered throughout, which includes transmission lines, gravel pits, and strip mines. The Yampa River is prominent in the eastern portion, and small reservoirs attract residential development. The parcels are in the Background zone in which areas are seen beyond the Foreground-Middleground zone to a distance of about 15 miles away. Activities and changes to the landscape in this zone would be generally less visible. However, due to the flat landscape with agriculture, industrial, and commercial development of the proposed parcels, any development would more than likely be visible to the casual observer even though there is no public access to the parcels except Parcel 6969.

Parcels 7014, 7015, 7016, 7060, and 7121, located in Routt County, are identified as the Dry Mountain Unit for Scenic Quality; although a small 80 acre parcel of 7016 falls within the Dunkley Pass/Flat Tops Unit. The Scenic Quality Rating for the unit is B. The parcels are located in the Sensitivity Level Rating Unit of Hayden, which has a maintenance level of visual quality as Moderate Value, where access issues affect the amount of recreation use. The parcels consist of both public and private lands. Private lands are unaccessible to the general public while access to public lands would mainly occur through the Routt National Forest. Parcel 7121, which is a small 40 acre public lands parcel, is landlocked and would not have access and Parcels 7060 would only be accessible at a corner section off of CR 179. Unit includes foothills and valleys from the Dunkley Flat Tops to Emerald Mountain. The rolling hills with flat to rolling valleys have vegetation ranging from sage and grasses to scrub oak, aspen, and pine. There are some historical sites, tourism, and hunting but for the most part, highway use is somewhat low. The area is predominately ranching and grazing operations. The parcel is in the Foreground-Middleground zone. Depending on location of any oil and gas development, the casual observer may be able to observe portions of oil and gas disturbance at various points along CR 29, and especially during hunting season for Parcel 7016 since there is access to the public portion of the parcel. Numerous routes are visible through the parcels.

Parcel 7054 located to the southwest of Phippsburg, in Routt County, is private land and unaccessible to the general public. The parcel is in the Yampa Scenic Quality Unit with an overall Scenic Quality rating of B. The Sensitivity Level Rating Unit is Hayden, which has a maintenance level of visual quality as Moderate Value. The Unit encompasses the foothill valley area from Toponas north to the base of Blacktail Mountain and is composed of expansive foothills and valleys with rural, residential, agriculture and ranching and grazing development scattered throughout. There are some historical sites, tourism, and hunting but for the most part, highway use is somewhat low. The parcel is in the Foreground-Middleground. Since the parcel is located on the valley floor, any oil and gas development would be highly visible to the community and visitors to the national forest.

Parcels 6971, 6973, 6976, 6977, 6978, 6981, 6982, 7019, 7027, 7031, 7040, 7063, and 7068 are located in Routt County except Parcel 7063, which is located in Moffat County. The parcels are predominately private land with some small parcels of public land. All parcels are inaccessible. For visual resource purposes, the parcels are identified as the Routt Unit. The Unit has a Scenic Quality rating of A. The parcels are located in the Sensitivity Level Rating Unit of Steamboat and has a sensitivity level rating of High Value. This unit is heavily forested mountains with interspersed valleys and rolling foothill areas. Some mountains have steep slopes and others are gently rounded. This unit encompasses the forested mountainous terrain adjacent to Routt National Forest. Parcels located near Highway 13 and 40 are in the Foreground-Middleground zone, while parcels closer to Pilot Knob and the National Forest Service are in the Background zone. Parcels located near the national forest lack residential development other than fences and catch ponds, while parcels closer to Highway 40 are closer to housing developments and have numerous routes throughout the area. Depending on location of any oil and gas development, the casual observer may be able to observe portions of oil and gas disturbance at various points along Highway 13 and 40.

Parcels 6971 is private property and 7068 is a 40 acre parcel of BLM public land that is surrounded by private property. These parcels are unaccessible to the general public. The parcels are in close proximity to a strip mine to the west and a housing development to the east. The housing development is located in rolling hills composed predominately of sage and scrub brush. Other than the scattered homes in the area, the area is pretty much prestine and any oil and gas development in the area would impact the scenic quality of the area to some of the residents.

