North Dakota Greater Sage-Grouse

Draft

Resource Management Plan Amendment and Environmental Impact Statement

US Department of the Interior
Bureau of Land Management
September 2013

BLM

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

BLM/MT/PL-13/013

DOI-BLM-MT-C030-2013-120-EIS

Cover Photo: Steve Ting

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
North Dakota Field Office
99 23rd Avenue West – Suite A
Dickinson, North Dakota 58601-2619
www.blm.gov/mt

In Reply Refer To:

August 28, 2013

Dear Reader:

Enclosed for your review and comment is the Greater Sage-Grouse Draft Resource Management Plan Amendment (RMPA)/Draft Environmental Impact Statement (DEIS) for the North Dakota Field Office (NDFO). This document has been prepared by the Bureau of Land Management (BLM) with assistance from the following cooperating agencies: North Dakota Game and Fish Department, US Fish and Wildlife Service, Bowman County Commissioners, and Bowman-Slope Conservation District.

The DEIS considers and analyzes four alternatives that address future management of approximately 30,030 acres of federal surface and 396,053 acres of federal mineral estate in southwestern North Dakota administered by the BLM's NDFO. Alternative D is identified as the agency's preferred alternative. Although a preferred alternative has been identified, a final decision has not been made. The final decision, which will be documented in a Record of Decision, will be made after consideration of the comments received on the DEIS and after a proposed RMPA/final EIS is released.

This DEIS consists of an Executive Summary, Chapters 1 through 6, References, Glossary, Index, and Appendices (including figures). Compact disc copies of the document may be obtained through the NDFO, or a copy of the document may be viewed at: http://www.blm.gov/mt/st/en/fo/north_dakota_field.html

You are invited to review and comment on the DEIS. The public review period for the DEIS is 90 calendar days from the publication date of the Notice of Availability in the *Federal Register* by the US Environmental Protection Agency (EPA). Information regarding public meeting dates and times to discuss the DEIS and provide comment will be released through the news media and website (identified in letterhead) after the publication of the EPA *Federal Register* Notice of Availability.

Written comments can be submitted to: North Dakota Greater Sage-Grouse EIS, 5001 Southgate Drive, Billings, MT 59101. Comments can also be submitted to this email address: blm_mt_nd_sage_grouse@blm.gov. Comments will be fully considered and evaluated in the preparation of the Proposed RMPA and Final EIS, and all substantive comments will be addressed.

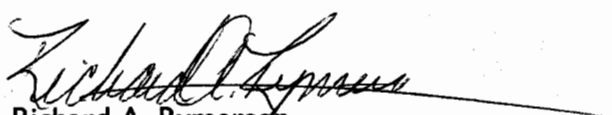
Comments will be most useful if they are specific, mention particular pages where appropriate, and address one or more of the following:

- inaccuracies or discrepancies in information
- identification of new information relevant to the analysis
- identification of new impacts, alternatives, or mitigation measures
- specific suggestions for improving management direction

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment -- including your personal identifying information -- may be made publicly available at any time. While you can ask us to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

We appreciate your help in this planning effort and look forward to your continued interest and participation. For additional information or clarification regarding this document, please contact Ruth Miller, Project Lead, at (406) 896-5023 or myself at (701) 227-7700.

Sincerely,



Richard A. Rymerson

North Dakota Greater Sage-Grouse
Draft Resource Management Plan Amendment and
Environmental Impact Statement

BLM/MT/PL-13/013
DOI-BLM-MT-C030-2013-120-EIS

1. Responsible Agency: United States Department of the Interior
   Bureau of Land Management

2. Type of Action: Administrative (X) Legislative ( )

3. Document Status: Draft (X) Final ( )

4. Abstract: The draft resource management plan amendment (RMPA)/environmental impact statement (EIS) has been prepared by the Bureau of Land Management (BLM) with assistance from the following cooperating agencies: North Dakota Game and Fish Department, US Fish and Wildlife Service, Bowman County Commissioners, and Bowman-Slope Conservation District.

