

United States Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-MT-C030-2015-0085-EA

July 14, 2015

Project Title: Oil and Gas Lease Parcel, July 14, 2015 Sale

Location: North Dakota Field Office (see Appendix A for list of lease parcels by number and legal description and Appendix D for Parcel Maps 1-5)



North Dakota Oil and Gas Lease Sale EA DOI-BLM-MT-C030-2015-0085-EA

1.0 PURPOSE and NEED..... 5

 1.1 Introduction 5

 1.2 Purpose and Need for the Proposed Action 8

 1.3 Conformance with BLM Land Use Plan(s)..... 8

 1.4 Public Scoping and Identification of Issues 8

 1.5 Identified Relevant Issues and Resources.....9

 1.6 Resources Considered but Eliminated from Further Analysis.....10

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION..... 10

 2.1 Alternative A (No Action)..... 10

 2.2 Alternative B (Proposed Action)..... 11

 2.3 Alternative C (BLM Preferred)..... 11

 2.4 Additional Considerations for Alternatives B and C 11

3.0 AFFECTED ENVIRONMENT 12

 3.1 Introduction 12

 3.2 Air Resources 13

 3.3 Soil Resources 21

 3.4 Water Resources 22

 3.5 Vegetation Resources 24

 3.6 Special Status Species 27

 3.7 Fish and Wildlife 33

 3.8 Cultural Resources 35

 3.9 Native American Religious Concerns 37

 3.10 Paleontology 38

 3.11 Visual Resources 39

 3.12 Recreation and Travel Management 40

 3.13 Lands and Realty 40

 3.14 Fluid Minerals 41

 3.15 Social Conditions and Environmental Justice..... 43

 3.16 Economics 48

 3.17 Special Designations.....51

4.0 ENVIRONMENTAL IMPACTS 51

 4.1 Assumptions and Reasonably Foreseeable Development Scenario Summary 51

 4.2 Alternative A (No Action) 58

 4.3 Alternative B (Proposed Action) 60

 4.4 Alternative C (BLM Preferred) 85

5.0 CONSULTATION AND COORDINATION 92

 5.1 Persons, Agencies, and Organizations Consulted 92

 5.2 Summary of Public Participation 93

 5.3 List of Preparers 94

6.0 REFERENCES 95

7.0 DEFINITIONS 103

APPENDICES

Appendix A – Descriptions of Lease Parcels and Lease Stipulations

Appendix B – Stipulation Key

Appendix C – Mitigation and Best Management Practices

Appendix D – Parcel Maps

MAPS

Map 1.1.1 General Map of Nominated Lease Parcels

Map 1 – All Nominated Lease Parcels

Map 2 – Nominated Parcel – NDM 97300-6J

Map 3 – Nominated Parcels – NDM 97300-7B and NDM 97300-7A

Map 4 – Nominated Parcel – NDM 97300-4H

Map 5 – Nominated Parcels – NDM 97300-6L and NDM 97300-6M

Map 6 – Nominated Parcels – NDM 97300-4V and NDM 97300-7K

Map 4.1.1 RFD Scenario for Development Potential

FIGURES

3.2.2 Air Quality Trends

3.2.3 Visibility Trends in Nearby Class I Areas

TABLES

3.2.1 USEPA Air Quality Index Reports

3.2.2 Monitored Concentrations Representative of the Study Area

3.5.1.5 USFWS Riparian and Wetland Areas

3.5.2.1 Noxious weeds in North Dakota

3.6.1 Aquatic sensitive or special status wildlife species in the analysis area

3.6.2 Sensitive bird/mammal/reptile species found in North Dakota

3.10.1 Potential Fossil Yield Classification (PFYC) Description

3.13.1 Number of parcels, surface ownership, and acres by county

3.14.1 Existing Development Activity

3.14.2 Oil and Gas Leasing and Existing Development within Townships Containing Lease Parcels

3.14.3 Oil and Gas Leasing and Existing Development Abbreviations Key

3.15.1.1 Census and Population Estimates, 2010-2013

3.15.1.2 Cumulative Estimates of the Components of Population Change, 2010-2013

3.15.1.3 2010 Census and 2013 Estimates of Sex and Median Age

3.15.3.1 Race and Hispanic Percentages

3.15.3.2 Percent Poverty, All Ages for 2011

4.1.1 Disturbance Associated With Existing Well Pads and Projected Active Well Pads for the Baseline Scenario (Short-Term Disturbance)

4.1.2 Disturbance Associated With Existing Well Pads and Projected Producing Well Pads for the Baseline Scenario (Long-Term Disturbance)

4.2.3.1 Summary Comparison of Estimated Average Annual Economic Impacts

4.2.3.2 Cumulative Annual Activity by Alternative

4.3.4.1.1 The BLM Projected Annual GHG Emissions Associated With Oil and Gas

	Exploration and Development Activity in the NDFO
4.3.4.2.2	Projected Non-BLM GHG Emissions Associated with the NDFO Reasonably Foreseeable Development Scenario for Fluid Mineral Exploration and Development
5.3	List of Preparers
18	Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program

North Dakota Field Office Oil and Gas Lease Sale Parcel
Reviews DOI-BLM-MT-C030-2015-0085-EA

1.0 Purpose and Need

1.1 Introduction

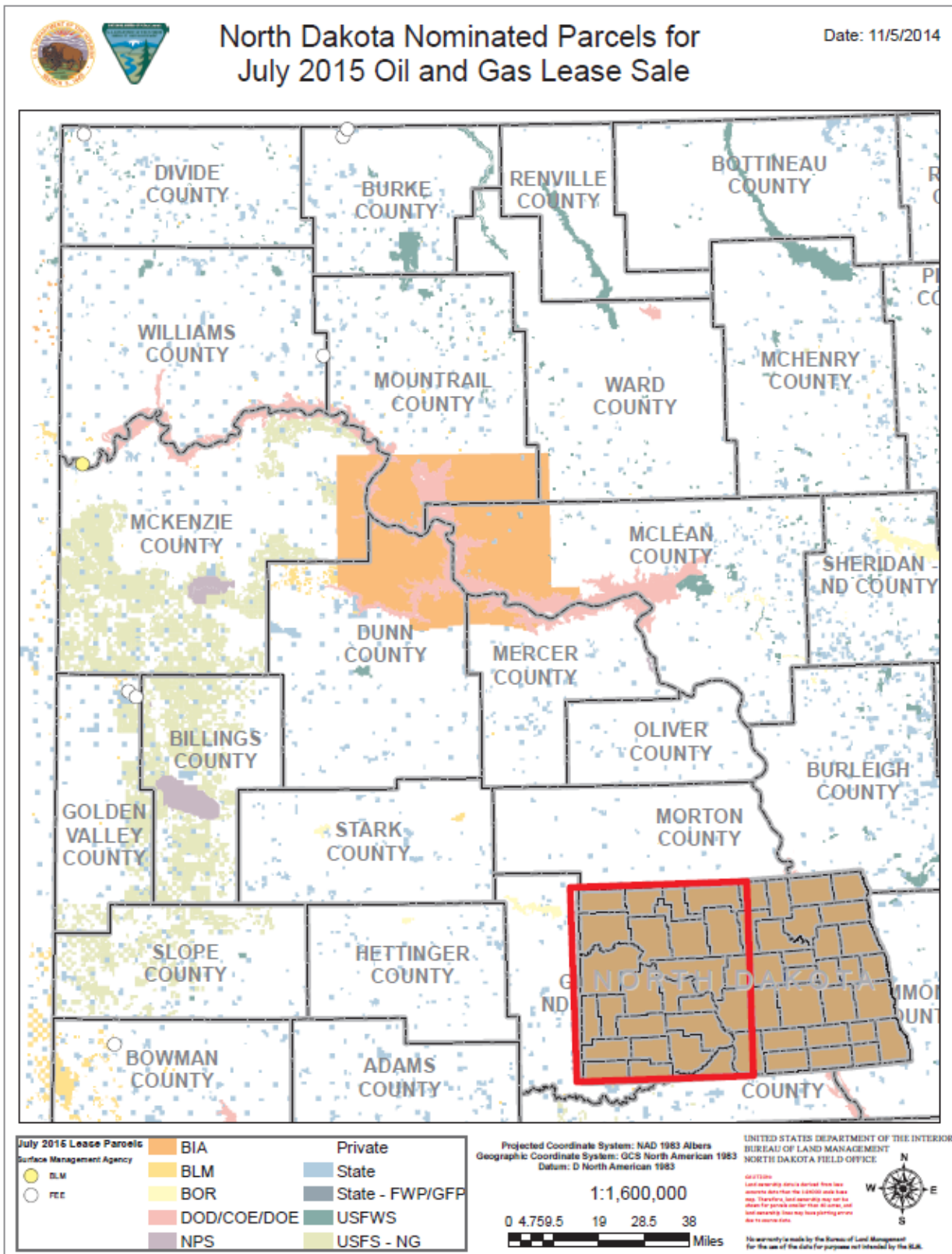
This Environmental Assessment (EA) has been prepared to analyze and disclose the potential environmental consequences of leasing all 8 nominated lease parcels encompassing a total of 1,164.26 surveyed Federal mineral acres located in the North Dakota Field Office (NDFO), to be included as part of a competitive oil and gas lease sale scheduled to occur on July 14, 2015. The EA is a site specific analysis of potential impacts that could result with the implementation of a Proposed Action or alternatives to the Proposed Action. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination as to whether any “significant” impacts could result from the analyzed actions. “Significance” is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of “Finding of No Significant Impacts” (FONSI). If the decision maker determines that this project has “significant” impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record (DR) may be signed for the EA approving the selected alternative, whether the Proposed Action or another alternative. A DR, including a FONSI statement, documents the reasons why implementation of the selected alternative would not result in “significant” environmental impacts.

It is the policy of the Bureau of Land Management (BLM) to make mineral resources available for use and to encourage development of mineral resources to meet national, regional, and local needs. This policy is based on various laws, including the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 Sec. 5102(a)(b)(1)(A) directs the BLM to conduct quarterly oil and gas lease sales in each state whenever eligible lands are available for leasing. The Montana State Office conducts mineral estate lease auctions for lands managed by the Federal Government, whether the surface is managed by the Department of the Interior (BLM or Bureau of Reclamation), United States Forest Service, or other departments and agencies. In some cases the BLM holds subsurface mineral rights on split estate lands where the surface estate is owned by another party, other than the Federal Government. Federal mineral leases can be sold on such lands as well. The Montana State Office is directed by the Mineral Leasing Act to conduct four lease sales per year.

Members of the public file Expressions of Interest (EOI) to nominate parcels for leasing by the BLM. From these EOIs, the Montana State Office provides draft parcel lists to the appropriate field offices for review. The BLM field offices then review legal descriptions of nominated parcels to determine: if they are in areas open to leasing; if new information has come to light which might change previous analyses conducted during the land use planning process; if there are special resource conditions of which potential bidders should be made aware; and which stipulations should be identified and included as part of a lease. Ultimately, all of the lands in

proposed lease sales are nominated by private individuals, companies, or the BLM, and therefore represent areas of high interest. The analysis area includes the 8 nominated parcels in Burke, Williams, Divide, Golden Valley, and Bowman counties (Map 1).

Map 1.1.1 General Map of Nominated Lease Parcels



1.2 Purpose and Need for the Proposed Action

The purpose of this Proposed Action is for BLM to process the Expressions of Interest (EOI) to explore and develop the oil and gas reserves within Federal mineral estate on the 8 lease parcels proposed for the July 14, 2015, Competitive Oil and Gas Lease Sale. The purpose of offering parcels for competitive oil and gas leasing is to provide a response to EOIs in opportunities for private individuals or companies to explore and develop Federal oil and gas resources after receipt of necessary approvals and to sell the oil and gas in public markets.

The need for action is reflected in BLM's role in permitting of exploration and development of Federal mineral estate by private industry. The requirement to act in consideration of an Expression of Interest (EOI) is an integral part of the BLM's oil and gas program under authority of the Mineral Leasing Act of 1920 as amended, the Mining and Minerals Policy Act of 1970, the Federal Land Policy and Management Act of 1976, the National Materials and Minerals Policy, Research and Development Act of 1980, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987. Thus, the BLM's need is to respond to the EOIs and determine which parcels should be leased and under what stipulations, and which parcels should be deferred.

The decision to be made is whether to sell oil and gas leases on the lease parcels identified, and, if so, identify stipulations that would be included with specific lease parcels at the time of lease sale.

1.3 Conformance with Land Use Plan(s)

This EA is tiered to and conforms with the information and analysis contained in the North Dakota RMP (April 1988) and its associated Environmental Impact Statement (EIS), the governing land use plan for the NDFO. An electronic copy of the North Dakota RMP and its associated EIS can be located via the internet on the BLM home page, www.blm.gov/mt. On the home page, locate the heading titled "Montana/Dakotas," then select "What We Do", then click on the "Planning" link.

A more complete description of activities and impacts related to oil and gas leasing, development, production, etc. can be found at pages 9-10 in Chapter 2 of the RMP/EIS.

Analysis of the 8 parcels is documented in this EA, and was conducted by NDFO resource specialists who relied on professional knowledge of the areas involved, review of current databases, file information, and site visits to ensure that appropriate stipulations were recommended for a specific parcel. Analysis may have also identified the need to defer entire or partial parcels from leasing pending further environmental review.

Offering the parcels for sale and issuing leases would not be in conflict with any local, county, or state laws or plans.

1.4 Public Scoping and Identification of Issues

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posted on the NDFO website National Environmental

Policy Act (NEPA) notification log. Scoping was initiated December 15, 2014. Comments were received through December 30, 2014.

The BLM coordinates with North Dakota Game and Fish Department (NDGF), and the United States Fish and Wildlife Service (USFWS) to manage wildlife habitat because BLM management decisions can affect wildlife populations which depend on the habitat. The BLM manages habitat on BLM lands, while NDGF is responsible for managing wildlife species populations. The USFWS also manages some wildlife populations but only those Federal trust species managed under mandates such as the Endangered Species Act, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. Managing wildlife is factored into project planning at multiple scales and is to be implemented early in the planning process.

Coordination with NDGF and USFWS was conducted for the 8 lease parcels being reviewed. BLM has coordinated with NDGF and USFWS in the completion of this EA in order to prepare analysis, identify protective measures, and apply stipulations associated with these parcels being analyzed.

The BLM consults with the State Historic Preservation Office (SHPO) and Native Americans under Section 106 of the National Historic Preservation Act (NHPA). BLM sent letters to the SHPO, Tribal Presidents and the Tribal Historical Preservation Officers (THPOs) or other cultural contacts for the Northern Cheyenne Tribe, Mandan, Hidatsa and Arikara Nation, Spirit Lake Sioux Tribe, Standing Rock Sioux Tribe, Lower Sioux Indian Community, and Turtle Mountain Band of Chippewa at the beginning of the 15 day scoping period informing them of the potential for the 8 parcels to be leased and inviting them to submit issues and concerns BLM should consider in the environmental analysis. In addition to scoping letters, THPOs also received file search results from the preliminary review of parcels conducted by BLM. The BLM sent a second letter with a copy of the EA to the tribes informing them about the 30 day public comment period for the EA and solicit any information BLM should consider before making a decision whether to offer any or all of the nominated parcels for sale.

Site specific resource concerns were identified by the BLM through the preliminary review process conducted prior to a 15-day public scoping period. Lease stipulations (as required by Title 43 Code of Federal Regulations 3131.3) were added as necessary to each parcel as identified by the BLM to address site specific resource concerns.

Refer to Section 5.2 of this EA for a more complete summary of the scoping comments received.

On February 9, 2015, the EA, along with an unsigned Finding of No Significant Impact (FONSI), were made available for a 30-day public comment period. Notification letters were distributed to external entities, local agencies, and tribes to explain that an EA and the unsigned FONSI were available for review and comment. Tribes also received a copy of the EA and unsigned FONSI for their review. One response was received during the comment period from Northern Cheyenne Tribe requesting additional information.

1.5 Identified Relevant Issues and Resources

The BLM focuses its analysis on issues that are truly significant to the action in question, rather than “amassing needless detail” (40 CFR 1500.1(b)). Issues have a relationship with the proposed action; are within the scope of analysis; and are amenable to scientific analysis.

The issues carried forward through analysis in this EA include:

- air resources;
- climate change and greenhouse gas emissions;
- soil resources
- economics;
- social conditions and environmental justice
- cultural resources;
- lands and realty conflicts
- fluid minerals
- Native American Religious Concerns
- paleontological resources;
- water resources;
- recreation and visual resources;
- vegetation;
- conservation of riparian and aquatic wildlife and water resources
- special Status and sensitive Species;

1.6 Resources Considered but Eliminated from Further Analysis

The BLM considered other issues, listed below, but decided not to analyze those in further detail. The aspects of the existing environment that the BLM determined to not be present or not potentially impacted by this project include:

- coal;
- locatable minerals;
- salable minerals;
- forest and woodland resources
- lands with wilderness characteristics;
- livestock grazing
- cave and karst resources;
- wild and scenic rivers; and
- wilderness study areas.

The EA contains no further discussion of these issues.

2.0 Description of Alternatives, Including Proposed Action

2.1 Alternative A - No Action

The No Action alternative provides a baseline for comparison of the alternatives. This alternative describes the existing conditions and continuing trends. For EAs on externally

initiated Proposed Actions, the No Action Alternative generally means that the Proposed Action would not take place. In the case of a lease sale, this would mean that all expressions of interest to lease (parcel nominations) would be denied or rejected.

The No Action Alternative would exclude all 8 lease parcels, covering 1,164.26 surveyed Federal mineral acres (49.36 surveyed BLM administered surface and 1,114.9 surveyed private/State surface), from the competitive oil and gas lease sale (Maps 1-6). Surface management would remain the same and ongoing oil and gas development would continue on surrounding Federal, private, and State leases.

2.2 Alternative B – Proposed Action

The Proposed Action Alternative would be to offer 8 lease parcels of Federal minerals for oil and gas leasing, covering 1,164.26 surveyed Federal mineral acres (49.36 surveyed BLM administered surface and 1,114.9 surveyed private surface), in conformance with the existing land use planning decisions. Parcel number, size, and detailed locations and associated stipulations are listed in Appendix A. Maps 1-6 indicate the detailed location of each parcel.

2.3 Alternative C –BLM Preferred

Under Alternative C, 7 whole parcels of the 8 lease parcels, 1,124.24 surveyed Federal mineral acres (49.36 surveyed BLM administered surface and 1074.88 surveyed private surface) would be offered with RMP lease stipulations and/or lease notices as necessary (Appendix A) for competitive oil and gas lease sale and lease issuance.

A total of 1 lease parcel in whole, encompassing 40.02 surveyed Federal mineral acres (40.02 surveyed private surface), is recommended for deferral. This lease parcel contains critical greater sage grouse habitat being analyzed in the current NDFO RMP Amendment; therefore, 1 whole lease parcel would be deferred at this time pending further review and analysis. This would provide for consideration of alternatives in the current NDFO RMP planning.

2.4 Additional Considerations for Alternatives B and C

For the split-estate lease parcels, the BLM provided courtesy notification to private landowners that the Federal oil and gas estate under their surface would be included in this lease sale. In the event of activity on such split estate lease parcels, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

The terms and conditions of the standard federal lease and federal regulations would apply to each parcel offered for sale in each of the two Alternatives. Stipulations shown in Appendix A would be included with identified parcels offered for sale. Standard operating procedures for oil and gas development include measures to protect the environment and resources such as groundwater, air, wildlife, cultural resource concerns, and others as mentioned in the 1988 RMP on pages 7 through 22. Lease stipulations would be attached to the parcels to address site-specific concerns or new information not previously identified in the land use planning process. Once sold, the lease purchaser would have the right to use as much of the leased lands as is reasonably necessary to explore and drill for all of the oil and gas within the lease boundaries, subject to the stipulations attached to the lease (43 CFR 3101.1-4). Conditions of Approval

(COAs) would be attached to permits issued to explore and develop the parcels to address site-specific concerns or new information. Standard operating procedures, best management practices (BMPs), COAs, and lease stipulations can change over time to meet RMP objectives, resource needs or land use compatibility.

Federal oil and gas leases would be issued for a 10-year period and would remain valid for as long thereafter as oil or gas is produced in paying quantities, required payments are made and lease operations are conducted in compliance with regulations and approved permits. If a lessee fails to produce oil and gas by the end of the initial 10-year period, does not make annual rental payments, or does not comply with the terms and conditions of the lease, the BLM would terminate the lease. The lessee can relinquish the lease. The oil and gas resources could be offered for sale at a future lease sale. Drilling of wells on a lease would not be permitted until the lessee or operator secures approval of a drilling permit and a surface use plan as specified in 43 CFR 3162.

3.0 Affected Environment

3.1 Introduction

This chapter describes the existing conditions and issue-related elements of the human environment (i.e., the physical, biological, social, and economic values and resources) within the analysis area, which includes the 8 nominated parcels in Burke, Williams, Divide, Golden Valley, and Bowman counties (Map 1), that could be affected by implementation of the alternatives described in Chapter 2.

The existing environment is described by the different resources found throughout the counties listed above. Within each resource description, lease parcels containing the resource will be listed and analyzed further in Chapter 4. If the lease parcel does not contain the resource, then the lease parcel will be omitted from the description of that specific resource.

Unless otherwise stated, resource analysis in this chapter, and Chapter 4, will be described in approximate acres due to the scaling and precision parameters associated with the Geographic Information System (GIS), in addition to being referenced to a different land survey.

All 8 parcels are located in western North Dakota, which is located in the Northern Mixed Grass Prairie, known for its high diversity of vegetation types and topography. Vegetation is comprised of both tall and short grass as well as both warm and cool season grasses. A variety of grass-like plants, forbs, shrubs, and trees also add to the vegetation diversity of this rangeland type. The public lands are rich in natural resources, such as wildlife and livestock forage, minerals, cultural resources, paleontological resources, recreation opportunities, and watershed values.

Western North Dakota is comprised of gently rolling hills, buttes, badlands, wetlands, riparian areas, and river breaks. Lands in North Dakota are primarily privately owned and are mainly utilized for agricultural uses. Lands that are not restricted by topography or soil constraints generally have been cultivated for crop production. Lands that have limitations from crop production are generally rangelands or pasture lands. Rangelands and pasture lands can be

native, but can also be improved or rehabilitated croplands. Rehabilitated croplands are usually evident due to their near monoculture of introduced cool season grasses such as crested wheatgrass or smooth brome.

Temperatures throughout North Dakota fluctuate widely on an annual, seasonal, and daily basis. Annual mean temperatures range from 37°F in the northeast to about 43°F in the southwest. Temperature extremes can range from below -40°F to over 110°F. Average July temperature is about 69°F, and average January temperature is 10°F. Average annual precipitation varies from 13 inches in the northwest to about 20 inches in the east with up to 70 percent of the precipitation falling as rain between May and July. Precipitation is mainly derived from air masses originating from the Gulf of Mexico. Winters are long and cold with snow accumulations from November or December through March. Windy conditions are common due to the greatly fluctuating temperatures and lack of physical barriers. Prevailing winds are from the north-northwest at an average speed of 12 miles per hour (mph). Winds of 25-30 mph will often last for six hours and can last as long as 15 hours. Winds in excess of 30 mph have lasted more than six hours. Severe weather may occur almost any time during the year. Blizzards are a common occurrence during winter and early spring. High winds and hail frequently occur in connection with summer thunderstorms (NDFO RMP, 1988).

3.2 Air Resources

Air resources include air quality, air quality related values (AQRVs), and climate change. As part of the planning and decision making process, BLM considers and analyzes the potential impacts of BLM and BLM-authorized activities on air resources.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven criteria air pollutants subject to National Ambient Air Quality Standards (NAAQS). Pollutants regulated under NAAQS include carbon monoxide (CO), lead, nitrogen dioxide (NO₂), ozone, particulate matter with a diameter less than or equal to 10 microns (PM₁₀), particulate matter with a diameter less than or equal to 2.5 microns (PM_{2.5}), and sulfur dioxide (SO₂). Two additional pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOCs) are regulated because they form ozone in the atmosphere. Regulation of air quality is also delegated to some states. Air quality is determined by pollutant emissions and emission characteristics, atmospheric chemistry, dispersion meteorology, and terrain. AQRVs include impacts on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic impacts, such as visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

3.2.1 Air Quality

The EPA air quality index (AQI) is an index EPA used for reporting daily air quality (<http://www.epa.gov/oar/data/geosel.html>) to the public. The index tells how clean or polluted an area's air is and whether associated health impacts might be a concern. The EPA calculates the AQI for five criteria air pollutants regulated by the Clean Air Act (CAA): ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established NAAQS to protect public health. An AQI value of 100

generally corresponds to the primary NAAQS for the pollutant. The following terms help interpret the AQI information:

- **Good** – The AQI value is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.
- **Moderate** – The AQI is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- **Unhealthy for Sensitive Groups** – When AQI values are between 101 and 150, members of “sensitive groups” may experience health impacts. These groups are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.
- **Unhealthy** – The AQI is between 151 and 200. Everyone may begin to experience some adverse health impacts, and members of the sensitive groups may experience more serious impacts.
- **Very Unhealthy** – The AQI is between 201 and 300. This index level would trigger a health alert signifying that everyone may experience more serious health impacts.

AQI data show that there is little risk to the general public from air quality in the analysis area (Table 1). Based on available 2011–2013 data for state-operated monitors in Billings, Burke, Dunn, and McKenzie counties, at least 92 percent of the days were rated “good” and the three-year median daily AQIs were 33, 34, 31, and 35, respectively.

Table 3.2.1. US EPA – Air Data Air Quality Index Report (2011–2013)

County ¹	# Days in Period	# Days Rated Good or No Data	Percent of Days Rated Good or No Data	# Days Rated Moderate	# Days Rated Unhealthy for Sensitive Groups	# Days Rated Unhealthy	# Days Rated Very Unhealthy
Billings	1,096	1,091	99%	5	0	0	0
Burke	1,094	1,006	92%	88	0	0	0
Dunn	1,023	968	95%	55	0	0	0
McKenzie	1,096	1,005	92%	90	0	0	1

Source: USEPA 2014. AirData website (http://www.epa.gov/airdata/ad_rep_aqi.html, accessed August 19, 2014).

¹ Monitor names and station identifiers are as follows:

The Billings County monitor is the Painted Canyon monitor at the Theodore Roosevelt National Park North Unit (38-007-002).

The Burke County monitor is located in the Lostwood Wilderness (38-013-004).

The Dunn County monitor is located in Dunn Center (38-025-003).

The McKenzie County monitor is located at the Theodore Roosevelt National Park North Unit (38-053-002).

The area managed by the NDFO is designated as an attainment area for all National Ambient Air Quality Standards (NAAQS). Maximum concentrations as a percentage of the NAAQS are

summarized in Table 2 based on 2013 monitoring data. Gaseous pollutant concentrations are provided in terms of parts per million (ppm) or parts per billion (ppb), while particulate concentrations are provided in terms of micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). Data are not provided for CO and lead, which are not monitored within the analysis area. Data from multiple State and Local Air Monitoring System (SLAMS) monitoring locations are provided, including monitors in the Lostwood Wilderness (Burke County) and Theodore Roosevelt National Park North Unit (McKenzie County). A non-SLAMS monitoring site is maintained by the National Park Service at the Theodore Roosevelt National Park South Unit in Billings County.

Table 3.2.2. 2013 Monitored Concentrations Representative of the Study Area

Pollutant	Averaging Time	Applicable Standard (Format)	Ambient Concentrations ^a (Billings, Burke, Dunn, McKenzie Counties)	Percentages of NAAQS (Billings, Burke, Dunn, McKenzie Counties)
NO ₂	1 hour	100 ppb (98 th percentile)	NA, 17, 10, 10	NA, 17%, 10%, 10%
O ₃	8 hour	0.075 ppm, (4 th highest daily maximum)	0.059, 0.058, 0.056, 0.058	79%, 77%, 75%, 77%
PM ₁₀	24 hour	150 $\mu\text{g}/\text{m}^3$ (2 nd highest)	NA, 37.0, 74.0, 19.0	NA, 25%, 49%, 13%
PM _{2.5}	24 hour	35 $\mu\text{g}/\text{m}^3$ (98 th percentile)	11, 15, 15, 11	31%, 43%, 43%, 31%
	Annual	12 $\mu\text{g}/\text{m}^3$ (weighted mean)	4.4, 6.8, 5.5, 6.5	37%, 57%, 46%, 54%
SO ₂	1 hour	75 ppb (99 th percentile)	NA, 28, 9, 9	NA, 37%, 12%, 12%

Source: NDDOH 2014.

NA = not available.

^aThese values represent a 3-year average or a single year depending on the format of the NAAQS. Three-year averages of annual values are needed to determine NAAQS compliance for the NO₂, O₃, PM₁₀, 24-hour PM_{2.5}, and SO₂ standards.

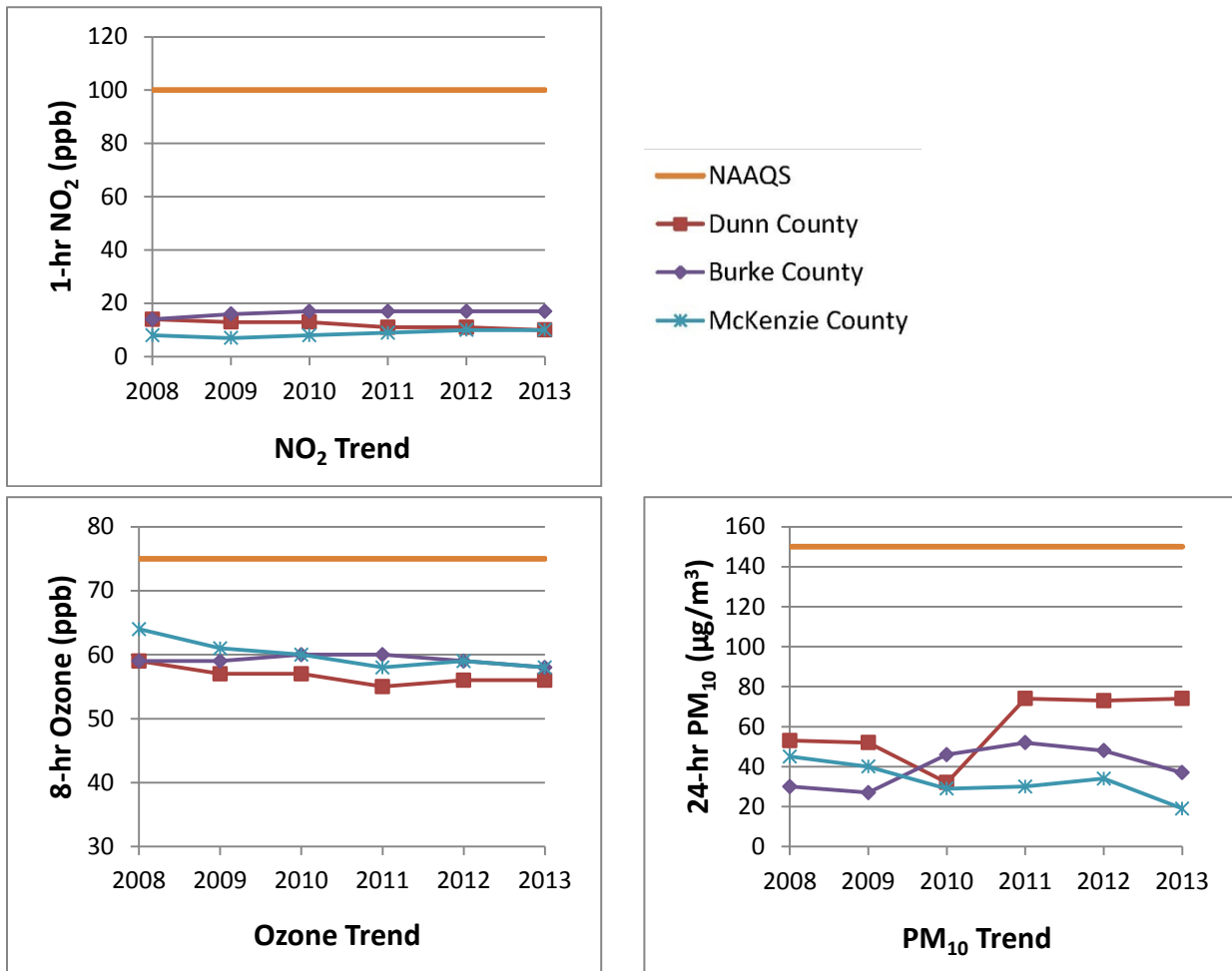
Figure 3.2.2 provides air quality trend data based on monitoring data provided by the North Dakota Department of Health for years 2006-2013. Although oil and gas activity has increased substantially during the last several years, ambient concentrations have remained relatively stable or have decreased slightly, with the exception of PM₁₀, which increased substantially in Dunn County from 2010 to 2011 and has remained at the higher level. Additional air quality regulations that reduce emissions from many types of sources and operator efforts to control emissions have maintained good air quality in the area.

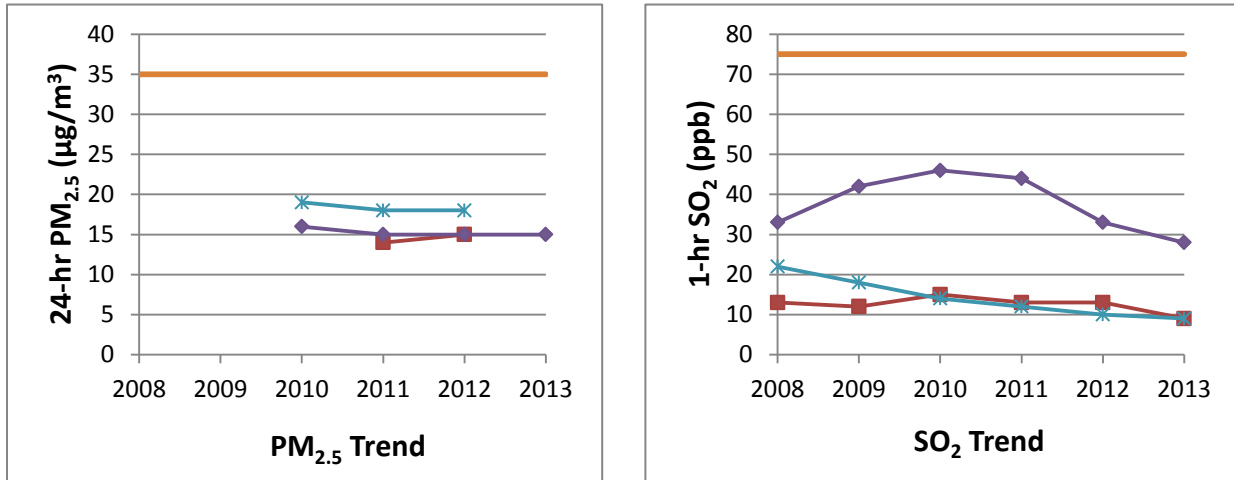
In addition, a new regulation adopted in mid-2014 by the North Dakota Industrial Commission (NDIC) will further limit VOC, GHG, and NO_x emissions from flaring of casinghead gas associated with oil wells. NDIC Order 24665 requires operators to capture greater percentages of casinghead gas at North Dakota Bakken Formation wells in order to

meet gas capture targets of 74% by October 1, 2014; 77% by January 1, 2015; 85% by January 1, 2016; and 90% by October 1, 2020. Gas capture targets may be met by routing gas to pipeline for sale, usage of gas at the well site, or through the beneficial use of casinghead gas (e.g. electrical power generation).

