United States Department of the Interior
Bureau of Land Management

Environmental Assessment for the Little Snake February 2014 Competitive Oil & Gas Lease Sale

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Little Snake Field Office
455 Emerson St.
Craig, Colorado 81625

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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 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/nm/st/en/prog/energy/oil_and_gas/lease_sale_notices.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 amendment to the sale notice.

If the parcels are not leased at the February 2014 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 operator 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 (COA) should apply.

Twenty-eight (28) parcels comprising 24,378.48 acres within the Little Snake Field Office (LSFO) were nominated for the February 2014 Competitive Oil and Gas Lease Sale. This figure is comprised of 8,893 acres of federal land and 15,483 acres of split-estate land in Moffat and Routt Counties. The legal descriptions of the nominated parcels can be found in Attachment A.

This EA documents the review of the nominated parcels under the administration of the Little Snake Field Office (LSFO). 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.

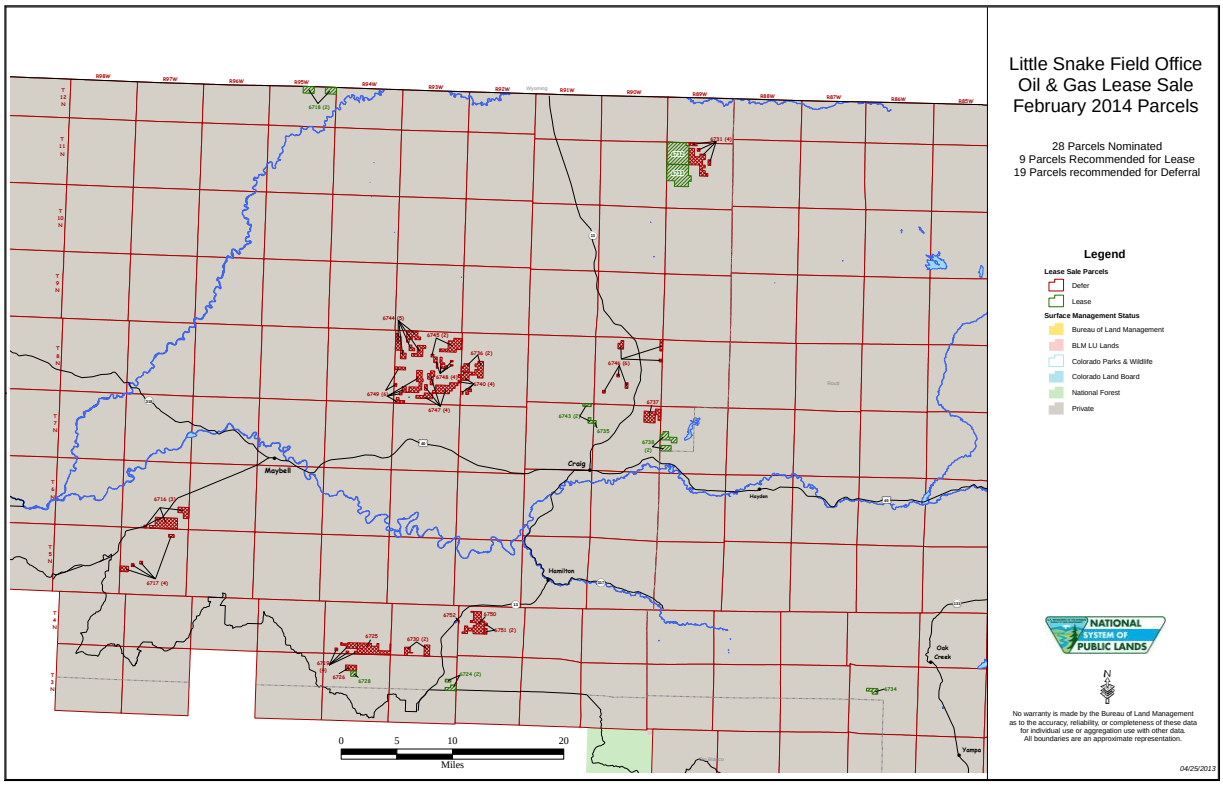
In accordance with Colorado BLM Instruction Memorandum No. CO-2012-027 and BLM IM-2010-117, this EA will be released for 30 days of public comment. Any comments received within the 30-day timeframe will be considered and incorporated into the EA as appropriate.

PROJECT NAME: February 2014 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:



Map 1

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 of 1920 (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 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:

Issues identified by BLM specialists included Lands with Wilderness Characteristics (LWC), BLM sensitive species, T&E species (plant and animal), fragile soils, and riparian concerns.

External scoping was conducted by posting the nominated lease parcels and associated stipulations from the RMP on the Little Snake Field Office website for two weeks from May 13 to May 28, 2013. 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/2014/february_2014_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 land 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 the National Parks Service (NPS) concerning potential impacts to air quality.

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 and therefore are dismissed from detailed analysis:

- Areas of Critical Environmental Concern
- Fire Management
- Floodplains
- Forestry
- Realty Authorizations
- Special Status Plant Species
- Wild and Scenic Rivers
- Wilderness Study Area
- Wild Horses
- Environmental Justice

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 2 and ending September 3,

2013. The document is available online at http://www.blm.gov/co/st/en/BLM_Information/nepa/lsfo.html and in the public room at the LSFO. The document may be viewed at the field office during regular business hours (7:45 a.m. to 4:30 p.m.), Monday through Friday, except holidays. Comments should be sent to:

lsfoweb@blm.gov or
455 Emerson Street
Craig, CO 81625-1129

Comments must be received by the close of business on September 3, 2013. Comments received from the public will be 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 2014 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 Lease All Nominated Parcels in Conformance with the RMP

Under this alternative, the BLM would lease Federal mineral estate in all **28** nominated parcels available for leasing in the resource area in accordance with the LSFO RMP (October 2011). The current lease sale includes parcels in Moffat and Routt Counties. Those lands proposed for lease under this alternative total 24,376.48 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 and connection to 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. Nineteen parcels were identified as being located in Preliminary Priority Habitat for Greater Sage-Grouse, as identified by Colorado Parks and Wildlife (CPW). In accordance with 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 FO 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."

2.2.3 Preferred Alternative

Under the proposed action, the BLM would offer nine parcels, 7,435.30 acres (2,078.28 on federal surface and 5,357.02 on split estate), for lease and defer 19 parcels, 16,941.18 acres, from the sale. Attachment B lists all parcels or portions of parcels that would be deferred from the lease sale under the proposed action. 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.

The parcels in Appendix B were all 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.

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.

2.4 PLAN CONFORMANCE REVIEW

The Proposed Action has been reviewed for conformance with the following plan (43 CFR 1610.5, BLM 1617.3):

Name of Plan: Little Snake Resource Management Plan

Date Approved: October, 2011

The Little Snake RMP of 2011 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 sales 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.

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 nine parcels, totaling 7,435.30 acres would not be leased. There would be no subsequent impacts from oil and/or gas construction, drilling, and production activities. 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 863 oil and gas leases in the LSFO, which comprise 50 percent of the available mineral estate.

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 FO 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 writing the Northwest Colorado Greater Sage-Grouse 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 the outcome of this EIS, but it is likely to have a strong influence on the future of energy development in the field office.

There are no projects currently planned within the parcels offered in this lease sale.

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) has established national ambient air quality standards (NAAQS) for criteria pollutants, including carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). 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 has delegated regulation of air quality under the federal Clean Air Act to the State of Colorado. 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 issuing permits for emission sources. The State has established the Colorado Ambient Air Quality Standards (CAAQS), which can be more, but not less stringent then the NAAQS. 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. All of the counties where the lease sale parcels are located within are currently in attainment of all the NAAQS. The following Table 3.4.1.1-1 provides list of NAAQS for each criteria pollutant and averaging time.

Table 3.4.1.1-1 NAAQS (EPA 2012)

Pollutant [final rule cite]	Primary/ Secondary	Averaging Time	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 $\mu g/m^3$	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]	primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	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
Particle Pollution [Dec 14, 2012]	$PM_{2.5}$	primary and secondary	Annual	12 μg/m^3	Annual mean, averaged over 3 years
			24-hour	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary	Annual	0.03 ppm	Arithmetic Average
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Ambient air quality in the affected environment (i.e. compliance with the NAAQS) is demonstrated by monitoring for ground level (i.e. receptor height) atmospheric air pollutant concentrations. In general, the ambient air measurements show that existing air quality in the region is good. Concentrations for the various air pollutants are below the applicable state and federal ambient air quality standards. The majority of the parcels are located in the northwest Colorado in Moffat County. Currently, there is an active ozone monitor located near the Lease Parcels in Moffat County administered by the State of Colorado, and two active ozone monitors in Rio Blanco County that borders Moffat County to the south that are administered by the BLM. There are also two active NO_2 and one active $PM_{2.5}$ monitoring sites in Rio Blanco County. Several IMPROVE (Interagency Monitoring of Protected Visual Environment) sites exist in nearby Rio Blanco and Routt Counties. The Rangely, Colorado (Rio Blanco County) monitor has recorded exceedances of the 8-hour ozone standard over the past three years during winter-time events, and the BLM continues to study the atmosphere in this area. Ozone is not emitted directly from 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). Ozone formation and prediction is complex, 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. The Lease Parcels are located outside of the non-attainment area.