   The draft EIS considers and analyzes four alternatives that address future management of approximately 30,030 acres of federal surface and 396,053 acres of federal mineral estate in southwestern North Dakota administered by the BLM's North Dakota Field Office (NDFO). Alternative A is a continuation of current management (No Action Alternative). Under this alternative, use of BLM-administered lands and resources would continue to be managed under the North Dakota RMP, as amended. Alternative B describes management actions taken directly from the Sage-Grouse National Technical Team (NTT) *A Report on National Greater Sage-Grouse Conservation Measures*. Alternative C describes management actions submitted by various citizen groups. Alternative D describes management actions developed by adapting the NTT measures to North Dakota. Alternative D is the BLM's current preferred alternative. Alternative D is not a final agency decision but instead an indication of the agency's preliminary preference that reflects the best combination of decisions to achieve BLM goals and policies, meet the purpose and need, address the key planning issues, and consider the recommendations of cooperating agencies and BLM specialists.

   Major issues discussed in the draft EIS include: Greater Sage-Grouse, realty actions, oil and gas, minerals, travel and transportation management, grazing, and fuels management. The alternatives present a range of management actions to achieve the goal of Greater Sage-Grouse conservation for the NDFO. When completed, the Record of Decision for the RMPA/EIS will provide allowable uses and management actions for select resources and resource uses to conserve Greater Sage-Grouse and habitat.

5. Review Period: Comments on the Draft RMPA/EIS will be accepted for 90 days following publication of the Notice of Availability by the US Environmental Protection Agency (EPA) in the *Federal Register*. The comment period will be announced in press releases and the website: http://www.blm.gov/mt/st/en/fo/north_dakota_field.html

6. For further information contact:

Ruth Miller, Team Leader
Bureau of Land Management
Montana State Office
5001 Southgate Drive
Billings, MT 59101
(406) 896-5023

TABLE OF CONTENTS

Chapter Page

TABLE OF CONTENTS *(continued)*

Chapter Page

TABLE OF CONTENTS *(continued)*

Chapter Page

TABLE OF CONTENTS *(continued)*

Chapter Page

TABLE OF CONTENTS *(continued)*

Chapter Page

TABLE OF CONTENTS *(continued)*

Chapter Page

TABLE OF CONTENTS *(continued)*

Chapter Page

TABLE OF CONTENTS *(continued)*

Chapter Page

TABLES

Page

TABLES *(continued)*

TABLES *(continued)*

DIAGRAMS

APPENDICES

This page intentionally left blank.

ACRONYMS AND ABBREVIATIONS

	Full Phrase
ACEC	Area of Critical Environmental Concern
AIM	Assessment, Inventory and Monitoring
AMP	Allotment Management Plan
APD	Application for Permit to Drill
AQI	air quality index
AQRV	air quality related value
AUM	animal unit month
bbls	million barrels
BER	Baseline Environmental Report
BLM	United States Department of the Interior, Bureau of Land Management
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
COA	conditions of approval
COT	Conservation Objectives Team
CSU	controlled surface use
DOI	Department of the Interior
EIS	environmental impact statement
EPA	US Environmental Protection Agency
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act of 1973
ES&R	emergency stabilization and rehabilitation
ESD	Ecological Site Descriptions
FLPMA	Federal Land Policy and Management Act of 1976
Forest Service	United States Department of Agriculture, Forest Service
FRCC	fire regime condition classes
GH	general habitat
GHG	greenhouse gas
GIS	geographic information systems
GRSG	Greater Sage-Grouse
ha	hectare
HAF	Habitat Assessment Framework
IM	Instruction Memorandum
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPCC	Intergovernmental Panel on Climate Change
Kg	kilogram
kV	kilovolt
kWh/m^2/day	kilowatt hours per square meter per day