The order requires that all existing and completed wells in the Bakken, Bakken/Three Forks, and/or Three Forks Pool be evaluated for compliance. A well is in compliance with the order if the gas capture percentage is consistent with the gas capture targets. If gas capture targets are not met, well production is limited to 100 or 200 barrels of oil per day depending on site-specific activities. Exemptions are allowed for (1) wells that have received an exemption to North Dakota Century Code Section 38-08-06.4; (2) the first horizontal well completed in a Bakken, Bakken/Three Forks, and/or Three Forks Pool non-overlapping spacing unit; or (3) the first 90 days commencing on the first day oil is produced through well-head equipment into tanks from the ultimate producing interval after casing has been run.

Figure 3.2.2 Air Quality Trends

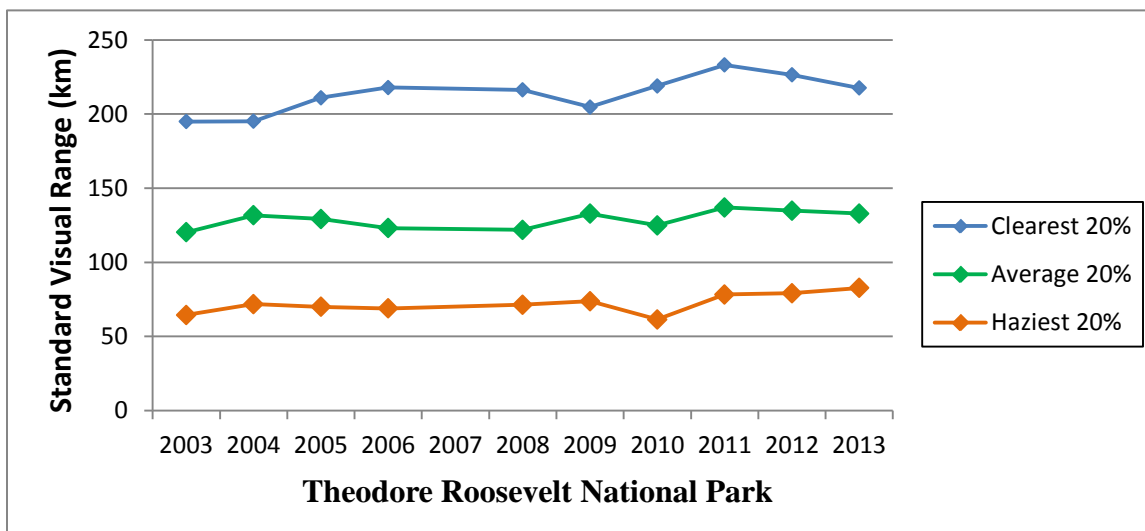


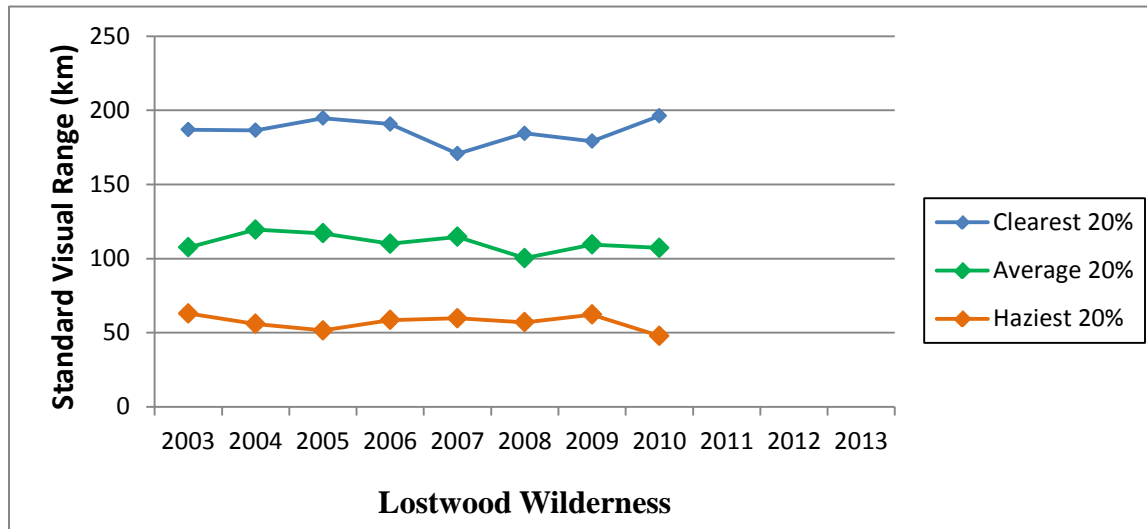


Sources: Data derived from NDDOH 2006, 2007, 2008, 2009, 2010, 2012a, 2012b, 2013, 2014.

Air resources also include visibility, which can be assessed in terms of the standard visual range (in kilometers or miles) that a person can distinguish a large dark object. Visibility degradation is primarily due to anthropogenic sulfate, nitrate, and particulate emissions and due to wildfires. Air pollutants affecting visibility can be transported hundreds of miles. Figure 3.2.3 illustrates visibility trends based on IMPROVE monitoring data from 2003-2013 at the two Class I areas in North Dakota: Lostwood Wilderness and Theodore Roosevelt National Park. Because visibility is highly variable throughout the year, it is characterized by three groupings: the clearest 20% days, average 20% days, and haziest 20% days. Monitoring data for the Lostwood Wilderness are not available for 2011-2013. A slight improving trend in visibility is apparent at Theodore Roosevelt National Park. At the Lostwood Wilderness, there was no apparent trend from 2003 to 2011.

Figure 3.2.3 Visibility Trends in Nearby Class I Areas





Source: Data derived from IMPROVE 2014.

Sulfur, nitrogen, and acid deposition rates in the study area are among the lowest in the nation, as measured at the Theodore Roosevelt National Park South Unit during 2012 (NADP 2013). Dry deposition was 2 kilograms per hectare (kg/ha) for sulfate and 3 kg/ha for nitrate. Nitrogen and sulfur wet deposition were 173 equivalents per hectare. Precipitation pH was 5.8, which is not considered to be acidic. Hydrogen ion wet deposition was extremely low at less than 0.01 kg/ha. Lake acidification is unlikely with these deposition values and has not been reported at lakes in the area.

3.2.2 Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as, “A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC 2013).” Climate change and climate science are discussed in detail in the climate change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management (Climate Change SIR 2010). This document is incorporated by reference into this EA.

The IPCC states, “Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased (IPCC 2013).” The global average surface temperature has increased approximately 1.5°F from 1880 to 2012 (IPCC 2013). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth’s atmosphere, up to 4-12 miles above the earth). Other indications of global climate change described by the IPCC (Climate Change SIR 2010) include:

- Rates of surface warming increased in the mid-1970s and the global land surface has been warming at about double the rate of ocean surface warming since then;
- Eleven of the last 12 years rank among the 12 warmest years on record since 1850; and
- Lower-tropospheric temperatures have slightly greater warming rates than the earth's surface from 1958-2005.

As summarized in the climate change SIR, earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, CO₂, methane, and N₂O absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (Climate Change SIR 2010). Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. Each GHG has a global warming potential that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere (Climate Change SIR 2010). The buildup of GHGs such as CO₂, methane, N₂O, and halocarbons since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth rather than allowing the heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially CO₂ and methane) from fossil fuel development, large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forcings and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the atmosphere. For example, CO₂ may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (Climate Change SIR 2010). Based on the GHG global warming potentials (GWPs) put forth in EPA regulations (40 *Code of Regulations* Part 98, Subpart A), companies must report GHG emissions using GWPs of 1 for CO₂, 25 for methane, and 310 for N₂O.

Climate change information and regional projections of impacts are becoming increasingly available. Chapter 3 of the climate change SIR describes impacts of climate change in detail at various scales, including the state scale when appropriate. The EPA identifies western North Dakota as part of the Great Plains region. The following summary characterizes potential changes identified by the EPA (EPA 2008) that are expected to occur at the regional scale, where the proposed action and its alternatives are to occur.

- The region is expected to experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow would be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs would be drier.

- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions would reduce the range and health of ponderosa and lodgepole pine forests, and increase the susceptibility to fire. Grasslands and rangelands could expand into previously forested areas.
- Ecosystems would be stressed and wildlife such as the mountain lion, black bear, long-nose sucker, marten, and bald eagle could be further stressed.

Other impacts could include:

- Increased particulate matter in the air as drier, less vegetated soils experience wind erosion.
- Shifts in vegetative communities which could threaten plant and wildlife species.
- Changes in the timing and quantity of snowmelt which could affect both aquatic species and agricultural needs.

Projected and documented broad-scale changes within ecosystems of the U.S. are summarized in the Climate Change SIR. Some key aspects include:

- Large-scale shifts have already occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue (USGCRP 2009, as cited by Climate Change SIR 2010). Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to 2 weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.
- Fires, insect epidemics, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff would increase fire risks.

More specific to North Dakota, additional projected changes associated with climate change described in Section 3.0 of the Climate Change SIR (2010) include:

- Temperature increases in North Dakota are predicted to be between 3 to 5°F at mid-21st century. As the mean temperature rises, more heat waves are predicted to occur.
- Precipitation is expected to increase during winter and spring, decrease slightly in summer, and remain relatively unchanged in the fall.
- For the western portion of the state, annual median runoff is expected to decrease between 2 and 5 percent by mid-21st century, while runoff in the northeastern part of the state would increase by 5-10 percent.
- Crop yields may increase in North Dakota, associated with predicted temperature increases.
- North Dakota's Prairie Pothole wetlands are expected to decline in quality, due to their shallow depths and rapid evaporation rates. Shrinking wetlands may lead to decreases in waterfowl populations.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in the western portion of North Dakota, based on a 1°C global average temperature increase, to be 393 percent.

While long-range regional changes might occur within this analysis area, it is impossible to predict precisely when they could occur.

3.3 Soil Resources

The soil-forming factors (climate, parent material, topography, biota, and age) are variable across the planning area, which results in soils with diverse physical, chemical, and biotic properties. Important properties of naturally functioning soil systems include biotic activity, diversity, and productivity; water capture, storage, and release; nutrient storage and cycling; contaminant filtration, buffering, degradation, immobilization, and detoxification; and biotic system habitat.

The lease parcels are located within five counties including Burke, Williams, Divide, Golden Valley, and Bowman. The acreage of the lease parcels comprises less than 1 percent of each county. Soils considered prime farmlands if irrigated occur within lease parcels NDM 97300-7A.

The lease parcels are located within 5 watersheds [HUC 8 (Hydrological Unit Code); subbasins]: the Lake Sakakawea (HUC 10110101), Beaver (HUC 10110204), Upper Souris (HUC 09010001), Brush Lake Closed Basin (HUC 10060007), and Upper Little Missouri (HUC 10110201). The acreage of the lease parcels comprises from less than 0.1 percent to 0.2 percent of each watershed. Soils considered prime farmlands if irrigated occur within lease parcels NDM 97300-7A. The following describes the common soil properties of the lease parcels within each watershed:

The Lake Sakakawea watershed contains proposed parcel NDM 97300-4V and NDM 97300-7K. The lease parcels are located within Williams County. Parcel soils are generally developed from fine loamy till for parcel NDM97300-4V and sandy alluvium for parcel NDM97300-7K. Ecological sites are typically loamy (MLRA R053BY011ND). Terrain within the parcels ranges from gentle to rugged.

The Beaver watershed contains proposed parcels NDM 97300-6L and NDM 97300-6M. The lease parcels are located within Golden Valley County. Parcel soils are generally developed from fine loamy alluvium, sedimentary rock, and loamy colluvium derived from mudstone. Ecological sites are typically thin loamy (MLRA R058CY087ND) and non-site (MLRA R058CY999ND). Terrain within the parcels ranges from gentle to rugged.

The Upper Souris watershed contains proposed parcels NDM 97300-7A and NDM97300-7B. The lease parcels are located in Burke County. Soils are generally developed from fine-loamy till. Ecological sites are typically clayey (MLRA R053AY001ND) and loamy (R053AY011ND). Terrain is gentle.

The Brush Lake Closed Basin watershed contains proposed parcels NDM 97300-4H. This lease parcel is located in Divide County. Parcel soils are generally developed from calcareous coarse-silty glaciolacustrine deposits. Ecological sites are typically thin loamy (MLRA R053BY015ND), limy upland (MLRA G053BY400ND) and clayey (MLRA R053BY001ND). Terrain within the parcels is commonly lake plains.

The Upper Little Missouri watershed contains proposed parcels NDM 97300-6J. This lease parcel is located in Bowman County. Parcel soils are generally developed from loamy residuum weathered from siltstone and mudstone. These soils are susceptible to water erosion. Ecological sites are typically Shallow Loamy (MLRA R058CY086ND). Terrain within the parcels is commonly ridges.

3.4 Water Resources

3.4.1 Surface Water

Surface water resources across the NDFO are present as lakes, reservoirs, rivers, streams, wetlands, and springs. Water resources are essential to the residents of eastern Montana to support agriculture, public water supplies, industry, and recreation. Water resources and riparian areas are crucial to the survival of many BLM-sensitive fish, reptiles, birds, and amphibians.

Perennial streams retain water year-round and have variable flow regimes. Intermittent streams flow during the part of the year when they receive sufficient water from springs, groundwater, or surface sources such as snowmelt or storm events. Ephemeral streams flow only in direct response to precipitation. Intermittent and ephemeral streams play an important role in the hydrologic function of the ecosystems within the lease parcels by transporting water, sediment, nutrients, and debris and providing connectivity within a watershed. They filter sediment, dissipate energy from snowmelt and storm water runoff, facilitate infiltration, and recharge groundwater (Levick et al. 2008). The pools of intermittent streams retain water in the summer months, supporting riparian vegetation and providing water resources for wildlife and livestock.

Stream morphology is influenced by a number of factors including: stream flow regime, geology, soils, vegetation type, climate, and land use history. Stream conditions reflect a number of historic and current impacts, ranging from agriculture to mining. Surficial geology is generally represented by Tertiary sandstones, siltstones, and shales, with some alluvium and glacial till which tends to form fine grain soils (loams to clays), that are highly erosive. Streambeds consist typically of sand and silt, with few bedrock channels. Stream morphology is highly influenced by the presence and type of riparian vegetation because streambeds and stream banks generally lack control features (e.g., rocks, cobbles, bedrock).

Approximately 50 acres of 100-year floodplains are present within 1 of the proposed lease parcels. These floodplains are associated with the Missouri River. Floodplain function is essential to watershed function, water quality, soil development, stream morphology, and riparian-wetland community composition. Floodplains reduce flood peaks and velocities, thereby reducing erosion; enhancing nutrient cycling; reducing frequency and duration of low flows; and increasing infiltration, water storage, and aquifer recharge. Floodplains enhance water quality by facilitating sedimentation and filtering overland flow. Floodplains support high plant productivity, high biodiversity, and habitat for wildlife.

The lease parcels are located within 5 watersheds [HUC 8 (Hydrological Unit Code); sub-basins]:

- Beaver Creek (HUC 10110204),
- Brush Lake Closed Basin (HUC 10060007),
- Headwaters Souris River (HUC 09010007),
- Lake Sakakawea (HUC 10110101), and
- Upper Little Missouri River (HUC 10110201).

The acreage of the lease parcels comprises less than 0.1 percent of each watershed (USGS 2009).

The Beaver Creek subbasin contains proposed parcels NDM 97300-6L and 6M; comprising less than 0.1 percent of the subbasin. The Brush Lake Closed Basin subbasin contains proposed parcel NDM 97300-4H; comprising less than 0.1 percent of the subbasin. The Headwaters Souris River subbasin contains proposed parcels NDM 97300-7A and 7B; comprising less than 0.1 percent of the subbasin. The Lake Sakakawea subbasin contains proposed parcels NDM 97300-4V and 7K; comprising less than 0.1 percent of the subbasin. The Upper Little Missouri River subbasin contains proposed parcel NDM 97300-6J; comprising less than 0.1 percent of the subbasin. Any beneficial use of produced water requires water rights to be issued by the North Dakota State Water Commission as established by law. Water used for oil well development may come from several different sources. It may be purchased from municipalities under certain conditions, appropriated from a surface water source under a new appropriation or by making changes to an existing water right, or by extracting groundwater from either a permitted or exempt well.

3.4.2 Groundwater

The quality and availability of groundwater varies greatly across the region. Residents in western North Dakota commonly get their ground water from aquifers consisting of unconsolidated, alluvial valley-fill materials, glacial outwash, or consolidated sedimentary rock formations and some coal beds.

Alluvial aquifers within the area generally consist of Quaternary alluvium and undifferentiated Quaternary/Tertiary sediments, which include sand and gravel deposits. Alluvial aquifers occur in terrace deposits, within floodplains, and along the channels of larger streams, tributaries, and rivers, and they are among the most productive sources of groundwater. They are typically 0-40 feet thick. The quality of groundwater from alluvial aquifers is generally good, but can be highly variable [approximately 100 mg/l to 2,800 mg/l TDS, specific conductance (SC) of 500 to 125,000 microsiemens/centimeter (uS/cm), and sodium adsorption ratio (SAR) of 5.0 to 10]. Wells completed in coarse sand and gravel alluvial aquifers can yield as much as 100 gallons per minute (gpm), although the average yield is 15 gpm. Alluvial deposits associated with abandoned river channels or detached terraces are topographically isolated and have limited saturation and yield as much as 20 gpm (Zelt et al. 1999).

Within the analysis area, the primary bedrock aquifers occur in sandstones and lignites of the Tertiary Fort Union Formation (Cenozoic rocks) (including Sentinel Butte, Cannonball, and Bullion Creek Formations) and the sandstones of the Cretaceous Hell Creek and Fox Hills formations (Mesozoic rocks). Wells within the Fort Union formation aquifers are typically 100 to 200 feet deep, but can be up to 1,500 feet in depth. These wells may produce as much as 40

gpm, but yields of 15 gpm are typical. Where aquifers are confined and artesian conditions exist, wells in the Fort Union Formation will generally flow less than 10 gpm. Well depths to the Hell Creek and Fox Hills formation aquifers are highly variable, but typically range from 200 to 1,000 feet in depth. Groundwater yields from these aquifers may be as much as 200 gpm, but are generally less than 100 gpm. Artesian wells within these aquifers may flow as high as 20 gpm (Zelt et al. 1999). Groundwater yields from the deeper Paleozoic Madison formation aquifer can range from 20 to 6,000 gpm, or can be higher, in karst areas. The depth to the Madison formation aquifer in the planning area can exceed 6,000 feet. Due to the extreme depth of this aquifer, it is rarely accessed for water use. Water quality of this aquifer is highly variable and is dependent on depth, bedrock type, recharge rate, and other factors.

3.5 Vegetation Resources

As described in the Introduction to this EA, all the lease parcels are located in western North Dakota, which is located in the Northern Mixed Grass Prairie. The Northern Mixed Grass Prairie is known for its diverse vegetation types, soil types, and topography. Vegetation is comprised of both tall and short grass as well as both warm and cool season grasses. A variety of grass-like plants, forbs, shrubs, and trees also add to the vegetation diversity of this rangeland type. Many of these plant species are found in woody draws and riparian/wetland zones.

Existing influences on local distribution of plant communities include soils, topography, surface disturbance, availability of water, management boundary fence lines, and soil salinity. Vegetation communities have been affected by human activities for over a century. Some of these activities include: infrastructure developments (roads, power lines, pipelines, etc.), chemical applications, livestock grazing, farming, and wildlife rehabilitation, prevention, manipulation, and suppression.

3.5.1 Vegetation Communities

Six major vegetation communities have been identified for the study area: native mixed grass prairie, wooded draws, agricultural lands, improved or restored pastures, riparian-wetlands, and other disturbed vegetative communities.

As a whole, the North Dakota landscape is comprised of a mosaic pattern. Settlement and privatization of most of the state has led to this pattern; therefore, large blocks of vegetative communities free of human disturbances are rare.

The native mixed grassland community is dominated by perennial grasses. Perennial grasses can be both warm season and cool season grasses, and they can also be both tall and short grasses. Some of the more common grasses include: western wheatgrass (*Pascopyrum smithii*), needle-and-thread (*Hesperostipa comata*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and prairie junegrass (*Koeleria macrantha*). Various forbs and shrubs are present but occur as a minor species composition component throughout the community. Many of these species occur in woody draws.

The wooded draw habitat type develops in ravines where the microclimate, primarily greater moisture, is suitable for the growth and development of trees. The major species include green ash, American elm, cottonwood, and quaking aspen. Wooded draws also support a variety of

shrub species including chokecherry, American plum, western snowberry, buffaloberry, red-osier dogwood, Missouri gooseberry, and juneberry. (North Dakota RMP/EIS, 1988).

Improved pastures consists of cultivated areas planted with introduced forage species, including crested wheatgrass and smooth brome (*Bromus inermis*) and intermediate wheatgrass (*Thinopyrum intermedium*) and alfalfa (*Medicago sativa*), planted specifically for the improved forage production for livestock consumption.

Restored pastures may include sub-marginal agricultural lands that have been restored due to poor crop production and/or high erosion potential. Historically, restored pastures were dominated by a monoculture of crested wheatgrass. These crested wheatgrass seedings are still present today and are essentially unchanged from when they were planted. They can be visible on aerial photographs, and grass, forb, and shrub species composition are similar from one crested seeding to another. More recent restoration activities of agricultural lands use a combination of crested wheatgrass, smooth brome, intermediate wheatgrass, or species native to Northern Mixed Grass Prairie.

The agriculture community is comprised of monocultures of crops which may include small grains, alfalfa, corn, sunflowers, or other crops grown primarily as supplemental feed sources for livestock production operations. These areas have been completely disturbed from the native vegetation potentials.

Riparian-wetland areas are among the most productive and important ecosystems, comprising approximately one percent of all national public lands. Characteristically, riparian-wetland areas display a greater diversity of plant, fish, wildlife, and other animal species and vegetative structure than adjoining ecosystems. Some of the more common vegetative species that occur in these areas include: prairie cordgrass, switchgrass, Canada wildrye, western wheatgrass, sedges (*Carex spp.*), rushes (*Juncus spp.*), willow, chokecherry, buffaloberry, and plains cottonwood. Healthy riparian systems filter and purify water as it moves through the riparian-wetland zone, reduce sediment loads and enhance soil stability, provide micro-climate moderation when contrasted to temperature extremes in adjacent areas, and contribute to ground water recharge and base flow (USDI, BLM, 1987b).

Prairie potholes are depressional wetlands created by the scouring action of glaciers. The formerly glaciated landscape within the study area is pockmarked with a number of these potholes, which fill with snowmelt and rain in the spring. Some prairie pothole marshes are temporary, while others may be essentially permanent. Submerged and floating aquatic plants take over the deeper water in the middle of the potholes, while bulrushes and cattails grow closer to shore.

From the USFWS National Wetland Inventory (NWI) GIS data, the proposed lease parcels contain approximately 84.8 acres of delineated riparian or wetland areas (see Table 3.5.1.5). Of these, 3.3 acres or 3.9 percent have been created or altered by dikes, impoundments, drains, ditches, or other human-caused disturbances.

Table 3.5.1.5: USFWS Riparian and Wetland Areas¹

Riparian Wetland Type	Classification	Acres
-----------------------	----------------	-------

Riparian Wetland Type	Classification	Acres
Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded	40.2
	Palustrine, Emergent, Seasonally Flooded, Partially Drained/Ditched	2.0
	Palustrine, Emergent, Temporary Flooded	2.9
	Palustrine, Emergent, Temporary Flooded, Partially Drained/Ditched	1.0
Freshwater Forested/Shrub Wetland	Palustrine, Forested, Temporary Flooded	0.5
	Palustrine, Scrub-Shrub, Temporary Flooded	18.0
Freshwater Pond	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	0.3
Riverine	Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded	6.1
	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded	13.8

¹(USFWS 2009)

Other disturbed vegetation communities include human disturbances or alterations to the landscape. These disturbances include, but are not limited to: infrastructure developments (e.g., roads, powerlines, pipelines, and fences), chemical applications, livestock grazing, farming and ranching, and industrial and commercial facilities. Invasive, non-native grasses such as smooth brome and crested wheatgrass are commonly found on these disturbed areas. For example, smooth brome was planted in many road ditches and has encroached into areas bordering road ditches. This is often true for native prairie sites adjacent to roadways; therefore, these sites often have a smooth brome component due to its ability to spread by creeping rhizomes.

Wildfire prevention, manipulation, and suppression activities are also human alterations on natural processes that have altered vegetation communities in western North Dakota.

Noxious weeds occur randomly in isolated pockets within the study area. No known populations are located within the parcels, but all of North Dakota has the potential for infestation. The following table (Table 3.5.2.1) shows the North Dakota state listed noxious weeds.

Table 3.5.2.1 North Dakota state listed noxious weeds

Common Name	Scientific Name
Absinth wormwood	<i>Artemisia absinthium</i>
Canada thistle	<i>Cirsium arvense</i>
Dalmatian toadflax	<i>Linaria genistifolia</i>
Diffuse knapweed	<i>Centaurea diffusa</i>
Leafy spurge	<i>Euphorbia esula</i>
Musk thistle	<i>Carduus nutans</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Russian knapweed	<i>Acroptilon repens</i>

Saltcedar	<i>Tamarix ramosissima</i>
Spotted knapweed	<i>Centaurea maculosa</i>

3.6 Special Status Species- Plant and Animal

3.6.1 Special Status Plant Species

There are no known threatened or endangered plant species in the study area and no special status plant species identified for North Dakota.

3.6.2 Special Status Animal Species

A number of animal species are priority species for BLM and could be found occupying habitats associated with the proposed lease nominations. Special status species (SSS) are species that are limited in number or that have observed a steady decline in their numbers across their range.

The **Special Status Species** designation includes **sensitive** and **state listed** as well as federally **proposed, listed, and candidate** species.

Sensitive species are those designated as sensitive by a BLM state director, usually in cooperation with the state agency responsible for managing the species and state natural heritage programs. They are those species that: (1) could become endangered in or extirpated from a state or within a significant portion of its distribution; (2) are under status review by the U.S. Fish and Wildlife Service (FWS); (3) are undergoing significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution; (4) are undergoing significant current or predicted downward trends in population or density such that federal listed, proposed, candidate, or state-listed status may become necessary; (5) Typically have small and widely dispersed populations; (6) Inhabit ecological refugia or other specialized or unique habitats; or (7) are state-listed but which may be better conserved through application of the BLM Sensitive Species Status.

State Listed (or Species of Conservation Priority) this designation includes species in decline at the state level whose population levels are not well known but are thought to be in decline.

Proposed species are species that have been officially proposed for listing as threatened or endangered by the Secretary of the Interior, and a proposed rule has been published in the Federal Register.

Listed species are designated as **threatened or endangered** by the Secretary of the Interior under the provisions of the Endangered Species Act, and a final rule for the listing has been published in the Federal Register.

Candidate species are designated as candidates for listing as threatened or endangered by the FWS, and listings have been published in the Federal Register.

3.6.2.1 Aquatic Wildlife

The analysis area contains sufficient habitat for five fish and one amphibian that are special status species. All of these species depend on perennial and intermittent streams or rivers

with intact floodplains, wetlands and riparian areas that are properly functioning. Threats to the aquatic species include but are not limited to habitat modification, exotic or non-native species, small population size, limited natural reproduction, hybridization, pollution and contaminants.

Table 3.6.1 Aquatic sensitive or specials status wildlife species in the analysis area

Species	USFWS Status	BLM Sensitive	In Range	Suitable Habitat present
Blue sucker	none	Sensitive	Yes	Yes
Northern Redbelly X Finescale Dace	none	Sensitive	Yes	Yes
Paddlefish	none	Sensitive	Yes	Yes
Sicklefin chub	none	none	Yes	Yes
Sturgeon Cub	none	Sensitive	Yes	Yes
Plains spadefoot	none	Sensitive	Yes	Yes

3.6.2.2 Terrestrial Wildlife

Evaluation of wildlife values at the landscape scale as a first step is key to understanding potential impacts of a large project. Various agencies and non-governmental organizations have evaluated wildlife values, including terrestrial conservation species, species richness, game quality, etc. and they have been mapped to various degrees at the landscape level.

Lease parcels were reviewed utilizing GIS overlays to assess potential aquatic, terrestrial and other habitat values. This course-scale landscape analysis of wildlife resources provides one tool for understanding the context of the wildlife values at a large scale. Fine-scaled tools, data, and resource information based on inventory and monitoring data, as well as local knowledge from BLM and NDGF employees, are used to further examine resource issues at the site-specific level.

The analysis area covers a wide variety of habitat consistent with the Northern Great Plains. Lease parcels are located within tame grasslands, short and mixed grass prairies, riparian and woody draw habitats, wetland habitats, under Lake Sakakawea and others. See section 3.5 for a detailed description of vegetation.

3.6.1.2.1 Grassland Birds

Several of the proposed lease nomination areas provide quality-habitat for a suite of sensitive bird species associated with northern mixed-grass and short-grass prairie habitats. The mixed-grass prairie contains both warm season grasses and cool season grasses such as blue grama, needle-and-thread, prairie junegrass, western snowberry, and western wheatgrass.

Some of the more common species which depend on these habitats are: Swainson’s hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), long-billed curlew (*Numenius americanus*), marbled godwit (*Limosa fedoa*), burrowing owl (*Athene*

cunicularia), Sprague’s pipit (*Anthus spragueii*), Le Conte’s sparrow (*Ammodramus leconteii*), Baird’s sparrow (*Ammodramus bairdii*), logger-head shrike (*Lanius ludovicianus*), black tern (*Chlidonias niger*), Nelson’s sharp-tailed sparrow (*Ammodramus nelsonii*), willet (*Catoptrophorus semipalmatus*), Wilson’s phalarope (*Phalaropus tricolor*), and the yellow rail (*Coturnicops noveboracensis*). [see table 3.6.2 for a complete list]

Most birds found within the analysis area are migratory. Populations of some of these species are declining as a consequence of land use practices and other factors predominately outside of BLM’s control. Many species of grassland birds nest and raise their young on these lease parcels or very near the lease parcels. Neo-tropical migrants exhibit quite variable habitat requirements and are found in most habitat types.

3.6.1.2.2 Mammals and Reptiles

Four sensitive species of mammals and two species of reptiles have the potential to be found within the analysis area. Several species of bats which are commonly found in close relation to conifer stands and rocky outcroppings, prairie dogs and the swift fox complete the list. Swift fox sightings were last observed in Mercer and Golden Valley Counties in 1976 and 1990 respectively.

Table 3.6.2 Sensitive bird/mammal/reptile species found in North Dakota and includes their global, state, and North Dakota Game and Fish (NDGF) ranks.

Species	Scientific Name	Global Rank	State Rank	NDGF Rank
Baird’s Sparrow	<i>Ammodramus bairdii</i>	G4	SU	Level 1
Black Tern	<i>Chlidonias niger</i>	G4	SU	Level 1
Brewer’s Sparrow	<i>Spizella breweri</i>	G5	S3	Level 3
Burrowing Owl	<i>Athene cunicularia</i>	G4	SU	Level 2
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	G5	SU	Level 1
Common Loon	<i>Gavia immer</i>	G5	S4	Not Ranked
Dickcissel	<i>Spiza americana</i>	G5	SU	Level 2
Ferruginous Hawk	<i>Buteo regalis</i>	G4	SU	Level 1
Franklin’s Gull	<i>Larus pipixcan</i>	G4, G5	SU	Level 1
Golden Eagle	<i>Aquila chrysaetos</i>	G5	S3	Level 2
Greater Sage-grouse	<i>Centrocercus urophasianus</i>	G4	SU	Level 2
Le Conte’s Sparrow	<i>Ammodramus leconteii</i>	G4	SU	Level 2
Loggerhead Shrike	<i>Lanius ludovicianus</i>	G4	SU	Level 2
Long-billed Curlew	<i>Numenius americanus</i>	G5	S2	Level 1
Marbled Godwit	<i>Limosa fedoa</i>	G5	SU	Level 1
McCown’s Longspur	<i>Calcarius mccownii</i>	G4	S2	Level 3

Nelson's Sharp-tailed Sparrow	<i>Ammodramus nelsonii</i>	G5	SU	Level 1
Northern Goshawk	<i>Accipiter gentilis</i>	G5	SU	Not Ranked
Peregrine Falcon	<i>Falco peregrinus</i>	G4, T4	S1	Level 3
Sedge Wren	<i>Cistothorus platensis</i>	G5	SU	Level 2
Sprague's Pipit	<i>Anthus spragueii</i>	G4	S3	Level 1
Swainson's Hawk	<i>Buteo swainsoni</i>	G5	SU	Level 1
White-faced Ibis	<i>Plegadis chihi</i>	G5	SU	Not Ranked
Willet	<i>Catoptrophorus semipalmatus</i>	G5	SU	Level 1
Wilson's Phalarope	<i>Phalaropus tricolor</i>	G5	SU	Level 1
Yellow Rail	<i>Coturnicops noveboracensis</i>	G4	S2	Level 1
Snapping Turtle	<i>Chelydra serpentine</i>	n/a	n/a	Level 2
Western Hog-nosed snake	<i>Heterodon nasicus</i>	n/a	n/a	Level 3
Long-legged myotis	<i>Myotis volans</i>	n/a	n/a	Level 3
Black-tailed Pr. Dog	<i>Cynomys ludovicianus</i>	n/a	n/a	Level 1
Swift Fox	<i>Vulpes velox</i>	n/a	n/a	Level 2

The State of North Dakota employs the standardized ranking system to denote global (or range-wide) and state status (Nature Serve, 2006). NDGF assigns numeric ranks ranging from 1 (highest risk, greatest concern) to 5 (demonstrably secure), reflecting the relative degree of risk to the species' viability, based on available information.