Parcels 6976, 6977, 6978, and 6981 are located to the east of Parcels 6971 and 7068 and is separated by CR 50. There terrain is rolling foothills and there are no noticeable developments, including fences and stock ponds, other than some primitive routes. Because of the proximity to Parcel 6971, any oil and gas development, depending on location, the residents of the area may be able to observe portions of oil and gas disturbances. See Figure 1.

Parcels 7036 and 7018 are in the Scenic Quality Unit of Elkhead. However, an 80 acre private land section of Parcel 7036, which also includes public lands, is located in the Great Divide Unit. The Elkhead Unit has a Scenic Quality rating of B. The Sensitivity has a maintenance level of visual quality as Moderate Value and is in the Fly Creek Sensitivity Level Rating Unit, where access issues affect the amount of recreation use. These parcels are located in Moffat County and encompasses rolling foothills from Highway 40 north to the Elkhead Mountains, and from Wolf Mountian west to CR 789 corridor. The unit includes rolling hills with grass and dense sage cover with ranches and agriculture throughout. The parcels are in the Foreground-Middleground zone. Depending on location of any oil and gas development, the casual observer may be able to observe portions of oil and gas disturbance at various points along Highways 13 and 40.

Figure 1: Residential Development

Parcel 7041 is public lands located in Moffat County and is approximately 2 miles west of Highway 13. For visual resource purposes, the area is identified as the Great Divide Unit. The overall scenic quality rating for the Great Divide Unit is a C and Sensitivity is Low Value. The parcel is in the Foreground-Middleground zone. It is located near a flat depression known as Big Bottom, Trapper Mine and the Williams Fork Mine. There are numerous routes and agricultural disturbance throughout the area. Any disturbance by oil and gas development would be noticeable to the casual observer.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:
For the areas proposed for leasing that already have high levels of human modification the proposed action would introduce visual disturbances, but at limited levels given the context of the project area, the level of existing development, and the BMPs if the lease were to go into production.

If development/production occurs, the visual impacts resulting from the construction of facilities are considered short-term and would include the implementation of mitigation measures (e.g., dust abatement, phased construction, etc.) intended to minimize impacts to the environment and BMPs including painting equipment a proper color that blends with the environment and locating facilities so they are off of ridges, are screened from nearby residences, and are not "skylined".

During construction, the presence of large trucks, cranes, and other large construction equipment would be present on the oil and gas site. Construction of the site, trenching, grading, surfacing, clearing, leveling, staging/parking area would be considered a short-term, or construction-related impact to visual resources.

Access roads connecting pads may need to be constructed (in areas where no roads presently exist) or improved upon (in areas where existing roads are present). During construction, access roads would need to accommodate construction equipment. New roads would create a linear, exposed soil route. Active construction including site preparation, excavation, facility installation, and other visible activities would be short-term in duration and would only occur during the construction phase of project implementation.

The rural nature of the proposed leasing and development, and possible placement on ridgelines would make facilities highly visible from certain viewpoints. Views of oil and gas facilities would not be avoided or completely concealed due to possible size or location. However, the distance from viewers, angle of observation, atmospheric conditions, and existing topography of the landscape would contribute to the reduced visibility of the facility. The most evident views would be at elevations similar to or lower than the structures, while from high views any structures would be less visible or noticeable.

In split-estate areas where there is less development, this disturbance would be more readily noticeable due to the lack of other structures or human modifications in the area. BMPs would also be applied to reduce these impacts.

Impacts to users such as recreationists who participate in such activities as sightseeing, wildlife viewing, and birding could be highly sensitive to changes in visual quality, whereas industry workers would not be as sensitive to the change. This would also apply to areas that are seen and used by a large number of people as visual values usually become more important as the number of viewers increase.

Land uses in adjacent lands could also affect the visual sensitivity of an area. For example, Parcels 6732 and 6733 located in the Wilderness Ranch area would be in the viewshed of a residential/recreation area that is very sensitive to the locals and visitors, whereas an area surrounded by commercially developed lands would not be visually sensitive.

Any changes to visual sensitivity are expected to vary with the type of user as would the impacts such as a possible decrease in recreational use and decrease in resort sales.