The following Table 3.4.1.1-2 shows monitored concentrations for select criteria pollutants for locations around the region. Notes for the monitored concentrations are provided in the Table. As shown, monitored concentrations are below the NAAQS.

Table 3.4.1.1-2 Background Concentrations for Select Criteria Pollutants

Pollutant	Averaging Time	Monitored Value*	NAAQS	Notes for Monitored Values and NAAQS
NO_2	1-hour	8.7 ppb	100 ppb	NAAQS: 98th percentile, averaged

				over 3 years. Monitored value: First maximum 1-hour value for year 2012 (Meeker, Colorado).
	Annual	1.64 ppb	53 ppb	NAAQS: Annual Mean Monitored value: Annual mean for year 2012 (Meeker, Colorado).
Ozone	8-hour	0.075 ppm	0.075 ppm	NAAQS: Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years. Monitored value: highest daily maximum 8-hr concentration for year 2012 (Lay Peak - Moffat County, Colorado.)
$PM_{2.5}$	Annual	10.13 $\mu g/m^3$	12 $\mu g/m^3$	NAAQS: Annual mean, averaged over 3 years. Monitored value: Annual mean for year 2012 (Rangely, Colorado).
	24-hour	24.9 $\mu g/m^3$	35 $\mu g/m^3$	NAAQS: 98th percentile, averaged over 3 years. Monitored value: 98th percentile for year 2012 (Rangely, Colorado).

*source: EPA AirData

The proposed lease parcels are located primarily in the eastern portion of Moffat County, and one parcel in nearby / bordering Routt County. Table 3.4.1.1-3 below shows recent nearby oil and gas development summary data on a parcel basis. An analysis of the Colorado Oil and Gas Conservation Commission (COGCC) database was conducted to determine the number of wells that have been drilled within 15 kilometers of each Lease Parcel over the past 5 years (years 2008-2012).

Table 3.4.1.1-3 Parcel IDs and Nearby O&G Development Data

Parcel ID	Total Parcel Acres	Number of Wells Developed in Years 2008-2012 (well counts) within 15km of Parcel	Comment
6718	777.7	7	development: 5 (year 2008), 2 (years 2010 and 2011)
6724	322.8	1	development: 1 (year 2009)
6728	160.3	2	development: 2 (years 2008 and 2009)
6732	2437.3	7	development: 2 (year 2008), 2 (year 2009), 1 (year 2010), 2 (year 2011)
6733	2328.0	7	development: 2 (year 2008), 2 (year 2009), 1 (year 2010), 2

			(year 2011)
6735	72.7	3	development: 1 (year 2008), 1 (year 2009), 1 (year 2012)
6738	837.2	4	development: 1 (year 2008), 2 (year 2009), 1 (year 2011)
6743	240.1	3	development: 1 (year 2008), 1 (year 2009), 1 (year 2012)
6734	247.3	0	N/A

The following Figure 3-1 shows locations of the 9 Lease Parcels within the LSFO and also shows recent oil and gas well spuds / completions in the area. Looking at the Colorado spuds / completions data for the last 5 years (2008 - 2012), the average development per year was 12 Federal and 9 non-Federal wells, and the maximum annual development was 17 Federal and 15 non-Federal wells (year 2011). As shown in the following map, the most recent development (years 2008-2012) in the LSFO occurred near the Wyoming border, with much of the development in the Powder Wash RFD area in the north-northwest portion of LSFO.

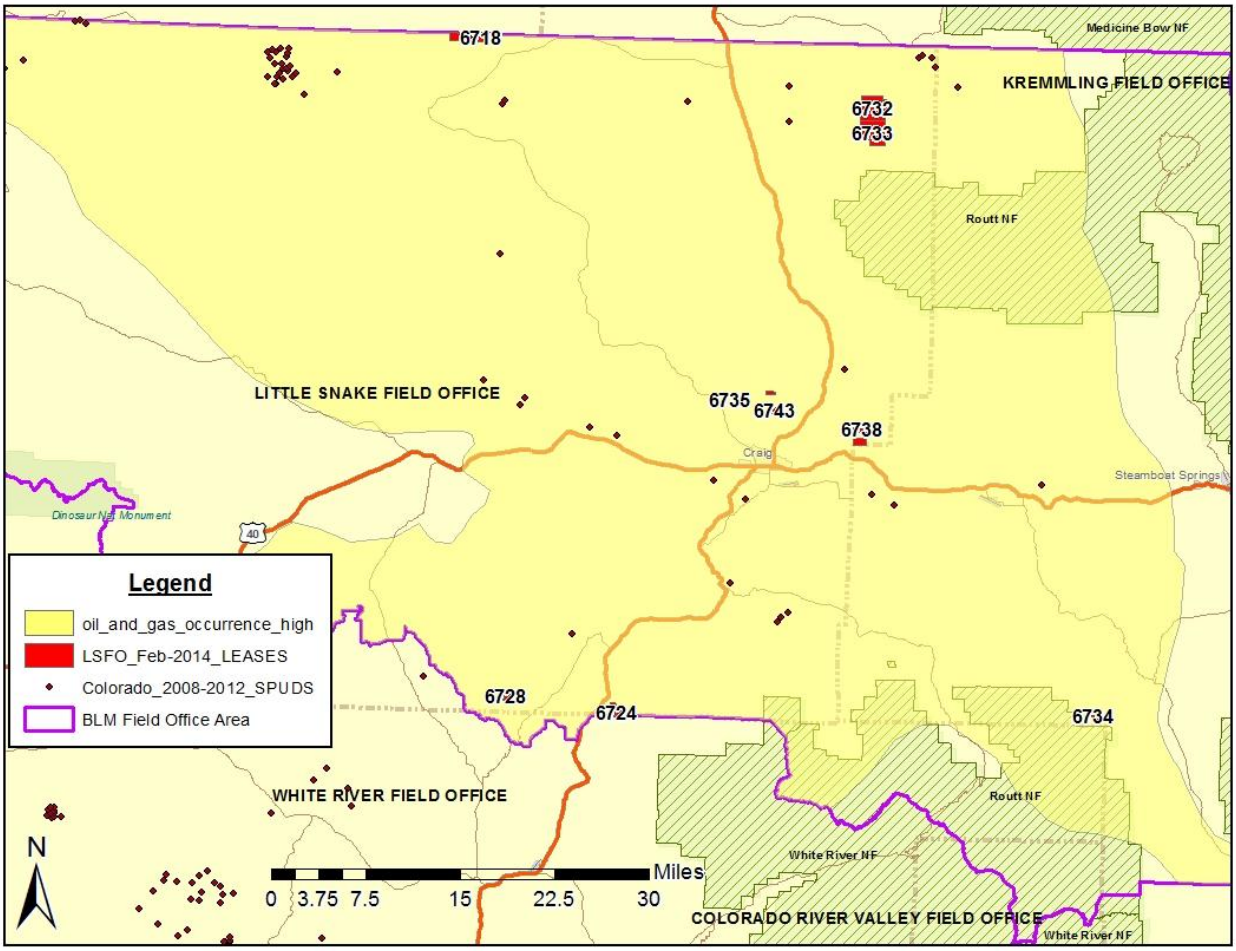


Figure 3-1. Lease Parcels and Recent Development Locations

Table 3.4.1.1-4 below shows EPA National Emissions Inventory (NEI) year 2008 summaries for Moffat and Routt Counties. The NEI emissions summaries account for emissions for many sectors including agriculture, biogenics, O&G, gas stations, on-road mobile and fires. The NEI is developed every 3 years and the year 2011 NEI has not been released at the time of this report writing.

Table 3.4.1.1-4 County Emissions Inventory Data (EPA - 2008 NEI - TPY)

County	PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	SO_2	CO_2	CH_4	N_2O	NH_3	HAP
Moffat	7,922	1,758	3,453	14,916	19,080	3,969	146,964	81	1	133	5,818
Routt	4,044	1,034	1,528	12,494	8,694	2,608	250,681	116	2	84	1,699

In addition to the comprehensive NEI emissions inventories, the following Table 3.4.1.1-5 below shows county-wide emissions summaries developed by the CDPHE for year 2010 that account for many sectors including on-road vehicles, O&G, non-road equipment, railroads, aircraft and tank trucks.

Table 3.4.1.1-5 County Emissions Inventory Data (CDPHE - 2010 - TPY)

County	PM	VOC	CO	NO_X	SO_2
Moffat	5,103	31,981	15,620	16,881	3,923
Routt	3,453	26,676	10,412	8,007	2,455

Table 3.4.1.1-6 below shows oil and gas emissions inventory for the BLM LSFO (includes Moffat and Routt Counties) as provided in the CDPHE Air Pollution Emissions Notice (APEND) database. These estimates account for oil and gas operations including heaters, flares, fugitives (tanks, equipment leaks, etc.), engines, dehydrators and amine units.