3.6.2.3 Threatened, Endangered, Candidate, and Proposed Species

Threatened, endangered, candidate, or proposed bird species may occupy habitat infrequently or seasonally within the analysis area. These species include:

- Interior Least Tern--*Sterna antillarum athalassos*** (Endangered)
- Whooping Crane--*Grus Americana*** (Endangered)
- Piping Plover --*Charadrius melodus*** (Threatened)
- Pallid Sturgeon-- *Scaphirhynchus albus*** (Endangered)
- Dakota Skipper Butterfly-- *Hesperia dacotae*** (Threatened)
- Spragues pipit--*Anthus spragueii*** (Candidate)
- Greater Sage Grouse – *Centrocercus urophasianus*** (Candidate)
- Northern Long Eared Bat – *Myotis septentrionalis*** (Proposed)
- Rufa Red Knot – *Calidris canutus rufa*** (Threatened)

The Black-footed Ferret (*Mustela nigripes*) and the Gray Wolf (*Canis lupis*) are not known to occur within the project area. Occasional sightings of wolves have been reported, but no documented home range has been identified.

3.6.2.3.1 Interior Least Tern

The interior least tern was listed as endangered in 1985. From mid-May to mid-August, interior least terns use sparsely vegetated sandbars or shoreline salt flats of lakes along the Missouri River system including Lake Sakakawea. They are not found on any other water body or waterway in North Dakota.

3.6.2.3.2 Whooping Crane

The whooping crane was listed as endangered in the United States in 1970 and in Canada in 1978. North Dakota lies directly in the middle of the major migratory path utilized by the remaining wild bird population. Sightings have been recorded in all the counties within western ND with the exception of McKenzie and Bowman counties. Palustrine wetland and cropland ponds are used during the migration for feeding and roosting. There has not been any recording nesting activity in North Dakota for more than 90 years. Recovery actions to protect and restore whooping cranes are outlined in the 2005 FWS Recovery Plan and can be found at: http://ecos.fws.gov/docs/recovery_plan/070604_v4.pdf

The majority of the parcels occur in the whooping crane migratory corridor through central and western North Dakota.

3.6.2.3.3 Piping Plover

Preferred habitat for the piping plover is generally characterized as exposed, sparsely vegetated shores and islands of shallow alkali lakes and impoundments. Salt-encrusted, alkali, or sub-saline semi-permanent lakes, ponds, and rivers with wide shorelines of gravel, sand, or pebbles are preferred.

The piping plover was listed as threatened in 1985. Critical habitat was designated in North Dakota in 2002 for the entire Lake Sakakawea boundary, the Missouri River as well as areas in Mountrail, Williams, Ward and Burke counties. The FWS estimated approximately 2,000 breeding pairs were located in North Dakota in 1993, compared to 11,000 breeding pairs in 1967 (<http://www.fws.gov/mountain-prairie/species/birds/pipingplover/>)

Critical habitats have been established in North Dakota for piping plovers (USFWS 2010e). Both Burke and Mountrail counties have designated critical habitats established, however none of the proposed lease parcels contain or are located near these habitats.

3.6.2.3.4 Pallid Sturgeon

The pallid sturgeon was listed as endangered in 1990. Pallid sturgeons are found in the upper reaches of the Missouri River in North Dakota near the confluence with the Yellowstone River and in the Yellowstone River proper. However, the confluence is continuous with Lake Sakakawea, and this species may be found throughout the entire system. The pallid sturgeon is adapted for living close to the bottom of large, silty rivers with swift currents. They prefer habitat consisting of sand flats and gravel bars.

3.6.2.3.5 Dakota Skipper Butterfly – Threatened Species

The Dakota skipper butterfly species may occupy habitat infrequently or seasonally within the analysis area, however, it is not known to occupy any nominated lease parcels. The following counties in the analysis area have recorded sightings: Burke, Dunn, McKenzie, and Mountrail.

The Dakota skipper can survive only in undisturbed, tall grass and mix-grass prairie. In the western part of North Dakota, the skipper can be found in ungrazed native pastures with little bluestem, needle-and-thread, and purple coneflower. Bluestem grass is a favorite food plant for the larval stage of the skipper. Dakota skippers rarely travel more than one-half mile in their entire lifetime.

3.6.2.3.6 Sprague's Pipit – Candidate Species

A 12 month finding for the Sprague's Pipit was published in the Federal Register by the Fish and Wildlife Service (USFWS) on September 15, 2010, warranting the listing of the Sprague's Pipit as a Federal protected species, but precluded the listing due to higher priority species. The species is currently on the candidate species list.

The Sprague's pipit is a relatively small (4–6 inches long and weighs 0.8-0.9 ounces) passerine endemic to the North American grasslands. It has a plain buff colored face with a large eye-ring. The Sprague's pipit is a ground nester that requires grassland habitats, preferably larger non-fragmented undisturbed habitat, at least 80 acres in size. It feeds mostly on insects, spiders, and some seeds.

Sprague's pipits are strongly tied to native prairie (land which has never been plowed) throughout their life cycle (Owens and Myres 1973, pp. 705, 708; Davis 2004, pp. 1138-1139; Dechant et al. 1998, pp. 1-2; Dieni et al. 2003, p. 31; McMaster et al. 2005, p. 219). They are rarely observed in cropland (Koper et al. 2009, p. 1987; Owens and Myres 1973, pp. 697, 707; Igl et al. 2008, pp. 280, 284) or land in the Conservation Reserve Program (a program whereby marginal farmland is planted primarily with grasses) (Higgins et al. 2002, pp. 46-47). Sprague's pipits will use nonnative planted grassland (Higgins et al. 2002, pp. 46-47; Dechant et al. 1998, p. 3; Dohms 2009, pp. 77-78, 88). Vegetation structure may be a better predictor of occurrence than vegetation composition (Davis 2004, pp. 1135, 1137).

Potential habitats for the Sprague's Pipit exist throughout western North Dakota. Potential suitable habitat exists for the Sprague's pipit across the entire lease area, and inventories have not been conducted within the parcels. Therefore, wildlife inventories would need to be conducted at APD stage of development to determine the presence or absence of Sprague's pipits.

3.6.2.3.7 Rufa Red Knot – Threatened

The **red knot** (*Calidris canutus*) is a medium sized shorebird which breeds in tundra and the Arctic. An adult red knot is the second largest *Calidris* sandpiper, measuring 23–26 cm (9.1–10.2 in) long with a 47–53 cm (19–21 in) wingspan. The body shape is typical for the genus, with a small head and eyes, a short neck and a slightly tapering bill that is no longer than its head. It has short dark legs and a medium thin dark bill. Their diet varies according to season; arthropods and larvae are the preferred food items at the breeding grounds, while various hard-shelled mollusks are consumed at other feeding sites at other times.

One of the longest distance migrants in the animal kingdom, some rufa red knots fly more than 18,000 miles each year between breeding grounds in the Canadian Arctic and wintering grounds along the Gulf Coast, southeast United States and South America.

3.6.2.3.8 Long Eared Bat – Proposed

On October 2, 2013, the USFWS proposed the northern long-eared bat for listing as endangered under the ESA (USFWS 2013b).

The northern long-eared bat is a medium-sized bat about 3 to 3.7 inches but with a wingspan of 9 to 10 inches. Its fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*, which are actually bats noted for their small ears (*Myotis* means mouse-eared). Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation.

Most records of northern long-eared bats are from winter hibernacula surveys, with more than 780 hibernacula identified within the United States. No known hibernacula are located in North Dakota, due to either no suitable hibernacula present or a lack of survey effort (USFWS 2013d).

Northern long-eared bats are not known to occur in the project area; however, there are documented occurrences near Killdeer, North Dakota. Areas of the Hells Creek Formation could provide cave-like cracks and crevices that potentially could provide suitable winter hibernacula.

3.7 Fish and Wildlife

A diversity of wildlife habitat, topography, and vegetation types exists across the analysis area. This diversity across western North Dakota and the analysis area provides habitat for many wildlife species in addition to those previously mentioned.

Current and historic land uses across the lease parcels include grazing, farming, hunting, energy development, and others. Consequently, some areas contain large contiguous blocks of well-functioning habitats, while other areas are composed of small, fragmented patches of native habitats. In some areas, existing anthropogenic disturbance at some frequency has been attributed to reducing habitat suitability for some species of wildlife intolerant to human activities.

Wildlife species and habitat surveys have been conducted throughout the analysis area at various times and for various species. The entire area has not been comprehensively surveyed for all wildlife resources; however, a combination of past surveys provides insight into what species have been documented, and what other species are expected within those habitat types.

Big game species in the analysis area include mule deer, white-tailed deer, pronghorn antelope, Bighorn sheep and elk.

White-tailed deer are the most abundant big game species and use the greatest variety of habitats, generally preferring riparian corridors, along creeks and rivers, as well as woody draws and grasslands (NDGF web site). Habitat diversity appears to be a good indicator of intensity of deer use. In mule deer habitats, diversity of vegetation usually followed topographic diversity; thus, rugged topography may be the ultimate factor influencing mule deer use of an area (Mackie et. al, 1998).

Winter range is often part of year-round habitat in western North Dakota for Mule Deer. Winter ranges are typically in areas of rougher topography and are often dominated by shrub species that provide crucial browse during winter months. Escape and thermal cover are also important for maintenance and survival. Thick stands of ponderosa pine and juniper are examples of important escapes and thermal cover used by mule deer in the analysis area while woody draws, shelterbelts and farmsteads provide winter cover for white-tailed deer.

Pronghorn antelope are sparsely distributed across the analysis area with Bowman County being the core area. They are generally associated with grasslands and shrublands, but they will also use agricultural fields. Winter ranges for pronghorn antelope generally occur within sagebrush grasslands with at least greater densities of big sagebrush than the surrounding areas.

Elk are primarily associated with the timbered portion of the breaks and the riparian bottoms along the river corridors. The riparian areas are used in conjunction with the upland areas for forage and security purposes. The riparian bottoms become increasingly important during the drought periods when upland reservoirs become dry.

The potential for big game movements or migrations through western North Dakota are not fully understood. At a local level, it is reasonable to assume big game movements occur at least seasonally. Migration corridors have not been identified through any of the lease parcels.

The analysis area provides habitat for sharp-tailed grouse, turkeys, Hungarian partridge, and pheasants.

In addition to sage grouse, sharp-tailed grouse are the other native prairie grouse species in the analysis area. Sharp-tailed grouse generally prefer hardwood draws, riparian areas, and prairie grasslands intermixed with shrubs such as chokecherry and buffaloberry. NDGF survey data on sharp-tailed grouse leks are sporadic throughout much of the study area. No known sharp-tailed grouse leks are located on the existing lease parcels.

Wild turkeys, pheasants, and Hungarian partridge are all species that have been introduced to western North Dakota and would be expected to utilize available habitats within some of the lease parcels.

3.7.1 Waterfowl

A portion of the lease parcels are north of the Missouri River and fall within the Prairie Pothole Region of North Dakota. Statewide, this region encompasses nearly 37,000 square miles and is one of the most important waterfowl-producing areas within North America. Region wide, more

than half of all the annual duck production in North America occurs within the entire 300,000 square miles of prairie potholes.

From the mid-1950s to the mid-1970s, approximately 458,000 acres per year of wetland habitat was lost to agriculture and drainage within the Prairie Pothole Region. This loss has increased the importance of wetland habitat, even though the study area makes up less than 1/10 percent of the pothole region in North America. While natural wetlands are crucial for waterfowl nesting, reservoirs become increasingly important during the dry years. Often, they are the only water sources for waterfowl during extended drought periods.

Most species of North American waterfowl have been found nesting within the study area, and many of these species are common migrants. Common nesters found here include but not limited to: mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), gadwall (*Anas strepera*), blue-winged teal (*Anas discors*), and northern shoveler (*Anas clypeata*).

The North American Waterfowl Management Plan was developed in 1988 because of the decline of waterfowl production in the United States and Canada (FWS, August 15, 2007; http://library.fws.gov/Bird_Publications/nawmp_98.pdf). The plan has been divided into various localized “Joint Ventures” such as the Prairie Pothole Joint Venture and the Great Plains Joint Venture, which encompass the entire study area. Joint venture projects not only benefit waterfowl but also provide needed habitat for various guilds of resident and migratory birds.

3.8 Cultural Resources

The Bureau of Land Management is responsible for identifying, protecting, managing, and enhancing cultural resources located on public lands, or that may be affected by BLM undertakings on non-Federal lands, in accordance with the National Historic Preservation Act (NHPA) of 1966, as amended. The procedures for compliance with the NHPA are outlined in regulation under 36 CFR 800. Cultural resources are defined as districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture (36 CFR 60.1). Cultural resources also refer to artifacts, records, remains, and properties of traditional religious and cultural importance to an Indian tribe (36 CFR 800.16(l)(1)).

Cultural resources are evaluated with reference to their eligibility for listing on the National Register of Historic Places (NRHP). Each resource is considered on a case-by-case basis. Common prehistoric resource types in North Dakota include stone circles, stone cairns, rock art, lithic artifacts, pottery remains, earthlodge villages, rock alignments, bone concentrations, eagle-trapping pits, and lithic procurement areas. Common historic site types in North Dakota are material remains of human life or activities over 50 years in age including homesteads, farmsteads, dumps, schools, churches, roads, railroad grades, trails, trading posts, and military forts.

To identify all known cultural resources and historic properties located within the nominated lease parcels, a BLM cultural resource specialist reviewed maps and records obtained from the North Dakota State Historical Society. The data review included all previously recorded cultural resources within the immediate vicinity of the nominated lease parcels. Additional cultural resource information was reviewed for the general area in the North Dakota RMP/EIS

and the North Dakota Statewide Comprehensive Historic Preservation Plan. To gather information on resources that may be of religious and cultural significance to Indian tribes, the North Dakota Field Office requested cultural information from the Tribal Historic Preservation Offices of six federally recognized Indian tribes in North Dakota, Montana, and Minnesota. Sections 3.8.1 and 3.8.2 summarize the results of the literature review.

3.8.1. Previous Cultural Resource Surveys in Lease Parcels

The previous surveys conducted within the proposed lease parcels consisted of linear surveys with narrow corridors such as water, gas and oil pipelines. The completed projects which occurred within the nominated lease parcels did not inventory the majority of the ground surface. Of the eight lease parcels reviewed for Alternative B and the seven lease parcels reviewed for Alternative C, approximately nine acres of lease parcel NDM-97300-4H and approximately four acres of lease parcel NDM-97300-6L were previously inventoried. Based on the maps obtained from the State Historic Preservation Office of North Dakota, less than two percent of the lease parcels have adequate cultural resource inventory.

3.8.2. Cultural Resource Types and Numbers inside Lease Parcels

Eight of the nine parcels are located on private surface with federal minerals. Lease Parcel NDM-97300-7K is located on lands managed by Bureau of Land Management. No known cultural, scientific, or historic resources lie within parcels NDM-97300-4V, NDM97300-4H, NDM-97300-6J, NDM-97300-6L, NDM-97300-6M, NDM-97300-7A, or NDM-97300-7B. Seven cultural resource sites, four isolated finds, and six site leads lie within a mile of parcels NDM-97300-4V, NDM97300-4H, NDM-97300-6L, and NDM-97300-6M, NDM-97300-7A. An isolated find refers to a location with four or fewer artifacts. Site leads refer to cultural resource locations reported by non-professionals or areas suspected of containing subsurface deposits. The following table summarizes the National Register status for all known cultural resources lying within a mile of parcels NDM-97300-4V, NDM97300-4H, NDM-97300-6L, NDM-97300-6M, and NDM-97300-7A.

Cultural Resources within a Mile of the Nominated Parcels			
<i>Parcel</i>	<i>SITS#</i>	<i>Type</i>	<i>Eligibility</i>
NDM-97300-4V	32MNx379	Site Lead	NA
NDM97300-4H	32DV56	Site	Unevaluated
	32DV137	Site	Unevaluated
	32DV139	Site	Unevaluated
NDM97300-6L	32GV77	Site	Unevaluated
	32GV283	Site	Unevaluated
NDM-97300-6M	32GV99	Site	Unevaluated
	32GV300	Site	Unevaluated
	32GVx218	Isolated Find	Not Eligible
	32GVx237	Isolated Find	Not Eligible

	32GVx236	Isolated Find	Not Eligible
	32GVx272	Isolated Find	Not Eligible
NDM-97300-7A	32BKx844	Site Lead	NA
	32BKx845	Site Lead	NA
	32BKx846	Site Lead	NA
	32BKx847	Site Lead	NA
	32BKx892	Site Lead	NA

Lease Parcel NDM-97300-7K: Lease Parcel NDM-97300-7K is located on the Lewis and Clark National Historic Trail. The 49.36 acre parcel is split with a small portion located on a Missouri River sandbar island and the rest along the river banks extending into the river. The visitor retracement route of the Trail is in the modern river (water trail) and the center line of the historic route is only 0.1 of a mile south of the nominated parcel. No other known cultural, scientific, or historic resources are located within parcel NDM-97300-7K, but the parcel is located within the viewshed of three historic properties: The Lewis and Clark Historic Trail, Fort Buford State Historic Site, and the Buford-Trenton Irrigation District. In addition, cultural resource sites 32MZ1698 and 32MZ1700 are located within a mile of the nominated lease parcel.

3.9 Native American Religious Concerns

The BLM’s management of Native American Religious concerns is guided through Manual 8120: *Tribal Consultation Under Cultural Resources Authorities* and Handbook 8120-1: *Guidelines for Conducting Tribal Consultation*. Further guidance for consideration of fluid minerals leasing is contained in BLM Washington Office Instruction Memorandum 2005-003: *Cultural Resources, Tribal Consultation, and Fluid Mineral Leasing*. The 2005 memo notes leasing is considered an undertaking as defined in the National Historic Preservation Act. Generally areas of concern to Native Americans are referred to as “Traditional Cultural Properties” (TCPs) which are defined as cultural properties eligible for the National Register of Historic Places because of its association with cultural practices or beliefs that (a) are rooted in that community’s history and (b) are important in maintaining the continuing cultural identity of the community.

Lease Parcel NDM-97300-7K is located along the banks of the Missouri River. The Mandan, Hidatsa, and Arikara Nation attach religious and cultural significance to the Missouri River (Murray et al 2011). When Indian tribes and Native Hawaiian organizations attach religious and cultural significance to historic properties off tribal lands, section 101(d)(6)(B) of the NHPA “requires Federal agencies to consult with such Indian tribes and Native Hawaiian organizations in the section 106 process” (36 CFR 800.2(c)(ii)(D)).

The NDFO consulted with six federally recognized Indian tribes regarding the sale of the nominated lease parcels. The NDFO sent maps, consultation letters, and cultural resource data to the Tribal Historic Preservation Officer and Chairperson of the Spirit Lake Sioux Tribe, the Standing Rock Sioux Tribe, the Turtle Mountain Band of Chippewa, the Lower Sioux Indian Community, the Northern Cheyenne Tribe, and the Mandan, Hidatsa, and Arikara Nation on

November 21, 2014. To date, the Tribal Nations have not expressed concern.

3.10 Paleontology

According to Section 6301 of the Paleontological Resource Protection Act of 2009 Omnibus Public Lands Bill, Subtitle D, SEC. 6301, paleontological resources are defined as “any fossilized remains, traces, or imprints of organisms, preserved in or on the earth’s crust, that are of paleontological interest and that provide information about the history of life on earth” (Paleontological Resource Protection Act of 2009 Omnibus Lands Bill, Subtitle D, SEC. 6301-3612 (P.L. 59-209; 34 Stat. 225; 16 U.S.C. 431-433). Paleontological resources contain crucial evidence to unravel the history of life on Earth, and so therefore are valued scientific resources. Paleontological resources do not include archaeological and cultural resources.

The BLM utilizes the Potential Fossil Yield Classification (PFYC) as a planning tool for identifying areas with high potential to yield significant fossils. The system consists of numbers ranging from 1 to 5 (low to high) assigned to geological units, with 1 being low potential and 5 being high potential to have significant fossil resources. It should be pointed out that the potential to yield significant fossil resources is never 0. Rock units not typically fossiliferous can in fact contain fossils in unique circumstances.

Table 3.10.1 Potential Fossil Yield Classification (PFYC) Description

PFYC Class	Potential	Description
Class 1	Very Low	Igneous and metamorphic geologic units, or very old deposits not likely to contain recognizable fossils.
Class 2	Low	Geologic units not likely to contain vertebrate fossils or scientifically non-vertebrate fossils such as very young sedimentary deposits.
Class 3	Moderate	Fossiliferous sedimentary geologic units- content varies in significance, abundance and predictable occurrence. Includes some units of unknown potential that should be reviewed.
Class 4	High	Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability.
Class 5	Very High	Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils.

BLM classified geologic formations that have a high Potential Fossil Yield Classification (PFYC) of 3 or higher should be specifically reviewed for paleontological resources. The NDFO has the following classifications on the relevant geologic units:

- Oahe Class 2
- Coleharbor Class 3
- Ludlow Class 4
- Bullion Creek Class 4

All or part of 7 of the 8 parcels include geologic units rated as PFYC 3-5. One parcel did not include units that are rated higher than 3, however, there is still a potential in those parcels for fossils. For example, Quaternary terraces can preserve the remains of Ice Age fauna. So, any discovery of fossils in these deposits would be significant, and should be mitigated appropriately.

One parcel (NDM 97300-7K) did not include geologic units rated as PFYC 3-5, so no prior assessment for paleontological resources is required on that parcel. However, prior to surface disturbance there should be an approved Unanticipated Resource Recovery Plan for fossils.

The 7 parcels that include geologic units with a PFYC of 3 or higher are: NDM 97300-7A; NDM 97300-7B; NDM 97300-4V; NDM 97300-4H; NDM 97300-6L; NDM 97300-6M; and NDM 97300-6J.

3.11 Visual Resources

The Federal Land Policy and Management Act requires that the BLM consider the scenic values of public land as a resource that merits management and preservation, as determined through the land use planning process. In response to this mandate, the BLM developed the Visual Resource Management (VRM) System, with the primary objective of managing public land in a manner that will protect the quality of scenic (visual) values (Information Bulletin No. 98-135). The VRM System provides guidance relating to the Visual Resource Inventory Process that the BLM implements to inventory scenic values (BLM Handbook 8410-1), as well as assess the potential effects of proposed actions based on the analysis of visual contrast (BLM Handbook 8431-1). Handbook 8410-1 also provides guidance regarding VRM classes, which set management objectives for BLM-administered land.

Primary factors considered for the inventory of scenic values are scenic quality, sensitivity level rating units, and distance zones (DZ), collectively referred to as the “VRI”. These three factors are combined to develop Visual Resource Inventory (VRI) classes, which represent the scenic values of BLM-managed land. The management of inventoried scenic values is evaluated during the land use planning process and VRM classes (I-IV) are assigned to all BLM administered lands.

The assignment of VRM classes is based on the consideration of: (1) inventoried scenic values (i.e., the VRI and VRI classes), (2) other land use and resource allocations within a given field office or management unit, and (3) public needs and national priorities for federal land. VRM assignments are land use plan decisions that guide future land management actions. It is important to note that VRM class assignments do not have to be consistent with inventoried scenic values (i.e., VRI classes) and should reflect a balance between the protection of visual values and other uses of BLM land to meet public demand or national priorities.

VRM classifications are only applied to BLM surface, as such; the affected environment for visual resources consists of approximately 49.36 acres of BLM-administered surface in the analysis area.

A Class II VRM area classification means that the character of the landscape has unique combinations of visual features such as land, vegetation, and water. The existing character of the landscape should be retained. Activities or modifications of the environment should not be evident or attract the attention of the casual observer. Changes caused by management activities must repeat the basic element of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

A Class III VRM area classification means the level of change to the character of the landscape should be moderate. Changes caused by management activities should not dominate the view of the casual observer and should not detract from the existing landscape features. Any changes made should repeat the basic elements found in the natural landscape such as form, line, color and texture.

A Class IV VRM area classification means that the characteristic landscape can provide for major modification of the landscape. The level of change in the basic landscape can be high. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

The NDFO does not currently have Visual Resource Classifications established for any lands found within the analysis area.

3.12 Recreation and Travel Management

The BLM only manages recreational opportunities and experiences on BLM-administered surface. The affected environment consists of approximately 49.36 acres of BLM-administered surface. Recreational activities enjoyed by the public on BLM lands within the analysis area may include hunting, hiking, camping, fishing, photography, picnicking, and winter activities such as snowshoeing and snowmobiling. Benefits and experiences enjoyed by recreational users include opportunities for solitude, spending time with families, enhancing leisure time, improving sports skills, enjoying nature and physical exercise.

The approximately 49.36 BLM-administered acres proposed for lease consist of small and scattered tracts with limited legal public access (i.e., no public easements or rights-of-way across private property). The types of limited public use on these lease parcels can be characterized as casual dispersed recreational activities including hiking, hunting, camping, and wildlife viewing. The lack of public access limits use of the BLM parcels for recreational use by the general public.

The general public will follow policy of no cross country travel off existing roads per the June 2003 Record of Decision: Off-Highway Vehicle Environmental Impact Statement and Proposed Plan Amendment for Montana, North Dakota and South Dakota.

3.13 Lands and Realty

The analysis area consists of 8 parcels that include 1,164.26 surveyed surface acres of which 49.36 surveyed acres are BLM administered surface and 1,114.9 surveyed acres are Non-Federal surface (private). Table 3.13.1 below categorizes the 8 parcels by surface ownership and county.

Currently, there is no biomass, geothermal, solar power, or wind projects within the study area of the aforementioned parcel. None of the parcels have authorized BLM Rights-of Way (ROWs) approved on BLM administered surface.

Table 3.13.1 Number of parcels, surface ownership, and acres by county.

County	Parcels	Owner-ship	Acres
Bowman			
	1 parcel (NDM 97300-6J)	Non-Federal	40.02
	1 TOTAL		40.02
Burke			
	2 parcels (NDM 97300-7A and NDM 97300-7B)	Non-Federal	474.88
	2 TOTAL		474.88
Divide			
	1 parcel (NDM 97300-4H)	Non-Federal	160
	1 TOTAL		160
Golden Valley			
	2 parcels (NDM 97300-6L and NDM 97300-6M)	Non-Federal	280
	2 TOTAL		280
Williams			
	1 parcel (NDM 97300-7K)	BLM	49.36
	1 parcel (NDM 97300-4V)	Non-Federal	160
	2 TOTAL		209.36

3.14 Fluid Minerals

It is the policy of the BLM to make mineral resources available for disposal and to encourage development of these resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable prices. At the same time, the BLM strives to assure that mineral development occurs in a manner which minimizes environmental damage and provides for the reclamation of the lands affected.

Federal Oil and Gas Lease Information and Federal, State and Private Oil and Gas Development Activity within the External Boundaries of the NDFO

The USFS manages large areas of land within the boundaries of the NDFO that contain federal oil and gas lease acreage. Currently, there are 2,124 federal oil and gas leases covering approximately 1,034,149 acres in the State of North Dakota. Existing production activity holds approximately 55 percent of this lease acreage (1,206 leases; total of 570,523 acres). Approximately 78 percent of this federal oil and gas lease acreage is within the boundaries of the USFS Little Missouri National Grasslands (1,276 leases; 804,316 acres).

Information regarding the numbers and status of wells on federal, private/State, and Indian lands within the external boundary of the NDFO is displayed in Table 3.14.1. Numbers of townships, lease acres within those townships, and development activity for all jurisdictions are summarized in Table 3.14.2.

Exploration and development activities would only occur after a lease is issued and the appropriate permit is approved. Exploration and development proposals would require completion of a separate environmental document to analyze specific proposals and site-specific resource concerns before BLM approved the appropriate permit.

Table 3.14.1 Existing Development Activity

	FEDERAL WELLS	PRIVATE AND STATE WELLS	INDIAN WELLS
Drilling Well(s)	261	379	183
Producing Gas Well(s)	94	92	2
Producing Oil Well(s)	1259	8132	758
Water Injection Well(s)	197	779	0
Shut-in Well(s)	144	85	6
Temporarily Abandoned Well(s)	65	324	4

Table 3.14.2 Oil and Gas Leasing and Existing Development within Townships Containing Lease Parcels

	Bowman	Burke	Divide	Golden Valley	Williams
Townships	T131N R105W	T163N R93W T164N R93W	T163N R102W	T144N R103W	T152N R104W T156N R95W
Number of Townships Containing Lease Parcels	1	2	1	1	2
Total Acres Within Applicable Township(s)	22,937	27,705	23,039	23,337	44,904
Total Acres of Federal O&G In Township(s)	3,103	475 gross 237 net	594	4,397	1,596
Total Federal Acreage (Percent of Township(s))	13.5%	1.7%	2.6%	18.8%	3.5%
Current Federal O&G Acres Leased In Township(s)	3,063	0	157	4,120	1,155
Total Acres of Leased O&G (Percent of Township(s))	13.4%	0%	0.68%	17.7%	2.6%
Proposed Acres To Be Leased	40	475 gross 237 net	160 gross 80 net	280	209 gross 129 net
Percent of Township(s) / Percent of Federal	0.2% / 1.3%	0.86% / 100%	0.34% / 13.5%	1.2% / 6.4%	0.29% / 8%
Acres Leased Federal O&G Minerals	0	0	0	0	0

Suspended					
Percent of Township(s)	0%	0%	0%	0%	0%
Total Acres In County	746,994	724,435	829,462	641,357	1,373,536
Total Federal O&G In County	59,076	15,562	9,888	106,117	23,451
Federal Percent Per County	7.9%	2.1%	1.2%	16.5%	1.7%
Tract Percent of County	0.005%	0.033%	0.01%	0.044%	0.009%
Tract Percent of Federal O&G In County	0.068%	1.5%	0.81%	0.26%	0.55%

Table 3.14.3 Oil and Gas Leasing and Existing Development Abbreviations Key

Acronym	Description
OIL	All wells which produce oil.
GAS	All wells which produce gas.
INJ	All disposal wells plus all injection wells.
TA	Temporarily Abandoned wells
WSW	Water Supply Wells

3.15 Social Conditions and Environmental Justice

Currently oil and gas leasing and production are taking place on public and private lands within or around these five counties. Interest in oil and gas development in this region has significantly increased over the last five years because of its proximity to the Bakken formation which extends from the Williston Basin in western North Dakota to northeastern Montana. The parcels proposed for leasing or deferment are in Bowman, Burke, Divide, Golden Valley, and Williams counties in North Dakota. Social conditions will focus on these five counties since they are in the immediate vicinity of the parcels proposed for leasing.

3.15.1 Population and Demographics

Population and demographic changes are instrumental to understanding a community, since they may drive many of the other community changes brought upon by federal resource management actions. Demographic changes such as large age cohort sizes or residential mobility can affect the local institutions and social context (Burdge 1983; Finsterbusch 1980). A community with an older cohort age (say 65 and older) may need different community services available to meet the ‘senior’ market. Population changes due to in- or out-migration can affect local community ties and social relationships. A federal management action that affects local communities’ populations or demographics can have impacts that ripple throughout the social and economic contexts. For example, an action that can bring in a large workforce can have immediate impacts upon the housing availability, school enrollment, employment changes and income; and the magnitude of these impacts are often dependent upon changing community population and demographics. Understanding the past and current trends occurring in a community provides a baseline for future impact analyses.

This five county region had an estimated 2013 population of 39,252 residents with 75% of the population located in Williams County which had a population of 29,595 residents (Table 3.15.1.1). The other four counties had populations ranging from 1,823 residents (Golden Valley

County) to 3,214 residents (Bowman County). All five counties saw an increase in population from Census 2010 to the 2013 estimate, with the largest percent change occurring in Williams County (32.1%). Bowman County saw the lowest percent increase at two percent from Census 2010 to the 2013 estimate. The population estimates are of residents which means that many individuals associated with a transient workforce are likely not counted.

Table 3.15.1.1: Census and Population Estimates, Census 2010-2013 Estimate.

Geography	April 1, 2010	Population Estimate (as of July 1)				Total Percent Change
	Census 2010	2010	2011	2012	2013	Census 2010-2013 Estimate
North Dakota	672,591	674,344	684,867	701,345	723,393	7.6%
Bowman County	3,151	3,139	3,135	3,214	3,214	2.0%
Burke County	1,968	1,965	2,060	2,178	2,306	17.2%
Divide County	2,071	2,073	2,135	2,234	2,314	11.7%
Golden Valley County	1,680	1,679	1,745	1,802	1,823	8.5%
Williams County	22,398	22,574	24,388	26,744	29,595	32.1%

Source: U.S. Census Bureau, Population Division, 2014. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2013.

Domestic in-migration was the largest factor for the increase in population for all of the counties in the 4-county impact area as well as for North Dakota as a whole. Table 3.15.1.2 shows that Williams County saw the largest in-migration of residents from Census 2010 to the 2013 estimate. Bowman County saw a natural decrease in population (more deaths than births), but still had a positive total population change indicating that in-migration was the dominant cause for that population increase. In rural communities, large in-migration can be a concern in terms of infrastructure and public service needs, housing availability, and community relationships.

Table 3.15.1.2 Cumulative Estimates of the Components of Population Change, Census 2010-2013 Estimate

Geography	Cumulative Estimates of the Components of Population Change						
	Census 2010, April 1, to July 1, 2013 Estimate						
	Total Population Change ¹	Natural Increase	Vital Events		Net Migration		
			Births	Deaths	Total	International ²	Domestic
North Dakota	50,802	12,271	31,187	18,916	38,223	3,602	34,621
Bowman County	63	-13	136	149	98	3	95
Burke County	338	35	97	62	297	0	297
Divide County	243	3	76	73	249	13	236
Golden Valley County	143	16	63	47	143	0	143
Williams County	7,197	646	1,359	713	6,518	-12	6,530

Source: U.S. Census Bureau, Population Division, 2014. Estimates of the Components of Resident Population Change, April 1, 2010 to July 1, 2013.

¹Total population change includes a residual. This residual represents the change in population that cannot be attributed to any specific demographic component. See Population Estimates Terms and Definitions at <http://www.census.gov/popest/about/terms.html>.

² Net international migration for the United States includes the international migration of both native and foreign-born populations. See Population Estimates Terms and Definitions at <http://www.census.gov/popest/about/terms.html>.

Changes in population can influence the age and sex structure of the communities. Table 3.15.1.3 provides information from Census 2010 and the 2013 estimate. The sex structure has remained relatively the same for those years, likely because of the small timeframe. In terms of median age, across the impact counties the trend was a decrease in age, which was also the case for the State of North Dakota as well. This downward trend could be the result of in-migration of a younger population which would be consistent with increasing energy development. These estimates are for residents and do not necessarily include the population of a transient workforce.