	Full Phrase
MCF	thousand cubic feet
µg/m^3	micrograms per cubic meter
MOU	memorandum of understanding
MW	megawatt
MZ	Management Zone
NAAQS	National Ambient Air Quality Standards
NDDoH	North Dakota Department of Health
NDFO	North Dakota Field Office
NDGFD	North Dakota Game and Fish Department
NEPA	National Environmental Policy Act of 1969, as amended
NH_4	ammonium
NO_2	nitrogen dioxide
NO_3	nitrates
NO_x	nitrogen oxides
NRCS	National Resource Conservation Service
NSO	no surface occupancy
NTT	National Technical Team
OHV	off-highway vehicle
PAC	Priority Area for Conservation
PCPI	per capita personal income
PFC	proper functioning condition
PGH	preliminary general habitat
PH	priority habitat
$PM_{2.5}$	particulate matter with a diameter less than or equal to 2.5 microns
PM_{10}	particulate matter with a diameter less than or equal to 10 microns
PPH	preliminary priority habitat
ppb	parts per billion
ppm	parts per million
RDF	required design feature
RFDS	reasonable foreseeable development scenario
RMP	resource management plan
RMPA	resource management plan amendment
ROD	Record of Decision
ROW	right-of-way
SGI	Sage-Grouse Initiative
SO_2	sulfur dioxide
SO_4	sulfates
SRP	special recreation permit
SRMA	Special Recreation Management Area
T&E	threatened and endangered

ACRONYMS AND ABBREVIATIONS *(continued)*

	Full Phrase
TL	timing limitation
TPI	total personal income
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USG	Unhealthy for Sensitive Groups
USGS	US Geological Society
WAFWA	Western Association of Fish and Wildlife Agencies

This page intentionally left blank.

Executive Summary

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The Federal Land Policy and Management Act of 1976 (FLPMA) directs the United States Department of the Interior, Bureau of Land Management (BLM) to develop and periodically revise or amend its resource management plans (RMPs), which guide management of BLM-administered lands.

In March 2010, the US Fish and Wildlife Service (USFWS) published its listing decision for the Greater Sage-Grouse (GRSG) as "Warranted but Precluded" (75 Federal Register 13910, March 23, 2010). Inadequacy of regulatory mechanisms was identified as a major threat in the USFWS finding on the petition to list the GRSG under the Endangered Species Act (ESA). The USFWS has identified conservation measures in RMPs as the principal regulatory mechanism for protecting GRSG on BLM-administered lands. Based on the identified threats to the GRSG and the USFWS timeline for making a listing decision on this species, the BLM needs to incorporate objectives and adequate conservation measures into RMPs to conserve GRSG and to avoid the potential for its being listed as a threatened or endangered species under the ESA. In response to the USFWS findings, the BLM will evaluate the adequacy of its RMPs and will address, as necessary, amendments to RMPs throughout the range of the GRSG.

Consistent with the National Greater Sage-Grouse Planning Strategy, the BLM is preparing several environmental impact statements (EISs), with associated plan amendments. These documents will address a range of alternatives focused on specific conservation measures across the range of the GRSG. Several on-going RMP revisions will also be addressing specific conservation measures. The amendments will be coordinated under two administrative planning regions across the entire range of the GRSG. The Rocky Mountain Region and the Great Basin Region boundaries are drawn roughly to correspond with the threats identified by the USFWS in the 2010 listing decision, along with the

Western Association of Fish and Wildlife Agencies (WAFWA) management zones framework (Stiver et al. 2006). The management zones reflect ecological and biological issues and similarities. In addition, management challenges within management zones are similar, and GRSG and their habitats are likely responding similarly to environmental factors and management actions. The Rocky Mountain Region consists of land use plans in North Dakota, South Dakota, Wyoming, and Colorado and in portions of Montana and Utah. The Great Basin Region consists of land use plans in California, Nevada, Oregon, and Idaho and in portions of Utah and Montana.