Table 3.4.1.1-6 Field Office O&G Emissions Inventory Data (CDPHE - 2011 - TPY)

Field Office	PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	SO_2
LSFO	13	12	3,027	607	798	6

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 gasses (GHGs) such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several industrial gases in our

atmosphere. An increase in GHG emissions is said to result in an increase in the earth's average surface temperature, primarily by trapping and 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, precipitation rates, etc., which is commonly 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 burning of fossil carbon sources have caused GHG concentrations to increase measurably, from approximately 280 ppm in 1750 to 396 ppm in 2012 (as of June). 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, or build up, since pre-industrial times has occurred within the last 50 years. In the coming decades climate change may lead to changes in the Mountain West and Great Plains, such as increased drought and wild land fire potential.

Environmental Consequences of Leasing and Potential Development (Direct and Indirect Impacts): The decision to offer the identified parcels for lease would not result in any direct emissions of air pollutants. However, the future development of these leases will result in emissions of criteria, HAP and GHG pollutants. The assessment of the relationship between GHG emissions and climate change is in a formative phase. While it is not possible to accurately quantify potential emissions in the affected areas as a result of making the proposed tracts available for leasing, some general assumptions can be made (e.g., selling the proposed tracts may lead to the drilling of new wells). Subsequent development of any leases sold would result in both short and longer term incremental increases in overall emissions of pollutants, including GHGs. Developmental air impacts will be addressed in a subsequent analysis when lessees file an Application for Permit to Drill (APD). 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.

Any subsequent activity authorized after APD approval 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 photochemically by 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.

During exploration and development, 'natural gas' may at times be flared and/or vented 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.

The BLM will continue to evaluate the impacts of oil and gas exploration and development on the global climate, and apply appropriate management techniques and BMPs to address changing conditions. 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.

An air pollutant emissions inventory was prepared for development and operational stages of a typical natural gas well in the BLM LSFO. As oil and gas development data becomes available during future permitting stages, the BLM will use this information to develop project-specific emissions estimates for a refined impacts analysis. The emissions estimates in the following Table 3.4.1.1-7 could be multiplied by the number of new wells to develop emissions for a specific project.

Table 3.4.1.1-7 BLM LSFO - One Typical O&G Well - Construction and Production Emissions Summary (TPY)

Field Office	PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	SO_2	CO_2	CH_4	N_2O	HAP
LSFO	9.26	1.03	2.85	2.54	2.99	0.02	707.10	6.76	0.01	0.28

An air pollutant emissions inventory was also developed for 4 years of additional oil and gas development and operations in the BLM LSFS based on the Reasonable Foreseeable Development (RFD) for the Field Office using oil and gas related emissions calculators that were developed for northwest Colorado oil and gas. Oil and Gas RFD for LSFO (developed using Industry input) shows that approximately 3,031 wells could be developed over 20 year period, which means that approximately 152 wells could be drilled per year in the LSFO. The LSFO RFD (based on Industry input) shows foreseeable oil and gas development will be focused in the

central, northern and northwestern portions of the Field Office. With the exception of one parcel (ID: 6718), the parcels are primarily east of the higher oil and gas potential development areas: Hiawatha, Powder Wash, Sand-Wash-Verm and Great Divide – East Godiva. Parcel ID 6718 is located along the northern Colorado-Wyoming border in an area of expected oil and gas development. The following Table 3.4.1.1-8 shows emissions for the LSFO for four years of additional oil and gas development according to the RFD; corresponding with 152 wells drilled per year and 608 new natural gas wells. The maximum annual development (i.e. spuds / completions per year) over the past 5 years has been ~ 35 wells / year for the entire LSFO.

Table 3.4.1.1-8 BLM LSFO – 4-year Additional O&G Emissions (TPY)

Field Office	PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	SO_2	CO_2	CH_4	N_2O	HAP
LSFO	430.4	62.7	1,435.1	694.8	606.0	2.7	182,935.7	4,103.2	1.8	143.5

The emissions estimates for a typical do not appear to be at critical levels as compared to thresholds such as CDPHE required minor source air quality modeling levels, however, the development of many wells according to the RFD rates over several years could lead to substantial increases in oil and gas related emissions for the BLM LSFO. Due to the spatial extent of oil and gas development, a regional-scale modeling analysis is usually warranted to determine the impacts associated with expansive increases in oil and gas. The BLM – Colorado is currently conducting a Colorado-wide oil and gas modeling study that will include analyses for each BLM Field Office including the LSFO. For this Study, oil and gas emissions increases projected out 10 years from year 2011 according to RFD and recent oil and gas development data will be modeled and impacts will be determined for each Field Office. Regional ozone and other pollutants and air quality related values (AQRVs) including visibility impacts will be evaluated in that Study. As future oil and gas development occurs on the Lease Parcels, the BLM Colorado plans to compare project-specific permitted levels of emissions (at the APD stage) to the LSFO oil and gas emissions rates modeled in the regional study along with the corresponding modeling results to ensure that the BLM Colorado is permitting activities that stay within the acceptable modeled emissions analyzed in the air quality impacts study.

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

As described in the previous section (Proposed Action), due the extensive spatial distribution of oil and gas development and cumulative emissions source inventories, regional-scale modeling analyses are warranted to determine cumulative impacts to air quality. The BLM Colorado-wide

oil and gas modeling study (completion target date: early year 2014) will provide air quality impacts associated with Federal oil and gas for each Field Office as well as cumulative impacts associated with national-scale emissions inventories. As oil and gas is expected to increase in the region, other emissions levels are expected to increase or decrease and the net overall cumulative effect will be modeled in the BLM Colorado study.

Substantial emission-generating activities cannot occur without further BLM analysis and approval of proposals for exploration and development operations. BLM will make its approval of these activities subject to conditions of approval addressing air pollutant emissions, as appropriate. The BLM is committed to looking at the big picture by evaluating cumulative emissions inventories and air quality impacts before making any approvals of activities with the potential to generate air pollutant emissions.

Protective/Mitigation Measures: To ensure a relevant air analysis takes place prior to commencement of future development activities, lessees are hereby given notice that development plans for leased parcels are required to be submitted at the time of the first APD filling. Development plans and exploration submittals shall include all reasonable information about emissions generating activities to assess or develop an air emissions inventory for the parcel or project. The emissions inventory can then be used to either qualitatively or quantitatively determine significance of the project in relation to potential area air quality impacts. No other additional mitigation measures would be required for leasing beyond those required by applicable local, State and Federal air quality laws and regulations. However, additional requirements (such as air dispersion modeling assessments or specific mitigation measures) could be imposed as COA based on the review and approval of site-specific proposals or another applicable analysis of future exploration and development activities.

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 emissions of regulated air pollutants (including GHGs) associated with the development of the oil and gas resources in a subsequent analysis at the APD stage of the lease life cycle. Project specific GHG emissions can generally be quantified and compared to overall sector, regional, or global estimates to provide some measures/context 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 policy to address changing conditions as developments occur.

3.4.1.2 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 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 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.

3.4.1.3 Minerals/Fluid

Affected Environment: These 9 parcels are located within Moffat County (8 parcels) and Routt County (1 parcel) 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 863 authorized leases within the LSFO resource area. Over 50 percent of the federal mineral estate is currently leased.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Leasing of the 9 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 1/3rd 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 at best, given that the pace, place, and specific equipment configurations of such development are unknown.

Potential Future Mitigation: None.

3.4.1.4 Minerals/Solid

Affected Environment: Parcels 6724, 6728, 6735, 6738, and 6743 are within the LSFO coal planning area. Parcels 6724 and 6728 are adjacent to or within the Colowyo coal mine permit boundary. Colowyo holds the rights to surface and underground coal reserves that could be affected by the proposed action. Leasing of the parcels within the coal planning area could prevent the leasing of coal deposits and the orderly development of coal resources. There are no other solid mineral authorizations within the area of the proposed action. The Little Snake Field Office supports a wide range of mineral development in addition to oil and gas, site specific geology would need to be analyzed during the APD NEPA process.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: There would be no direct impacts due as a result of leasing. Indirect Impacts would result when site specific drilling and surface disturbance are proposed when an APD is submitted. Indirect impacts would occur if an APD is submitted within the coal planning area. The coal planning area contains approximately 623,860 acres deemed acceptable for further consideration for leasing for either surface or underground development. Stipulation Exhibit CO-25 would be applied to parcels 6724 and 6728 to protect surface or underground coal mines. The 5 parcels within the coal planning area total 1,633 acres. The RMP does include a no surface occupancy stipulation for oil and gas development and operations on federally leased surface coal mines.

The 9 leases recommended for leasing comprise 7,435 acres of federal mineral estate. Indirect impacts of leasing could impact mineral material and locatable mineral development depending on the location and size of the oil and gas development. If undiscovered mineral deposits exist within the leases, their orderly development may be adversely affected. This activity could benefit solid minerals by leading to increased development of federal mineral materials products for road and well pad construction to support oil and gas development. Drilling could provide valuable geologic information.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Continued leasing of oil and gas could prevent future leasing of coal deposits within the coal planning area if the leases and subsequent drilling were to prevent the logical development of surface and underground coal deposits. A logical consequence of leasing would be to drill for fluid minerals. Drilling could lead to an increased development of federal mineral material products for the associated infrastructure associated with drilling activities.