Table 3.15.1.3 Census 2010 and 2013 Estimates of Sex (in Percentage of Population) and Median Age

	Census April 1, 2010		Estimate, July 1, 2013		Median Age	
	Male	Female	Male	Female	Census 2010, April 1	2013 Estimate, July 1
North Dakota	50.5%	49.5%	51.1%	48.9%	37	35.3
Bowman County	50.1%	49.9%	51.3%	48.7%	46.9	43.0
Burke County	52.6%	47.4%	53.2%	46.8%	48.1	42.2
Divide County	51.2%	48.8%	52.1%	47.9%	51.4	48.3
Golden Valley County	49.5%	50.5%	50.5%	49.5%	45.9	42.6
Williams County	51.6%	48.4%	53.9%	46.1%	39	33.1

Source: U.S. Census Bureau, Population Division, 2014. Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States, Counties, and Puerto Rico Commonwealth and Municipalities: April 1, 2010 to July 1, 2013

3.15.2 Quality of Life

Quality of Life (QOL) is an integral aspect of understanding a community and its people. The components of this outline help to provide a basis for which QOL can be discussed. QOL is what brings pleasure and happiness to life-it can include “feeling a part of the community where you live; knowing where you stand in relationship to other people; having a sense that you and people in your community have control over the decisions that affect your future;...living without undue fear of crime or personal attack...” (Branch et al. 1982). The components of QOL can differ amongst individuals, however generally many components relate to income, employment and job satisfaction, affordable housing, health, food, culture, leisure, and amenities. Understanding these components can then help provide a sense of the QOL available in the impact area.

Farming and ranching has been and continues to be a long-standing influence on local business, culture, and social activities in the area. In 2012 there were a total of 2,297 farms across the 5 county impact area with over 3.5 million acres of land in farms (NASS 2014). In 2013 across North Dakota counties, Williams County ranked first and Burke County ranked fifth for durum

wheat production while Bowman County ranked fourth and Golden Valley ranked seventh in sheep and lambs (NASS 2014). This information helps highlight the agricultural nature of the five counties.

However, the general quality of life for long-time residents is changing in many of the communities in the impact area. A 2011 study highlights several of the changes that have been seen across the Bakken oil counties and the impacts to quality of life (Bohnenkamp et. al., 2011). For example, the study highlights that the familiarity of residents with other residents and the safety often felt in small rural communities has shifted to in-migration of new people and safety concerns resulting from not knowing these people. There has also been an increasing division being seen between the “haves” and the “have-nots” including between long-time residents and a general increase in the cost of living. Additionally, housing availability is very limited and this causes housing prices to be high compared to similar rural areas in North Dakota and Montana outside the influence of the Bakken oil boom. Many people live in man camps (similar to college dormitories), commute relatively long distances to work, or live in what otherwise may be considered substandard housing. The study also highlights concerns over housing prices and values increasing and the changing of the population. While there is an in-migration of people for oil field jobs, there has also been an out-migration of long-time residents due to not being able to afford the rising housing costs (Bohnenkamp et. al., 2011).

Within the five counties, the 2009-2015 5-year American Community Survey data provides information on housing, including the percent of housing units occupied and vacant. In areas where increases in population may rapidly occur, knowing the availability of housing is important since supply may not meet the demand. This data indicates that within the five county area, Burke, Divide and Golden Valley counties all had over twenty percent of all housing units as vacant (U.S. Census 2014a). However, these three counties had the lowest rental vacancy rates, ranging from 0 to 0.9 (U.S. Census 2014a) meaning that are very few vacant housing units available to rent. The high percentages of vacant housing units in these three counties are driven by vacant units used for seasonal, recreational or occasional use and for vacant units classified as “other vacant”¹ (U.S. Census 2014b).

The current oil boom in North Dakota associated with oil and gas exploration, development, and production from the Bakken formation limits housing availability, increases traffic, increases pressure on existing infrastructure, and generally affects the quality of life for long-time residents as well as new residents attracted to the area by the oil boom.

Traffic associated with the Bakken oil boom is currently an issue. Increased truck traffic hauling heavy equipment, fracking fluids, and water as well as increased traffic associated with oil workers and increased populations cause more traffic congestion, increase commuting times, and affect public safety.

The Bakken boom has also increased infrastructure pressure. Demand for better roads, upgrades to waste water treatment, increased police protection, more hospital and school services, and

¹ “Other vacant” is a vacant housing unit that does not fall into any of the following categories: for rent; rented, not occupied; for sale only; sold, not occupied; for seasonal, recreational, or occasional use; or, for migrant workers (U.S. Census 2014c).

other public services is apparent in many communities.

3.15.3 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, states “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations...” (Executive Order 12989).

Minority populations as defined by Council on Environmental Quality (CEQ) guidance under the National Environmental Policy Act (CEQ 1997) include individuals in the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified where “(a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater...” (CEQ 1997). Additionally, “[a] minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds” (CEQ 1997). Low-income populations are determined by the U.S. Census Bureau based upon poverty thresholds developed every year.

U.S. Census data is used to determine whether the populations residing in the study area constitute an “environmental justice population” through meeting either of the following criteria:

- At least one-half of the population is of minority or low-income status; or
- The percentage of population that is of minority or low-income status is at least 10 percentage points higher than for the entire State of North Dakota.

CEQ guidance does not provide specific criteria for determining low-income populations as it does for minority populations so for this planning effort we will use the criteria for minority populations, which are discussed above, as the criteria for low-income populations. We identify low-income and minority population percentages that are “meaningfully greater” as at least 10 percentage points higher than for the entire State of North Dakota.

Data for the identification of low-income is from the U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE). The SAIPE program produces yearly single year poverty estimates for states, counties, and school districts and is considered the most accurate for these geographic scales, especially for areas with populations of 65,000 or less (U.S. Census 2014d). Minority populations are identified using the U.S. Census Population Estimates program which provides estimates for the resident population by age, sex, race, and Hispanic origin at the national, state and county scales. Estimates from SAIPE and the Population Estimates program are used in federal funding allocations.

Based upon the data provided by Table 3.15.3.1 and Table 3.15.3.2, none of the five counties have been identified as having environmental justice populations per the criteria discussed above.

Table 3.15.3.1. Race, Hispanic and Total Minority Percentages, 2013 Estimates

	Race Alone					Two or More Races	Hispanic	Total Minority Population ¹
	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander			
North Dakota	89.6%	1.8%	5.4%	1.2%	0.1%	1.9%	2.9%	12.7%
Bowman County	96.5%	0.3%	2.1%	0.2%	0.0%	0.8%	4.6%	6.7%
Burke County	96.4%	0.7%	1.0%	0.7%	0.0%	1.3%	2.7%	6.1%
Divide County	96.9%	0.6%	0.6%	0.7%	0.0%	1.2%	3.1%	6.0%
Golden Valley County	97.4%	0.7%	0.8%	0.2%	0.1%	0.8%	2.8%	5.0%
Williams County	91.3%	1.3%	3.8%	0.8%	0.1%	2.8%	4.4%	12.5%

Source: U.S. Census Bureau, Population Division, 2014. Table PEPSR6H Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States, States, and Counties: April 1, 2010 to July 1, 2013

¹For the purposes of this EA, the term "total minority population" refers to the part of the total population which is not classified by the race/ethnicity category Non-Hispanic White Alone by the U.S. Census Bureau. This definition is most inclusive of populations that may be considered as a minority population under EO 12898.

Table 3.15.3.2. Poverty Percentages for All Ages, 2013 Estimates

	Poverty Percent
North Dakota	11.6
Bowman County	8.0
Burke County	9.5
Divide County	9.0
Golden Valley County	11.7
Williams County	7.8

3.16 Economics

3.16.1 Introduction

There are characteristics of North Dakota counties leasing land for oil and gas exploration and development which define and influence the relationship between BLM-administered lands and social and economic activity within the region. These characteristics may include local populations, the presence and proximity of cities or regional business centers, longstanding industries, infrastructure, predominant land and water features, and amenities unique to the area. In order to accurately portray the relationship of current BLM management, and examine the social and economic effects of leasing new parcels for fluid minerals exploration and development, the geographic scope of the analysis was defined by a nine county impact area. This impact area includes five North Dakota counties which contain parcels currently nominated for oil and gas leasing: Bowman, Burke, Divide, Golden Valley, and Williams counties. Four additional counties (Billings, McKenzie, Slope, and Stark) were also included in the economic area of influence because of trade flows, population bases, and business centers serving the counties with lease parcels. Although the distribution of effects stemming from additional fluid minerals leasing are likely to vary across the impact area, the distribution of economic effects

stemming from the sale of additional lease will be based on the number of acres leased, levels of production, and the business patterns of these counties.

3.16.2 Affected Environment

Western North Dakota has experienced tremendous growth over the last decade as oil development of the Bakken formation has intensified. In 2012, the 9-county analysis area was reported to have a population of 72,523 people and 32,876 households. Major population and business centers include Williston (the epicenter of North Dakota's recent oil boom, in addition to being the county seat for Williams County and the state's largest business center in the Northwest), and Dickinson (in Stark County) (IMPLAN 2012).

According to IMPLAN's 2012 model, the 9-county local economy surrounding areas nominated for additional federal mineral leasing supported 83,297 local jobs in 179 industrial sectors. Total local personal income (including non-labor income) exceeded \$6 billion, and the average household income was \$191,594 (IMPLAN 2012). The largest employing industries in the analysis area include Support activities for oil and gas operations (sector 29), Transportation by truck (sector 335), Wholesale Trade (sector 319), drilling oil and gas wells (sector 28), grain farming (sector 2), and Food services and drinking places (sector 413). Combined, these sectors support more than 40% of total regional employment (IMPLAN 2012).

3.16.3 Nature of the Oil and Gas Industry in North Dakota

North Dakota is the 2nd largest oil producing state in the U. S, producing more than 242 million barrels (bbls) of oil and 258.9 MCF of natural gas in 2012 (ND Department of Mineral Resources 2013). Although the state has 17 active oil and gas producing counties, the core counties of Dunn, McKenzie, Mountrail, and Williams produce more than 75% of state's annual production. As of September 30 2013, there were 185 drilling rigs and approximately 10,294 wells capable of producing oil and gas across the state. In 2012, the average well in North Dakota produced approximately 91.6 barrels of oil per day and cost nearly \$8.9 million to complete (ND Petroleum Council 2013). The average wellhead price for ND crude oil was \$83.68 per bbl in 2012 (ONRR 2013).

At the time of this analysis there were 2,124 federal oil and gas leases, covering approximately 1,034,149 acres in North Dakota. Although oil and gas exploration, development, and production is a driving force behind the state's economy, only 7% of statewide oil production and 11% of natural gas production is attributable to federal minerals (IPAA 2013). As discussed in above section 3.15, the USFS manages large areas of land within the boundaries of the NDFO. Approximately 78 percent of existing federal oil and gas lease acreage is located within the boundaries of the USFS Little Missouri National Grasslands (1,276 leases; 804,316 acres). The extent to which leasing federal minerals administered by the BLM affects local communities depends on the number of acres leased, the number of wells drilled, and the amount of oil and gas produced by these wells. Since federal minerals administered by the BLM are associated with only a small portion of total oil and gas related activities in Western Montana, the leasing and production of BLM administered mineral estates have a relatively minor impact on the analysis area.

3.16.4 Leasing

The North Dakota Field Office manages over 4.1 million acres of Federal and Indian Trust mineral estate in the western one-third of the state. As of November 2014 the BLM managed more than 2,000 federal mineral leases, totaling 241,231 mineral acres. Approximately 60 percent of these leased minerals were public domain, while the remaining 40 percent were acquired. As of November 2014, the BLM managed leases on approximately 93,699 mineral acres within the five counties nominated for additional federal mineral leasing. Currently, annual lease rental is paid on 24,918 acres which are not held by production. Lease rental is \$1.50 per acre per year for the first five years and \$2.00 per acre per year thereafter. Annual average lease and rental revenue from BLM lands in these five counties was estimated to generate approximately \$43,600 for the federal government. Forty-nine percent of the federal leasing revenues are distributed back to the state in which they were generated. The state of North Dakota distributes half of these revenues to school districts across the state (ND state code 15.1-27-25) while the other half is returned to the counties where the rental revenue was generated. On annual average about \$10,700 is returned to North Dakota school districts and collectively \$10,700 is returned to Bowman, Burke, Divide, Golden Valley, and Williams counties.

In addition to annual rents, federal oil and gas leases can generate a one-time lease “bonus” bid. The minimum competitive lease bid is \$2.00 per acre; however, parcels in North Dakota often command bonus bids much higher. Average per acre bonus bids for parcels in North Dakota have steadily risen over the past five years as development along the Bakken formation has boomed. Between 2013 and 2014, 107 federal parcels were leased in North Dakota at an average price of \$8,299 per acre. During the October 2014 lease sale, five parcels received bids ranging from \$5.00 per acre to \$290 per acre. The weighted average of these bonus bid was \$122 per acre. Typically, federal oil and gas leases expire after 10 years unless the parcel contains one or more producing wells or is incorporated into an existing field through a communitization agreement. Once the leased parcel becomes associated with oil or gas production, the parcel is said to be held by production (HBP) at which time, annual rent on the land ceases and royalties are assessed at 12.5% of the value of production begin. Approximately 74 percent of the mineral acres leased from the BLM in Bowman, Burke, Divide, Golden Valley, and Williams counties are held by production. Instead of paying annual rents on these leased minerals, leasees pay royalties on the oil and gas extracted from these 68,781 acres.

3.16.6 Local Economic Contribution

The total economic contribution of federal oil and gas leasing to a local economy includes employment and labor income generated from the distribution of bonus bid and non-bonus bid (i.e. rents and royalties) federal revenues back to counties where they were generated and the economic activity generated from drilling and support activities. Federal revenues distributed to the state and counties help fund traditional county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and keeping records. Other county functions that may be funded include operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems. A significant amount of funding is used for primary and secondary education. Salary and non-salary expenses associated with providing with these public services ripple through the local economy and support a portion of local employment in nearly all of the 179 industrial sectors.

Activities related to oil and gas exploration, development, and extraction form a basic industry that attracts new money into the state and region and creates jobs in a variety of economic sectors. Extraction of oil and natural gas (IMPLAN sector 20), drilling oil and gas wells (IMPLAN sector 28), and support activities for oil and gas operations (IMPLAN sector 29) supported an estimated 18,960 local jobs and \$2 billion in employee compensation and proprietor's income within the 9-county local economy (IMPLAN, 2012). Although BLM administered minerals are only associated with a small portion of total oil and gas related activities in these 9 counties, these minerals can be attributed with directly supporting a small portion of the 18,960 local jobs and \$2 billion in employee compensation and proprietor's income.

3.17 Special Designations

3.17.1 Lewis and Clark National Historic Trail

National Historic Trails commemorate historic or pre historic travel routes that are of significance to the entire nation. A designated trail should generally follow the route of the historic trail but may deviate if necessary. To qualify for designation as a national historic trail, a trail must meet the following criteria: have been established by a historic use and have historical significance as a result of that use, have historic use of the trail that has had a far and reaching effect on broad pattern of American culture, and has significant potential for public recreational or historical interest. National Historic Trails are managed in accordance with the National Trail System Act of 1968, as amended (16 USC 1241-1251) to identify and protect the historic route and its historic remnants and artifacts for public use and enjoyment.

The Lewis and Clark National Historic Trail (the Trail) was established by Congress in an amendment to the National Trails System Act. The National Park Service administers the Trail and is charged under this Act with the identification and protection of the historic route, remnants, and artifacts of the Lewis and Clark Expedition for public use and enjoyment. The following proposed lease parcel is located along the Trail: NDM 97300 -7K.

4.0 Environmental Impacts

4.1 General Impact Analysis Assumptions and Reasonably Foreseeable Development Scenario

This chapter describes the environmental effects (direct, indirect, and cumulative) that would result from the alternatives. This analysis is tiered to the final environmental impact statement (EIS) for the NDFO RMP. The analysis contained within that RMP/FEIS remains adequate. The RMP determined which areas are available for oil and gas leasing and under what conditions those leases are to be offered and sold.

This section organizes the resources as identified in Chapter 1.0, Section 1.5, Identified Relevant Issues and Resources, and compares the general current conditions to impacts between the alternatives. Mitigation and Best Management Practices described in Appendix C would apply to all alternatives and have been incorporated into the analysis as a means to reduce or eliminate adverse environmental impacts.

Impacts have been categorized according to the phase of development and duration of activities on the resources. The duration of the possible impacts is analyzed and described as either short-term or long-term. Short-term impacts generally last less than five years and long-term impacts generally last more than five years.

Direct and Indirect Impacts

Impacts are also categorized as being direct or indirect, and beneficial or adverse. This analysis identifies these types of impacts and compares the alternatives accordingly.

Direct impacts are those that are caused by the action and occur at the same time and place. Indirect impacts are those that are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable. Sometimes it is difficult to separate these impacts and so the impacts may be described together.

The act of leasing parcels would not directly impact the resources. The only direct impacts of leasing are creation of valid existing rights and revenue generated by the lease sale receipts.

Potential indirect impacts associated with a lease sale would result from any future developments. The BLM assumes there is a high interest in development of any leased parcels but, even if lease parcels are leased, it is speculative to assume development would actually occur, and if so, it is speculative to assume where specific wells would be drilled and where facilities would be placed. This would not be determined until the BLM receives an APD in which detailed information about proposed wells and facilities would be provided for particular leases.

Upon receipt of an APD, the BLM would initiate a more site-specific NEPA analysis with public review opportunities to more fully analyze and disclose site-specific Impacts of specifically identified activities. In all potential exploration and development scenarios, the BLM would require the use of BMPs documented in “Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development” (USDI and USDA 2007), also known as the “Gold Book.” The BLM could also identify APD COAs, based on site-specific analysis that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

For split-estate leases, the BLM would notify the private landowners that oil and gas exploration or development activities are proposed on their lands and they are encouraged to attend the onsite inspection to discuss the proposed activities. In the event of activity on such split estate leases, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

Environmental consequences are discussed below by alternative to the extent possible at this time for the resources described in Chapter 3. As per NEPA regulations at 40 CFR 1502.14(f), 40 CFR 1502.16(h), and 40 CFR 1508.20, mitigation measures to reduce, avoid, or minimize

potential impacts are identified by resource below in Appendix C, Mitigation and Best Management Practices.

Reasonable Foreseeable Development

The RFD for this EA is based on information contained in the RFD developed in 2009 and revised in 2011 for the NDFO RMP. The RFD prepared for the NDFO RMP contains the number of possible oil and gas wells that could be drilled and produced in the NDFO area and used to analyze the possible number of wells drilled for the 7 nominated parcels. These well numbers are only an estimate based on historical drilling and geologic data.

Environmental consequences are discussed below by alternative to the extent possible at this time for the resources described in Chapter 3. As per NEPA regulations at 40 CFR 1502.14(f), 40 CFR 1502.16(h), and 40 CFR 1508.20, mitigation measures to reduce, avoid, or minimize potential impacts are identified by resource below.

Analysis Assumptions for Alternatives B and C

By itself, the act of leasing the parcels would have no direct impact on any natural resources in the area administered by the NDFO. Standard terms and conditions as well as special stipulations would apply to the lease parcels. All impacts would link to as yet undetermined future levels of lease development.

If the lease parcels are developed, short-term impacts would be stabilized or mitigated rapidly (within two to five years). Long-term impacts are those that would substantially remain for more than five years.

The following assumptions are from the RFD developed for the NDFO RMP revision (http://www.blm.gov/mt/st/en/fo/north_dakota_field/rmp/RFD.html.) The BLM administers approximately 324,269 acres of federal minerals (for fluid minerals) within the NDFO. The RFD forecasts and maps the oil and gas development potential in the North Dakota planning area.

A version of this map is reproduced with this EA as Map 4.1.1. For the RFD, very high potential forecasts more than 20 well pads per township; high potential forecasts 10 to 20 well pads per township; moderate potential forecasts two to 10 well pads per township; low potential forecasts one to two well pads per township; and very low potential forecasts less than one well per township over the life of the plan.

A coalbed natural gas (CBNG) play is assumed in the planning area in the Williston Basin. Pilot projects would contain 16 to 25 wells. A total of 150 wells are forecasted allowing for some exploration activity and preliminary development.

Directional and horizontal drilling has, in the past several years, become important in the planning area. Drilling depths (measured depth) are from 4,413 to 21,727 feet for oil wells and 4,173 to 19,954 feet for gas wells. However, most of the oil wells have a measured depth of between 13,000 and 16,000 feet, and the measured depths of gas wells are typically within the 13,000 to 16,000 foot range.

The majority of the oil and gas wells in the planning area have historically been drilled vertically. However, of the 2,983 wells spud in the planning area between January 1998 and December 2007, only 787 were vertical wells. Vertical well depths in North Dakota range from a few hundred feet in the northeast part of the study area to over 15,000 feet in the central Williston Basin. Disturbance projections from the RFD are presented in Tables 4.1.1 and 4.1.2. Measured depths in the southwest part of the state range from 1,300 feet to 9,500 feet.

Map 4.1.1 RFD Scenario for Development Potential

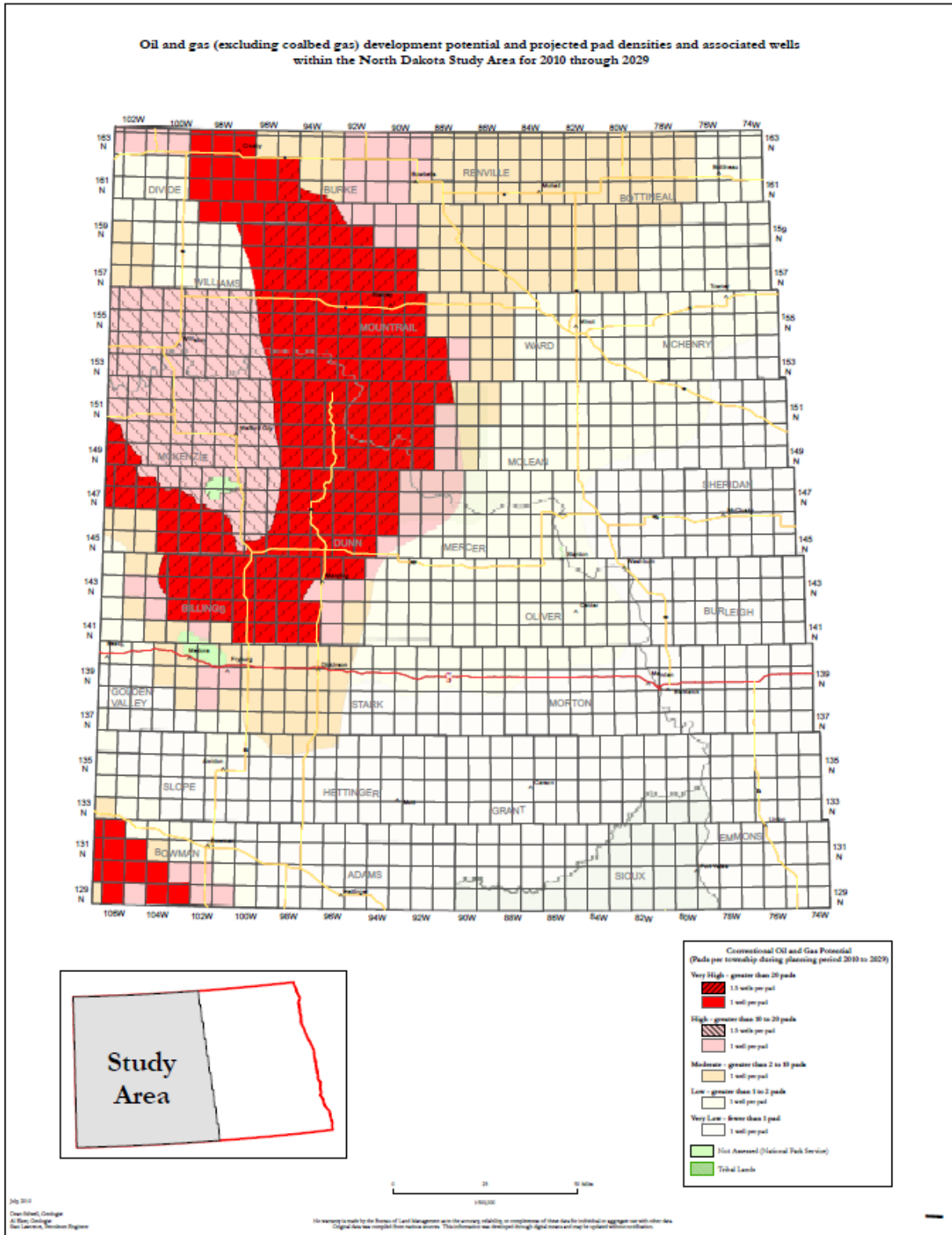


Table 4.1.1 Disturbance Associated With Existing Well Pads and Projected Active Well Pads for the Baseline Scenario (Short-Term Disturbance)

Well Pads			Acres of Surface Disturbance			
Type	Total	BLM Managed	Access Roads	Well Pad	Total	BLM Managed
New Exploratory and Development Coalbed Gas Well Pads (2010-2029)	150	7	0.6	0.5	165	8
New Exploratory and Development Gas Well Pads (2010-2029)	315	34	0.6	0.5	347	40
New Exploratory and Development Oil Well Pads; 1.5 wells/pad (2010-2029)	3,691	402	2.9	4.2	26,206	2,945
New Exploratory and Development Oil Well Pads 1.0 wells/pad (2010-2029)	2,609	284	2.9	4	18,002	2,023
<i>Total New Exploratory and Development Well Pads</i>	<i>6,765</i>	<i>727</i>			<i>44,720</i>	<i>5,017</i>
Existing Active Gas Well Pads (as of August 2010)	211	121	0.3	0.25	116	71
Existing Active Oil Well Pads (as of August 2010)	6,760	851	1.5	1.75	21,970	2,857
<i>Total Existing and Projected Well Pads</i>	<i>6,971</i>	<i>972</i>			<i>22,086</i>	<i>2,928</i>
Total Well Pads	13,736	1,699	Total Short-Term Disturbance		66,806	7,945

Table 4.1.2 Disturbance Associated With Existing Well Pads and Projected Producing Well Pads for the Baseline Scenario (Long-Term Disturbance)

Well Pads			Acres of Surface Disturbance			
Type	Total	BLM Managed	Access Roads	Well Pad	Total	BLM Managed
New Producing Coalbed Gas Well Pads (2010-2029)	135	6	0.3	0.25	74	4
New Producing Gas Well Pads (2010-2029)	293	21	0.3	0.25	161	12
New Producing Oil Well Pads; 1.5 wells/pad (2010-2029)	3,248	353	1.5	1.75	10,556	1,186
New Producing Oil Well Pads; 1.0 wells/pad (2010-2029)	2,035	221	1.5	1.75	6,614	743
<i>Total New Producing Well Pads</i>	<i>5,711</i>	<i>602</i>			<i>17,405</i>	<i>1,945</i>
Existing Active Gas Well Pads (as of August 2010) ¹	203	116	0.3	0.25	111	68
Existing Active Oil Well Pads (as of August 2010) ¹	5,881	740	1.5	1.75	19,114	2,486
<i>Total Existing and Projected Well Pads</i>	<i>6,084</i>	<i>857</i>			<i>19,225</i>	<i>2,554</i>
Total Well Pads	11,795	1458	Total Long-Term Disturbance		36,631	4,499
¹ minus abandonments during August 2010-December 2029 period						

New oil and gas wells projected to be drilled in the NDFO RFD from 2010 through 2029 total as many as 8,460 in the planning area. Up to 150 of these wells could be coalbed gas wells. Of the other remaining wells (those drilled in areas of very high, high or moderate potential areas) the majority are projected to be drilled in and around existing fields in the deeper portion of the Williston Basin and along the Cedar Creek anticline. Those wells drilled in areas of low or very

low potential are projected for areas generally not proven productive by historical drilling, but which still may contain hydrocarbons based on U.S. Geological Survey assessment data. The BLM component of oil and conventional gas activity within the RFD is expected to be approximately 11.4 percent of all activity.

No surface disturbance would occur as a result of issuing leases. For analysis purposes, the potential number of acres disturbed by exploration and development activities is shown in Tables 4.1.1 and 4.1.2. The potential acres of disturbance reflect acres typically disturbed by construction, drilling, and production activities, including infrastructure installation throughout the NDFO. Typical exploration and development activities and associated acres of disturbance were used as assumptions for analysis purposes in the EA. (Note: The assumptions were not applied to Alternative A because the lease parcels would not be offered for lease; therefore, no wells would be drilled or produced on the lease parcels, and no surface disturbance would occur on those lands from exploration and development activities).

Cumulative Impacts

Cumulative impacts are those impacts resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions (40 CFR 1508.7). This section describes cumulative impacts associated with this project on resources. The ability to assess the potential cumulative impacts at the leasing stage for this project is limited for many resources due to the lack of site-specific information for potential future activities. Upon receipt of an APD for any of the lease parcels addressed in this document, more site-specific planning would be conducted in which the ability to assess contributions to cumulative impacts in a more detailed manner would be greater due to the availability of more refined site-specific information about proposed activities.

Past, present, or reasonably foreseeable future actions that have or could affect the same components of the environment as the Proposed Action in project area include mineral exploration and development, road construction, agriculture, recreational activities, subdivision of private lands, energy/utility infrastructure development, vehicle travel, wild and prescribed fire activities and water flow alterations and diversions. Much of this activity has, and is expected to continue, occurred on private surface lands, which comprise a majority of the total land ownership in the project area.

4.2 Alternative A (No Action Alternative)

4.2.1 Direct and Indirect Impacts Common to All Resources, not Including Economics

Under Alternative A, the 8 parcels, covering 1,164.26 surveyed Federal mineral acres (49.36 surveyed BLM administered surface and 1,114.9 surveyed private surface), would not be offered for competitive oil and gas lease sale. Under this alternative, the State and private minerals could still be leased in surrounding areas. Surface management would remain the same and ongoing oil and gas development would continue on surrounding Federal, private, and State leases.

There would not be new impacts from oil and gas exploration or production activities on the Federal lease parcel lands at this time. No additional natural gas or crude oil would enter the public markets, and no royalties would accrue to the Federal or State treasuries from the parcel

lands.

4.2.2 Cumulative Impacts Common to All Resources, not Including Economics

The No Action Alternative would result in the continuation of the current land and resources uses and trends on the lease parcels.

Except for impacts to economic resources described below, no further analysis is presented for impacts of the No Action Alternative.

4.2.3 Economics

4.2.3.1 Direct and Indirect Impacts:

The economic contributions of the oil and gas industry to the local economy were discussed earlier in the Affected Environment section. Although total contributions include all employment and labor income generated by 1) payments to counties associated with the leasing and rent of federal minerals, 2) royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities; only contributions from leasing nominated parcels are analyzed at this time. Subsequent analyses would need to be done at the development stage to assess how drilling and production on these parcels would affect economic conditions in the surrounding economy.

Under Alternative A, none of the nominated parcels would be leased. Consequently, there would be no change in local revenues, employment, or wages from leasing additional BLM administered minerals.

Table 4.2.3.1 Summary Comparison of Estimated Average Annual Economic Impacts

Alternative	Additional Acres Leased	Change in Average Annual Local Revenue to Counties	Change in Total Employment (full, part-time, and seasonal jobs)	Change in Total Labor Income
A	0	0	0	0
B	1,164	\$35,360	0	\$12,700
C	1,124	\$34,145	0	\$12,300

4.2.3.2 Cumulative Impacts:

Since no action would be taken under Alternative A, there are no direct, indirect, or cumulative effects associated with this alternative. Oil and gas development is anticipated to grow in the region regardless of the BLM’s leasing decision because of activity on state and private lands. While not leasing federal minerals can affect the recoverability of surrounding mineral estates, these parcels are not anticipated to have much of an effect on the future development of fluid minerals in these areas.

Table 4.2.3.2 Cumulative Annual Activity by Alternative

Activity	Alternative		
	A	B	C
Existing acres leased within the 5 counties	93,699	93,699	93,699

Acres that would be leased based on this EA	0	1,164	1,124
Total acres leased	93,699	94,863	94,823
Acres held by production	68,781	68,781	68,781
Total acres leased for which lease rents would be paid	24,918	26,082	26,042
Average Annual Additional Federal Bonus Bid Revenue	0	\$142,289	\$137,398
Federal Revenues Distributed back to North Dakota	0	\$69,722	\$67,325
Counties Share of Additional Bonus Bid Revenues	0	\$34,861	\$33,663
Average Annual Additional Federal Rent Revenue	0	\$2,037	\$1,967
Federal Revenues Distributed back to North Dakota	0	\$998	\$964
Counties Share of Additional Rent Revenues	0	\$499	\$482

As highlighted in the table above, leasing nominated BLM administered minerals under Alternatives B and C would generate new federal, state, and local public revenues. While 51 percent of these revenues would remain within the federal government, North Dakota could receive some funds from the redistribution of federal mineral leasing revenues under these alternatives. Revenues associated with leasing activities associated with the July 2015 sale would provide additional funding to primary and secondary education across the state, and for public infrastructure and services in Bowman, Burke, Divide, Golden Valley, and Williams counties. Local government spending of these monies will generate small amounts of economic activity in the economy, but are unlikely to alter the underlying business patterns and demographics characteristic of the region's economic structure. Most of the employment and income would be associated with payments to the five counties with nominated parcels.

4.3 Alternative B (Proposed Action)

Under Alternative B, 8 lease parcels of Federal minerals for oil and gas leasing, covering 1,164.26 surveyed Federal mineral acres (49.36 surveyed BLM administered surface and 1,114.9 surveyed private surface) would be offered for competitive oil and gas lease sale. No parcels would be deferred.

4.3.1 Direct Impacts Common to All Resources

The action of leasing the parcels would not directly impact resources. The only direct impacts of leasing are the creation of valid existing rights and revenue generated by the lease sale receipts.

4.3.2 Indirect Impacts Common to All Resources

Any potential Impacts on resources from the sale of leases would occur during lease exploration and development activities, which would be subject to future BLM decision-making and NEPA analysis upon receipt of an APD or Sundry Notice.

Oil and gas exploration and development activities such as construction, drilling, production, infrastructure installation, vehicle traffic and reclamation could be indirect Impacts from leasing the lease parcels in Alternative B. As mentioned above, it is speculative to make assumptions about whether a particular lease parcel would be sold and, even if so, it is speculative to assume 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.

For the purposes of this EA and based on the location of these parcels in the Williston Basin, any future development activity that would occur would probably be oil production. As defined under section 4.1, short-term impacts would be stabilized or mitigated rapidly (within two to five years), and long-term impacts are those that would substantially remain for more than five years. Short-term disturbance would be 2.9 acres for access roads and flow lines and four acres per well pad. Long-term disturbance would be 1.5 acres for access roads and 1.75 acres per well pad. Many of the parcels would probably require the formation of a communitization agreement (CA) to facilitate development. A CA provides for the pooling of federal and/or Indian lands, with other lands, when separate tracts under such federal and Indian lands cannot be independently developed and operated in conformity with an established well-spacing program. Actual well drilling and surface disturbance activity may occur on fee or state lands, not on the federal lease parcels.