As identified above, this change in direction is the result of the March 2010 publication of the USFWS 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered. In this document, the agency concluded that the GRSG is warranted for listing as a threatened or endangered species. The USFWS reviewed the status and threats to the GRSG in relation to the five listing factors provided in Section 4(a)(1) of the ESA. The USFWS determined that factor A, "the present or threatened destruction, modification, or curtailment of the habitat or range of the Greater Sage-Grouse," and factor D, "the inadequacy of existing regulatory mechanisms," both posed "a significant threat to the Greater Sage-Grouse now and in the foreseeable future" (75 Federal Register 13910, March 23, 2010). This plan amendment, along with the other plans cited above, proposes to address both listing factors A and D (above) and proposes to provide consistency in the management of GRSG habitat.

This plan amendment addresses GRSG habitat within the North Dakota Field Office (NDFO). The BLM Montana State Office has mapped this habitat preliminarily, in coordination with the North Dakota Game and Fish Department (NDGFD). GRSG habitat falls into one of the two following categories:

- **Preliminary Priority Habitat (PPH)—**Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations. These areas include breeding, late brood-rearing, and winter concentration areas.
- **Preliminary General Habitat (PGH)—**Areas of seasonal or year-round habitat outside of priority habitat.

Through the land use planning process and plan amendment, the BLM will refine PPH and PGH data to (1) delineate priority habitat (PH) and to analyze actions within PH areas to conserve GRSG habitat functionality, or where possible, improve habitat functionality; and (2) to identify general habitat (GH) areas and analyze actions within GH areas that provide for major life history function (e.g., breeding, migration, or winter survival). This is to maintain genetic diversity needed for sustainable GRSG populations.

Range-wide, approximately 51 percent of sagebrush habitat within GRSG management zones is BLM-administered land; within the NDFO, approximately three percent of GRSG habitat is on BLM-administered lands. Changes in management of GRSG habitats are needed to avoid the continued decline of populations that are anticipated across the species' range. Range-wide, adaptive management strategies will focus on areas affected by threats to GRSG habitat, such as wildfire, energy development, disease, and infrastructure development, depending on the threats within each subregion of the Rocky Mountain and Great Basin regions. The BLM administers a large portion of GRSG habitat within the affected states; because of this, changes in its management of GRSG habitats is anticipated to have a considerable impact on existing GRSG populations across the range of GRSG.

The planning area for the North Dakota Greater Sage-Grouse RMP Amendment (RMPA)/EIS is composed of the BLM-administered lands, the US Department of Agriculture, Forest Service (Forest Service) lands, the State of North Dakota lands, USFWS-managed lands, and private lands (**Table ES-1**, Land Ownership within the Planning Area). These areas are in Bowman, Slope, and Golden Valley Counties in southwestern North Dakota. Unlike other RMPAs that are part of the National Greater Sage-Grouse Planning Strategy, for this amendment, the Forest Service is not a cooperating agency; therefore, the North Dakota Greater Sage-Grouse RMPA/EIS does not address a range of alternatives for Forest Service surface/federal minerals. **Figure 1-1**, Project Planning Area (**Appendix A**, Figures) is a map of the planning area.

The planning area incorporates the PPH, the historic GRSG distribution zone (PGH), as well as additional lands not designated as PPH or PGH. Though the planning area includes private lands, the decision area includes only BLM federal surface and federal minerals in this amendment. Management direction and actions outlined in this RMPA apply only to these BLM-administered lands in the planning area and to federal mineral estate under BLM administration that may lie beneath other surface ownership.

The current GRSG habitat on BLM-administered lands in the NDFO consists of 32,900 acres of PPH (seven percent of all PPH in planning area) and 80 acres of PGH (less than one percent of all PGH in planning area). PPH and PGH were mapped in cooperation with the NDGFD. **Table ES-1** shows the acreage of PPH and PGH by landowner, and **Figure 1-1** (**Appendix A**), shows areas mapped as PPH and PGH.