<u>Environmental Consequences of Leasing and Development - Cumulative Impacts:</u> Incremental impacts on visual resources would occur primarily from resource development, oil and gas

leasing, motorized recreation, and urban growth and development. Mitigation and appropriate VRM categories would reduce these incremental impacts on BLM managed lands in the long term. Visual impacts on private lands would continue and ultimately impact BLM lands.

3.4.4 Resource Uses

3.4.4.1 Access and Transportation

Affected Environment: FLPMA provides for recreational use of public land as part of multiple use management. Dispersed, unstructured activities typify the recreational uses occurring on most public land. Recreational activities include motorized touring, big and small game hunting, backpacking, horseback riding, hiking, mountain bike use, sightseeing, pleasure driving, and OHV use. All OHV use on public land is limited to existing routes until comprehensive transportation planning occurs, at which point OHV use would be limited to designated routes. Of the 31,425.40 acres under consideration for lease, 24,284.78 surface acres are managed by the BLM. The majority of the BLM surface acres are isolated parcels surrounded by private land with no designated BLM roads and no designated travel restrictions. Nominated lease parcels located on private surface do not fall under the BLM's travel management. Roads on private surface on and accessing the lease parcels are mostly private ownership or rural county roads. Traffic on these routes varies by season, but road use appears to be predominately private landowners in the area.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: The construction of new roads could promote future unauthorized use and off-road travel and could contribute to impacts to environmental values, traffic, wildlife, cultural and paleontological resources.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Cumulative Impacts of the road construction to the wells within identified parcels would be minimal. There are many non-system roads in the areas the parcels are located in, that are somewhat inaccessible due to private land/ locked gates and signs which designate the roads as for "administrative use" only.

3.4.4.2 Livestock Operations

Affected Environment: Many of the parcels lie within one or more BLM grazing allotments authorized for public land livestock grazing in the RMP.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: There would be no direct impacts associated with this proposed lease sale. Potential direct and indirect impacts would not be known and cannot be analyzed until the proposed development stage.

Environmental Consequences of Leasing and Development - Cumulative Impacts: This lease sale, and site specific development when combined with the past, present and reasonably foreseeable actions could elevate the *potential* for the reduction or loss of current allocated forage within BLM grazing allotments.

3.4.4.3 Prime and Unique Farmlands

Affected Environment: Soils designated as special status farmaland (prime and unique and/or farmland of statewide importance) occur within 17 of the proposed lease parcels.

Prime Farmland is land that has the best combination of physical, chemical and biological characteristics for producing food, feed, and fiber, and oilseed crops. The land is available for these uses, even though it may currently be devoted to use as pastureland, rangeland, forestland, or as other land (but not urban "built up" land or water areas). Prime Farmland areas have the soil quality, moisture supply, and growing season to economically produce sustained high yields of crops when those lands are treated and managed, including water management, according to acceptable farming methods. In Colorado, Prime Farmland is irrigated with an adequate and dependable supply of water.

Unique Farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. The land has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high-quality crops and/or high yields of a specific crop when the lands are treated and managed according to acceptable farming methods.

Farmland of Statewide Importance is another category of Important Farmland. This is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, and oilseed crops. Generally, farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods.

Parcel IDs that have special status farmland soil types present somewhere within the parcel, regardless of surface ownership: 6939, 6946, 6950, 6951, 6955, 6956, 6983, 7009, 7010, 7015, 7016, 7018, 7027, 7036, 7041, 7079, 7121.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Irrigating or otherwise manipulating these soil types so as to create conditions favorable to create special status farmland on public land is against BLM management policy. Therefore, any disturbance to or development on these soil types on public lands would have no impact to these farmlands on public lands. However, development or disturbance to these soils on private lands within the proposed parcels for lease may diminish the opportunity to develop these soils to their full agricultural potential.

Environmental Consequences of Leasing and Development - Cumulative Impacts: This lease sale, when combined with the past, present and reasonably foreseeable actions would elevate *potential* for the degradation of special status farmlands on private lands, effectively reducing the total amount of farmland potentially available under certain conditions. The sale has little to no impact on these farmlands on public lands, since conventional farming practices are not permitted per agency policy.