4.3.3 Cumulative Impacts Common to All Resources

Environmental consequences are discussed below to the extent possible at this time for the resources described in Chapter 3. As per NEPA regulations at 40 CFR 1502.14(f), 40 CFR 1502.16(h), and 40 CFR 1508.20, mitigation measures to reduce, avoid, or minimize potential impacts are identified by resource below in Appendix C, Mitigation and Best Management Practices.

4.3.4 Air Resources

4.3.4.1 Direct and Indirect Impacts

4.3.4.1.1 Air Quality

Leasing the parcels would have no direct impacts on air quality. Any potential Impacts from sale of lease parcels could occur at the time the leases are developed.

Potential impacts of development could include increased airborne soil particles blown from new well pads or roads; exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as potential releases of GHGs and VOCs during drilling or production activities. The amount of increased emissions cannot be precisely quantified at this time since it is not known for certain how many wells might be drilled, the types of equipment needed if a well were to be completed successfully (e.g., compressor, separator, dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of impact would also vary according to the characteristics of the geologic formations from which production occurs, as well as the scope of specific activities proposed in an APD.

Current monitoring data show that criteria pollutants concentrations are below applicable air quality standards, indicating good air quality. The potential level of development and

mitigation described below is expected to maintain this level of air quality by limiting emissions. In addition, pollutants would be regulated through the use of State-issued air quality permits or air quality registration processes developed to maintain air quality below applicable standards.

If the leases are developed, hazardous air pollutants (HAPs) would be emitted from oil and gas operations, including well drilling, well completion, and gas and oil production. Recent air quality modeling performed for the Miles City Field Office, which is located west of the NDFO, indicates that concentrations of benzene, ethylbenzene, formaldehyde, n-hexane, toluene, and xylene would be less than 14 percent of applicable health-based standards and that the additional risk of cancer would be less than 0.18 in one million (BLM 2013).

Small impacts to air quality related values such as visibility, deposition, and lake acidification would occur if the leases were developed.

Sources of GHGs associated with development of lease parcels could include construction activities, operations, and facility maintenance in the course of oil and gas exploration, development, and production. Estimated GHG emissions are discussed for these specific aspects of oil and gas activity because the BLM has direct involvement in these steps. However, the current proposed activity is to offer parcels for lease. No specific development activities are currently proposed or potentially being decided upon for any parcels being considered in this EA. Potential development activities would be analyzed if the BLM receives an APD on any of the parcels considered here.

Anticipated GHG emissions presented in this section are taken from the Climate Change SIR, 2010. Aggregate GHG emissions are reported in terms of carbon dioxide equivalent (CO₂e) emissions. The CO₂e emissions shown below reflect combined emissions of CO₂, methane (CH₄), and N₂O based on GWPs of 1, 25, and 310, respectively, as required by the EPA in 40 *Code of Federal Regulations* Part 98, Subpart A. Different GWPs for CH₄ and N₂O exist in scientific literature; however, most emission inventories at the national level were developed based on the EPA regulatory numbers. Prior to 2014, most US emission inventories used a methane GWP of 21 rather than 25. Readers may use different global warming potentials to calculate CO₂e by multiplying emissions of each GHG by the desired GWP to determine CO₂e for each GHG and then adding CO₂e for CO₂, CH₄, and N₂O together to determine total CO₂e.

Data are derived from emission calculators developed by air quality specialists at the BLM National Operations Center in Denver, Colorado, based on methods described in the Climate Change SIR (2010) and revised to include a GWP of 25 for methane, as set forth in recent EPA regulatory revisions. Table 4.3.4.1.1 discloses projected annual GHG source emissions from BLM-permitted activities associated with the RFD.

Table 4.3.4.1.1 The BLM Projected Annual GHG Emissions Associated With Oil and Gas Exploration and Development Activity in the NDFO.

Source	BLM Long-Term GHG Emissions in tons/year				Emissions (metric tons/yr)
	CO ₂	CH ₄	N ₂ O	CO ₂ e ¹	CO ₂ e

Conventional Natural Gas	563	117	0	3,484	3,161
Coal Bed Natural Gas	3,822	49	0	5,074	4,604
Oil	547,165	1,132	7	577,774	524,272
Total	551,550	1,298	8	586,332	532,038

¹ GWPs used to determine CO₂e in this table are 1 for CO₂, 25 for CO₂e, and 310 for N₂O based on a 100-year time frame.

To estimate GHG emissions associated with the action alternatives, the following approach was used:

1. The proportion of each alternative relative to the total RFD was calculated based on total acreage of parcels under consideration for leasing relative to the total acreage of Federal mineral acreage available for leasing in the RFD.
2. This ratio was then used as a multiplier with the total estimated GHG emissions for the entire RFD (with the highest year emission output used) to estimate GHG emissions for that particular alternative.

Under Alternative B, approximately 1,164 acres of lease parcels with Federal minerals would be leased. These acres constitute approximately 0.118 percent of the total Federal mineral estate of approximately 986,324 acres identified in the NDFO RFD. Therefore, based on the approach described above to estimate GHG emissions, 0.118 percent of the RFD total estimated BLM emissions of approximately 532,038 metric tons/year would be approximately 628 metric tons/year of CO₂e if the parcels within Alternative B were to be developed.

4.3.4.1.2 Climate Change

The assessment of GHG emissions and climate change is in its formative phase. As summarized in the Climate Change SIR, climate change impacts can be predicted with much more certainty over global or continental scales. Existing models have difficulty reliably simulating and attributing observed temperature changes at small scales. On smaller scales, natural climate variability is relatively larger, making it harder to distinguish changes expected due to external forcings (such as contributions from local activities to GHGs). Uncertainties in local forcings and feedbacks also make it difficult to estimate the contribution of GHG increases to observed small-scale temperature changes (Climate Change SIR 2010).

It is currently not possible to know with certainty the net impacts from lease parcel development on climate. The inconsistency in results of scientific models used to predict climate change at the global scale, coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. It is therefore beyond the scope of existing science to relate a specific source of GHG emission or sequestration with the creation or mitigation of any specific climate-related environmental Impacts. Although the Impacts of GHG emissions in the global aggregate are well documented, it is currently impossible to determine what specific effect GHG emissions resulting from a particular activity might have on the environment. For additional information on environmental Impacts typically attributed to climate change, please refer to the cumulative Impacts discussion below.

While it is not possible to predict Impacts on climate change of potential GHG emissions discussed above in the event of lease parcel development for alternatives considered in this EA, the act of leasing does not produce any GHG emissions in and of itself. Releases of GHGs could occur at the exploration/development stage.

4.3.4.2 Cumulative Impacts

The cumulative impacts analysis area is the NDFO, with additional discussion at state-wide, national, and global scales for GHG emissions and climate change.

This section incorporates an analysis of the contributions of the Proposed Action to GHG emissions, followed by a general discussion of potential impacts to climate change. Potential emissions relate to those derived from potential exploration and development of fluid minerals. Additional emissions beyond the control of the BLM, and outside the scope of this analysis, would also occur during any needed refining processes, as well as end uses of final products.

4.3.4.2.1 Air Quality

4.3.4.2.2 Greenhouse Gas Emissions

Projected GHG emissions for this project and the NDFO RFD are compared below with recent, available inventory data at the State, national, and global scales. GHG emissions inventories can vary greatly in their scope and comprehensiveness. State, national, and global inventories are not necessarily consistent in their methods or in the variety of GHG sources that are inventoried (Climate Change SIR 2010). However, comparisons of emissions projected by the BLM for its oil and gas production activities are made with those from inventories at other scales for the sake of providing context for the potential contributions of GHGs associated with this project.

As discussed in the Climate Change section of Chapter 4, total projected BLM GHG emissions from the RFD are 532,038 metric tons/year CO₂e. Potential emissions under Alternative B would be approximately 0.118 percent of this total. Table 4.3.4.2.2 displays projected GHG emissions from non- BLM activities included in the NDFO RFD. Total projected emissions of non-BLM activities in the RFD are 4,407,872 metric tons/year of CO₂e. When combined with projected annual BLM emissions, this totals 4,939,910 metric tons/year CO₂e. Potential GHG emissions under Alternative B would be 0.013 percent of the estimated emissions for the entire RFD. Potential incremental emissions of GHGs from exploration and development of fluid minerals on parcels within Alternative B and Alternative C would be minor in the context of projected GHG contributions from the entire RFD for the NDFO.

Table 4.3.4.2.2 Projected non-BLM GHG Emissions Associated With the NDFO Reasonably Foreseeable Development Scenario for Fluid Mineral Exploration and Development.

Source	Non-BLM Long-Term GHG Emissions in tons/year				Emissions (metric tons/yr)
	CO ₂	CH ₄	N ₂ O	CO ₂ e	CO ₂ e
Conventional	4,273	851	0	25,560	23,193
Natural Gas					
Coal Bed Natural	32,407	412	1	42,892	38,920
Oil	4,538,510	9,376	53	4,789,243	4,345,759

Total	4,575,191	10,639	53	4,857,695	4,407,872
--------------	------------------	---------------	-----------	------------------	------------------

¹ GWPs used to determine CO₂e for this table are 1 for CO₂, 25 for CO₂e, and 310 for N₂O. based on a 100-year time frame.

Contribution to U.S. and Global GHGs

The EPA published an inventory of U.S. GHG emissions, indicating gross U.S. emissions of 6,526 million metric tons, and net emissions of 5,546 million metric tons (when CO₂ sinks were considered) of CO₂e in 2012 (EPA 2014). Potential annual emissions under Alternative B of this project would amount to approximately 0.00001 percent of gross U.S. total emissions. Global GHG emissions for 2004 (IPCC 2007, summarized by the Climate Change SIR 2010) indicated approximately 49 gigatonnes (10⁹ metric tons) of CO₂e emitted. Potential annual emissions under Alternative B would amount to approximately 0.000001 percent of this global total.

As indicated above, although the impacts of GHG emissions in the global aggregate are well-documented, it is currently not possible to determine what specific effect GHG emissions resulting from a particular activity might have on climate or the environment. If exploration and development occur on the lease parcels considered under Alternative B, potential GHG emissions described above could incrementally contribute to the total volume of GHGs emitted to the atmosphere, and ultimately to climate change.

Mitigation measures identified in the Appendix C Air Quality section above may be in place at the APD stage to reduce GHG emissions from potential oil and gas development on lease parcels under Alternative B. This is likely because many operators working in Montana, South Dakota, and North Dakota are currently USEPA Natural Gas STAR Program Partners and future regulations may require GHG emission controls for a variety of industries, including the oil and gas industry (Climate Change SIR 2010).

4.3.4.2.3 Climate Change

As previously discussed in the Air Quality section of Chapter 4, it is impossible to identify specific impacts of climate change on specific resources within the analysis area. As summarized in the Climate Change SIR (2010), climate change impacts can be predicted with much more certainty over global or continental scales. Existing models have difficulty reliably simulating and attributing observed temperature changes at small scales. On smaller scales, natural climate variability is relatively larger, making it harder to distinguish changes expected due to external forcings (such as contributions from local activities to GHGs). Uncertainties in local forcings and feedbacks also make it difficult to estimate the contribution of GHG increases to observed small-scale temperature changes (IPCC 2007, as cited by the Climate Change SIR 2010). Impacts of climate change on resources are described in Chapter 3 of this EA and in the Climate Change SIR (2010).

4.3.5 Soil Resources

4.3.5.1 Direct and Indirect Impacts

Surface use activities associated with oil and gas exploration and development could cause surface disturbances. Such acts result in reduced ground cover, soil mixing, compaction, or removal, exposing soils to accelerated erosion by wind and water, resulting in the irretrievable loss of topsoil and nutrients and potentially resulting in mass movement or sedimentation.

Surface disturbances also change soil structure, heterogeneity (variable characteristics), temperature regimes, nutrient cycling, biotic richness, and diversity. Along with this, mixed soils have decreased bulk density, and altered porosity, infiltration, air-water relationships, salt content, and pH (Perrow and Davy, 2003; Bainbridge 2007). Soil compaction results in increased bulk density, and reduced porosity, infiltration, moisture, air, nutrient cycling, productivity, and biotic activity (Logan 2001; 2003; 2007). Altering such characteristics reduces the soil system's ability to withstand future disturbances (e.g., wildfire, drought, high precipitation events, etc.). The probability and magnitude of these effects are dependent upon local site characteristics (e.g., reclamation suitability), climatic events, and the specific mitigation applied to the project.

Measures would be taken to reduce, avoid, or minimize potential impacts to soil resources from exploration and development activities. Prior to authorization, proposed actions would be evaluated on a case-by-case basis and would be subject to mitigation measures in order to maintain the soil system. Mitigation would include avoiding areas poorly suited to reclamation, limiting the total area of disturbance, rapid reclamation, erosion/sediment control, soil salvage, decompaction, revegetation, weed control, slope stabilization, surface roughening, and fencing. Areas poorly suited to reclamation would require unconventional and/or site-specific reclamation measures.

4.3.5.2 Cumulative Impacts

The cumulative impacts analysis area is the boundary of the lease parcels. Impacts to soil in these areas from activities other oil and gas development include grazing and farming, and dispersed recreation (mostly hunting). The majority of parcels are located on privately owned surface where grazing and/or farming currently occur. Dispersed recreation may result in erosion in some localized areas from vehicle use. In general, it is not anticipated that leasing and possible development would cause long term loss of soil productivity.

4.3.6 Water Resources

4.3.6.1 Direct and Indirect Impacts

The magnitude of the impacts to water resources would be dependent on the specific activity, season, proximity to waterbodies, location in the watershed, upland and riparian vegetation condition, effectiveness of mitigation, and the time until reclamation success. Surface disturbance impacts typically are localized, short-term, and occur from the time of implementation through vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so would the potential impacts on water resources.

Oil and gas exploration and development of a lease parcel could cause the removal of vegetation, soil compaction, and soil disturbance in uplands within the watershed, floodplains of streams and rivers, waterbodies, and riparian and wetland areas. The potential impacts from these activities would be accelerated erosion, increased overland flow, decreased infiltration, increased water temperature, channelization, and water quality degradation associated with increased sedimentation, turbidity, nutrients, metals, and other pollutants. Erosion potential could be further increased in the long term by soil compaction and low permeability surfacing (e.g., roads and well pads) which increases the energy and amount of overland flow and decreases infiltration, which in turn changes flow characteristics, reduces groundwater recharge, and increases sedimentation and erosion.

Stipulations addressing riparian areas, wetlands, lakes, ponds, and the floodplains of the Yellowstone and Missouri Rivers would minimize the potential impacts and would be included with the lease when necessary (Appendix A). In the event of exploration or development, measures would be taken to reduce, avoid, or minimize potential impacts to water resources including application of appropriate mitigation (Appendix C). Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control non-native species, and expedite rapid reclamation (including interim reclamation) would maintain water resources.

Methods to reduce erosion and sedimentation could include: reducing surface disturbance acres; installing and maintaining adequate erosion control; proper road design, road surfacing, and culvert design; road/infrastructure maintenance; use of low water crossings; and use of isolated or bore crossing methods for waterbodies and floodplains. In addition, applying mitigation to maintain adequate, undisturbed, vegetated buffer zones around waterbodies and floodplains could reduce sedimentation and maintain water quality. Site-specific mitigation and reclamation measures would be described in the COAs.

Groundwater

Spills or produced fluids could have long-term impacts to surface and ground water resources. Oil and gas exploration/development could potentially contaminate aquifers with salts, drilling fluids, fluids and gases from other formations, detergents, solvents, hydrocarbons, metals, and nutrients; change vertical and horizontal aquifer permeability; and increase hydrologic communication with adjacent aquifers (EPA 2004). Groundwater removal could result in a depletion of flow in nearby streams and springs if the aquifer is hydraulically connected to such features. Typically, produced water from conventional oil and gas wells is from a depth below useable aquifers or coal seams (FSEIS 2008).

Well bores 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.

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. 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, and 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. Appropriate well completion, the use of Spill Prevention Plans, and Underground Injection Control regulations would mitigate groundwater impacts.

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 North Dakota State water rights regulations and a source of water would need to be secured by industry that would not harm senior water rights holders.

4.3.6.2 Cumulative Impacts

The Cumulative Impacts Analysis Area is the Williston Basin. Throughout the lease area there are many activities currently occurring, along with historic impacts, which affect water quality. These activities include: oil and gas development, residential development, farming, 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 in 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 below State standards.

4.3.7 Vegetation Resources

4.3.7.1 Direct and Indirect Impacts

Leasing the parcels would have no direct impacts on vegetation resources. Any potential Impacts from sale of lease parcels could occur at the time the leases are developed.

Impacts to vegetation depend on the vegetation type/community, soil community and the topography of the lease parcels. Disturbance to vegetation is of concern because protection of soil resources, maintenance of water quality, conservation of wildlife habitat, and livestock production capabilities could be diminished or lost over the long-term through direct loss of vegetation (including direct loss of both plant communities and specific plant species).

Other direct impacts, such as invasive species invasion, could result in loss of desirable vegetation. Invasive species and noxious weeds could also reduce livestock grazing forage, wildlife habitat quality, and native species diversity. In addition, invasive species are well known for changing fire regimes.

Additionally, surface disturbing activities directly affect vegetation by destroying habitat,

churning soils, impacting biological crusts, disrupting seed banks, burying individual plants, and generating sites for competitive species. Other vegetation impacts could also be caused from soil erosion and result in loss of the supporting substrate for plants, or from soil compaction resulting in reduced germination rates. Impacts to plants occurring after seed germination but prior to seed set could be particularly harmful as both current and future generations would be affected.

Fugitive dust generated by construction activities and travel along dirt roads could affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Oil, fuel, wastewater or other chemical spills could contaminate soils as to render them temporarily unsuitable for plant growth until cleanup measures were fully implemented. If cleanup measures were less successful, longer term vegetation damage could be expected.

Oil and gas development activity could reduce BLM's ability to manage livestock grazing while meeting or progressing towards meeting the Standards of Rangeland Health. Development and associated disturbances could reduce available forage or alter livestock distribution leading to overgrazing or other localized excess grazing impacts. Construction of roads, especially in areas of rough topography could cause significant changes in livestock movement and fragment suitable habitat for some plant communities.

4.3.7.2 Cumulative Impacts

The Cumulative Impacts Analysis Area is the lease parcel boundaries. Future oil and gas development throughout the proposed lease sale parcels would disturb soils and vegetation beyond the present disturbances. Most vegetation loss would be for a relatively short timeframe because successful reclamation would return desirable vegetation and ecological function to disturbed sites. Where invasive annuals or noxious weeds dominate plant communities, successful reclamation of those disturbances would likely improve the condition of the plant community.

4.3.8 Riparian-Wetland Habitats

4.3.8.1 Direct and Indirect Impacts

Leasing the parcels would have no direct impacts on riparian-wetland habitats. Any potential effects on riparian-wetland habitats from sale of lease parcels would occur at the time the leases are developed. The exploration and development of oil and gas within uplands or adjacent to riparian-wetland areas could reduce riparian/wetland functionality by changing native plant productivity, composition, richness, and diversity; accelerating erosion; increasing sedimentation; and changing hydrologic characteristics. Impacts that reduce the functioning condition of riparian and wetland areas would impair the ability of riparian/wetland areas to reduce nonpoint source pollution (MDEQ 2007) and provide other ecosystem benefits. The magnitude of these effects would be dependent on the specific activity, season, proximity to riparian-wetland areas, location in the watershed, upland and riparian-wetland vegetation condition, mitigation applied, and the time until reclamation success. Erosion increases typically are localized, short term, and occur from implementation through vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so would the effects on riparian-wetland resources.

Stipulations addressing steep slopes, waterbodies, streams, 100-year floodplains of the Yellowstone and Missouri Rivers, riparian areas, and wetlands would minimize potential impacts and would be included with the lease when necessary (refer to Appendix A). In the event of exploration or development, site-specific mitigation measures would be identified which would avoid or minimize potential impacts to riparian-wetland areas at the APD stage. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, maintain biodiversity, maintain vegetated buffer zones, and expedite rapid reclamation (including interim reclamation) would maintain riparian/wetland resources.

4.3.9 Special Status Species

4.3.9.1 Direct and Indirect Impacts

Leasing the parcels would have no direct impacts on special status plant species. Any potential impacts from the sale of leases could occur at the time the leases are developed.

The use of standard lease terms and stipulations on these lands (refer to Appendix A) would minimize, but not preclude impacts to wildlife. Oil and gas development which results in surface disturbance could directly and indirectly impact aquatic and terrestrial wildlife species. These impacts could include loss or reduction in suitability of habitat, improved habitat for undesirable (non-native) competitors, species or community shift to species or communities more tolerant of disturbances, nest abandonment, mortalities resulting from collisions with vehicles and power lines, electrocutions from power lines, barriers to species migration, habitat fragmentation, increased predation, habitat avoidance, and displacement of wildlife species resulting from human presence. The scale, location, and pace of development, combined with implementation of mitigation measures and the specific tolerance of the species to human disturbance all influence the severity of impacts to wildlife species and habitats, including Threatened, Endangered, Candidate, Proposed, and other special status species.

4.3.10 Wildlife

4.3.10.1 Direct and Indirect Impacts

Although there are no direct or indirect impacts to wildlife resources at the leasing stage, the following assumptions can be made about potential future direct and indirect effects at the time of development.

Piping Plover/Least Turn

Critical habitats have been established in North Dakota for piping plovers (USFWS 2010e). Both Burke and Mountrail counties have designated critical habitats established, however none of the proposed lease parcels contain or are located near these habitats.

Existing stipulations from the North Dakota RMP (1988) requires a No Surface Occupancy (NSO) stipulation associated with all wetlands (for analysis purposes, Lake Sakakawea is viewed as a wetland by BLM). The stipulation would not allow surface disturbance/development activities to occur within 200 feet of known wetlands. The 200 feet could also be adjusted to accommodate site specific concerns at the APD stage. As a result of this stipulation, impacts are not expected to nesting habitats within these areas. Due to the NSO stipulation associated with wetlands and the identified critical habitats, issuing the proposed lease parcels would have no

effect on piping plovers and least terns.

Pallid Sturgeon

Potential impacts from development could include: overland oil spills, underground spills from activities associated with horizontal drilling or other practices, spills from drilling mud or other extraction and processing chemicals, and surface disturbance activities that create a localized erosion zone. Oil spills and other pollutants from the oil extraction process could harm the endangered pallid sturgeon in two different ways. First, toxicological impacts from direct contact could have immediate lethal effects to eggs, juveniles, and adults. Second, toxic effects to lower food web levels (e.g. aquatic macro-invertebrates) would indirectly affect the pallid sturgeon species by degrading water quality and degrading or eliminating food resources. Other aquatic species would experience the same type of direct and indirect impacts.

Currently, in the North Dakota RMP there are no stipulations specific to Pallid sturgeon habitat. However, a floodplain stipulation (NSO 11-39 and NSO 11-36, see Appendix A) would not allow surface occupancy in the 100-year floodplain boundary of the Missouri and Yellowstone Rivers, respectively. Additionally, Pallid Sturgeons would be protected by stipulation NSO 11-33 (see Appendix A) which would not allow surface disturbance/development activities to occur within 200 feet of known wetlands. BLM considers the Yellowstone and Missouri Rivers wetlands habitat.

BLM has determined that issuing leases for any of the nominated parcels will have no effect on the pallid sturgeon. If development were to occur, additional mitigation would be included as conditions of approval at the APD stage. These conditions could include the placement of earthen berms and oil skimmers (a culvert device placed in drainages which is intended to block oil from entering streams) which should help protect pallid sturgeon habitat in case of oil spills by greatly reducing the potential for spills to reach pallid sturgeon habitat. There is one parcel that is nominated in pallid sturgeon habitat along the Yellowstone River.

Whooping Crane

The majority of the parcels occur in the whooping crane migratory corridor through central and western North Dakota. BLM has determined that the act of issuing leases within the whooping crane migration corridor will not affect the whooping crane. However, impacts to whooping cranes are possible from subsequent oil and gas development activities that would be permitted at the APD stage. At this time, stipulations are limited to protect any known whooping crane migration staging areas. Line strikes, collisions with vehicles, habitat fragmentation, and other anthropogenic activities can disturb, displace, or cause direct mortality of whooping cranes.

Therefore, if development of these leases in known whooping crane feeding/staging/resting areas is proposed and an effect determination is made, BLM would work with the USFWS pursuant to section 7(a)(2) of ESA, if warranted. An outcome of the conferencing process may be that conditions of approval are attached to the permit or the permit may not be approved. Other BMP's would also be developed through consultation, including minimizing disturbance, adherence to Avian Powerline Interaction Committee (APLIC) guidelines, and others as deemed appropriate.

Dakota Skipper Butterfly

Several of the parcels occur in counties where the Dakota Skipper (skipper) has been positively identified (USFWS 2014d). Burke and Mountrail counties have remaining native prairies required for the skipper to varying degrees. BLM has determined the act of issuing leases within these counties will not affect the skipper due to the lack of native prairies associated with the nominated parcels.

At this time, stipulations are limited to protect any known skipper habitats. Drilling pads, roads, collisions with vehicles, habitat fragmentation, and other anthropogenic activities can disturb, displace, or cause direct mortality of skippers.

If development of these leases in known skipper areas is proposed, BLM would work with the USFWS pursuant to section 7(a)(2) of ESA if warranted. An outcome of the conferencing process may be that conditions of approval are attached to the permit or the permit may not be approved. Other BMP's would also be developed through consultation, including minimizing disturbance, adherence to conservation plans and others as deemed appropriate.

Sprague's Pipit

Energy development (oil, gas, and wind) and associated roads and facilities increase the fragmentation of grassland habitat. A number of studies have found that Sprague's pipits appear to avoid non-grassland features in the landscape, including roads, trails, oil wells, croplands, woody vegetation, and wetlands (Dale et al. 2009, pp. 194, 200; Koper et al. 2009, pp. 1287, 1293, 1294, 1296; Greer 2009, p. 65; Linnen 2008, pp. 1, 9-11, 15; Sutter et al. 2000, pp. 112-114). Sprague's pipits avoid oil wells, staying up to 350 meters (m)[1148 feet (ft)] away (Linnen 2008, pp. 1, 9-11), magnifying the effect of the well feature itself. Oil and gas wells, especially at high densities, decrease the amount of habitat available for breeding territories. ([Federal Register: September 15, 2010 (Volume 75, Number 178)])

The leasing action will have no effect on the pipit, however potential suitable habitat exists for the Sprague's pipit across the entire lease area, and inventories have not been conducted within the parcels. Therefore, wildlife inventories would need to be conducted at APD stage of development to determine the presence or absence of Sprague's pipits. The ESA Section 7 Stipulation (16-3) and lease notice is issued with those leases and would be applied if Sprague's pipits are found in the area. If Sprague's pipits are found in the proposed development area, informal consultation with USFWS would be initiated, and Conditions of Approval would be applied for the protection of habitat to ensure there would be no measurable direct negative effect to Sprague's pipits. None of the nominated parcels have large enough native prairie components remaining to provide sufficient habitats for the pipit.

Rufa Red Knot

The rufa red knot is a robin-sized shorebird that migrates long distances annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the southeast United States, the northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America (USFWS 2013a). During migration, rufa red knots utilize certain staging and stopover areas to rest and feed. In North Dakota, the red knot is a very rare migrant (USFWS 2013a). Currently there are no known records of rufa red knot associated with the

nominated lease parcels however, this species could utilize habitat along Lake Sakakawea as a stopover during migration.

Potential habitat does exist along Lake Sakakawea. Potential spills and sedimentation occurring if the leases are developed are concerns for downstream water quality and could indirectly affect suitable stopover habitat for the rufa red knot. However, a variety of mitigation measures would be incorporated into the permits to drill if leases are developed. Best Management Practices, when implemented, would minimize the potential for spills, or provide immediate remediation should spills occur. These measures include but not limited to the use of secondary containment around all vessels containing chemicals that are stored on the well pads, use of closed-loop drilling system, sloping the interior floor of the drilling pads away from drainage ways, and the use of berms around the well pads.

Long Eared Bat

On October 2, 2013, the USFWS proposed the northern long-eared bat for listing as endangered under the ESA (USFWS 2013b). This medium-sized bat can be found across the eastern and north-central United States and all of the Canadian provinces (USFWS 2013b). Populations are distributed in a patchy pattern throughout most of this species' range. They emerge mainly at night and feed through the understory of forested hillsides and ridges, targeting moths, flies, leafhoppers, caddis flies, and beetles.

Winter hibernacula surveys provide most records of northern long-eared bats, with more than 780 hibernacula identified within the United States. North Dakota is not known to have any hibernacula's, due to either no suitable hibernacula habitat present or a lack of survey effort (USFWS 2013d). Suitable winter habitat contains large caves and mines (USFWS 2013b). Daily roosting locations include abandoned buildings, bridges, hollow trees, stumps, spaces under loose bark, and rock fissures (Jones and Choate 1978).

Northern long-eared bats are not known to occur on any of the proposed leasing areas; however, there are documented occurrences near Killdeer, North Dakota. Areas of the Hells Creek Formation in the badlands of western ND could provide cave-like cracks and crevices that may provide suitable winter hibernacula. Trees with a DBH greater than 3 inches may provide potential summer roosting habitat.

The leasing action will have no effect on the Long Eared Bat, however with further inventories potential suitable maybe identified across the entire lease area. Therefore should wildlife inventories reveal habitat and the presents of the myotis at the APD stage of development informal consultation with USFWS would be initiated if an effects determination is made. Conditions of Approval would be applied for the protection of habitat to ensure there would be no measurable direct negative effect to the Long Eared Bat. None of the nominated parcels have known hibernaculum's associated with them.

4.3.10.2 Cumulative Impacts

Generally speaking construction of roads, production well pads, and other facilities would result in long term (>5 years) loss of habitat and forage in the analysis area if the leases are developed. This would be in addition to acres disturbed, or habitats fragmented from various other adjacent activities. As new development occurs, direct and indirect impacts would continue to stress wildlife populations, most likely displacing the larger, mobile animals into adjacent habitat, and increasing competition with existing local populations. Non-mobile animals would be affected

by increased habitat fragmentation and interruptions to preferred nesting habitats.

Certain species are localized to some areas and rely on very key habitats during critical times of the year. Disturbance or human activities that would occur in winter range for big game, nesting and brood-rearing habitat for grouse and raptors could displace some or all of the species using a particular area or disrupt the normal life cycles of species. Wildlife and habitat in and around the project would be influenced to different degrees by various human activities. Some species and/or a few individuals from a species group may be able to adapt to these human influences over time.

With the addition of various forms of stipulations, mitigation, and terms and conditions applied during the development stage, the assessed resources of concern are not expected to approach conditions where additional stresses associated with the proposed action and, past, present and future foreseeable actions will have consequential cumulative effects.

4.3.11 Cultural Resources

4.3.11.1 Direct and Indirect Impacts

The transfer, lease, or sale of property can only affect significant cultural, scientific, or historic resources when the transfer out of Federal ownership or control occurs without adequate and legally enforceable restrictions or conditions. The purchaser of a lease is entitled to develop the parcel consistent with lease stipulations, but must have an approved Application for Permit to Drill (APD), including a plan of operations, before ground disturbing activities can begin. Leasing the parcels would have no direct or indirect impacts on cultural resources, because the BLM will not approve any ground disturbing activities that may affect such properties or resources until it completes its obligations under applicable requirements of the National Historic Preservation Act and other authorities (Lease Stipulation 16-1).

Any potential effects from the sale of leases would occur at the time the leases are developed and the drilling of federally owned minerals requires an Application for a Permit to Drill (APD). When APD is received, the North Dakota Field Office defines the area of potential effects (APE) and assesses the proposed undertaking's effect on cultural resources and historic properties as per Section 106 of the National Historic Preservation Act (NHPA). NHPA requires the BLM to identify historic properties within the APE and make a "reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey" (36 CFR 800.5(b)). If cultural resources are identified within the APE, the BLM will evaluate the resource's significance and determine if the resource is eligible for listing on the National Register of Historic Places. If a historic property will be adversely affected by the proposed undertaking, the BLM and consulting parties will develop appropriate mitigations measures.

The potential impacts of approving an APD are caused by the surface disturbing activities associated with exploration and development. The drilling of a well and the construction of a well pad have the potential to alter the characteristics of a significant cultural or historic property by causing destruction, damage or alterations that diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. The permitted surface disturbing activities can also impact a historic property by introducing visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features.

The approval of an APD can indirectly impact a significant cultural resource or historic property by approving a project that increases soil erosion or causes change in traffic patterns which increase the likelihood of looting and vandalism. Climate change can also have an effect on cultural resources by changing the frequency and severity of natural events, such as heavy rain and wildfires (Agee 1993; Maslin 2004). For example, severe storms can increase the likelihood of flooding and soil erosion which expose and displace scientific data. Wildfires can affect the morphology of artifacts through fracturing and discoloration, which can reduce an artifact's ability to render information about the past (Winthrop 2004). Wildfires can also destroy organic materials such as bone, wood, and pollen that provide information about past environments and subsistence.

Under the BLM proposed Alternative B, eight lease parcels (NDM-97300-7A, NDM-97300-7B, NDM-97300-4V, NDM-97300-4H, NDM-97300-6L, NDM-97300-6M, NDM-97300-7K, NDM-97300-6J) totaling 1164.26 acres would be offered with RMP lease stipulations and /or lease notices as necessary for competitive oil and gas lease sale and lease issuance (Appendix A).

Based on the data obtained from the State Historical Society of North Dakota only one of the eight parcels (NDM 97300-7K) contains previously recorded cultural properties and four of the eight parcels lie within a mile of unevaluated cultural properties.

Parcel NDM 97300-7K lies within the viewshed of the Lewis and Clark Historic Trail, Fort Buford State Historic Site, and the Buford-Trenton Irrigation District. The lease development has the potential to introduce visual, atmospheric, and audible elements that could adversely affect the scenic quality and historical integrity of the Lewis and Clark Historic Trail, Fort Buford State Historic Site, and the Buford-Trenton Irrigation District.

Mitigation of Surface Disturbance

To ensure that the sale of lease parcels NDM-97300-7A, NDM-97300-7B, NDM-97300-4V, NDM-97300-4H, NDM-97300-6L, NDM-97300-6M, NDM-97300-7K, NDM-97300-6J retains adequate and legally enforceable restrictions and conditions, it is recommended that sale includes Lease Notice 14-2, Lease Notice 14-14, and Cultural Resource Stipulation CR 16-1. See Appendix A for the Lease Parcel Summary Table and Appendix B for description of Lease Stipulations. In addition to specific lease stipulations, it is recommended that the BLM embraces the spirit of the North Dakota State Historical Society's recommendation, by ensuring that the area of potential effects is surveyed for cultural resources before the approval of any ground disturbance (ND SHPO Ref 15:0279).