Table ES-1
Land Ownership within the Planning Area

	Bowman County		Slope County		Golden Valley County		Planning Area		
	PPH Acres	PGH Acres	PPH Acres	PGH Acres	PPH Acres	PGH Acres	Planning Area Acres[1]	PPH Acres	PGH Acres
Surface Ownership									
BLM	32,900	80	0	0	0	0	33,030	32,900	80
Forest Service	0	11	56,691	26,608	9,858	3,244	140,432	66,549	29,863
State lands	15,281	5,047	5,318	5,824	951	0	40,894	21,550	10,871
Private	213,230	111,508	102,105	88,140	19,987	1,368	741,607	335,322	201,016
Water	2,778	2	1,926	469	45	0	6,416	4,749	471
USFWS	0	0	0	0	0	0	638	0	0
Total	**264,189**	**116,648**	**166,040**	**121,041**	**30,841**	**4,612**	**963,017**	**461,070**	**242,301**
Federal Mineral Estate[2]									
Total	**68,232**	**39,815**	**81,988**	**65,869**	**17,071**	**4,221**	**396,053**	**167,291**	**109,905**

Source: BLM 2012a
[1]Planning area acres include additional acres that are not PPH or PGH on BLM-administered lands.
[2] Includes federal mineral estate under BLM administration that may lie beneath other surface ownership

ES.2 PURPOSE AND NEED

The BLM is preparing RMP amendments with associated EISs for RMPs containing GRSG habitat. This effort responds to the USFWS's March 2010 "warranted, but precluded" ESA listing petition decision. Inadequacy of regulatory mechanisms was identified as a significant threat in the USFWS finding on the petition to list the GRSG. The USFWS identified the principal regulatory mechanism for the BLM as conservation measures embedded in RMPs. Changes in management of GRSG habitats are necessary to avoid the continued decline of populations that are anticipated across the species' range. These plan amendments (BLM plans being amended across the entire GRSG range) would focus on areas affected by threats to GRSG habitat identified by the USFWS in the March 2010 listing decision. A threats cross-walk table is included in **Chapter 2**, Proposed Action and Alternatives, to show what threats are being addressed in the range of alternatives for this RMPA/EIS.

The purpose for the RMP amendments is to identify and incorporate appropriate conservation measures to conserve, enhance and/or restore GRSG habitat by reducing, eliminating, or minimizing threats to that habitat.

Because BLM administers a large portion of GRSG habitat within the affected states, changes in BLM management of GRSG habitats are anticipated to have a considerable beneficial impact on present and future GRSG populations and could reduce the need to list the species as threatened or endangered under the ESA.

ES.3 PROPOSED ACTION

This proposed North Dakota Greater Sage-Grouse RMPA/EIS provides future management direction to maintain or increase GRSG abundance and distribution by conserving, enhancing, or restoring the sagebrush ecosystem on which populations depend throughout the North Dakota portion of WAFWA Management Zone (MZ) I (Stiver et al. 2006). MZ I includes all of Montana (except the Dillon Field Office), North Dakota, South Dakota, and northeastern Wyoming. Proposed amendments to the North Dakota RMP (BLM 1988a) would include allowable uses and management actions for select resources and resource uses. Allowable uses are those that are allowed, restricted, or prohibited and may include stipulations. The decisions to be made are (1) to delineate PH and GH and (2) to identify the management actions, restrictions, and constraints that would be placed on allowable uses on BLM-administered lands to conserve, restore, and enhance GRSG habitat.

ES.4 SCOPING

Scoping is an early and open process for determining the scope, or range, of issues to be addressed and for identifying the significant issues to consider in the planning process. Scoping is designed to meet the public involvement requirements of FLPMA and the National Environmental Policy Act of 1969, as amended (NEPA). It identifies the affected public and agency concerns, and defines the relevant issues and alternatives that will be examined in detail in the plan amendment. A planning issue is defined as a major controversy or dispute regarding management or uses on BLM-administered lands that can be addressed through a range of alternatives.