Potential Future Mitigation: None.

3.4.1.5 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. However, the following table indicates which proposed lease parcels have the potential for fragile soils. Because many of the parcels are under private surface ownership, the nature and condition of soils there would not be known until a field visit can be conducted.

TABLE 3
Fragile Soil Potential for Proposed Lease Sale Parcels

PARCEL ID	SURFACE OWNERSHIP	POTENTIAL FOR FRAGILE SOILS? (CSU)[1]	SLOPES >35% PRESENT? (CSU)
6718	BLM	Yes	Yes
6724	Private and BLM	Yes	Yes
6728	Private	Yes	Yes
6732	Private and BLM	Yes	Yes
6733	Private and BLM	Yes	Yes
6734	Private	Yes	Yes

6735	Private	Yes	No
6738	Private and BLM	Yes	Yes
6743	Private	Yes	No

1 – Controlled Surface Use

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: The Proposed Action allows for the exploration and subsequent development of the lease. 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.

Direct impacts resulting from the construction 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 this USDA data, many 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 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 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 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.

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 permitted in this sale could occur. Therefore, this sale would lease parcels with stipulations to protect soil resources. Steep slope and fragile soils lease stipulations (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. 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

3.4.1.6 Ground Water Quality

Affected Environment: The geologic formations at or near the surface in the area of the nominated parcels consist of Tertiary Age formations: Wasatch (Tw), Browns Park (Tbp); and, Cretaceous Age formations: Iles (Ki), Lewis shale (Kls), Williams Fork (Kw), Fort Union (Tf) and Mancos Shale (Km). These formations can and do contain potable, useable water. Fresh to moderately saline groundwater (TDS < 10,000 ppm) could be found within the formations listed above. Published water quality data for the Sand Wash Basin are minimal. One study indicates that the total dissolved solids (TDS) in the recharge areas for the Wasatch-Fort Union aquifer are less than 500 mg/L, but concentrations increase down the flow paths. Based on this interpretation, good water quality should exist along the western and eastern margins of the basin, with increasing TDS toward the Little Snake River. In general, the TDS concentration of ground water in the Mesozoic rocks is less than 1,000 mg/L, along the southeastern and eastern part of the basin where there is good potential for recharge from precipitation. As ground water in these older rocks moves toward the center of the basin, it becomes briny with TDS greater than 35,000 mg/L.

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 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 areas would be protected by drilling requirements and, with proper practices, contamination of ground water resources would be highly unlikely. Casing along with cement would be 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. 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 reclaimed. 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 BMPs; to protect water quality would be analyzed and added at the APD stage.

3.4.1.7 Surface Water Quality

Affected Environment: The following table summarizes only those proposed lease parcels that, if developed, have the potential to influence surface water quality and conditions of perennial waters that are identified by the State of Colorado Department of Public Health and Environment (CDPHE) as having impairments (Clean Water Act 303(d) List) or as having suspected water quality problems (Monitoring and Evaluation List):

TABLE 4
Surface water quality issues associated with proposed lease sale parcels

Parcel ID	Waterbody ID	Segment Description	Portion	Monitoring & Evaluation Parameter(s)	Clean Water Act Section 303(d) Impairment
6718	COLCLY16	Little Snake River from Powder Wash to the Yampa River	all	sediment	NA
6733	COLCLY18	Slater Creek, including tributaries from source to Second Creek	all	*E. coli*, total recoverable iron, selenium	NA
6738	COLCY02	Yampa River, Elkhead Creek to Green River	all	sediment	Total recoverable iron (high priority)
	COUCYA15	Mainstem of Elkhead Creek and tributaries Calf Creek and 80A Road on the Dry Fork of Elkhead Creek, to the confluence with the Yampa River	Elkhead Creek		Aquatic Life (provisional; 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.

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 lease stipulation in the LSFO RMP (LS-105) identifies measures to protect water resources. Steep slope and fragile soils lease stipulations (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. 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. Collectively, these stipulations will protect areas from excessive erosion and subsequent sedimentation that could impact surface water quality

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

Additional site-specific mitigation 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:

- No surface occupancy for all fragile soils within municipal watersheds and public water supplies to minimize risk of mass wasting, sedimentation, and reduced reclamation costs. Strict engforcement 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.

- No surface occupancy and surface disturbing activities within 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.
- No surface occupancy and surface disturbing activities 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.

<u>For water quality protection:</u>

- No surface occupancy or use is allowed on 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.

Reference: Colorado Oil & Gas Conservation Commission. 2012. http://cogcc.state.co.us/

3.4.2 Biological Resources

3.4.2.1 Invasive/Non-Native Species

Affected Environment: Invasive species and noxious weeds occur within the affected area. Most of these species are on the Colorado Department of Agriculture noxious weed lists. Downy brome (cheatgrass), yellow alyssum, blue mustard and other annual weeds are common along roadsides and in other disturbed areas. 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 and bull). 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, 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. Sagebrush is present on most of the parcels and may provide potential habitat for this species.

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. Parcel 6718 provides potential habitat for these two species.

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. Parcels 6732, 6733 and 6734 provide potential habitat for these two species.

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.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: 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 parcel 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. Since the LSFO RMP did not analyze several recommendations outlined in WO IM 2012-043, all parcels located in sage-grouse PPH are being deferred at this time. Parcels 6718, 6724, 6728, 6733, 6735, 6738, and 6743 are located in greater sage-grouse PGH. Parcel 6732 is not located in either PPH or PGH but may provide limited habitat for grouse. A detailed description of sage-grouse habitat on each parcel is located below:

> Parcel 6718 – This parcel is 776 acres in size. Vegetation on the west portion of the parcel is primarily scattered pinyon/juniper woodlands with small areas of sagebrush. Vegetation on the east portion of the parcel is a combination of sagebrush and scattered pinyon-juniper woodlands. Although the entire parcel is mapped as PGH, only about half of the parcel provides suitable habitat for sage-grouse. The closest active lek is 4.40 miles from the eastern boundary of the parcel. The parcel is not mapped as nesting or brood rearing habitat, however, most of the eastern portion is mapped as winter habitat.
>
> Parcel 6724 – This parcel is 322 acres is size. Vegetation on the parcel is comprised of oakbrush and sagebrush. Pure oakbrush has very little value to sage-grouse, however, sage-grouse may use habitat with an oakbrush/sagebrush mix on the edge of sagebrush habitats. Although the entire parcel is mapped as PGH, only 130 acres provide potential

habitat for grouse. The closest active lek is 4.5 miles from the parcel and the area is not mapped as nesting habitat. The parcel may provide limited brood rearing and winter habitat for grouse.

Parcel 6728 – This parcel is 160 acres in size. Vegetation on the parcel is comprised primarily of oakbrush. Although the parcel is mapped as PGH, this parcel provides almost no value to sage-grouse due to lack of sagebrush and dominance of oakbrush.

Parcel 6732 – This parcel is 2443 acres in size. Vegetation on the parcel consists of oakbrush with a few small sagebrush stands. Aspen and mixed aspen/conifer woodlands can be found at higher elevations. Although this parcel is not located within PPH or PGH, approximately 700 acres of the parcel is mapped as nesting habitat. Vegetation within mapped nesting habitat is comprised of a mix of sagebrush, oakbrush and aspen. The amount of oakbrush/aspen decreases the value of habitat for sage-grouse, making this marginal habitat for nesting grouse. The closest active lek is 2.75 miles from the parcel and the closest inactive lek is 1.18 miles from the parcel.

Parcel 6733 – This parcel is 2332 acres in size. Vegetation on the parcel consists of oakbrush with small sagebrush stands. Aspen and mixed aspen/conifer woodlands can be found at higher elevations. Approximately 960 acres of PGH and 355 acres of nesting habitat are located on the parcel. Vegetation within mapped nesting habitat is comprised of a mix of sagebrush, oakbrush and aspen. The amount of oakbrush/aspen decreases the value of habitat for sage-grouse, making this marginal habitat for nesting grouse. The closest active lek is 4.7 miles from the parcel and the closest inactive lek is 3.17 miles from the parcel.

Parcel 6735 – This parcel is 72 acres in size. Vegetation on the southern portion is comprised of sagebrush, however the northern portion of the parcel is an agricultural field. There is also a residence located on this parcel with several buildings and anthropological structures. This parcel provides approximately 50 acres of marginal habitat for sage-grouse. Habitat is reduced by human disturbances (agriculture, residences, roads) in the area. This parcel is 3.9 miles from the closest inactive lek and 7.8 miles from the closest active lek. It is mapped as PGH and nesting habitat.

Parcel 6738 – This parcel is 838 acres in size. It is made up of sagebrush and agricultural fields. Although habitat is reduced by agricultural development, the parcel provides about 750 acres of suitable habitat for sage-grouse. The closest active lek is 4.1 miles from the parcel and the closest inactive lek is 2.5 miles from the parcel. The parcel is mapped as PGH and nesting habitat.