As per Cultural Resource Stipulation CR 16-1, the BLM may require modification to exploration or development proposals to protect cultural resources. In most situations, direct impacts to cultural resources can be avoided by project redesign and/or the relocation of the surface disturbing activities (e.g., roads, well pads and pipelines, etc.). It should be noted that BLM, in consultation with the participants defined in 36 CFR 800.2, has discretionary control over mitigation measures imposed on a project. Although a lessee has a right to develop a lease, BLM may require specific mitigation measures, including but not limited to, site avoidance, excavation, or data recovery. Mitigation measures would be developed on a site-specific basis and in consultation with the participants defined in 36 CFR 800.2.

Mitigation of Visual Impacts

As per Lease Notice 14-14, the BLM may require the operator to implement specific measures to reduce the impact of oil and gas operations on historic properties and values. These measures may include, but are not limited to, project design, location, painting and camouflage. To ensure that visual impacts are considered, it is recommended at the APD stage, that a viewshed analysis be conducted and that measures are employed to mitigate the introduction of visual elements prior to the approval of any APD.

4.3.12 Native American Religious Concerns

4.3.12.1 Direct and Indirect Impacts

The transfer, lease, or sale of property can only affect areas of religious or cultural significance to Indian tribes when the transfer out of Federal ownership or control occurs without adequate and legally enforceable restrictions or conditions. The purchaser of a lease is entitled to develop the parcel consistent with lease stipulations, but must have an approved Application for Permit to Drill (APD), including a plan of operations, before ground disturbing activities can begin. Leasing the parcels would have no direct or indirect impacts on areas of religious or cultural importance, would not interfere with the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act (AIRFA) or EO 13007, and would not prevent Indian tribes from visiting sacred sites or prevent possession of sacred objects.

The potential impacts of approving an APD are caused by the surface disturbing activities associated with exploration and development. The drilling of a well and the construction of an oil well pad have the potential to negatively affect properties of religious or cultural significance. In addition, the introduction of a well pad and the hazards associated with oil extraction may interfere with the performance of traditional ceremonies and rituals pursuant to the AIRFA. The construction of an oil well pad may also limit access to sacred sites or prevent possession of sacred objects.

The approval of an APD can indirectly impact properties of religious or cultural significance by approving a project that increases soil erosion or causes change in traffic patterns which increase the likelihood of looting and vandalism.

Under the BLM proposed Alternative B, eight lease parcels (NDM-97300-7A, NDM-97300-7B, NDM-97300-4V, NDM-97300-4H, NDM-97300-6L, NDM-97300-6M, NDM-97300-7K, NDM-97300-6J) totaling 1128.24 acres would be offered with RMP lease stipulations and /or lease notices as necessary for competitive oil and gas lease sale and lease issuance (Appendix A).

Based on article, *The Remaking of Lake Sakakawea: Locating Cultural Viability in Negative Heritage on the Missouri River* by Murray et al., the Missouri River is of religious and cultural significance to the Mandan, Hidatsa, and Arikara Nation. Parcel NDM 97300-7K lies on and within the viewshed of the Missouri River. The lease development has the potential to introduce visual, atmospheric, and audible elements that could adversely affect the scenic quality and cultural integrity of the Missouri River.

To ensure that the sale of lease parcels NDM-97300-7A, NDM-97300-7B, NDM-97300-4V, NDM-97300-4H, NDM-97300-6L, NDM-97300-6M, NDM-97300-7K, NDM-97300-6J retains

adequate and legally enforceable restrictions and conditions, it is recommended that Lease Notice 14-2, Lease Notice 14-14, and Cultural Resource Stipulation CR 16-1 be applied to each parcel. See Appendix A for the Lease Parcel Summary Table and Appendix B for description of Lease Stipulations. In addition to specific Lease Stipulations, it is recommended that the BLM complies with the State Historical Society's recommendation that the lease parcels be surveyed for cultural resources prior to ground disturbance (ND SHPO Ref 15:0279).

As per Lease Notice 14-14, the BLM may require the operator to implement specific measures to reduce impacts of oil and gas operations on historic properties, including properties of traditional religious and cultural importance to an Indian tribe (36 CFR 800.16(l)(1)). These measures may include, but are not limited to, project design, location, painting and camouflage. To ensure that visual impacts are considered, it is recommended at the APD stage, that a viewshed analysis be conducted and that measures are employed to mitigate the introduction of visual elements prior to the approval of any APD.

In addition, the application of Cultural Resources Lease Stipulation 16-1 ensures that BLM's obligations under NHPA, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, and other statutes as applicable will be met. As per Cultural Resource Stipulation CR 16-1, the BLM may require modification to exploration or development proposals to protect cultural resources. In most situations, direct impacts to cultural resources, including properties of traditional religious and cultural importance to an Indian tribe, will be avoided by project redesign and/or relocating the surface disturbing activities (e.g., roads, well pads and pipelines, etc.). It should be noted that BLM, in consultation with the participants defined in 36 CFR 800.2, has discretionary control over mitigation measures imposed on a project. Though a lessee has a right to develop a lease, BLM may require specific mitigation measures, including but not limited to, site avoidance, excavation, or data recovery. Mitigation measures would be developed on a site-specific basis and in consultation with the participants defined in 36 CFR 800.2.

Lastly, when there is a reasonable indication of tribal concerns in the area in question based on previous correspondence or discussions with tribal governments, published ethnographic studies, or other credible known information, BLM Washington Office Instruction Memorandum 2005-003 requires that additional consultation occurs at the APD stage on a case-by-case basis.

4.3.13 Paleontology

4.3.13.1 Direct and Indirect Impacts

Leasing the parcels would have no direct impacts on paleontological resources. Any potential effects from the sale of leases would occur at the time the leases are developed.

Indirect impacts from the sale of leases would be from the surface disturbances associated with oil and gas exploration and development activities. It is anticipated that most significant fossil resources are located in those geologic units with a Potential Fossil Yield Classification (PFYC) of 3 or higher. However, significant fossil resources could be discovered anywhere. Surface-disturbing activities could potentially alter the characteristics of paleontological resources through damage, fossil destruction, or disturbance of the stratigraphic context in which paleontological resources are located, resulting in the loss of important scientific data. Identified

paleontological resources could be avoided by project redesign or relocation before project approval which would negate the need for the implementation of mitigation measures.

Conversely, surface-disturbing activities could potentially lead to the discovery of paleontological localities that would otherwise remain undiscovered due to burial or omission during review inventories. The scientific retrieval and study of these newly discovered resources would expand our understanding of past life and environments of North Dakota.

The application of lease terms, including the paleontological no surface occupancy stipulation (NSO 11-12), and the paleontological lease notices (LN 14-3 and LN 14-12) at leasing, provides protection to paleontological resources during development. The paleontological lease notice LN 14-12 is applied to those lease parcels that fall within geological units with a PFYC Class of 3 or higher, requiring professional assessment, which may include a field survey, prior to surface disturbance. The results of the assessment and survey by a BLM-permitted paleontologist will serve as the basis for a mitigation plan during development. If the inventory resulted in the identification of paleontological resources mitigation measures such as avoidance or salvage might be indicated.

Specific mitigation measures could include, but are not limited to, site avoidance, salvage of discovered resources, professional monitoring, and the adoption of an Unanticipated Resource Discovery Plan. Avoidance of paleontological properties would be a best management practice. However, should a paleontological locality be unavoidable, significant fossil resources must be mitigated (salvaged) prior to implementation of a project. Depending upon the rock unit involved professional monitoring by a BLM-permitted paleontologist may be required during ground disturbing activities. Also, during surface disturbance significant fossil resources could be discovered in areas that had not been surveyed (PFYC of less than 3). Those resources must also be reported and professionally mitigated, so to limit delays in the project an approved Unanticipated Resource Discovery Plan should be developed that outlines the steps to take in the event fossils are discovered. These mitigation measures and contingencies would be determined when site specific development proposals are received.

In order to protect paleontological resources, 7 of the parcels are recommended to have the Paleontological lease notice 14-12 applied per guidance identified in IM 2009-011 and 2008-009. One parcel has the general lease notice 14-3. No parcels are recommended for the no surface occupancy lease stipulation (NSO 11-12) based upon paleontological resources. See section 3.10 Paleontology for list of parcels.

4.3.13.2 Cumulative Impacts

The CIAA for paleontological resources can take into account past, present, and foreseeable leasing actions. There are no impacts to paleontological resources due to leasing, however lease development that includes ground-disturbing actions could impact the resource. The cumulative impact to paleontological resources could be very adverse if proper mitigation is not done at the same time. It is currently unknown what the impact of past lease development is in terms of disturbing and destroying paleontological resources. However, lease development that lacked adequate mitigation measures and oversight by qualified professional paleontologists may have resulted in significant resource loss in the immediate aftermath of

development. Continuing impacts could result from ground disturbance that increased bedrock exposure and increased erosion, leading to a long-term threat of loss of the paleontological resources through weathering. Conversely, with professional mitigation, lease development could have a positive impact on the resource through the salvage of informative scientific specimens and information that might otherwise have been overlooked.

4.3.14 Visual Resources

4.3.14.1 Direct and Indirect Impacts

Leasing the parcels would have no direct impacts on visual resources. Any potential Impacts from the sale of leases could occur at the time the leases are developed. Development of a lease parcel could result in some level of modification to the existing landscape at the time of development.

All new oil and gas development would implement, as appropriate for the site, BLM BMP's for VRM, regardless of the VRM class. This includes, but would not be limited to, proper site selection, reduction of visibility, minimizing disturbance selecting color(s)/color schemes that blend with the background and reclaiming areas that are not in active use. Repetition of form, line, color and texture when designing projects would reduce contrasts between landscape and development. Wherever practical, no new development would be allowed on ridges or mountain tops. Overall, the goal would be to not reduce the visual qualities or scenic value that currently exists.

4.3.14.2 Cumulative Impacts

Continued oil and gas develop activities, combined with other surface disturbing activities, will cumulatively impact the visual resource in the NDFO. Use of BMPs during development will help reduce long term impacts.

4.3.15 Recreation and Travel Management

4.3.15.1 Direct and Indirect Impacts

Leasing the parcels would have no direct impacts on recreation and travel management. Any potential impacts from the sale of leases could occur at the time the leases are developed.

Recreation indirect impacts could exist where oil and gas development and recreational user conflicts could occur. More specifically, in areas of high oil and gas development potential, there could be user conflicts between motorized recreationists (OHV activities), hunting, target shooting, camping, fishing, river use, picnicking, and winter activities (e.g., snowmobiling) and associated oil and gas activities. These impacts could exist in both the short-term (exploration and construction phases of oil and gas development) and in the long-term (producing wells, maintenance of facilities, etc.). Oil and gas wells, equipment, and facilities could affect the general solitude (space and noise) and scenic value of the area.

Areas frequented by recreationists, where there is other land use activities occurring, in addition to oil and gas development, the public could perceive these areas as inaccessible or unavailable because of the existing facilities. As oil and gas development occurs, new routes are created which often attract recreationists seeking additional or new areas to explore for motorized recreational opportunities. Motorized recreational opportunities could be enhanced through the

additional opportunities to explore; however, user conflicts and public safety issues could result from the use of the new travel routes. The creation of routes from oil and gas activities could lead to a proliferation of user-created motorized routes, resulting in adverse impacts to the scenic qualities of the area and increased level of surface disturbance.

For those areas with isolated tracks of BLM public lands that generally do not have existing public access, recreation opportunities that occur in these areas are limited to use with adjacent land owner permission or hunting by an outfitter; therefore, oil and gas activities would have little or no impact on recreational experiences in these isolated tracks.

Foreseeable changes in recreation use levels would be an increase on the demand for recreational use of public land. Increases could be expected in, but not limited to, hunting, fishing, hiking, camping, wildlife viewing, and dispersed recreational uses. This could increase the incidence of conflict between recreationists involved in motorized activities and non-motorized activities.

4.3.15.2 Cumulative Impacts

Continued oil and gas field development, in conjunction with other forms of energy development and other surface disturbing activities, could cumulatively impact the recreation experience through the potential displacement of some game species; increased potential for conflict with other uses and users.

4.3.16 Lands and Realty

4.3.16.1 Direct and Indirect Impacts

Leasing the parcels would have no direct impacts on lands and realty. Any potential impacts from the sale of leases could occur at the time the leases are developed.

Under this alternative 8 parcels that include 1,164.26 surveyed surface acres of which 49.36 surveyed acres are BLM administered surface and 1,114.9 surveyed acres are Non-Federal surface would be offered for lease.

None of the parcels have authorized BLM Rights-of Way (ROWs) approved on BLM administered surface. Additional ROWs could be required across Federal surface for “off-lease” or third party facilities required for potential development of the parcels.

4.3.17 Fluid Minerals

4.3.17.1 Direct and Indirect Impacts

Leasing the parcels would have no direct impacts on fluid minerals. Any potential effects from the sale of leases could occur at the time the leases are developed.

Hydraulic fracturing (known as “fracking” in the oil and gas industry) is a process that uses high pressure pumps to develop pressure at the bottom of a well to crack the hydrocarbon formation. This aids extraction of oil and gas deposits that might be left behind by conventional oil and gas drilling and pumping technology. Hydraulic fracturing (HF) is a 60-year-old process that is now being used more commonly as a result of advanced technology. Wells are often treated during completion to improve the recovery of hydrocarbons by increasing the rate and volume of hydrocarbons moving from the natural oil and gas reservoir into the wellbore. These processes

are known as well-stimulation treatments, which create new fluid passageways in the producing formation or remove blockages within existing passageways. They include fracturing, acidizing, and other mechanical and chemical treatments often used in combination. The results from different treatments are additive and complement each other. This makes it possible to introduce fluids carrying sand, walnut hulls, or other small particles of material into the newly created crevices to keep the fractures open when the pressure is relieved. This process increases the flow rate and volume of reservoir fluids that move from the producing formation into the wellbore. The fracking fluid is typically more than 99 percent water and sand, with small amounts of readily available chemical additives used to control the chemical and mechanical properties of the water and sand mixture.

North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division, is responsible for the enforcement of laws, rules, and regulations dealing with conservation of oil and gas. In the North Dakota Century Code, (effective April 1, 2012) NDCC 38-08-04, chapter 43-02-03, it states the commission, its agents, representatives, and employees are charged with the duty and obligation of enforcing all rules and statutes of North Dakota relating to the conservation of oil and gas.

Regarding HF stimulation, at chapter 43-02-03-27.1 there is a detailed discussion of HF stimulation performed through a frac string run inside the intermediate casing string. It outlines the depth at which the frac string must be run, pressurization and monitoring during frac operations; pressure relief valves on the treating line to limit the volume of flowback fluid; diversion lines from intermediate casings to a pit or containment vessel in case of frac string failure; remote operated frac valve between the treating line and the wellhead; posting on fracfocus chemical disclosure registry website.

The chapter continues with a discussion of HF stimulation performed through an intermediate casing string and gives criteria when a frac string must be run inside the intermediate casing. It details the maximum treating pressure; depth for verification of wall thickness of the intermediate casing and visual inspection with photographs of the top joint of the intermediate casing and wellhead flange; depth for verification of cementing of the intermediate casing; depth, duration, and criteria of pressure testing; criteria when a wellhead and blowout preventer system must be used; pressure relief valves on the treating line to limit the volume of flowback fluid; diversion lines from intermediate casings to a pit or containment vessel in case of frac string failure; remote operated frac valve between the treating line and the wellhead; posting on fracfocus chemical disclosure registry website.

Finally, the chapter discusses the measuring the pressure in the intermediate casing-surface casing annulus. If the pressure exceeds three hundred fifty pounds per square inch, the owner or operator notifies the director as soon as practicable following the incident.

To ensure that HF is conducted in a safe and environmentally sound manner, the BLM approves and regulates all drilling and completion operations, and related surface disturbance on Federal public lands. Operators must submit Applications for Permit to Drill (APDs) to the agency. Prior to approving an APD, the BLM identifies all potential subsurface formations that will be penetrated by the wellbore. This includes all groundwater aquifers and any zones that would

present potential safety or health risks that may need special protection measures during drilling, or that may require specific protective well construction measures.

Once the geologic analysis is completed, the BLM reviews the company's proposed casing and cementing programs to ensure the well construction design is adequate to protect the surface and subsurface environment, including the potential risks identified by the geologist and all known or anticipated zones with potential risks.

Before HF takes place, (in accordance with State of North Dakota law) all surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface. The cemented well is pressure tested to ensure there are no leaks and a cement bond log is run to ensure the cement has bonded to the casing and the formation. If the fracturing of the well is considered to be a "non-routine" fracture for the area, the BLM will always be onsite during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use would have the greatest effects on oil and gas exploration and development. Leases issued with major constraints such as no surface occupancy may decrease some lease values, increase operating costs, and, to a lesser extent, require relocation of well sites and modification of field development. Leases issued with moderate constraints such as timing limitations and controlled surface use stipulations may result in similar but reduced impacts and delays in operations and uncertainty on the part of operators regarding restrictions.

Under the Proposed Action, all of the lease parcel areas would be recommended for oil and gas leasing at this time. Approximately 99 percent of the areas would be offered for lease subject to major constraints. Approximately 1 percent would be offered for lease subject to moderate constraints. No parcels would be offered for lease subject only to standard terms and conditions.

If areas are deferred, some development plans could be delayed, relocated, or completely dropped because of the need to include federal acreage as part of an exploration or development plan.

4.3.18 Social Conditions and Environmental Justice

4.3.18.1 Direct and Indirect Impacts

Leasing the parcels would have no direct impacts on social resources. Any potential impacts from the sale of leases could occur at the time the leases are developed.

While the act of leasing Federal minerals itself would result in no social impact, subsequent exploration and development may generate impacts to people living near or using the area in the vicinity of the lease. Exploration, drilling or production could create an inconvenience to people living adjacent to leases due to increased traffic and traffic delays, and light, noise and visual impacts. This could be especially noticeable in rural areas where oil and gas development has not occurred previously. The amount of inconvenience would depend of the activity affected, traffic patterns within the area, noise and light levels, length of time and season these activities occur, etc. In addition, competition for housing could occur in some communities. However, residents living in areas that have been experiencing ongoing population losses may support the increased

employment and population related to oil and gas development. Residents of counties where the development actually occurs would also benefit from the additional revenues to counties due to oil and gas leasing and development.

There were no environmental justice populations identified in the counties with parcels in this lease sale, so therefore there would be no disproportionate effects to low income or minority populations.

4.3.18.2 Cumulative Impacts

The cumulative impact analysis area for social and environmental justice conditions is the five counties that have parcels for lease. Potential development of these lease sale parcels would have minor contribution to overall development in the area given the large extent of private minerals being developed.

Oil and gas development is anticipated to grow in the region regardless of the BLM's leasing decision because of activity on state and private lands. While not leasing federal minerals can affect the recoverability of surrounding mineral estates, these parcels are not anticipated to have much of an effect on the future development of fluid minerals in these areas.

4.3.19 Economics

4.3.19.1 Direct and Indirect Impacts

Under Alternative B, 8 new parcels totaling 1,164 acres of federal minerals would be leased in Bowman, Burke, Divide, Golden Valley, and Williams counties. Based on the average price per acre in recent North Dakota lease sales, these leases could generate more than \$144,300 in federal revenue. Forty-nine percent of these federal revenues will be allocated back to the State of North Dakota. Under Alternative B, leasing the 8 nominated parcels could generate more than \$70,000 in federal revenues distributed back to North Dakota. Half of these revenues would go towards ND public school, while the other half would be returned to Bowman, Burke, Divide, Golden Valley, and Williams counties. This would equate to an additional \$35,000 in local public revenue to fund public infrastructure and services in these counties.

In addition to one-time bonus bids, the leasing of these additional parcels would generate an additional \$200 in mineral rent on annual average until the leases either expired or become held by production. Similar to bonus bid revenues, 49 percent of these federal revenues would be distributed back to the State of North Dakota. Half of these revenues would go towards ND public school, while the half would be returned to these five counties. Local governments' share of these revenues would equate to roughly \$50 per year.

Leasing an additional 1,164 acres of federal minerals would not affect local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), and economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates). The redistribution of federal revenue from leasing these parcels will provide local governments with additional funds for enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and keeping records. Other county functions that could be funded include operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems. Local education would continue to receive the largest share of these funds.

Salary and non-salary expenditures funded with redistributed federal revenue from leasing these parcels will ripple through the local economy stimulating economic activity. It is estimated that these public revenues would not support additional local jobs but would support approximately \$12,700 in labor income across the 9 counties which make up the local economy. While contributions would likely be largest in the five counties leasing these parcels, some of this economic activity will leak out into Billings, McKenzie, Slope, and Stark counties, generating employment and local income in communities providing good, services, and commuting workers.

4.3.19.2 Cumulative Impacts

As highlighted in table 4.2.3.1, leasing nominated BLM administered minerals under Alternatives B and C would generate new federal, state, and local public revenues. While 51 percent of these revenues would remain within the federal government, North Dakota could receive some funds from the redistribution of federal mineral leasing revenues under these alternatives. Revenues associated with leasing activities associated with the July 2015 sale would provide additional funding to primary and secondary education across the state, and for public infrastructure and services in Bowman, Burke, Divide, Golden Valley, and Williams counties. Local government spending of these monies will generate small amounts of economic activity in the economy, but are unlikely to alter the underlying business patterns and demographics characteristic of the region's economic structure. Most of the employment and income would be associated with payments to the five counties with nominated parcels.

4.3.20 Special Designations

4.3.20.1 National Historic/Scenic Trails

Lease parcel NDM 97300 -7K is located within the viewshed of the Lewis and Clark National Historic Trail. Indirect effects from lease development on the landscape would have the potential to introduce visual impacts that would adversely affect the scenic quality and historical integrity of the trail.

Potential effects from surface disturbances associated with exploration and development activities after leasing have the potential to alter the characteristics of the significant Lewis and Clark National Historic Trail cultural and historic property by diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Other effects to the Lewis and Clark National Historic Trail cultural resource from proposed surface disturbance activities include the destruction, damage, or alteration to all or part of the cultural resource and diminishing the property's significant historic features as a result of the introduction of visual, atmospheric, or audible elements. This could alter or diminish the elements of the National Register eligible property and diminish the property's eligibility status. Cultural resource investigations associated with development potentially adds to our understanding of the prehistory/history of the area and discovery of sites that would otherwise remain undiscovered due to burial or omission.

The mitigation measures for the Lewis and Clark National Historic Trail would be the same as those described in Sections 4.3.11 Cultural Resources (Cultural Resource Lease Stipulation CR 16-1), Lease Notice 14-14 (Cultural Visual Setting). Other recommended resource stipulations

for lease parcel NDM 97300 -7K would also contribute to the mitigation of potential adverse effects (See Appendix A and B), in particular NSO 11-39, which stipulates No Surface Occupancy within the flood plain of the Missouri River.

4.3.20.2 Areas of Critical Environmental Concern (ACECs)

None of the 8 parcels are situated within a proposed or designated Area of Critical Environmental Concern (ACEC). There will be no affect to ACEC's through the proposed alternative.

4.4 Alternative C – BLM Preferred

Under Alternative C, 7 parcels totaling 1,124.24 surveyed Federal mineral acres (49.36 surveyed BLM administered surface and 1074.88 surveyed private surface) would be offered for competitive oil and gas lease sale. The remaining lease parcels encompassing 40.02 surveyed Federal mineral acres (40.02 surveyed non-federal surface) would be deferred pending further review.

4.4.1 Direct Impacts Common to All Resources

The action of leasing the parcels in Alternative C would not directly impact the resources. The only direct impacts of leasing are the creation of valid existing right and revenue generated by the lease sale receipts.

4.4.2 Indirect Impacts Common to All Resources

Indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent due to approximately 40.02 acres of parcels proposed for deferral pending further review.

Any potential Impacts on resources from the sale of leases would occur during lease exploration and development activities, which would be subject to future BLM decision-making and NEPA analysis upon receipt of an APD or sundry notice.

Oil and gas exploration and development activities such as construction, drilling, production, infrastructure installation, vehicle traffic and reclamation could be indirect Impacts from leasing the lease parcels in Alternative B. As mentioned above, it is speculative to make assumptions about whether a particular lease parcel would be sold and, even if so, it is speculative to assume 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.

For the purposes of this EA and based on the location of these parcels in the Williston Basin, any future development activity that would occur would probably be oil production. Short-term disturbance would be 2.9 acres for access roads and flow lines and four acres per well pad. Long-term disturbance would be 1.5 acres for access roads and 1.75 acres per well pad. Many of the parcels would probably require the formation of a communitization agreement (CA) to

facilitate development. A CA provides for the pooling of federal and/or Indian lands, with other lands, when separate tracts under such federal and Indian lands cannot be independently developed and operated in conformity with an established well-spacing program. Actual well drilling and surface disturbance activity may occur on fee or state lands, not on the federal lease parcels.

4.4.3 Cumulative Impacts Common to All Resources

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent due to approximately 40.02 acres of parcels proposed for deferral pending further review.

Environmental consequences are discussed below to the extent possible at this time for the resources described in Chapter 3. As per NEPA regulations at 40 CFR 1502.14(f), 40 CFR 1502.16(h), and 40 CFR 1508.20, mitigation measures to reduce, avoid, or minimize potential impacts are identified by resource below in Appendix C, Mitigation and Best Management Practices.

4.4.4 Air Resources

4.4.4.1 Air Quality

4.4.4.1.1 Direct and Indirect Impacts

Air quality impacts would likely be slightly less than those for Alternative B. Fewer leased acres would likely result in less future development and fewer emissions than Alternative B.

4.4.4.1.2 Cumulative Impacts

Cumulative impacts to air quality would likely be slightly less than those for Alternative B. Fewer leased acres would likely result in less future development and fewer emissions than Alternative B.

4.4.4.2 GHG Emissions

4.4.4.2.1 Direct and Indirect Impacts

Alternative C CO₂e emissions are estimated to be 22 mtpy less than those for Alternative B.

4.4.4.2.2 Cumulative Impacts

CO₂e emissions are estimated to be 22 metric tons/year less than Alternative B.

4.4.4.3 Climate Change

4.4.4.3.1 Direct and Indirect Impacts

Under Alternative C, climate change impacts would likely be slightly less than those for Alternative B.

4.4.4.3.2 Cumulative Impacts

Due to the slight decrease in CO₂e emissions under Alternative C, cumulative climate change impacts on resources would be imperceptibly less than those for Alternative B.

4.4.5 Soil Resources

4.4.5.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 82 percent due to approximately 6,549 acres of parcels proposed for deferral pending further review. Less than one percent of the soils rated as low potential for restoration would be deferred. There are no CSU 12-1 soils stipulations applied to the deferred parcels. Soils are the same as those described in the Affected Environment section 3.3.

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

Mitigation would be the same as Alternative B.

4.4.5.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

4.4.6 Water Resources

4.4.6.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

The potentially impacted acres on water resources would be decreased by 40.02 acres.

4.4.6.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

The potentially impacted acres on water resources would be decreased by 40.02 acres.

4.4.7 Vegetation Resources

4.4.7.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3%, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

4.4.7.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3%, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

4.4.8 Riparian-Wetland Habitats

4.4.8.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of the lease parcels

proposed for deferral pending further review.

The potentially impacted acres on riparian resources would be decreased by 40.02 acres.

4.4.8.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

The potentially impacted acres on riparian resources would be decreased by 40.02 acres.

4.4.9 Special Status Plant Species

4.4.9.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3%, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

4.4.9.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3%, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

4.4.10 Wildlife & Fisheries/Aquatics

4.4.10.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3.5 percent, due to 40.02 acres of the lease parcels proposed for deferral pending further review.

At this stage (lease sale), there are no impacts to fish and wildlife. Impacts (both direct and indirect) could occur if and when the lease is developed in the future. The potential impacts would be analyzed on a site-specific basis at the APD stage prior to development.

Should any or all of the nominated parcels be developed in the future, it is expected there would be limited impacts as stated above. However, the BLM would address applications for permits to drill on a case-by-case basis where clear, precise locations can be analyzed for potential impacts. Currently, special stipulations would be placed on the lease nominations where applicable to facilitate resource protection (refer to Appendix A).

4.4.10.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 1 whole parcels parcel pending further review. If the remaining lease parcels are developed, potential additional cumulative impacts to wildlife would occur over less area than what is described in Alternative B.

4.4.11 Cultural

4.4.11.1 Direct and Indirect Impacts

Under the BLM preferred Alternative C, seven lease parcels (NDM-97300-7A, NDM-97300-7B, NDM-97300-4V, NDM-97300-4H, NDM-97300-6L, NDM-97300-6M, NDM-97300-7K) totaling 1124.24 acres would be offered with RMP lease stipulations and /or lease notices as necessary for competitive oil and gas lease sale and lease issuance (Appendix A).

The deferment of lease parcel NDM-97300-6J would not affect the analysis described in section 4.3.11.1. Consequently, the potential impacts of Alternative C are the same as Alternative B.

The deferment of lease parcel NDM-97300-6J would not affect the analysis described in section 4.3.11.1. Consequently, the mitigations described in section 4.3.11.1 and 4.3.11.1 are the same for Alternative C.

4.4.12 Native American Religious Concerns

4.4.12.1 Direct and Indirect Impacts

Under the BLM preferred Alternative C, seven lease parcels (NDM-97300-7A, NDM-97300-7B, NDM-97300-4V, NDM-97300-4H, NDM-97300-6L, NDM-97300-6M, NDM-97300-7K) totaling 1078.88 acres would be offered with RMP lease stipulations and /or lease notices as necessary for competitive oil and gas lease sale and lease issuance (Appendix A).

The deferment of lease parcel NDM-97300-6J would not affect the analysis described in section 4.3.12.1. Consequently, the potential impacts of Alternative C are the same as Alternative B.

The deferment of lease parcel NDM-97300-6J would not affect the analysis described in section 4.3.12.1. Consequently, the mitigations described in section 4.3.12.1.1 are the same for Alternative C.

4.4.13 Paleontology

4.4.13.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of lease parcels proposed for deferral pending further review. Specifically, impacts would not occur on the lease parcels in whole or part proposed for deferral.

4.4.13.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of lease parcels proposed for deferral pending further review. Specifically, impacts would not occur on the lease parcels in whole or part proposed for deferral.

4.4.14 Visual Resources

4.4.14.1 Direct and Indirect Impacts

Under this alternative, 7 whole parcels that include 1,124.24 surveyed surface acres of which 49.36 acres are BLM administered surface and 1,074.88 acres are non-federal surface would be offered for lease.

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced, due to approximately 40.02 surface acres of 1 lease parcels being proposed for deferral, pending further review. The parcel proposed for deferral consists of

40.02 non-federal surface acres.

4.4.14.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

4.4.15 Recreation and Travel Management

4.4.15.1 Direct and Indirect Impacts

Under this alternative, 7 parcels that include 1,124.24 surveyed surface acres of which 49.36 acres are BLM administered surface and 1,074.88 acres are non-federal surface would be offered for lease.

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced, due to approximately 40.02 nonfederal surface acres of 1 lease parcel being proposed for deferral, pending further review. The parcels or portions of parcels proposed for deferral consist entirely of non-federal surface acres.

There are no Special Recreation Management Areas or current Travel Management Areas within any of the proposed leased areas or deferred areas.

4.4.15.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

4.4.16 Lands and Realty

4.4.16.1 Direct and Indirect Impacts

Under this alternative, 7 parcels that include 1,124.24 surveyed surface acres of which 49.36 acres are BLM administered surface and 1,074.88 acres are non-federal surface would be offered for lease.

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced, due to approximately 40.02 nonfederal surface acres of 1 lease parcel being proposed for deferral, pending further review.

None of the parcels have authorized BLM Rights-of Way (ROWs) approved on BLM administered surface. Additional ROWs could be required across Federal surface for “off-lease” or third party facilities required for potential development of the parcels.

4.4.17 Fluid Minerals

4.4.17.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3%, due to approximately 40.02 nonfederal surface acres of 1 lease parcel being proposed for deferral, pending further review. The remaining 7 lease parcels would be offered for lease subject to major (NSO) or moderate (CSU) constraints and/or standard lease terms and conditions.

Deferring lease parcels would result in delays of some development plans, relocation of development to state or private leases, or completely eliminate development plans because of the need to include federal acreage as part of a plan. In addition, less natural gas or crude oil would enter the public markets.

4.4.18 Social Conditions and Economic Justice

4.4.18.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B but potentially to a lesser degree with a reduction in acres.

4.4.18.2 Cumulative Impacts

While the act of leasing federal minerals itself would result in no social impacts, subsequent development of a lease may generate impacts to people living near or using the area in the vicinity of the lease. Impacts associated with Alternative C would be similar to Alternative B, but may be on a smaller scale given the reduced number of parcels for sale. However, it is possible that development may occur at the same pace as in Alternative B if companies move to private minerals.

Oil and gas development is anticipated to grow in the region regardless of the BLM's leasing decision because of activity on state and private lands. While not leasing federal minerals can affect the recoverability of surrounding mineral estates, these parcels are not anticipated to have much of an effect on the future development of fluid minerals in these areas.

4.4.19 Economics

4.4.19.1. Direct and Indirect Impacts

Under Alternative C, 7 new parcels totaling 1,124 acres of federal minerals would be leased in Bowman, Burke, Divide, Golden Valley, and Williams counties. Based on the average price per acre in recent North Dakota lease sales, these leases could generate more than \$139,000 in federal revenue. Forty-nine percent of these federal revenues will be allocated back to the State of North Dakota. Under Alternative C, leasing the 7 nominated parcels could generate more than \$68,000 in federal revenues distributed back to North Dakota. Half of these revenues would go towards ND public school, while the other half would be returned to Bowman, Burke, Divide, Golden Valley, and Williams counties. This would equate to an additional \$34,000 in local public revenue to fund public infrastructure and services in these counties.

In addition to one-time bonus bids, the leasing of these additional parcels would generate an additional \$200 in mineral rent on annual average until the leases either expired or become held by production. Similar to bonus bid revenues, 49 percent of these federal revenues would be distributed back to the State of North Dakota. Half of these revenues would go towards ND public school, while the other half would be returned to these 9 counties. Local governments' share of these revenues would equate to nearly \$50 annually.

Leasing an additional 1,124 acres of federal minerals would not affect local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), and economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates). The redistribution of

federal revenue from leasing these parcels will provide local governments with additional funds for enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and keeping records. Other county functions that could be funded include operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems. Local education would continue to receive the largest share of these funds.