Reference: NRCS Information Bullitan on Prime and Unique Farmlands
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1187178.pdf

3.4.4.3 Recreation

Affected Environment: Many of the proposed lease parcels are within dispersed recreation areas subject to public use. Dispersed recreation areas are areas that are used by recreationists as they desire. Activities including sightseeing, pleasure driving, rock collecting, photography, hunting, hiking, equestrian, OHV use, bird and wildlife watching occur in dispersed recreation areas. The proposed lease area is used by the public for camping, hunting, hiking and other outdoor recreation activities.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: During the exploration phase, survey and drilling crews are likely to use available access roads and trails across the Little Snake Field Office that are also used for recreation access. The survey activities conducted during the exploration phase are likely to minimally impact recreation, if at all, due to the short duration, small crew size and temporal nature of the surveys and drilling of wells as well as the dispersed nature of recreation activities in these areas. However, if parcels were developed in the future, site-specific mitigation measures and BMPs would be attached as COAs for each proposed activity, which would be analyzed under their own site-specific NEPA analysis.

Exploration of the leases would include construction activities. At this time, access roads and well pads are constructed. Increased truck traffic during this phase could affect recreation due to increased noise and dust levels and could cause temporary delays or closures on access roads. Construction sites are likely to have limited access to the public which could, in turn, slightly decrease access to the area for recreation. The production stage includes operation and maintenance of the constructed facilities. These activities require a small number of employees who would utilize access roads in the area but are not likely to limit the recreational use of these roads. Oil and gas production facilities are likely to have limited access to the public; however, improved access to the area for recreation may be available because of the maintained access road to the production facility.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Development intensity, terrain, and proximity to main travel corridors, towns, recreation facilities, etc. would greatly influence recreation impacts. Cumulative impacts to recreation and adjacent recreation areas could be the loss of desired natural settings, the displacement of wildlife, temporary noise and lighting at night, and traffic or hazards on existing and/or designated routes.

CHAPTER 4– COORDINATION AND CONSULTATION

PERSONS/AGENCIES CONSULTED: Dinosaur National Park, Colorado Parks and Wildlife, Native American Tribes, and affected surface owners.

The LSFO performs annual consultation with the following tribes: the Eastern Shoshone, Ute Mountain Ute, Uinta and Ouray Agency Ute, and the Southern Ute. Letters were sent to the tribes in the spring of 2014 describing general oil and gas development projects, including preliminary information for this proposed lease sale.

LIST OF PREPARERS AND PARTICIPANTS

INTERDISCIPLINARY REVIEW

Name	Title	Resource
Kathy McKinstry	Environmental Planner	NEPA Compliance
Forrest Cook	Air Quality Scientist	Air Quality
Shawn Wiser	Natural Resource Specialist	Invasive/Non-native Species, Hazardous or SolidWastes, Fire Management, Fluid Minerals, Forest Management, Wild Horses
Emily Spencer	Ecologist	Floodplains, Surface Hydrology, Soils, Water Quality (Surface), Wetlands & Riparian Zones, Prime and Unique Farmlands
Louise McMinn	Realty Specialist	Socioeconomics, Environmental Justice, Realty Authorizations, Land Tenure
Tim Wilson	Associate Field Office Manager	Ground Hydrology, Water Quality (Ground)
Jennifer Maiolo	Mining Engineer	Minerals, Solid, Paleontological Resources
Desa Ausmus	Wildlife Biologist	Migratory Birds, Special Status Animal Species, Wildlife (Aquatic & Terrestrial)
Aimee Huff	Rangeland Management Specialist	Special Status Plant Species
Mark Lowrey	Rangeland Management Specialist	Upland Vegetation, Livestock Operations
Kim Ryan	Archaeologist / Cultural Heritage Program Manager	Cultural Resources, Native American Religious Concerns
Gina Robison	Recreation Planner	Visual Resources, Areas of Critical Environmental Concern, Lands with Wilderness Characteristics, Wilderness Study Areas, Wild and Scenic Rivers
Dario Archuleta	Recreation Planner	Access and Transportation, Recreation

Attachments:
Attachment A – All Nominated Parcels/Proposed Action with Stipulations for Lease
Attachment B – Recommended Parcel Deferrals
Attachment C – Preferred Alternative Parcels with Stipulations for Lease

Attachment D – Stipulation and Lease Notice Exhibits
Attachment E – Maps
Attachment F – Response to Public Comments