Parcel 6743 – This parcel is 240 acres in size. It is made up of sagebrush and agricultural fields. This parcel provides approximately 230 acres of marginal habitat for sage-grouse. Habitat is reduced by human disturbances (agriculture, residences, roads) in the area. This parcel is 3.6 miles away from the closest inactive lek and 7.6 miles from the closest active lek. It is mapped as PGH and nesting habitat.

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, northern goshawk, Columbian sharp-tailed grouse, Brewer's sparrow, northern leopard frog, Great Basin spadefoot, and Colorado River cutthroat trout (CRCT).

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.

The northern goshawk occupies coniferous and riparian forests. The LSFO has very few goshawk nests documented on BLM lands within the resource area. Coniferous forest on parcels 6732 and 6733 may provide suitable 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). There are no leks located within the boundary of any of the proposed lease parcels, however, there is one lek located in close proximity to parcel 6733. Several parcels (6724, 6732, 6733, 6738 and 6734) provide nesting and/or 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.

The Colorado River cutthroat trout (CRCT) is a native trout species of the Colorado River Basin. It is one of 3 sub-species of cutthroat that currently reside in Colorado. CRCT, like all cutthroat subspecies, inhabit cold-water streams and lakes with adequate spawning habitat present in the spring. Their primary source of food is aquatic and terrestrial insects. Habitat for this species occurs on/near Parcel 6724.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

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 poor or marginal. Only one parcel (6732) is within a four mile radius of an active lek, however, mapped sage-grouse habitat on this parcel is comprised of vegetative communities that are marginal for nesting sage-grouse. 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 is successful, impacts would 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 parcels 6724, 6732, 6733 and 6738.

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.

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

3.4.2.4 Upland Vegetation

Affected Environment: The proposed lease parcels are scattered across a wide area of the LSFO. The project area is primarily sagebrush grassland and mountain shrub plant communities that have been disturbed by long term livestock grazing and/or other agricultural practices, and energy exploration and development.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Generally oil and gas development involves complete removal of vegetation and at times re-contouring of the landscape to allow for resources to be retrieved. The type of ground activity associated with oil and gas development results in increased susceptibility to adverse impacts such as soil compaction, weed infestations and erosion (See Soils and Invasive, Non-Native Species sections). Due to these adverse impacts, establishment of native vegetation similar to adjacent undisturbed vegetation can take up to 30 years.

Environmental Consequences of Leasing and Development - Cumulative Impacts: In view of the current and historical widespread disturbances in the area the proposed action would have minimal cumulative impact. Long term impacts would be small and localized after successful interim reclamation practices are implemented.

Potential Future Mitigation: Proposed mitigation measures, including reclamation practices, would be developed upon review of a site-specific APD.

3.4.2.5 Wetlands and Riparian Zones

Affected Environment: The following table indicates which proposed lease parcels have known or the potential for both perennial and ephemeral surface waters. Because many of the parcels are under 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.

TABLE 5
Potential for surface water presence in proposed lease parcels

Parcel ID	KNOWN/POTENTIAL FOR PERENNIAL WATER PRESENT?	KNOWN/POTENTIAL FOR EPHEMERAL WATER PRESENT?
6718	Not likely	Yes
6724	Yes	Yes
	Yes	Yes

6728		
6732	Yes	Yes
6733	Yes	Yes
6734	Yes	Yes
6735	Yes	Yes
6738	Yes	Yes
6743	Yes	Yes

Only one of the proposed parcels (6733) has documented riparian areas identified on BLM managed surface. Approximately 3.7 miles of perennial stream has been assessed within this parcel, with conditions ranging from properly functioning to degraded. 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 are 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 permitted 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 lease stipulation in the LSFO RMP (LS-105) identifies measures to protect water resources. Steep slope and fragile soils lease stipulations (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. The success or failure of stipulations and BMPs (see Potential Future Mitigation) designed to manage storm water and reduce erosion/sedimentation during construction and operation of oil and gas facilities would determine much of the impact with regard to riparian areas. Collectively, these stipulations will maintain and protect riparian form and function, including attributes such as water quality, stream stability, aquatic health, fisheries, and downstream sediment processes.

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 in section 3.4.1.7.

3.4.2.6 Aquatic Wildlife

Affected Environment: Only one perennial stream with riparian vegetation has been identified and assessed on Parcel 6733. However, 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 6724, 6728, 6732, 6733 and 6743 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 consequence on 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. 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. Parcels 6718, 6724 and 6743 are mapped as mule deer critical winter range. Parcels 6732, 6733, 6735, 6743 and 6738 are located within elk winter concentration areas and/or elk severe winter habitat. In addition, Parcels 6728 and 6732 provide elk calving habitat. Several parcels (6718, 6735, 6743 and 6738) provide habitat for pronghorn, although none of this habitat is classified as 'critical' or 'severe.' 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, Parcel 6732 provides 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 Parcels 6718, 6724, 6732, 6733, 6735, 6743 and 6738.

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

Affected Environment: The BLM's offering of oil and gas lease parcels is considered an undertaking subject to compliance with Section 106 of the National Historic Preservation Act (NHPA). The BLM has the legal responsibility to consider the effects of its actions on cultural resources. BLM Manual 8100 Series; the Colorado State Protocol; and BLM Colorado Handbook of Guidelines and Procedures for Identification, Evaluation, and Mitigation of Cultural Resources provide guidance on Section 106 compliance requirements to meet appropriate cultural resource standards. Section 106 of NHPA requires federal agencies to: 1) inventory cultural resources within federal undertaking Areas of Potential Effect (APEs), 2) evaluate the significance of cultural resources by determining National Register of Historic Places (NRHP) eligibility and, 3) consult with applicable federal, state, and tribal entities regarding inventory results, NRHP eligibility determinations, and proposed methods to avoid or mitigate potential impacts to eligible sites.

In Colorado, the BLM's NHPA obligations are carried out under a Programmatic Agreement (PA) among the BLM, the Advisory Council on Historic Preservation, and the State Historic Preservation Officer (SHPO). Should an undertaking be determined to have "no effect" or "no adverse effect" by the BLM-LSFO archaeologist, the undertaking may proceed under the terms and conditions of the PA. If the undertaking is determined to have "adverse effects," project-specific consultation is then initiated with the SHPO.

The culture history of northwestern Colorado is presented among several recent context studies. Reed and Metcalf's (1999) study of the Northern Colorado River Basin provides applicable prehistoric and historic overviews as compiled by Frederic J. Athearn (1982) and Michael B. Husband (1984). A historical archaeology context also was prepared for the State of Colorado by Church and others (2007). Furthermore, significant cultural resources administered by the LSFO are provided in a Class 1 overview (McDonald and Metcalf 2006), in addition to valuable

contextual data provided by synthesis reports of archaeological investigations conducted for a series of large pipeline projects in the LSFO management area (Metcalf and Reed 2011; Rhode and others 2010; Reed and Metcalf 2009).

A Class 1 cultural resources assessment was completed by the LSFO archaeologists for a one-mile "buffer" area surrounding each of the proposed lease parcels (herein referred to as the research area). Data reviewed were obtained from the LSFO cultural program project files, site reports, and atlases, in addition to BLM-maintained General Land Office (GLO) plats and patent records. Electronic files also were reviewed through online cultural resource databases including *Compass* (maintained by the Colorado Office of Archaeology and Historic Preservation), the Routt County Register of Historic Places, and the National Register Information System (NRIS; maintained by the National Park Service). The results of archival research are summarized as follows:

> Parcel 6718 - Eight prior cultural resource surveys have been conducted within the lease sale parcel comprising an aggregate area of approximately 150 acres. Background research shows 24 cultural resource sites within the parcel research area, two of which consist of NRHP-eligible sites with potential cultural significance to Native American tribes. Additionally, four of the identified cultural sites are located within the proposed lease sale parcel. Specific information regarding site types and numeric designations are herein withheld with respect and consideration for potential cultural sensitivities.
>
> Parcel 6724 - Research indicates the one prior cultural resource survey was conducted within the lease sale parcel that covered approximately 40 acres (OAHP #MC.LM.R45). Additionally, three historic-age linear features (i.e., roads) were identified within the parcel research area. One of the identified road features consists of the historic alignment of State Highway 13 (5MF.5138) that was previously recommended NRHP-eligible. However, this roadway has been continually used and maintained/upgraded since original construction.
>
> Parcel 6728 - No cultural resource surveys have been conducted within the lease sale parcel. However, archival data indicates two archaeological sites have been documented within the overall research area. Additionally, a review of GLO plat maps shows an unnamed road segment along a northeast-southwest trending drainage (plat dated 1909). This alignment roughly corresponds to a mapped and in-use road segment as evidenced by satellite imagery and local-area atlases.
>
> Parcel 6732 - Research shows that one linear survey has been conducted within the parcel (OAHP #MF.LM.NR674). Prior cultural survey covered approximately 15 acres. Archival data indicates three cultural resource sites within the parcel research area including a multicomponent site with prehistoric artifacts and historic burials (5MF.504), a prehistoric lithic/artifact concentration (5MF.505), and a historic ranch complex (5MF.528). The historic ranch complex was previously recommended NRHP-eligible; the remaining two sites are classified as "needs data" for eligibility recommendation/determination. None of the sites are located within the parcel.