Salary and non-salary expenditures funded with redistributed federal revenue from leasing these parcels will ripple through the local economy stimulating economic activity. It is estimated that these public revenues would not support additional local jobs but would support approximately \$12,300 in labor income across the 9 counties which make up the local economy. While contributions would likely be largest in the five counties leasing these parcels, some of this economic activity will leak out into Billings, McKenzie, Slope, and Stark counties, generating employment and local income in communities providing good, services, and commuting workers.

4.4.19.2 Cumulative Impacts

Direct and indirect impacts would be similar to Alternative B. Under this alternative, the cumulative Impacts of federal mineral leasing within the local economy as well as the specific impacts of leasing an additional 1,124 acres are summarized in Table 4.2.3.1 and Table 4.2.3.2. These tables also display in comparative form the cumulative Impacts of alternatives A, B, and C.

4.4.20 Special Designations

4.4.20.1 Direct and Indirect Impacts

Under this alternative, 7 whole parcels would be offered for lease totaling 1,124.24 surveyed surface acres of which are 49.36 BLM administered surface and 1,074.88 acres of non-federal surface.

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3% due to approximately 40.02 surface acres of 1 lease parcels being proposed for deferral, pending further review. The parcels or portions of parcels proposed for deferral consist of 40.02 non-federal surface acres.

4.4.20.2 Cumulative Impacts

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 3 percent, due to approximately 40.02 acres of the lease parcels proposed for deferral pending further review.

5.0 Consultation and Coordination

5.1 Persons, Agencies, and Organizations Consulted

BLM has coordinated with NDGF, Theodore Roosevelt National Park, and Lewis and Clark National Historic Trail in the completion of this EA in order to prepare analysis, identify protective measures, and apply stipulations associated with these parcels being analyzed.

The BLM consults with Native Americans under Section 106 of the National Historic

Preservation Act (NHPA). A packet that included a formal cover letter, an official list and maps of the lease parcels, and Class I site and survey information for each lease parcel were sent certified mail to the tribal historic preservation officer (THPO) and tribal chairmen for each of the Turtle Mountain Band of the Chippewa (TMBC) Tribe; the Standing Rock Sioux Tribe (SRST); the Mandan Hidatsa, and Arikara Nation (MHAN); the Spirit Lake Tribe of Fort Totten, ND; the Northern Cheyenne Tribe, of Lamedeer MT; and the Lower Sioux Indian Community of Morton, MN. BLM will send a second letter to the tribes informing them about the 30 day public comment period for the EA and soliciting any information BLM should consider before making a decision whether to offer any or all of the parcels for sale.

5.2 Summary of Public Participation

5.2.1 Scoping

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posting on the field office website NEPA notification log. Scoping was initiated December 15, 2014. 5 scoping responses were received during the scoping period that ended on December 30, 2014.

We received a response from SHPO recommending cultural surveys on all parcels prior to ground disturbance. Western Energy Alliance responded with a letter in support of leasing of all 8 parcels stating that the existing stipulations that would be applied would be sufficient to address resource concerns. Comments from Theodore Roosevelt National Park stated that they do not expect direct impacts to the Elkhorn unit in terms of visual degradation, as the Elkhorn Ranch Unit is about 4 miles east from the eastern most parcel. They did comment that impacts to the natural quiet, wildlife, natural sound, and public safety should be considered in the EA. We received comments from the NPS- Lewis and Clark National Historic Trail. They expressed concern about impacts from development in the area of the trail and recommended LN 14-14 for parcel NDM97300-7K. The trail is about .1 mile from the parcel. They also stated that analysis should take into consideration direct, indirect, and cumulative impacts of leasing on or near the trail. We also received comments from the North Dakota Game and Fish Department with recommendations on mitigating wildlife concerns for each parcel

5.2.2 Public Comment Period

On February 9, 2015, the EA, along with an unsigned Finding of No Significant Impact (FONSI), were made available for a 30-day public comment period. Notification letters were distributed to external entities, local agencies, and tribes to explain that an EA and the unsigned FONSI were available for review and comment. Tribes also received a copy of the EA and unsigned FONSI for their review.

Only one response was received during the comment period from Northern Cheyenne Tribe requesting additional information. No changes have been made to the EA based on comment period responses.

After the 30-day protest period, but before lease issuance, the BLM will issue the Decision Record and signed Finding of No Significant Impact for this EA. This information, along with other updates and Lease Sale Notice information, can be found on the Montana/Dakotas BLM website http://www.blm.gov/mt/st/en/prog/energy/oil_and_gas/leasing/leasesaleinfo.html.

Current and updated information about our EAs, Lease Sale Notices, and corresponding information pertaining to this sale can be found at the link referenced above.

5.3 List of Preparers

Table 20. List of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
Susan Bassett	Air Specialist	Air Resources
Tim Zachmeier	Wildlife Biologist	Wildlife
Chris Robinson	Hydrologist	Water Resources/Riparian Vegetation
Justin Peters/Sean Berry	Archaeologist	Cultural/Special Designations
Justin Peters/Sean Berry	Archeologist	Native American Religious Concerns
Allen Ollila	Petroleum Engineer	Fluid Minerals/RFD
Jennifer Frazer	Natural Resource Specialist	GIS
Carmen Drieling	Rangeland Management Specialist	Livestock Grazing
Greg Liggitt	Paleontologist	Paleontology
Paul Kelley	Natural Resource Specialist	EA Lead/Forestry/ Soils /Vegetation/Lands/Realty /Recreation/VRM/Travel Management
Jessica Montag	Social Analyst	Economic Conditions, Social Conditions
Samantha Iron	Legal Land Examiner-Sale	Expressions of Interest/Lease Sale

6.0 References

- Agee, J. 1993. *Fire Ecology of Pacific Northwest Forests*. Island Press. Washington.
- Bald Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250) as amended -- Approved June 8, 1940, and amended by P.L 86-70 (73 Stat. 143) June 25, 1959; P.L. 87-884 (76 Stat. 1346) October 24, 1962; P.L. 92-535 (86 Stat. 1064) October 23, 1972; and P.L. 95-616 (92 Stat. 3114) November 8, 1978.
- Bainbridge, DA. 2007. *A Guide for Dryland Restoration: New Hope for Arid Lands*. Island Press. Washington, DC.
- Bohnenkamp, S., Finken, A., McCallum, E., Putz, A., and Goreham, G., 2011. Concerns of the North Dakota Bakken Oil Counties: Extension Service and Other Organizations' Program Responses to These Concerns. A report prepared for Center for Community Vitality, NDSU Extension Service, North Dakota State University, Fargo. Available at: <http://www.ag.ndsu.edu/ccv/documents/bakken-oil-concerns>
- Branch, K., Thompson, J., Creighton, J., and Hooper, D.A. 1982. *The Bureau of Land Management Social Effects Project: Guide to Social Assessment*.
- Burdge, R. 1983. Community needs assessment and techniques. In *Social Impact Assessment Methods*. Finterbusch, K., Llewellyn, L.G, and Wolf, C.P. (eds) Sage Publications, Inc. pp. 191-193.
- Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. *International recovery plan for the whooping crane*. Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 162 pp.
http://ecos.fws.gov/docs/recovery_plan/070604_v4.pdf
- CCSP. 2008. *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States*. U.S. Climate Change Science Program (CCSP). May.
- CEQ, 1997. *Environmental Justice: Guidance under the National Environmental Policy Act*. Council for Environmental Quality (CEQ).
- CRS. 2007. *State Greenhouse Gas Emissions: Comparison and Analysis*. Congressional Research Service (CRS). December 5.
http://assets.opencrs.com/rpts/RL34272_20071205.pdf
- Dale, B.C., T.S. Wiens, and L.E. Hamilton. 2009. Abundance of three grassland songbirds in an area of natural gas infill drilling in Alberta, Canada. Pages 194-204 in T.D. Rich, C. Arizmendi, D.W. Demarest, and C. Thompson, editors. *Proceedings of the 4th International Partners in Flight Conference*. 13-16 February 2008. McAllen, Texas.
<http://www.partnersinflight.org/pubs/McAllenProc/index.cfm> (9 July 2010).

- Davis, S.K. 2004. Area sensitivity in grassland passerines: effects of patch size, patch shape, and vegetation structure on bird abundance and occurrence in southern Saskatchewan. *Auk* 121:1130-1145.
- Dieni, J.S. and S.L. Jones. 2003. Grassland songbird nest site selection patterns in northcentral Montana. *Wilson Bulletin* 115:32-40.
- Distribution of Mineral Royalty by County*. (2010). Retrieved July 21, 2010 from Office of North Dakota State Treasurer: <http://www.nd.gov/ndtreas/index.htm>.
- Dohms, K.M. 2009. Sprague's Pipit (*Anthus spragueii*) nestling provisioning and growth rates in native and planted grasslands. M.S. thesis, University of Regina, Regina, Saskatchewan, Canada.
- Finsterbusch, K., 1980, Understanding social impacts—Assessing the effects of public projects: Beverly Hills, Calif., Sage Publications.
- Hagen, S.K., P.T. Isakson, and S.R. Dyke. 2005. North Dakota comprehensive wildlife conservation strategy. North Dakota Game and Fish Department. Bismarck, North Dakota <http://gf.nd.gov/conservation/cwcs.html> (12 october 2006)
- Higgins, K.F., D.E. Naugle, and K.J. Forman. 2002. A case study of changing land use practices in the Northern Great Plains, U.S.A.: an uncertain future for waterbird conservation. *Waterbirds* 25:Special Publication 2:45-50.
- Holloran, M. J, and S. H. Anderson. 2005b. Spatial Distribution of Greater Sage-Grouse nests in Relatively Contiguous Sagebrush Habitats. *The Condor*, 107:742–752.
- Holloran, M.J. 2005. Greater Sage Grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. Dissertation, University of Wyoming, Laramie, USA.
- Holloran, M.J. 2005. Greater Sage-Grouse (*Centrocercus urophasianus*) Population Response to Natural Gas Development in Western Wyoming. December, 2005. (Doctoral Dissertation, University of Wyoming). Laramie, WY. Available at: <http://www.uwyo.edu/wycoopunit/showthesis.asp?thesisid=182>.
- Holloran, M.J. and S.H. Anderson. 2005a. Greater sage-grouse population response to natural gas development in western Wyoming: are regional populations affected by relatively localized disturbances? In Wildlife Management Institute (Ed.), *Transactions from the 70th North American Wildlife and Natural Resources Conference* (March 16–19, 2005, Arlington, VA). Wildlife Management Institute.
- Igl, L.D. and D.H. Johnson. 1997. Changes in breeding bird populations in North Dakota: 1967-1992-93. *Auk* 114:74-92.

- IMPLAN, 2012. Minnesota IMPLAN Group 2013. Data for purchase and additional information can be found at www.implan.com
- IMPROVE 2014. *IMPROVE and RHR (Regional Haze Rule) Summary Data Website*. Interagency Monitoring of Protected Visual Environments (IMPROVE). Accessed on August 19, 2014.
http://vista.cira.colostate.edu/improve/Data/IMPROVE/summary_data.htm
- IPCC 2007. IPCC Fourth Assessment Report: Climate Change 2007 (AR4). Intergovernmental Panel on Climate Change (IPCC).
- IPCC 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.
- Independent Petroleum Association of America (IPAA), 2013. Oil and Gas Producing Industry in Your State 2001-2012, North Dakota.
- Jones, J., and J.R. Choate. 1978. Distribution of Two Species of Long-eared Bats of the Genus *Myotis* on the Northern Great Plains. *Prairie Naturalist* 10(2):49–52.
- Koper, N., D.J. Walker, and J. Champagne. 2009. Nonlinear effects of distance to habitat edge on Sprague's pipits in southern Alberta, Canada. *Landscape Ecology* 24: 1287-1297.
- Linnen, C.G. 2008. Effects of oil and gas development on grassland birds. Unpublished report, prepared for Petroleum Technology Alliance Canada. Saskatoon, Saskatchewan, Canada.
- Logan R. 2001. Water Quality BMPs for Montana Forests. Montana State University Extension Service. Bozeman, MT.
- Mackie, R.J., D. Pac, K. Hamlin, and G. Dusek. 1998. Ecology and Management of Mule Deer and White-tailed Deer in Montana. Fed. Aid in Wildlife Restor. Proj. W-120-R. Mont. Dept. Fish, Wildl. And Parks, Helena. 180 pgs.
- Maslin, Mark. 2004. *Global Warming: A Very Short Introduction*. Oxford University Press. New York.
- McMaster. D.G., J.H., and S.K. Davis. 2005. Grassland birds nesting in haylands of southern Saskatchewan: landscape influences and conservation priorities. *Journal of Wildlife Management* 69:211-221.
- Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755) as amended by: Chapter 634; June 20, 1936; 49 Stat. 1556; P.L. 86-732; September 8, 1960;

74 Stat. 866; P.L. 90-578; October 17, 1968; 82 Stat. 1118; P.L. 91-135; December 5, 1969; 83 Stat. 282; P.L. 93-300; June 1, 1974; 88 Stat. 190; P.L. 95-616; November 8, 1978; 92 Stat. 3111; P.L. 99-645; November 10, 1986; 100 Stat. 3590 and P.L. 105-312; October 30, 1998; 112 Stat. 2956.

Minerals Management Service (MMS). (2010). Retrieved July 21, 2010 from Total Reported Royalty by Revenues, North Dakota, FY2009: <http://www.mms.gov/index.htm>.

Morrisette, Joe, North Dakota Office of Management and Budget, 7/8/2010

Murray, Wendy Field; Maria Nieves Zedeno, Kacy L. Hollenback, Calvin Grinnel and Elgin Crows Breast. 2011. The Remaking of Lake Sakakawea: Locating Cultural Viability in Negative Heritage on the Missouri River. *American Ethnologist*, Vol. 38, No. 3:468-483.

NASS (National Agricultural Statistics Service) 2014. North Dakota Agricultural Statistics 2014. Available at:
http://www.nass.usda.gov/Statistics_by_State/North_Dakota/Publications/Annual_Statistical_Bulletin/index.asp

National Atmospheric Deposition Program (NADP) 2013. 2012 Annual Summary. NADP Data Report 2013-01. Illinois State Water Survey, University of Illinois at Urbana-Champaign, IL.

Natural Resources Conservation Service (NRCS), United States Department of Agriculture (USDA). 2012. Web Soil Survey.
<<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>>. (accessed August 1, 2012).

Natural Resources Conservation Service (NRCS), United States Department of Agriculture (USDA). 2012. Ecological Site Descriptions.
<<http://esis.sc.egov.usda.gov/Welcomes/pgReportLocation.aspx?type=ESD>> (accessed August 1, 2012).

Natural Resources Conservation Service (NRCS). United States Department of Agriculture (USDA). 2012. Soils Data Mart. < <http://soildatamart.nrcs.usda.gov/>> (accessed August 1, 2012).

North Dakota Department of Health (NDDOH) 2007. Annual Report: North Dakota Air Quality Monitoring Data Summary 2006. June 2007.

North Dakota Department of Health (NDDOH) 2008. Annual Report: North Dakota Air Quality Monitoring Data Summary 2007. June 2008.

North Dakota Department of Health (NDDOH) 2009. Annual Report: North Dakota Air Quality Monitoring Data Summary 2008. June 2009.

North Dakota Department of Health (NDDOH) 2010. Annual Report: North Dakota Ambient Monitoring Network Plan 2010. July 2010.

North Dakota Department of Health (NDDOH) 2012a. Annual Report: North Dakota Ambient Monitoring Network Plan 2010. April 2012.

North Dakota Department of Health (NDDOH) 2012b. Annual Report: North Dakota Ambient Monitoring Network Plan 2012.

North Dakota Department of Health (NDDOH) 2013. Annual Report: North Dakota Ambient Monitoring Network Plan 2013.

North Dakota Department of Health (NDDOH) 2014. Draft Annual Report: North Dakota air Quality Monitoring Data Summary 2013. August 2014.

North Dakota Department of Mineral Resources (NDDMR) 2012. Historical Annual Oil Production. Oil and Gas Division

North Dakota Office of the State Treasurer, 7/9/2010

North Dakota Petroleum Council, 2013. North Dakota Oil & Gas Industry. Facts & Figures. https://www.ndoil.org/image/cache/Facts_and_Figures_2013_9.30.pdf accessed on 1/16/2015

North Dakota QuickFacts. (2010). Retrieved July 13, 2010 from U.S. Census Bureau: <http://quickfacts.census.gov/qfd/index.html>

North Dakota State Auditor's Office, Dennis Roller, 7/13/2010

North Dakota State Historic Preservation Office (NDSHPO), Archaeology and Historic Preservation Division. *HISTORIC PRESERVATION IN NORTH DAKOTA, 2010-2015: A Statewide Comprehensive Plan*, December 2009. State Historical Society of North Dakota, <http://www.history.nd.gov/hp/plancopy.html>.

Office of Natural Resources Revenue (ONRR), Total Reported Royalty Revenues, ND 2009, 2010

Office of Natural Resource Revenue, 2013. Lease Bonus and Rent Revenue, Production, and Royalties.

Owens, R.A., and M.T. Myers. 1973. Effects of agriculture upon populations of native passerine birds of an Alberta fecue grassland. *Canadian Journal of Zoology* 51:697-713.

- Perrow, MR and AJ Davy. 2003. Handbook of Ecological Restoration: Vol. 1 Principles of Restoration. Cambridge University Press. New York, NY.
- Sutter, G.C., S.K. Davis, and D.C. Duncan. 2000. Grassland songbird abundance along roads and trails in southern Saskatchewan. *Journal of Field Ornithology* 71:110-116.
- Tack, J.D. 2010. Sage Grouse and the Human Footprint: Implications for Conservation of Small and Declining Populations. Thesis. University of Montana, Missoula, MT. USA.
- 2011 The Remaking of Lake Sakakawea: Locating Cultural Viability in Negative Heritage on the Missouri River. *American Ethnologist*, Vol. 38, No. 3:469-483.
- U.S. Census, 2014a. 2009-2013 5-Year American Community Survey, DP04: Selected Housing.
- U.S. Census, 2014b. 2009-2013 5-Year American Community Survey, B25004: Vacancy Status.
- U.S. Census, 2014c. American Community Survey and Puerto Rico Community Survey: 2013 Subject Definitions.
- U.S. Census, 2014d. Small Area Income and Poverty Estimates-About SAIPE. Available at: <http://www.census.gov/did/www/saipe/about/index.html>
- U.S. Department of Commerce. 2012. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C. Table CA05N.
- U.S. Department of the Interior Bureau of Land Management. 2010. Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management. October.
- U.S Department of the Interior Bureau of Land Management, 2012. BLM LR2000, 2010, Authorized Leases/Leases Held by Production, November 4, 2013.
- U.S Department of the Interior Bureau of Land Management, 2009. Instruction Memorandum No. MT-2009-039. 2009 Montana/Dakota's Special Status Species List.
- U.S Department of the Interior Bureau of Land Management, Instruction Memorandum No. 2003-253, August 21, 2003.
- U.S Department of the Interior Bureau of Land Management, 1988, North Dakota Resource Management Plan and Environmental Impact Statement, April 22, 1988.

- U.S. Department of the Interior Bureau of Land Management, 2009, *Oil & Gas Reasonable Foreseeable Development (RFD) Scenario*. (2009). Retrieved from Bureau of Land Management Website : http://www.blm.gov/mt/st/en/fo/north_dakota_field/rmp/RFD.html
- U.S. Department of the Interior Bureau of Land Management, 1987b, Riparian area management policy: national policy statement, January 22, 1987.
- U.S. Department of the Interior Bureau of Land Management, June 2003, Record of Decision: Off-Highway Vehicle Environmental Impact Statement and Proposed Plan Amendment for Montana, North Dakota and South Dakota.
- U.S. Department of the Interior and United States Department of Agriculture. 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. BLM/WO/ST-06/021+3071/REV 07. Bureau of Land Management. Denver, Colorado. 84 pp.
- USDA, NRCS. 2010. The PLANTS Database (<http://plants.usda.gov>, 9 November 2010). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
- U.S. Department of Mineral Management Service (MMS). 2008. Stacy Browne 2008.
- USEPA. 2013a. The 2011 National Emissions Inventory (NEI), Version 1 updated September 30, 2013. U.S. Environmental Protection Agency (USEPA). Accessed December 4, 2013. <http://www.epa.gov/ttn/chief/net/2011inventory.html>
- USEPA. 2013b. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2011. U.S. Environmental Protection Agency (USEPA). EPA 430-R-13-001. April 12, 2013. <http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html>
- USEPA. 2014. AirData Website. U.S. Environmental Protection Agency (USEPA). Accessed August 19, 2014. <http://www.epa.gov/airdata/>
- U. S. Fish and Wildlife Service. 2010. Black-footed ferret website <http://www.fws.gov/mountain-prairie/species/mammals/blackfootedferret/>
- U.S. Fish and Wildlife Service (USFWS) 2010. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31. <http://www.fws.gov/wetlands/> USGS 2009. National Hydrography Dataset (NHD). <http://nhd.usgs.gov/> accessed 11/2009.
- U.S Fish and Wildlife Service (USFWS) 2010. Pallid Sturgeon species description and ESA status and review. http://www.fws.gov/mountain-prairie/missouririver/moriver_pallidsturgeon.htm

- U.S. Fish and Wildlife Service. 1989. Black footed ferret survey guidelines for compliance with the Endangered Species Act. 15 pgs.
- U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northern Great Plains Breeding Population of the Piping Plover; Final Rule 50 CFR Part 17. 57638 Federal Register / Vol. 67, No. 176. <http://www.fws.gov/mountain-prairie/species/birds/pipingplover/>.
- U.S. Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Sprague's Pipit as Endangered or Threatened throughout Its Range.
- U.S. Fish and Wildlife Service (USFWS). 2013a. Endangered and Threatened Wildlife and Plants; Proposed Threatened Status for the Rufa Red Knot (*Calidris canutus rufa*). *Federal Register* 78(189):60024–60098.
- U.S. Fish and Wildlife Service (USFWS). 2013b. Northern Long-eared Bat Fact Sheet. Midwest Endangered Species. Available at: <http://www.fws.gov/midwest/endangered/mammals/nlba/nlbaFactSheet.html>. Accessed March 11, 2014.
- U.S. Fish and Wildlife Service (USFWS). 2013c. Endangered and Threatened Wildlife and Plants; 12-month Finding on a Petition to List the Eastern Small-Footed Bat and the Northern Long-eared Bat as Endangered or Threatened Species; Listing the Northern Long-eared Bat as an Endangered Species; Proposed Rule. *Federal Register* 78(191):61046–61080
- U.S. Fish and Wildlife Service (USFWS). 2014d. County Occurrence of Endangered, Threatened, and Candidate Species and Designated Critical Habitat in North Dakota. North Dakota Field Office, USFWS. March 2014. Available at: <http://www.fws.gov/northdakotafieldoffice/SEtable.pdf>. Accessed May 2014.
- U.S. Fish and Wildlife Service (USFWS). 2010e. Piping plover. Available at: <http://www.fws.gov/mountain-prairie/species/birds/pipingplover>. Accessed September 2010.
- Walker, B. L., D, E. Naugle, K.E. Doherty. 2007. Greater Sage Grouse Population Response to Energy Development and Habitat Loss. *Journal of Wildlife Management* 71(8):2644-2654; 2007).
- Western Regional Air Partnership (WRAP). 2014. O&G Emissions Inventory Project: ND-SD-MT Williston and MT North Central (Great Plains) Basins website. Accessed October 8, 2014. <http://www.wrapair2.org/ND-SD-MT.aspx>.
- Winthrop, K. 2004. *Bare Bones Guide to Fire Effects on Cultural Resources for Cultural Resource Specialists*. U.S. Department of the Interior, Bureau of Land Management, Denver, Colorado.

7.0 Definitions

The North American Industry Classification System (NAICS) is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. NAICS was developed under the auspices of the Office of Management and Budget (OMB), and adopted in 1997 to replace the Standard Industrial Classification (SIC) system and to allow for a high level of comparability in business statistics among the North American countries.

IMPLAN: The IMPLAN Model is the most flexible, detailed and widely used input-output impact model system in the U.S. It provides users with the ability to define industries, economic relationships and projects to be analyzed. It can be customized for any county, region or state, and used to assess "multiplier impacts" caused by increasing or decreasing spending in various parts of the economy. This can be used to assess the economic impacts of resource management decisions, facilities, industries, or changes in their level of activity in a given area. The current IMPLAN input-output database and model is maintained and sold by MIG, Inc. (Minnesota IMPLAN Group). The 2007 data set was used in this analysis.

APPENDIX A – Description of Lease Parcels and Lease Stipulations

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED STIPULATIONS FOR ENTIRE PARCEL IF LEASED	PROPOSED FOR DEFERRAL-NO LEASING
NDM 97300-7A	T. 163 N, R. 93 W, 5TH PM, ND SEC. 4 SE; BURKE COUNTY 160.00 AC 50% U.S. MINERAL INTEREST ACQ	CR 16-1 (ALL LANDS) CSU 12-5 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-14 (ALL LANDS) NSO 11-33 (ALL LANDS) STD 16-3 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-15 (ALL LANDS)	NONE
NDM 97300-7B	T. 164 N, R. 93 W, 5TH PM, ND SEC. 27 LOTS 1,2; SEC. 34 NE,E2NW; BURKE COUNTY 314.88 AC 50% U.S. MINERAL INTEREST ACQ	CR 16-1 (ALL LANDS) CSU 12-5 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-14 (ALL LANDS) NSO 11-33 (ALL LANDS) STD 16-3 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-15 (ALL LANDS)	NONE
NDM 97300-4V	T. 156 N, R. 95 W, 5TH PM, ND SEC. 25 SW; WILLIAMS COUNTY 160.00 AC 50% U.S. MINERAL INTEREST ACQ	CR 16-1 (ALL LANDS) CSU 12-5 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-13 (ALL LANDS) LN 14-14 (ALL LANDS) NSO 11-33 (ALL LANDS) STD 16-3 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-15 (ALL LANDS)	NONE

NDM 97300-4H	T. 163 N, R. 102 W, 5TH PM, ND SEC. 4 S2NW; SEC. 5 S2NE; DIVIDE COUNTY 160.00 AC 50% U.S. MINERAL INTEREST ACQ	CR 16-1 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-13 (ALL LANDS) LN 14-14 (ALL LANDS) NSO 11-33 (ALL LANDS) STD 16-3 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-15 (ALL LANDS)	NONE
NDM 97300-6L	T. 144 N, R. 103 W, 5TH PM, ND SEC. 22 NW; GOLDEN VALLEY COUNTY 160.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-5 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-14 (ALL LANDS) LN 14-15 (ALL LANDS) STD 16-3 (ALL LANDS) TES 16-2 (ALL LANDS)	NONE
NDM 97300-6M	T. 144 N, R. 103 W, 5TH PM, ND SEC. 26 E2NE, NESE; GOLDEN VALLEY COUNTY 120.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-5 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-14 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-33 Sec. 26 NESE; NSO 11-38 (ALL LANDS) STD 16-3 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-22 (ALL LANDS) TL 13-23 (ALL LANDS) TL 13-24 (ALL LANDS)	NONE

NDM 97300-7K	T. 152 N, R. 104 W, 5TH PM, ND SEC. 23 LOT 1; SEC. 24 LOTS 2,3; WILLIAMS COUNTY 49.36 AC PD	CR 16-1 (ALL LANDS) CSU 12-5 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-3 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-14 (ALL LANDS) NSO 11-33 (ALL LANDS) NSO 11-39 (ALL LANDS) STD 16-3 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-15 (ALL LANDS)	NONE
NDM 97300-6J	T. 131 N, R. 105 W, 5TH PM, ND SEC. 2 LOT 3; BOWMAN COUNTY 40.02 AC PD	DEFER ALL LANDS PENDING FURTHER REVIEW OF RESOURCE VALUES BEING ANALYZED IN THE NORTH DAKOTA GREATER SAGE- GROUSE DRAFT RESOURCE MANAGEMENT PLAN AMENDMENT	DEFER ALL LANDS PENDING FURTHER REVIEW OF RESOURCE VALUES BEING ANALYZED IN THE NORTH DAKOTA GREATER SAGE- GROUSE DRAFT RESOURCE MANAGEMENT PLAN AMENDMENT

Appendix B – North Dakota Field Office Stipulation Descriptions

Stipulation Number	Stipulation Name/Brief Description
CR 16-1	<p>CULTURAL RESOURCES LEASE STIPULATION</p> <p>This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities.</p>
CSU 12-5	<p>CONTROLLED SURFACE USE STIPULATION</p> <p>Surface occupancy or use is subject to the following special operating constraint: No disturbance of riparian areas of wetlands, intermittent, ephemeral, or perennial streams and rivers would be allowed except for essential road and utility crossings.</p>
LN 14-2	<p>LEASE NOTICE CULTURAL RESOURCES</p> <p>The Surface Management Agency is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures.</p>
LN 14-3	<p>LEASE NOTICE</p> <p>The lessee or operator shall immediately bring to the attention of the Surface Management Agency (SMA) any paleontological resources or any other objects of scientific interest discovered as a result of approved operations under this lease, and shall leave such discoveries intact and undisturbed until directed to proceed by the SMA.</p>
LN 14-12	<p>LEASE NOTICE PALEONTOLOGICAL RESOURCE INVENTORY REQUIREMENT</p> <p>This lease has been identified as being located within geologic units rated as being moderate to very high potential for containing significant paleontological resources. The locations meet the criteria for Class 3, 4 and/or 5 as set forth in the Potential Fossil Yield Classification System, WO IM 2008-009, Attachment 2-2. The BLM is responsible for assuring that the leased lands are examined to determine if paleontological resources are present and to specify mitigation measures. Guidance for application of this requirement can be found in WO IM 2008-009 dated October 15, 2007, and WO IM 2009-011 dated October 10, 2008.</p> <p>Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or project proponent shall contact the BLM to determine if a paleontological resource inventory is required. If an inventory is required, the lessee or project proponent will complete the inventory subject to the following:</p> <ul style="list-style-type: none"> • the project proponent must engage the services of a qualified paleontologist, acceptable to the BLM, to conduct the inventory. • the project proponent will, at a minimum, inventory a 10-acre area or larger to incorporate possible project relocation which may result from environmental or other resource considerations. • paleontological inventory may identify resources that may require mitigation to the satisfaction of the BLM as directed by WO IM 2009-011.
LN 14-13	<p>LEASE NOTICE GRASSLAND / WETLAND EASEMENT</p> <p>The lease parcel is encumbered with a U.S. Fish and Wildlife Service wetland and/or grassland easement to restrict draining, burning, filling, or leveling of wetlands and/or protection of grassland depending on the specific easement. The operator may be required to implement specific measures to reduce the impacts of oil and gas operations on wetlands or grasslands on easements. Additional measures may be developed during the application for permit to drill during the on-site inspection as well as the environmental review process, consistent with the lease rights granted and in accordance with 43 CFR 3101.1-2.</p>
LN 14-14	<p>LEASE NOTICE CULTURAL VISUAL SETTING</p> <p>The lease is located adjacent to known historic properties that are or may be eligible for listing on the National Register of Historic Places (NRHP). The lease may in part or whole contribute to the importance of the historic properties and values, and listing on the NRHP. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on historic properties and values. These measures may include, but are not limited to, project design, location,</p>

	<p>painting and camouflage. Such measures shall be developed during the on-site inspection and environmental review of the application for permit to drill (APD), and shall be consistent with lease rights.</p> <p>The goal of this Lease Notice is to provide information to the lessee and operator that would help design and locate oil and gas facilities to preserve the integrity and value of historical properties that are or may be listed on the National Register of Historic Places.</p> <p>This notice is consistent with the present Montana guidance for cultural resource protection related to oil and gas operations (NTL-MSO-85-1).</p>
LN 14-15	<p>LEASE NOTICE SPRAGUE’S PIPIT</p> <p>The lease area may contain habitat for the federal candidate Sprague’s pipit. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on Sprague’s pipits, their habitat and overall population. Such measures would be developed during the application for permit to drill and environmental review processes, consistent with lease rights.</p> <p>If the U.S. Fish and Wildlife Service lists the Sprague’s pipit as threatened or endangered under Endangered Species Act, the BLM would enter into formal consultation on proposed permits that may affect the Sprague’s pipit and its habitat. Restrictions, modifications, or denial of permits could result from the consultation process.</p>
NSO 11-33	<p>NO SURFACE OCCUPANCY STIPULATION</p> <p>No surface occupancy or use is allowed within 200 feet of wetlands, lakes, and ponds.</p>
NSO 11-38	<p>NO SURFACE OCCUPANCY STIPULATION</p> <p>No surface occupancy or use is allowed within one-half mile of golden eagle nests known to have been occupied at least once within the seven previous years.</p>
NSO 11-39	<p>NO SURFACE OCCUPANCY STIPULATION</p> <p>No surface occupancy or use is allowed on lands within the floodplain of the Missouri River.</p>
Standard 16-3	<p>STANDARD LEASE STIPULATION</p> <p>ESTHETICS--To maintain esthetic values, all surface-disturbing activities, semipermanent and permanent facilities may require special design including location, painting and camouflage to blend with the natural surroundings and meet the intent of the visual quality objectives of the Federal Surface Managing Agency (SMA).</p> <p>EROSION CONTROL--Surface-disturbing activities may be prohibited during muddy and/or wet soil periods.</p> <p>CONTROLLED OR LIMITED SURFACE USE STIPULATION --This stipulation may be modified, consistent with land use documents, when specifically approved in writing by the Bureau of Land Management (BLM) with concurrence of the SMA. Distances and/or time periods may be made less restrictive depending on the actual onground conditions. The prospective lessee should contact the SMA for more specific locations and information regarding the restrictive nature of this stipulation. The lessee/operator is given notice that the lands within this lease may include special areas and that such areas may contain special values, may be needed for special purposes, or may require special attention to prevent damage to surface and/or other resources. Possible special areas are identified below. Any surface use or occupancy within such special areas will be strictly controlled, or if absolutely necessary, excluded. Use or occupancy will be restricted only when the BLM and/or the SMA demonstrates the restriction necessary for the protection of such special areas and existing or planned uses. Appropriate modifications to imposed restrictions will be made for the maintenance and operations of producing oil and gas wells.</p> <p>After the SMA has been advised of specific proposed surface use or occupancy on the leased lands, and on request of the lessee/operator, the Agency will furnish further data on any special areas which may include:</p> <ul style="list-style-type: none"> • 100 feet from the edge of the rights-of-way from highways, designated county roads and appropriate federally-owned or controlled roads and recreation trails. • 500 feet, or when necessary, within the 25-year flood plain from reservoirs, lakes, and ponds and intermittent, ephemeral or small perennial streams: 1,000 feet, or when necessary, within the 100-year flood plain from larger perennial streams, rivers, and domestic water supplies. • 500 feet from grouse strutting grounds. Special care to avoid nesting areas associated with strutting grounds will be necessary during the period from March 1, to June 30. One-

	<p>fourth mile from identified essential habitat of state and federal sensitive species. Crucial wildlife winter ranges during the period from December 1 to May 15, and in elk calving areas during the period from May 1 to June 30.</p> <ul style="list-style-type: none"> • 300 feet from occupied buildings, developed recreational areas, undeveloped recreational areas receiving concentrated public use and sites eligible for or designated as National Register sites. • Seasonal road closures, roads for special uses, specified roads during heavy traffic periods and on areas having restrictive off-road vehicle designations. • On slopes over 30 percent or 20 percent on extremely erodible or slumping soils. <p>APPLICATIONS FOR PERMIT TO DRILL (APDs)--The appropriate BLM field offices are responsible for the receipt, processing, and approval of APDs. The APDs are to be submitted by oil and gas operators pursuant to the requirements found in Onshore Oil and Gas Order No. 1 -- Approval of Operations on Onshore Federal and Indian Oil and Gas Leases (Circular No. 2538). Additional requirements for the conduct of oil and gas operations can be found in the Code of Federal Regulations Title 43, Part 3160. Copies of Onshore Oil and Gas Order No. 1, and pertinent regulations, can be obtained from the BLM field offices in which the operations are proposed. Early coordination with these offices on proposals is encouraged.</p> <p>CULTURAL AND PALEONTOLOGICAL RESOURCES--The SMA is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator, unless notified to the contrary by the SMA, shall:</p> <ul style="list-style-type: none"> • Contact the appropriate SMA to determine if a site-specific cultural resource inventory is required. If an inventory is required, then: • Engage the services of a cultural resource specialist acceptable to the SMA to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the area of proposed disturbance to cover possible site relocation which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the SMA for review and approval no later than that time when an otherwise complete application for approval of drilling or subsequent surface-disturbing operation is submitted. • Implement mitigation measures required by the SMA. Mitigation may include the relocation of proposed lease-related activities or other protective measures such as testing salvage and recordation. Where impacts to cultural resources cannot be mitigated to the satisfaction of the SMA, surface occupancy on that area must be prohibited. <p>The operator shall immediately bring to the attention of the SMA any cultural or paleontological resources discovered as a result of approved operations under this lease, and not disturb such discoveries until directed to proceed by the SMA.</p> <p>ENDANGERED OR THREATENED SPECIES--The SMA is responsible for assuring that the leased land is examined prior to undertaking any surface-disturbing activities to determine effects upon any plant or animal species, listed or proposed for listing as endangered or threatened, or their habitats. The findings of this examination may result in some restrictions to the operator's plans or even disallow use and occupancy that would be in violation of the Endangered Species Act of 1973 by detrimentally affecting endangered or threatened species or their habitats.</p> <p>The lessee/operator may, unless notified by the authorized officer of the SMA that the examination is not necessary, conduct the examination on the leased lands at his discretion and cost. This examination must be done by or under the supervision of a qualified resources specialist approved by the SMA. An acceptable report must be provided to the SMA identifying the anticipated effects of a proposed action on endangered or threatened species or their habitats.</p>
<p>TES 16-2</p>	<p>ENDANGERED SPECIES ACT SECTION 7 CONSULTATION STIPULATION</p> <p>The lease area may now or hereafter contain plants, animals or their habitats determined to be threatened, endangered or other special status species. BLM may recommend modifications to exploration and development, and require modifications to or disapprove proposed activity that is likely to result in jeopardy to proposed or listed threatened or endangered species or designated or proposed critical habitat.</p>
<p>TL 13-15</p>	<p>TIMING LIMITATION STIPULATION</p>

	No seismic exploration is allowed within 500 feet of waterfowl nesting habitat from March 1 through July 1 to protect nesting waterfowl. This stipulation does not apply to operation and maintenance of production facilities.
TL 13-22	TIMING LIMITATION STIPULATION No surface use is allowed from June 1 to July 1 to protect elk calving. This stipulation does not apply to operation and maintenance of production facilities.
TL 13-23	TIMING LIMITATION STIPULATION No surface use is allowed on elk winter range from November 30 to May 1 to protect wintering elk. This stipulation does not apply to operation and maintenance of production facilities.
TL 13-24	TIMING LIMITATION STIPULATION No surface use is allowed from February 15 to July 15 within one-half mile of occupied golden eagle nests known to be occupied at least once within the seven previous years to protect golden eagle nesting. This stipulation does not apply to operation and maintenance of production facilities.