A 60-day public scoping period was initiated on December 9, 2011, with the publication in the *Federal Register* of a notice of intent to begin a planning effort. The scoping period was extended through a notice of extension, published February 10, 2012, and ended on March 23, 2012. This cooperative process included soliciting input from interested state and local governments, tribal governments, other federal agencies and organizations, and individuals to identify the scope of issues to be addressed in the plan amendment and to assist in formulating reasonable alternatives. The scoping process is an excellent method for opening dialogue between the BLM and the public about managing GRSG and their habitats on BLM-administered lands. This process also identifies the concerns of those who have an interest in this subject and in the GRSG habitats. As part of the scoping process, the BLM also requested that the public submit nominations for potential Areas of Critical Environmental Concern (ACECs) for GRSG and their habitat.

Scoping included an open-house meeting in Bowman, North Dakota, on January 17, 2012. In addition, news releases notified the public of the scoping period and invited them to provide written comments. Public comments obtained during the scoping period were used to define the relevant issues that would be addressed by a reasonable range of alternatives in the North Dakota Greater Sage-Grouse RMPA/EIS.

The National Greater Sage-Grouse Planning Strategy Scoping Summary Report (BLM 2012b) is available at the project website for the national conservation effort: http://www.blm.gov/wo/st/en/prog/more/sagegrouse.html. The discussion below provides an overview of the scoping results both range-wide and specific to North Dakota.

ES.5 ISSUES

Issues to be addressed in the North Dakota Greater Sage-Grouse RMPA/EIS were identified by the public and the agencies during the scoping process for the range-wide planning effort. The issues identified in the Scoping Summary Report, and other resource and use issues identified in the BLM *Planning Handbook and Manual* (H-1610-1), were considered in developing the alternatives brought forward for analysis. Range-wide issues identified in the Scoping Summary Report that are applicable for North Dakota are included in **Table ES-2**, Range-Wide Planning Issues for the North Dakota Field Office.

Table ES-2
Range-Wide Planning Issues for the North Dakota Field Office

Issue	Planning Issue Category	Planning Issue
1.	Greater Sage-Grouse and habitat	How would the BLM use the best available science to delineate PPH, PGH, and no-habitat categories and accurately monitor the impact of land uses on GRSG?
2.	Energy and mineral development	How would energy and mineral development, including renewable energy, be managed within GRSG habitat, while recognizing valid existing rights?
3.	Livestock grazing	What measures would the BLM put into place to protect and improve GRSG habitat, while maintaining permitted grazing use?
4.	Vegetation management	How would the BLM conserve, enhance, or restore GRSG habitat, such as sagebrush communities and minimize or prevent the introduction or spread of noxious weeds and invasive species?
5.	Lands and realty	What opportunities exist to adjust public land ownership that would increase management efficiency for GRSG and GRSG habitat?
6.	Social, economic, and environmental justice	How could the BLM promote or maintain activities that provide social and economic benefit to local communities, while providing protection for GRSG habitat?

Table ES-2
Range-Wide Planning Issues for the North Dakota Field Office

Issue	Planning Issue Category	Planning Issue
7.	Recreation and travel management	How would motorized, nonmotorized, and mechanized travel be managed to provide access to federal lands and a variety of recreation opportunities, while protecting GRSG habitat?
8.	Fire management	What measure should be undertaken to manage fuels and wildland fires, while protecting GRSG habitat?
9.	Special management areas	What special management areas would the BLM designate to benefit the conservation, enhancement, and restoration of GRSG and habitat?
10.	Drought/climate change	How would the BLM incorporate the impacts of a changing climate on GRSG habitat?

ES.5.1 Issues Specific to North and South Dakota

Issues discussed in the comments for North and South Dakota included GRSG habitat, energy and mineral development, livestock grazing, and water resources (as related to West Nile virus and GRSG). No additional unique comment themes were identified outside of the issues identified in the range-wide analysis (**Table ES-2**).

ES.6 PLANNING CRITERIA

Planning criteria are the standards, rules, and factors used as the sideboards to resolve issues and develop alternatives. Planning criteria are based on appropriate laws, regulations, BLM manual sections, and policy directives. Criteria also were based on public participation and coordination with cooperating agencies, other federal agencies, state and local governments, and Indian tribes. Planning criteria are prepared to ensure that decision making is tailored to the issues and to ensure that the BLM avoids unnecessary data collection and analysis.