Parcel 6733 - Background data show one prior cultural resource survey within the lease sale parcel, comprising a linear alignment of approximately two acres (OAHP #MF.LM.NR634). No cultural resources have been documented within the parcel research area.

Parcel 6734 - One prior linear survey has been conducted within the parcel (OAHP #RT.LM.NR58). Archival data show no known cultural resources within the parcel study area.

Parcel 6735 - Archival data show no prior cultural resource investigations and no documented sites within the parcel research area.

Parcel 6738 - Archival data show no prior cultural resource investigations and no documented sites within the parcel research area.

Parcel 6743 - Archival data show no prior cultural resource investigations and no documented sites within the parcel research area.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Because the proposed lease sale does not involve construction, ground disturbance, or the direct sale/exchange of federally managed lands, the proposed undertaking poses no effects to historic properties. Any future parcel development for oil and gas extraction would be subject to project-specific authorization by the BLM. Cultural resource surveys and assessments are a required component for BLM review of APDs because NRHP-eligible cultural resources—i.e., historic properties—may be subject to direct or indirect impacts as a result of construction and/or operational activities. Future lease developments also have potential to detract from the visual integrity of adjacent historic properties. Indirect effects to historic properties also may include increased access to/collection of artifacts and cultural materials, inadvertent trespass/damage to cultural resources, and possible damage of the environmental setting.

Before any APDs are approved for exploration or drilling, Class 3 cultural resource surveys would be completed, reviewed and, as necessary, consulted upon for BLM compliance with Section 106 of the NHPA; all jurisdictional lands are subject to BLM compliance measures as stipulated in Exhibit CO-39. The LSFO requires a minimum of a 10-acre block survey surrounding any proposed well location, however, larger-area block surveys may be required to accommodate for construction, staging, and/or avoidance of significant cultural resources. Class 3 (intensive pedestrian) cultural resource surveys also are required for associated access roads (new or improved) and infrastructure (e.g., buried and surficial pipelines, processing facilities, and work-camps).

Environmental Consequences of Leasing and Development - Cumulative Impacts: Cultural resources are constantly subject to site formation processes or events after creation (Binford 1981; Schiffer 1987). These processes can be both cultural and natural, and may occur instantly or over thousands of years. Cultural formation processes include activities directly or indirectly caused by humans. Natural processes include chemical, physical, and biological processes of the natural environment that impinge upon and/or modify cultural materials.

The cumulative effects to cultural resources are broad and may include impacts within a project construction footprint (i.e., APE for direct effects), the immediate vicinity, and/or the surrounding view-shed (i.e., APEs for indirect effects). Future energy developments and resource extraction projects have potential to cause impacts as a result of construction, operational, and maintenance activities. Likewise, infrastructure has potential to detract from the integrity of cultural resources through physical disturbance (direct impacts) or degradation of the historical/environmental setting (indirect impacts). Increased utilization of the area also raises the potential for illegal collection of cultural materials. However, federal review of proposed developments (e.g., APD review) triggers the need for cultural resources inventory and assessment; such investigations serve to augment the cultural-historical record and provide data to aid in the future identification and/or mitigation of newly identified sites.

Potential Future Mitigation:

Because cultural resources are irreplaceable and most are highly sensitive to ground disturbance, it is necessary for resources to be properly identified, evaluated, and reported prior to any future activity that may affect their integrity or condition. Where potential impacts to historic properties are identified, the BLM's preferred mitigation is to relocate any proposed construction activities to avoid adverse effects. For example, direct effects to archaeological sites should be avoided by at least 100 meters and where practicable. Indirect effects caused by visual intrusion may be avoided or mitigated through project relocation, topographic "shielding," and/or "stealth" construction design. If potential impacts to significant cultural resources become unavoidable, preparation of mitigation/data recovery plans would be initiated in consultation with the SHPO. Specific mitigation plans are developed during the NEPA and NHPA compliance review process for individual APDs and related projects.

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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 understood 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.

3.4.3.3 Lands with Wilderness Characteristics

Affected Environment: BLM Manual 6310 provides guidance on updating wilderness characteristics inventories for all BLM managed lands and disclosing impacts of a proposed action on wilderness characteristics if present. The majority of the lands with wilderness characteristics (LWC) inventory units that the lease parcels are contained within are not of sufficient size to make practicable its preservation and use in an unimpaired way or did not meet the adjacency standard (adjacent to lands presently managed to protect wilderness characteristics). Only one of the proposed parcels (6718) is within an LWC unit (polygon #47) that does meet the size criteria and the criteria for LWC.

Parcel 6718 was inventoried for wilderness characteristics in October 2012 by AECOM as part of an effort to inventory for LWC in the area affected by transmission projects proposed by TransWest Express and Pacificorp through the LSFO. The 9,607 acre unit is identified as Polygon 47 through the LSFO RMP and as Unit 291 through AECOM.

Polygon 47 is located is situated on several ridges on either side of Powder Wash and the Little Snake River. This sagebrush, pinyon-juniper covered area of moderate relief hills offers

outstanding opportunities for primitive recreation. The majority of land within the unit is used for rangeland activity including livestock grazing.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: The act of leasing the parcels for oil and gas development would not have a direct impact on wilderness characteristics; however activities at the exploration and development stage would have impacts to wilderness characteristics.

Impacts to wilderness characteristics would be associated with the surface disturbance from the construction of roads, pipelines, well pads, and powerlines. Specific impacts could be loss of naturalness in which human-made features would be substantially noticeable; and impact to solitude where vegetative cover and topography would not provide adequate screening from human-made features, activities, and noise associated with oil and gas development.

Environmental Consequences of the Leasing and Development - Cumulative Impacts: At present, any future potential cumulative impact is unforeseeable and speculative, given that the pace, place, and specific equipment configurations of such development are unknown. Data shows that within the section (640 acres) where the parcels are located there are approximately 13 wells that have been drilled since record keeping began. The records indicate these wells were either dry and abandoned, abandoned locations, or plugged and abandoned. Any potential cumulative impacts from exploration and development of these leases would not be expected to have significant cumulative impacts within the region. However, increased development of oil and gas would result in a cumulative increase in surface and subsurface disturbances. The severity of these impacts could be elevated based on any development on federal or private land in the surrounding area.

Potential Future Mitigation: The proposed project actions are appropriate and consistent with applicable requirements of law and other resource management considerations due to active subsurface rights and the BLM's management decision to not protect wilderness characteristics within these parcels. In this LWC unit where the management decision is not to protect wilderness characteristics, measures to minimize impacts on those characteristics would be applied at the APD stage.

3.4.3.4 Native American Religious Concerns

Affected Environment: Four Native American tribes have cultural and historical ties to lands administered by the LSFO. These tribes include the Eastern Shoshone, Ute Mountain Ute, Uinta and Ouray Agency Ute, and the Southern Ute.

American Indian religious concerns are legislatively considered under several acts and Executive Orders including the American Indian Religious Freedom Act, the Native American Graves Environmental Assessment Protection and Repatriation Act, and Executive Order 13007 (Indian Sacred Sites). In sum, and in concert with other provisions such as those found in the NHPA and Archaeological Resources Protection Act, these acts and orders require the federal government to carefully and proactively consider the traditional and religious values of Native American culture and lifeways to ensure, to the greatest degree possible, that access to sacred sites, treatment of

human remains, the possession of sacred items, conduct of traditional religious practices, and the preservation of important cultural properties are not unduly infringed upon. In some cases, these concerns are directly related to "historic properties" and "archaeological resources." Likewise, elements of the landscape without archaeological or human material remains also may be involved. Identification of Native American concerns is normally completed during land-use planning efforts, reference to existing studies, or through direct consultation with tribes.

Consultation letters regarding the proposed lease sale were sent to the aforementioned tribes on July 9, 2013 (dated July 1, 2013). No comments were received. Consultations for individual APDs would be performed in conjunction with project-specific cultural resource assessments.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Items, sites, or landscapes determined as culturally significant to the tribes can be directly or indirectly impacted. Direct impacts may include, but are not limited to, physical damage, removal of objects or items, and activities construed as disrespectful (e.g., installation of portable toilets near a sacred site). Indirect impacts may include, but are not limited to, prevention of access (hindering the performance of traditional ceremonies and rituals), increased visitation of an area, and potential loss of integrity related to religious feelings and associations.

As a result of Class 1 cultural resources assessment, two historic properties of potential cultural significance were identified within or adjacent to Parcel 6718 (see Section 3.4.3.1). There are no other currently known items, sites, or landscapes determined as culturally significant within or immediately adjacent to the remaining, proposed lease sale parcels. The proposed action does not prevent access to any known sacred sites, prevent the possession of sacred objects, or interfere with the performance of traditional ceremonies and/or rituals.

Additionally, consulting tribes have previously expressed concern for oil and gas developments within the view-shed of the Thornburgh Battlefield site; the closest proposed lease-sale parcels (Parcels 6724 and 6728) are located over three miles away and accessed by different routes. Likewise, adjacent topography obscures the comparative view-shed of the Thornburgh Battlefield site from the nearest lease sale parcels.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Continued energy development in the area has the additive effect of altering the landscape from that ancestrally known by the tribes. The overarching concern is for potential cumulative effects that modern culture/developments cause upon the overall landscape. Two potentially significant sites were identified within and adjacent to Parcel 6718, however, because the lease sale does not involve construction, ground disturbance, or the direct sale/exchange of federally managed lands, the proposed undertaking poses no effects with regard for Native American concerns.