Appendix C - Mitigation and Best Management Practices

This appendix contains in-depth information for mitigation and best management practices (BMPs) and in the planning area. Information includes:

- mitigation guidelines and objectives;
- best management practices (BMPs) for protection of resources; and
- guidelines for specific activities associated with oil and gas development.

Mitigation Guidelines

The following Mitigation Guidelines are a compilation of practices employed by the BLM Montana/Dakotas to mitigate impacts from various activities. They can be included as stipulations, conditions of approval, best management practices and design features. The guidelines are designed to protect resources such as soil, water, air, vegetation, wildlife habitat, and cultural and historic properties. The guidelines apply to many resources and are derived from many laws. This appendix is not comprehensive and is intended to be used as a guide for appropriate project planning, design and implementation.

Mitigation employs measures that have been developed to reduce environmental impacts associated with certain types of activities. BMPs are mitigation measures designed to reduce undesirable impacts to the environment. Incorporation of mitigation can typically result in a more efficient environmental review process, increased operating efficiency, reduced reclamation and fewer environmental impacts.

Additional descriptions of mitigation, and BMPs related to oil and gas lease activities can be found in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development-The Gold Book, and online at

http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html.

Offering the parcels for sale and issuing leases would not be in conflict with any local, county, or state laws or plans.

Mitigation Objectives

1. Avoidance or relocation would be the preferred strategy for reducing adverse impacts.
2. Surface-disturbing effects of operations would be minimized and the reclamation potential of the site would be maintained through design, construction, and other practices or techniques.
3. Impacts to air resources, air quality related values, and atmospheric greenhouse gas (GHG) concentrations would be reduced.
4. Impacts to soil, vegetation and water resources would be reduced. Sources of groundwater and surface water contamination would be eliminated.
5. Impacts to cultural and historic properties would be reduced or eliminated.

Mitigation Guidelines for Specific Resources

Air Quality, Greenhouse Gas Emissions and Climate Change

The BLM encourages industry to incorporate and implement BMPs to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. Measures would also be required as COAs on permits by either the BLM or the applicable State air quality regulatory agency. The BLM also manages venting and flaring of gas from Federal wells as described in the provisions of Notice to Lessees (NTL) 4A, Royalty or Compensation for Oil and Gas Lost.

Some of the following measures could be imposed at the development stage:

- flaring or incinerating hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- emission control equipment of a minimum 95 percent efficiency on all condensate storage batteries;
- emission control equipment of a minimum 95 percent efficiency on dehydration units, pneumatic pumps, produced water tanks;
- vapor recovery systems where petroleum liquids are stored;
- tier II or greater, natural gas or electric drill rig engines;
- secondary controls on drill rig engines;
- no-bleed pneumatic controllers (most effective and cost effective technologies available for reducing VOCs);
- gas or electric turbines rather than internal combustions engines for compressors;
- NO_x emission controls for all new and replaced internal combustion oil and gas field engines;
- water dirt and gravel roads during periods of high use and control speed limits to reduce fugitive dust emissions;
- interim reclamation to re-vegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads.
- co-located wells and production facilities to reduce new surface disturbance;
- directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores;
- gas-fired or electrified pump jack engines;

- velocity tubing strings;
- cleaner technologies on completion activities (i.e. green completions), and other ancillary sources;
- centralized tank batteries and multi-phase gathering systems to reduce truck traffic;
- forward looking infrared (FLIR) technology to detect fugitive emissions; and
- air monitoring for NO_x and ozone.

More specific to reducing GHG emissions, Section 6 of the Climate Change SIR identifies and describes in detail commonly used technologies to reduce methane emissions from natural gas, coal bed natural gas, and oil production operations. Technologies discussed in the Climate Change SIR and as summarized below in Table 18 (reproduced from Table 6-2 in Climate Change SIR) display common methane emission technologies reported under the EPA Natural Gas STAR Program and associated emission reduction, cost, maintenance and payback data.

Table 18. Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program¹

Source Type / Technology	Annual Methane Emission Reduction ¹ (Mcf/yr)	Capital Cost Including Installation (\$)	Annual Operating and Maintenance Cost (\$)	Payback (Years or Months)	Payback Gas Price Basis (\$/Mcf)
Wells					
Reduced emission (green) completion	7,000 ²	\$1K – \$10K	>\$1,000	1 – 3 yr	\$3
Plunger lift systems	630	\$2.6K – \$10K	NR	2 – 14 mo	\$7
Gas well smart automation system	1,000	\$1.2K	\$0.1K – \$1K	1 – 3 yr	\$3
Gas well foaming	2,520	>\$10K	\$0.1K – \$1K	3 – 10 yr	NR
Tanks					
Vapor recovery units on crude oil tanks	4,900 – 96,000	\$35K – \$104K	\$7K – \$17K	3 – 19 mo	\$7
Consolidate crude oil production and water storage tanks	4,200	>\$10K	<\$0.1K	1 – 3 yr	NR
Glycol Dehydrators					
Flash tank separators	237 – 10,643	\$5K – \$9.8K	Negligible	4 – 51 mo	\$7
Reducing glycol circulation rate	394 – 39,420	Negligible	Negligible	Immediate	\$7
Zero-emission dehydrators	31,400	>\$10K	>\$1K	0 – 1 yr	NR
Pneumatic Devices and Controls					
Replace high-bleed devices with low-bleed devices					
End-of-life replacement	50 – 200	\$0.2K – \$0.3K	Negligible	3 – 8 mo	\$7
Early replacement	260	\$1.9K	Negligible	13 mo	\$7
Retrofit	230	\$0.7K	Negligible	6 mo	\$7
Maintenance	45 – 260	Negl. to \$0.5K	Negligible	0 – 4 mo	\$7

Convert to instrument air	20,000 (per facility)	\$60K	Negligible	6 mo	\$7
Convert to mechanical control systems	500	<\$1K	<\$0.1K	0 – 1 yr	NR

Table 18. Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program¹

Source Type / Technology	Annual Methane Emission Reduction ¹ (Mcf/yr)	Capital Cost Including Installation (\$)	Annual Operating and Maintenance Cost (\$)	Payback (Years or Months)	Payback Gas Price Basis (\$/Mcf)
Valves					
Test and repair pressure safety valves	170	NR	\$0.1K – \$1K	3 – 10 yr	NR
Inspect and repair compressor station blowdown valves	2,000	<\$1K	\$0.1K – \$1K	0 – 1 yr	NR
Compressors					
Install electric compressors	40 – 16,000	>\$10K	>\$1K	>10 yr	NR
Replace centrifugal compressor wet seals with dry seals	45,120	\$324K	Negligible	10 mo	\$7
Flare Installation	2,000	>\$10K	>\$1K	None	NR

Source: Multiple EPA Natural Gas STAR Program documents. Individual documents are referenced in Climate Change SIR (2010).

¹ Unless otherwise noted, emission reductions are given on a per-device basis (e.g., per well, per dehydrator, per valve, etc).

² Emission reduction is per completion, rather than per year.

K = 1,000
mo = months
Mcf = thousand cubic feet of methane
NR = not reported
yr = year

In the context of the oil sector, additional mitigation measures to reduce GHG emissions include methane reinjection and CO₂ injection. These measures are discussed in more detail in Section 6.0 of the Climate Change SIR (2010).

In an effort to disclose potential future GHG emission reductions that might be feasible, the BLM estimated GHG emission reductions based on the RFD for the Field Office. The emission reductions technologies and practices are identified as mitigation measures that could be imposed during development. Furthermore, the EPA is expected to promulgate new Federal air quality regulations that would require GHG emission reductions from many oil and gas sources.

Soil Resources

Measures would be taken to reduce, avoid, or minimize potential impacts to soil resources from exploration and development activities. Prior to authorization, proposed actions would be evaluated on a case-by-case basis and would be subject to mitigation measures in order to maintain the soil system. Mitigation would include avoiding areas poorly suited to reclamation, limiting the total area of disturbance, rapid reclamation, erosion/sediment control, soil salvage, de-compaction, re-vegetation, weed control, slope stabilization, surface roughening, and

fencing.

Conducting oil and gas development with the following BMPs would enhance soil resilience and reduce soil system fragmentation, accelerated wind and water erosion, and the total area of surface disturbance with the following:

- Utilizing plans of development;
- Removing vegetation in the smallest area possible;
- Co-locating infrastructure;
- Using a single trench for utilities and piping;
- Employing multiple completions per well bore and directional drilling;
- Closed-loop drilling or other pit-less methods;
- Ensuring reclamation of all new roads at the end of the life of the well;
- Preventing degradation of the watershed from produced water;
- Designing impoundments or water disposal methods to minimize impacts to soil; and
- Initiating interim reclamation within 25 days of drilling the well.

Water Resources

Stipulations addressing steep slopes, waterbodies, streams, 100-year floodplains of major rivers, and riparian areas would minimize potential impacts and would be included with the lease when necessary (Appendix A). In the event of exploration or development, measures would be taken to reduce, avoid, or minimize potential impacts to water resources including application of appropriate mitigation. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, and expedite rapid reclamation (including interim reclamation) would maintain water resources.

Methods to reduce erosion and sedimentation could include reducing the area of surface disturbance; installing and maintaining adequate erosion control; proper road design, road surfacing, and culvert design; road/infrastructure maintenance; use of low water crossings; and use of isolated or bore crossing methods for waterbodies and floodplains. In addition, applying mitigation to maintain adequate, undisturbed, vegetated buffer zones around water bodies and floodplains could reduce sedimentation and maintain water quality. Appropriate well completion, the implementation of Spill Prevention Plans, and Underground Injection Control regulations would mitigate groundwater impacts. Site-specific mitigation and reclamation measures would be described in the COAs.

Vegetation Resources

Mitigation would be addressed at the site specific APD stage of exploration and development. If needed, COAs would potentially include, but not limited to, re-vegetation with desirable plant species, soil enhancement practices, direct live haul of soil material for seed bank re-vegetation, reduction of livestock grazing, fencing of reclaimed areas, and the use of seeding strategies consisting of native grasses, forbs, and shrubs. In areas infested with noxious weeds, weed management plans with special conditions would be required.

Riparian-Wetland Habitats

Stipulations addressing steep slopes, waterbodies, streams, 100-year floodplains of major rivers, and riparian areas would minimize potential impacts and would be included with the lease when necessary (Appendix A). In the event of exploration or development, site-specific mitigation measures would be identified which would avoid or minimize potential impacts to riparian-wetland areas at the APD stage. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, maintain biodiversity, maintain vegetated buffer zones, and expedite rapid reclamation (including interim reclamation) would maintain riparian-wetland resources.

Special Status Plant Species

Stipulations applied to wildlife resources, steep slopes, water bodies, streams, 100-year floodplains of major rivers, riparian areas, and wetlands would likely also provide protections for special status plant species. Proposed development would be analyzed on a site-specific basis prior to approval of oil and gas exploration or development activities at the APD stage. Mitigation would also be addressed at the site-specific APD stage. Surveys to determine the existence of federally listed species could occur on BLM-administered surface or minerals prior to approval of exploration and development activities at the APD stage.

Wildlife

Threatened, Endangered and Candidate Species

Other Special Status Species

Other Fish and Wildlife

Measures would be taken to prevent, minimize, or mitigate impacts to fish and wildlife animal species from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation could include rapid re-vegetation, project relocation, or pre-disturbance wildlife species surveying. If oil and gas development is proposed in suitable habitat for threatened or endangered species, consultation with the USFWS would occur to determine if additional terms and conditions would need to be applied.

Cultural Resources

Application of standard lease terms, stipulations, and cultural lease notices provide mechanisms to protect vulnerable significant cultural resource values on these lease parcels (Appendix A). The inclusion of these requirements at the leasing stage provide notification to the lessee that potentially valuable cultural resources are or are likely to be present on the lease parcels and potential mitigation measures may be required. The application and implementation of these stipulations and lease notices at the development stage would provide the necessary measures to

protect cultural resources.

Specific mitigation measures, include but are not limited to, site avoidance, excavation or data recovery would have to be determined when site-specific development proposals are received. Most surface-disturbing situations for cultural resources would be avoided by project redesign or relocation. Unavoidable, significant properties would be site-specifically mitigated with concurrence with the State Historic Preservation Office prior to implementation of a project.

Native American Religious Concerns

Mitigation would be the same as Cultural Resources above. For those parcels where no inventory data is available or where no information is available for TCPs, BLM would apply the cultural lease notice (CR 16-1). Any sites in question would be revisited and reevaluated for National Register eligibility prior to any surface disturbance.

Paleontology

The application of lease terms, the paleontological no surface occupancy stipulation (NSO 11-12), and the paleontological lease notices (LN 14-3 and LN 14-12) at leasing, provides protection to paleontological resources during development. The paleontological lease notice LN 14-12 is applied to those lease parcels that fall within geological units with a PFYC Class of 3 or higher, usually requiring a field survey prior to surface disturbance. These inventory requirements could result in the identification of paleontological resources. Avoidance of significant paleontological resources or implementation of mitigation prior to surface disturbance would protect paleontological resources. However, the application of lease terms only allows the relocation of activities up to 200 meters, unless documented in the NEPA document, and cannot result in moving the activity off lease.

Specific mitigation measures could include, but are not limited to, site avoidance or excavation. Avoidance of paleontological properties would be a best management practice. However, should a paleontological locality be unavoidable, significant fossil resources must be mitigated prior to implementation of a project. Also, significant fossil resources could be discovered in areas that had not been evaluated (PFYC of less than 3) during surface disturbance. Those resources must also be professionally mitigated. These mitigation measures and contingencies would be determined when site specific development proposals are received.

Visual Resources

All new oil and gas development could implement, as appropriate for the site, BLM BMPs for VRM, regardless of the VRM class. This includes, but would not be limited to, proper site selection, reduction of visibility, minimizing disturbance, selecting color(s)/color schemes that blend with the background and reclaiming areas that are not in active use. Repetition of form, line, color and texture when designing projects would reduce contrasts between landscape and development. Wherever practical, no new development would be allowed on ridges or mountain tops. Overall, the goal would be to not reduce the visual qualities or scenic value that currently exists.

Forest and Woodland Resources

Measures could be taken to prevent, minimize, or mitigate impacts to forest and woodland resources from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. The road construction and maintenance BMPs outlined in the Gold Book are designed to protect water quality and forest soils. Other mitigation measures could include the artificial planting of bare root or containerized nursery stock seedlings, and removal of severed forest and woodland vegetative material.

Livestock Grazing

Measures would be taken to prevent, minimize, or mitigate impacts to livestock grazing from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project could be subject to mitigation measures. Mitigation could potentially include controlling livestock movement by maintaining fence line integrity, fencing of facilities, re-vegetation of disturbed sites, and fugitive dust control.

Recreation and Travel Management

Additional measures could be taken to minimize, avoid, or mitigate impacts to recreation from oil and gas exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation measures could potentially include, but are not limited to, reclamation of industrial routes/areas when no longer needed, fencing of facilities, and installing signs along roads.

Lands and Realty

Measures would be taken to avoid disturbance to or impacts to existing rights-of-way, in the event of any oil and gas exploration and development activities. Any new “off-lease” or third party rights-of-way required across federal surface for exploration and/or development of lease parcels would be subject to lands and realty stipulations to protect other resources as determined by environmental analyses.

Special Designations

National Historic and Scenic Trails

Areas of Critical Environmental Concern (ACECs)

For any congressionally designated component of the National Historic Trail (NHT) system, BLM would apply the same kind of analysis that is applied to determining an effect to a property eligible for the National Register of Historic Places. That process includes determining whether an undertaking would have an adverse effect on the historic nature of the NHT by altering, directly or indirectly, any of the characteristics of the historic nature of the NHT in a manner that would diminish the integrity of the Trail’s location, setting, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by an undertaking that may occur later in time, be farther removed in distance or be cumulative.

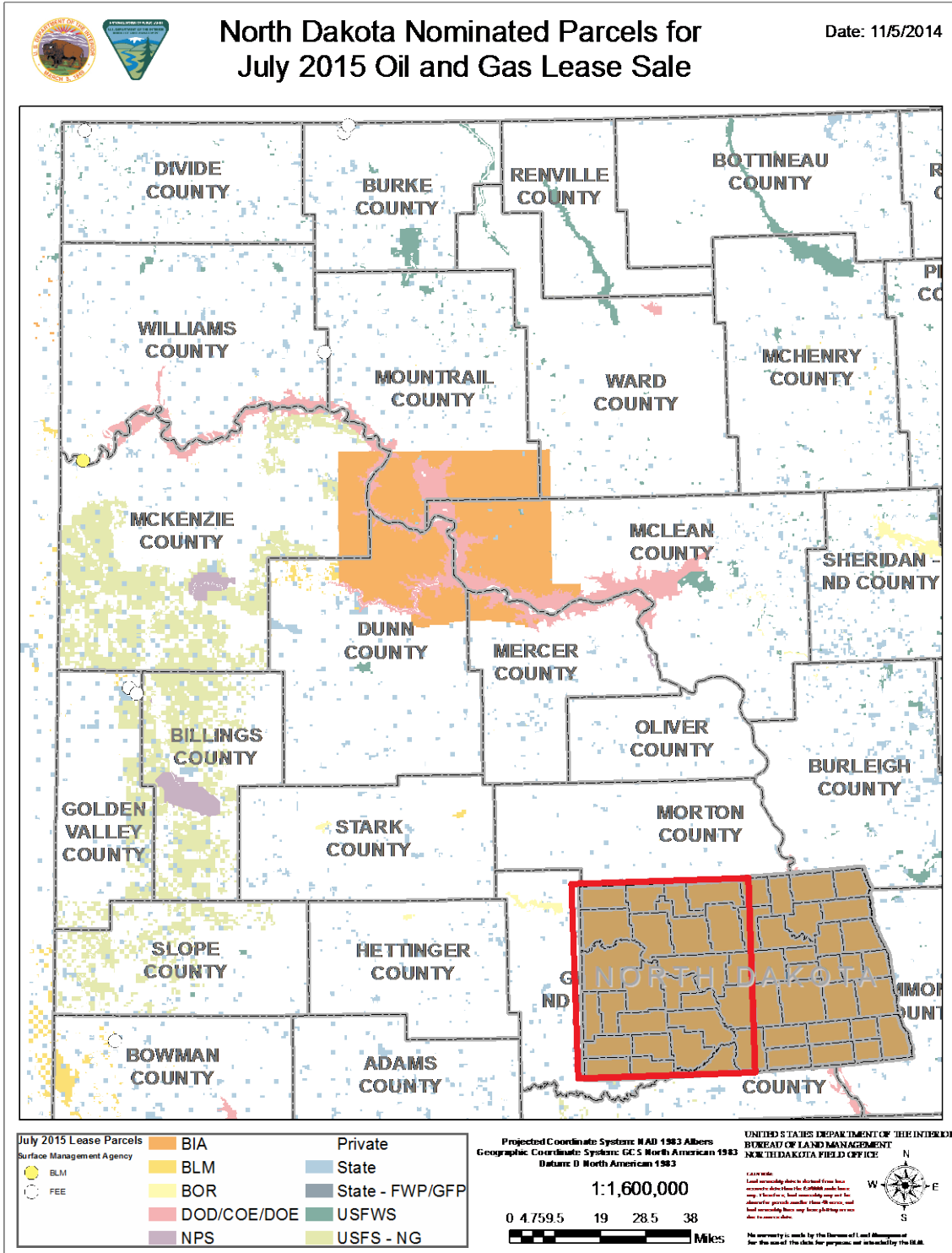
Examples of adverse effects on NHTs include, but are not limited to change of the character of the Trail’s historic nature or physical features within Trail’s corridor setting that contribute to diminishing the Trail’s historic significance; and the introduction of visual, atmospheric or audible elements that diminish the integrity of the Trail’s historic significance. If it is

determined that an undertaking within the viewshed of the NHT would have an adverse effect on the historic character of the Trail where the integrity of the setting is a contributing element of the historic character of the Trail, then surface occupancy or use and surface disturbance would be restricted.

Prior to surface disturbance, occupancy or use a mitigation plan (Plan) would need to be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. The Plan would need to demonstrate to the authorized officer's satisfaction that the infrastructure will either not be visible or will result in a weak contrast rating and would not have an adverse effect on the setting of the historic character of a National Historic Trail.

Appendix D – Parcel Maps

Map 1. All Nominated Lease Parcels

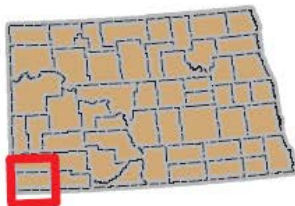
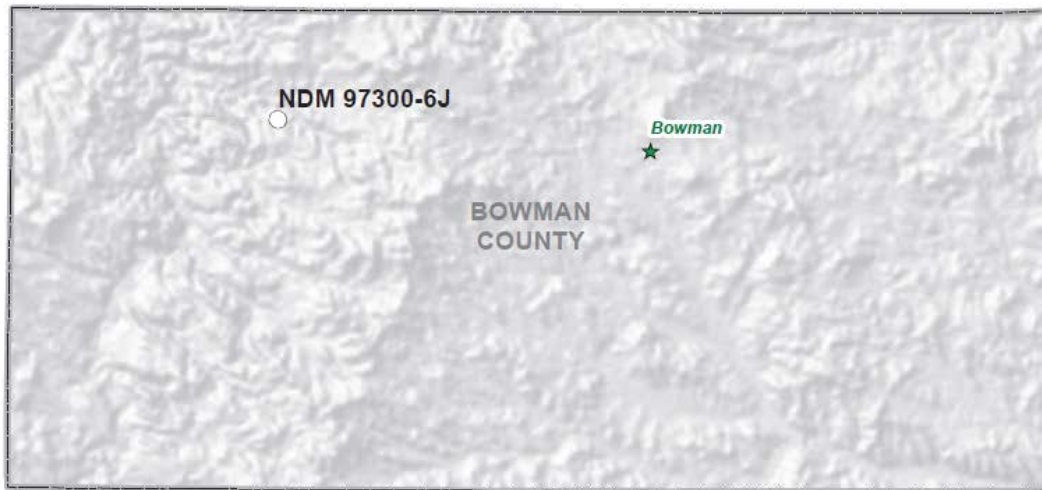


Map 2. Nominated Parcels – NDM973006J



July 2015 Oil and Gas Lease Sale Nominated Parcels for Bowman County

Date: 10/16/2014



July 2015 Lease Parcels Surface Management Agency

○ PRIVATE

Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

1:470,922



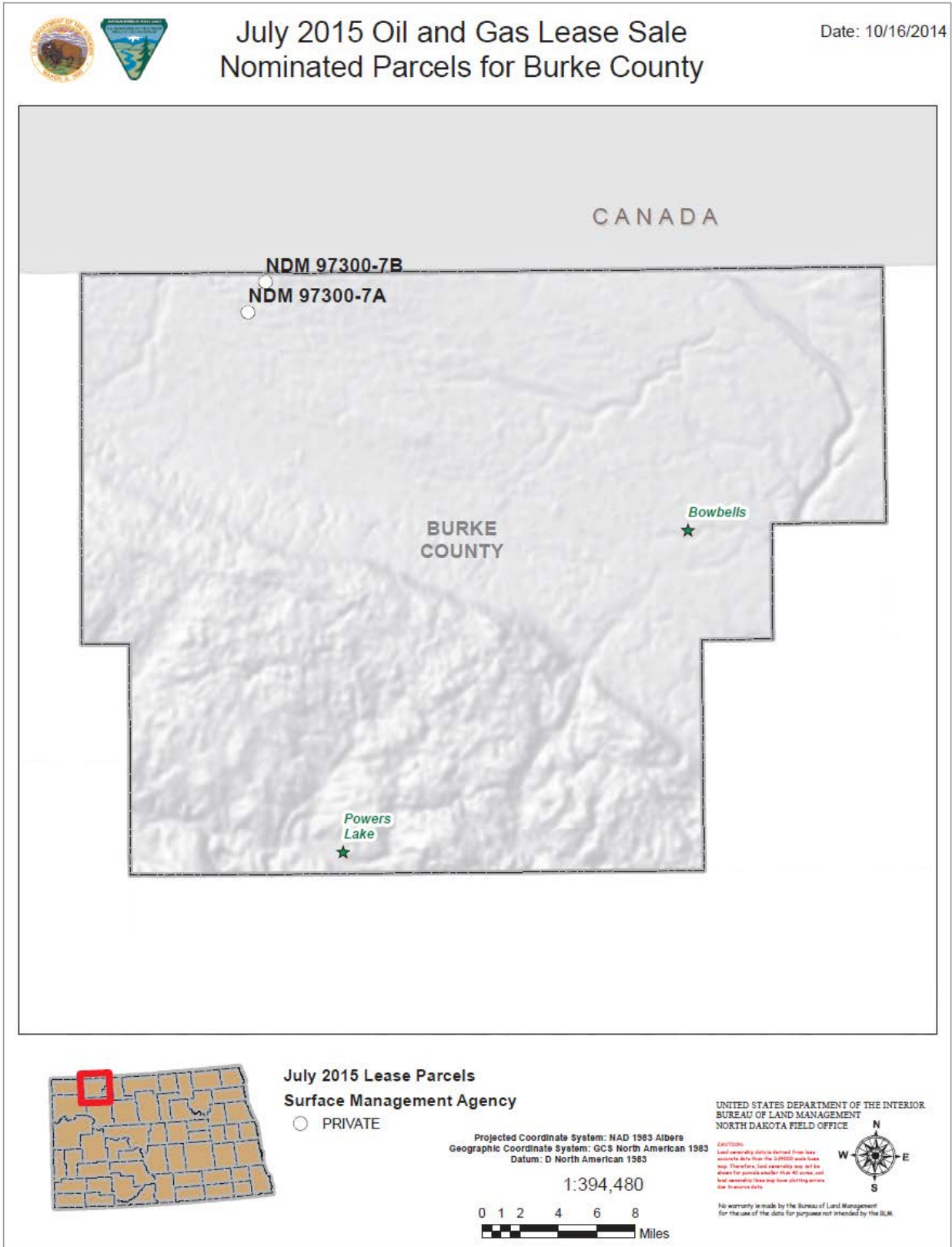
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTH DAKOTA FIELD OFFICE

CAUTION:
Land ownership data is derived from lease
survey data from the 20000 scale base
map. Therefore, land ownership may not be
shown for parcels smaller than 40 acres, and
land ownership lines may have shifting errors
due to source data.

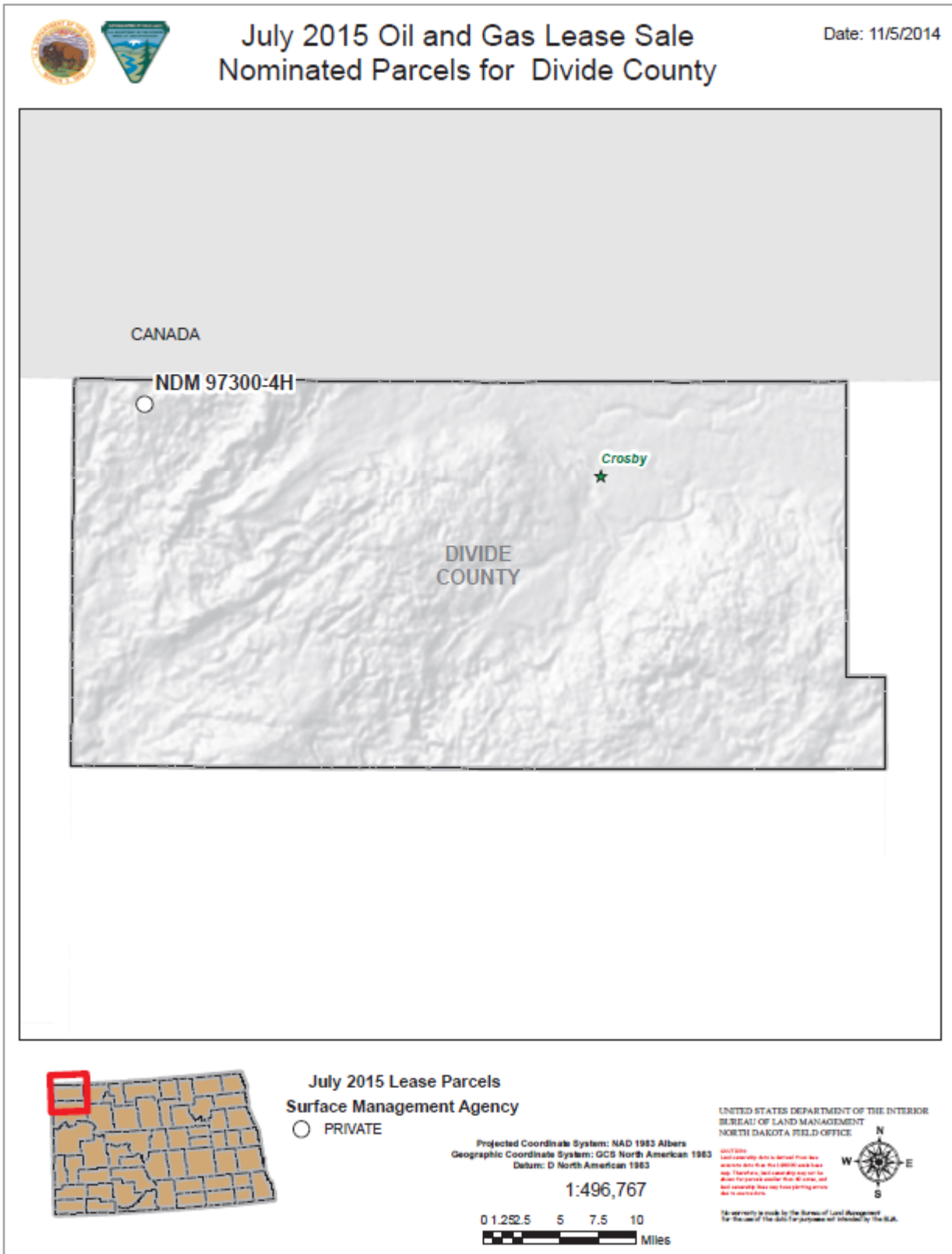


No warranty is made by the Bureau of Land Management
for the use of the data for purposes not intended by the BLM.

Map 3. Nominated Parcels – NDM97300-7B and NDM97300-7A



Map 4. Nominated Parcel – NDM 97300-4H



Map 5. Nominated Parcels – NDM 97300-6L and NDM 97300-6M