Potential Future Mitigation: There are no known adverse impacts to any culturally significant items, sites, or landscapes. If new information is provided by consulting tribes, additional or edited terms and conditions for mitigation may be required to protect resource values. Future assessment and consultation would occur during the BLM's review of project-specific APDs. Further discussion regarding potentially significant sites and possible avoidance/mitigation strategies is warranted (e.g., for known sites within and adjacent to Parcel 6718).

3.4.3.5 Paleontological Resources

Affected Environment: Occurrences of paleontological resources are closely tied to the geologic unit that contains them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. The Potential Fossil Yield Classification (PFYC) system classifies geologic units based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts. The higher PFYC Class number indicates a higher potential for finding paleontological resources. Eight leases are in geologic units that range from 3 – 5 in the PFYC system.

Parcel (6738) is comprised primarily of PFYC 3 or lower formations, and as such, raises no special concern.

TABLE 6

PFYC CLASS	DESCRIPTION
Class 3 – Moderate or Unknown	Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.
Class 4 - High	Geologic units containing a high occurrence of significant fossils.
Class 5 – Very High	Highly Fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

TABLE 7

LEASE PARCEL	GEOLOGIC UNIT	PFYC CLASS
6718	Tertiary Cathedral Bluffs	3
6724	Cretaceous Williams Fork	5
6728	Cretaceous Williams Fork	5
6732	Tertiary Browns Park	5
6733	Tertiary Wasatch	5
6734	Cretaceous Iles	5
6735	Tertiary Wasatch	5
6743	Tertiary Wasatch	5

Parcel 6718 has 2 documented paleontological sites within close proximity.
Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Leasing would not cause any damage or degradation to the paleontological resources. Drilling, pad construction and other earth disturbances associated with the proposed action could destroy or damage paleontological resources. The proposed action could also constitute a beneficial impact to paleontological resources by increasing the chances for discovery of scientifically significant fossils. Locations for proposed oil or gas well pads, pipelines, and associated infrastructure would be subject to further analysis for the protection of paleontological resources within eight of the nine lease parcels (see Table 5 above) during APD/development stage NEPA review.

Areas that contain geologic formations that are PFYC 3, 4, and 5, for which new surface disturbance is proposed on or adjacent to bedrock (native sedimentary stone) including disturbance that may penetrate protective soil cover and disturb bedrock, may be subject to an inventory that shall be performed by a BLM permitted paleontologist and approved by the appropriate LSFO specialist. Surface disturbing activities in many areas including PFYC 4 and 5 may also require monitoring by a permitted paleontologist.

Environmental Consequences of Leasing and Development - Cumulative Impacts: This lease sale, when combined with the past, present and reasonably foreseeable actions would have the potential to identify previously unrecorded paleontological resources by increasing the surface and subsurface area documented by preconstruction paleontological surveys and construction monitoring. Sites that could not be avoided may require excavation and collection, which would add to existing regional paleontological knowledge. The following stipulation would be applied to Parcels 6718, 6724, 6728, 6732, 6733, 6734, 6735, 6743; CO-29.

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.

Reference:

Armstrong, Harley J. and Wolny, David G., 1989, Paleontological Resources of Northwest Colorado: A Regional Analysis, Museum of Western Colorado, Grand Junction, CO, prepared for Bur. Land Management, Vol. I of V.

Miller, A.E., 1977, Geology of Moffat County, Colorado, Colo. Geol. Surv. Map Series 3, 1:126,720.

3.4.3.6 Social and Economic Conditions

Affected Environment: 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.

TABLE 8
Profile of County Demographics, 2000-2010

	Moffat	Rio Blanco	Routt	Colorado	U.S.
Population (2010*)	13,519	6,494	22,924	5,029,196	303,965,272
Population (2000)	13,184	5,986	19,690	4,301,261	281,421,906
Population Percent Change (2000-2010*)	2.5%	8.5%	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 three-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 $60,000 per year (US Census Bureau, County Business Patterns 2010).

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 9
Average Annual Production and Revenue

	Moffat	Rio Blanco	Routt	Total
Oil Production (Thousand bbl)	279	5,409	76.9	4,027
Oil Revenue ($Thousand)	14,579	283,068	4,027	301,673
Gas Production (MMCF)	18,182	53,992	35.3	72,209
Gas Revenue ($Thousand)	58,365	173,314	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.

<u>Environmental Consequences, Proposed Action:</u> No minority or low income populations would be directly affected in the vicinity of the proposed action.

The direct effect of the proposed action would be the payments received, if any, from the leasing of the 7,435.30 acres of federal mineral estate, or a subset thereof. 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 a small 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, however, highly speculative to predict exact 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. A rough estimate for the amount to be raised in the lease sale can be determined using recent lease sales in the field office as a guideline. Approximately 95% of all acres proposed for leasing are bid upon, with an average bid of approximately $170 per acre. Using these values, the lease sale could result in $1,264,001.00 in total bonus bids, though the actual amount may vary widely. To predict the results of future development would be too speculative in nature. Any 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.

Environmental Consequences, 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.

Mitigation: None.

3.4.3.7 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.

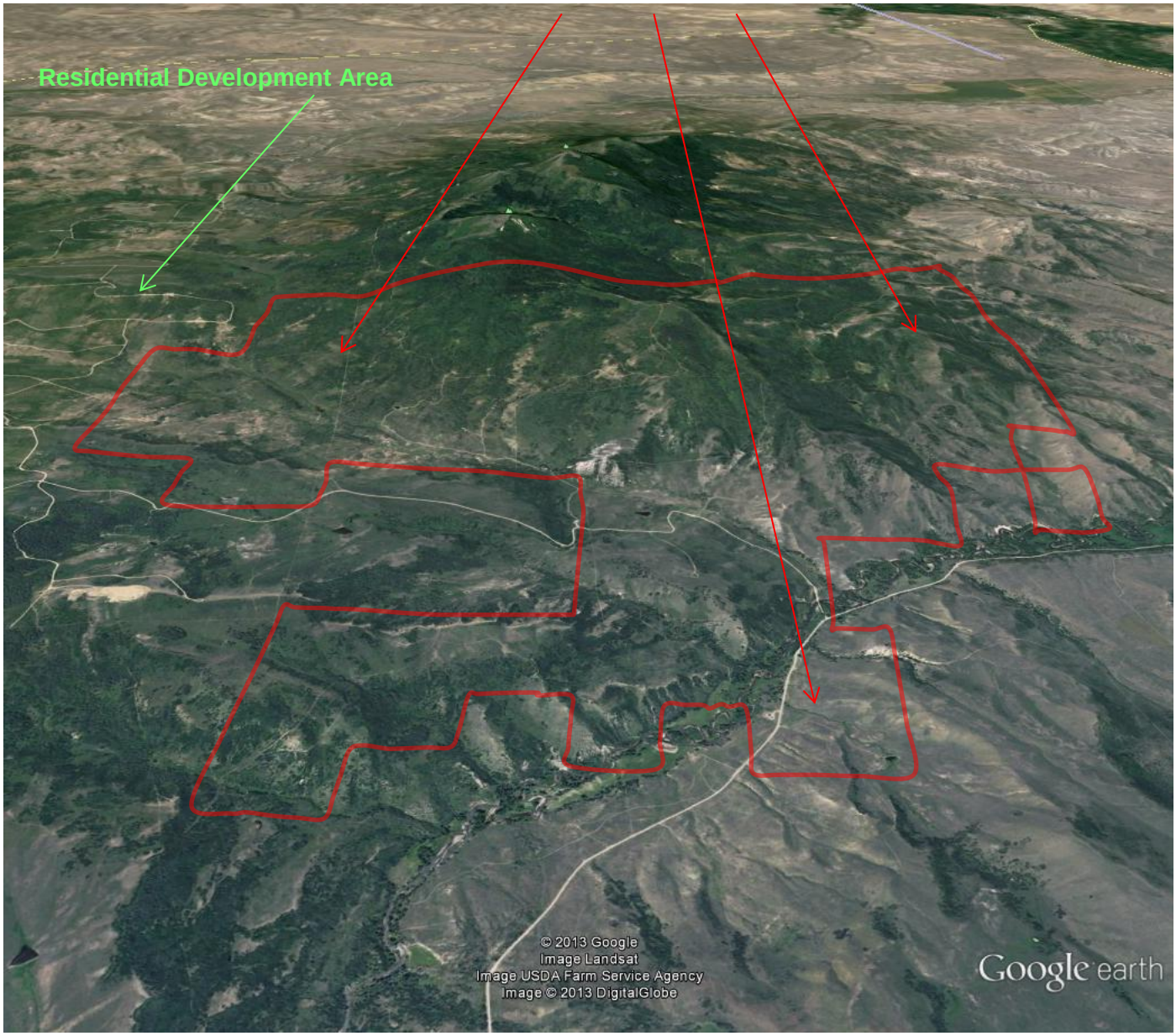
The majority of the parcels proposed for leasing occur on private surface in areas that have already been modified including roads, houses, oil and gas, and agricultural development and have been inventoried as VRI Class III.

Lease parcel 6718 is located along the Wyoming border just northwest of the Little Snake River and near County Road 21N, in Moffat County on BLM managed surface. For visual resource purposes, the area is identified as the Seven Mile Unit, which encompasses portions of the Little Snake River basin, including the slopes east of Sevenmile Ridge. The Seven Mile Unit has a sensitivity level rating of Moderate Value because of its proximity to the Little Snake River and the incorporation of Godiva Rim in the Unit. These features (e.g., river, Godiva Rim) provide

recreational opportunities and scenic values, which give the Unit a Scenic quality Rating of B. However, Godiva Rim is located in the southern portion of the Unit and the river is located over 2 miles away from the proposed lease parcels.
There is a long history of oil and gas development in the project area and on the surrounding landscape. There are numerous existing roads and a pipeline corridor in the project area that create a visual impact to the form, line, and color of the landscape. Because the project area is in the foreground-middleground zone, landscape areas are more visible to the public and may precipitate the public's concern for visual quality.

Parcel 6724 is approximately 4-5 miles south of Axial, Colorado off of State Highway 13 on BLM managed surface with a small portion located on private land within Moffat County. For visual resource purposes, the area is identified as the Danforth Hills Unit, which encompasses the Danforth Hills from Highway 57 east to the base of Thornburgh Mountain.

Approximate location of lease Parcels 6733, 6731 & 6732



See narrative for the above parcels on next page

Most of the parcel is surrounded by private land with developments typical of large acreage ranches. Because the project areas are in the foreground-middleground zone, landscape areas are more visible to the public and may precipitate the public's concern for visual quality.

Parcel 6728 is located solely on private land west of Highway 13 and adjacent to State Land located on the Rio Blanco County line to the north in Moffat County. The parcel falls within the Danforth Hills Unit. The project area is in the foreground-middleground zone. Because the parcel does not have any public access, any oil and gas development would probably not be visible to the casual observer.

Parcel 6732 and the adjacent Parcel 6733 are located in Moffat County just to the west of County Road 38 on BLM managed surface and private land within Wilderness Ranch. Parcel 6733 is bordered to the east by State Land. For visual resource purposes, the area is identified as the Three Forks Unit, with the Little Snake River prominent along the north areas and Slater Creek dissecting the unit from north to east along County Road 82. The adjoining landscape, immediately visible at foreground and middleground distances, has high visibility, noticeability and significant sense-of-place attachment to locals and visitors. This would impact the scenic values of both local area residents and recreation-leisure travelers.

Parcels 6732 and 6733 are mostly private land but also include BLM surface ownership. There is evidence of oil and gas development in Parcel 6732. Because the project areas are in the background zone, activities and changes to the landscape would generally be less visible. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Parcel 6734 is located on private land southwest of the town of Oak Creek and just north of Routt National Forest from County Road 90 in Routt County. For visual resource purposes, the area is identified as the Dry Mountain Unit. The project area 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 the Proposed Action at various points along County Road 90 or 29. The overall scenic quality rating for the Dry Mountain Unit is a B.

Parcel 6735 is solely on private land just to the north of Craig, Colorado in Moffat County. The parcel is located in the Great Divide Unit. The project area 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 the Proposed Action from Cedar Mountain or along State Highway 13. The overall scenic quality rating for the Great Divide Unit is a C.

Parcel 6738 is of mostly private lands with a 40-acre parcel of BLM surface managed land. The parcel is located northeast of Craig, Colorado in Moffat County near Elkhead Reservoir. The landscape for this parcel is rolling foothills from State Highway 40 north to the Elkhead Mountains. Most of the parcel is surrounded by private land with developments typical of large acreage ranches. Vegetation is predominately sage/grasses with most of the area open grazing lands.

Because the parcel does not have any public access, including the small BLM parcels, any oil and gas development would probably not be visible to the casual observer (if facilities are placed off ridge lines and existing routes are used for access) even though Parcel 6738 is located in the foreground-middleground zone. The overall scenic quality rating for the Elkhead Unit is a B.

Parcel 6743 is located on private land just to the north of Craig, Colorado in Moffat County. The parcel is located in the Great Divide Unit with one section adjacent to Parcel 6735 and the other adjacent to State Land to the south. The project areas 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 the proposed action from Cedar Mountain or along State Highway 13. The overall scenic quality rating for the Great Divide Unit is a C.

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.

Environmental Consequences of Leasing and Development - Cumulative Impacts: 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.
Mitigation: None

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 7,435.30 acres under consideration for lease, 2078.28 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, Proposed Action: 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, 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.

Mitigation: While the goal of the travel management program is to provide appropriate access for BLM permittees and to provide for administrative access for management of public lands, travel restrictions help to ensure that unrestricted motorized vehicle use does not occur.

3.4.4.2 Livestock Operations

Affected Environment: The nominated parcels overlap a few livestock grazing allotments administered by the LSFO. There may be fences, water developments, and other rangeland improvement projects within the proposed parcels.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: The actual amount of direct and indirect effects to livestock grazing in any given allotment cannot be predicted until the site-specific APD stage of development. Generally there is an initial loss of forage (animal unit month or AUMs) associated with each development-related disturbance. The amount of forage loss would vary based on the productivity of the affected ecological site prior to disturbance as well as the amount of the disturbance that is reclaimed and the success of re-vegetation actions. After successful final reclamation herbaceous forage production would likely be slightly higher than pre-disturbance levels until woody re-vegetation reestablishes. Within any allotment, livestock distribution and utilization may be permanently altered by placement of facilities, this has the potential to mandate changes to previously authorized livestock use. Rangeland improvements such as fences, corrals, and watering facilities could be impacted by road and pad construction. Placement of facilities near rangeland improvement projects could compromise their usefulness, particularly during the development stage. In addition, proximity to livestock water can increase potential for stock to use the pad areas for resting, rubbing, and potential exposure to other drilling related hazards. Livestock might avoid an area during the period of active development due to the increased activity and noise levels.

Environmental Consequences of Leasing and Development - Cumulative Impacts: The continued and additional development of federal oil and gas resources and associated loss of vegetation would further reduce the diversity and abundance of available forage. Even with successful reclamation, substantial continued disruption of the natural succession of the upland plant community would have far reaching effects to natural and other permitted land uses.

Mitigation/Residual Effects: Development actions would avoid rangeland improvement projects (e.g., ponds, tanks, waterlines, fences, corrals, cattle-guards, gates etc.) if possible but if they could not be avoided, the project proponent would relocate the rangeland improvement facilities to an adjacent BLM designated site and reconstruct them to BLM specifications to maintain their original function and purpose. If fences would be affected by development, the project proponent would install temporary fencing to prevent unwanted livestock movement between allotments or pastures. The BLM notifies grazing permittees on a site-by-site basis as part of the APD process. BMPs for livestock operations would be incorporated into the COAs during evaluation of a specific project or APD.

3.4.4.3 Prime and Unique Farmlands

Affected Environment: Soils designated as farmland of statewide importance occur within two of the proposed lease parcels (6738 and 6743). 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. Some may produce as high

a yield as prime farmlands if conditions are favorable. No parcels contain soils designated as prime and unique farmland.

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 preclude any 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.

Potential Future Mitigation: None.

3.4.4.4 Recreation

Affected Environment: Of the 7435.30 acres under consideration for lease, 2078.28 surface acres are managed by the BLM upon which dispersed recreational activities could occur. However, the majority of the BLM surface acres are isolated parcels surrounded by private land through which no formalized legal access exists. The recreational activity most likely to occur on the parcels managed by the LSFO is big game hunting. Due to the remote nature, and difficult access of these areas, the expectation of a successful hunt, and the importance of an undisturbed natural setting are likely important elements to the hunting experience.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: On the parcels that are either “land locked” or are located on private surface there is no public recreation use and therefore impacts to recreation would be minimal or none.

Due to the very small size of some of the proposed parcels on public lands there are limited options to locate the facilities so that they are screened and not visible from recreational users. Recreation users would most likely choose to avoid this area, especially during drilling operations but other areas would still be available for hunting use.

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.

Potential Future Mitigation: None.

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 2013 describing general oil and gas development projects, including preliminary information for this proposed lease sale. Follow-up letters describing specific lease parcel locations and the results of Class 1 cultural resources assessment (as provided in Section 3.4.3.1; see also Section 3.4.3.4) were sent on July 9, 2013 (dated July 1, 2013). No comments were received.

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, Forest Management, Wild Horses
Emily Spencer	Ecologist	Floodplains, Surface Hydrology, Soils, Water Quality (Surface), Wetlands & Riparian Zones, Prime and Unique Farmlands
Louis McMinn	Realty Specialist	Socioeconomics, Environmental Justice, Realty Authorizations, Land Tenure
Tim Wilson	Associate Field Office Manager	Ground Hydrology, Fluid Minerals, 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 Exhibits
Attachment E – Maps
Attachment F – Response to Public Comments