- The BLM will use the USFWS's Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report (USFWS 2013),WAFWA *Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats* (Connelly et al. 2004), US Geological Society's (USGS) Summary of Science, Activities, Programs and Policies that Influence the Rangewide Conservation of Greater Sage-Grouse (*Centrocercus urophasianus*) (Manier et al. 2013), and any other appropriate resources, to identify GRSG habitat requirements and best management practices (BMPs).
- The approved RMPAs will be consistent with the BLM's National Sage-Grouse Conservation Strategy.

- The approved RMPAs will comply with FLPMA, NEPA, and Council on Environmental Quality (CEQ) regulations at 40 Code of Federal Regulations (CFR), Parts 1500-1508, and Department of the Interior regulations at 43 CFR, Part 46, and 43 CFR, Part 1600; the BLM H-1601-1 *Land Use Planning Handbook*, "Appendix C: Program-Specific and Resource-Specific Decision Guidance Requirements" for affected resource programs; the 2008 BLM NEPA Handbook (H-1790-1; BLM 2008a); and all other applicable BLM policies and guidance.
- The RMPAs will be limited to making land use planning decisions specific to the conservation of GRSG habitat.
- The BLM will consider allocations and prescriptive standards to conserve GRSG habitat, as well as objectives and management actions to restore, enhance, and improve GRSG habitat.
- The RMPAs will recognize valid existing rights.
- Lands addressed in the RMPAs will be BLM-administered lands (including surface-estate/split estate lands) managed by the BLM in GRSG habitats. Any decisions in the RMPAs/revisions will apply only to BLM-administered lands.
- The BLM will use a collaborative and multijurisdictional approach, where appropriate, to determine the desired future condition of BLM-administered lands for the conservation of GRSG and their habitats.
- As described by law and policy, the BLM will strive to ensure that conservation measures are as consistent as possible with other planning jurisdictions within the planning area boundaries.
- The BLM will consider a range of reasonable alternatives, including appropriate management prescriptions that focus on the relative values of resources, while contributing to the conservation of the GRSG and its habitat.
- The BLM will analyze socioeconomic impacts of the alternatives, using an accepted input-output quantitative model, such as IMPLAN.
- The BLM will endeavor to use current scientific information, research, and technologies and the results of inventory, monitoring, and coordination to determine appropriate local and regional management strategies that will enhance or restore GRSG habitat.
- For BLM-administered lands, all activities and uses within GRSG habitats will follow existing land health standards. Guidelines for livestock grazing and other programs that have developed guidelines will be applicable to all alternatives for BLM-administered lands.

- The BLM will consult with Native American tribes to identify sites, areas, and objects important to their cultural and religious heritage within GRSG habitats.
- The BLM will coordinate with state, local, and tribal governments to ensure that it considers provisions of pertinent plans, seeks to resolve inconsistencies between state, local, and tribal plans, and provides ample opportunities for state, local, and tribal governments to comment on the development of amendments or revisions.
- The RMPAs will be based on the principles of adaptive management.
- Reasonable foreseeable development scenarios and planning for fluid minerals will follow BLM Handbook H-1624-1 (BLM 1990) and current fluid minerals manual guidance for fluid mineral (oil and gas, coal-bed methane, oil shale) and geothermal resources.
- The RMPAs will be developed using an interdisciplinary approach to prepare reasonable foreseeable development scenarios, to identify alternatives, and to analyze resource impacts, including cumulative impacts on natural and cultural resources and the social and economic environment.
- The most current, approved, BLM corporate spatial data will be supported by current metadata and will be used to ascertain GRSG habitat extent and quality. Data will be consistent with the principles of the Information Quality Act of 2000.
- State game and fish agencies' GRSG data and expertise will be used to the fullest extent practicable in making management determinations on federal lands.
- Analysis of impacts in the plan amendments will address the resources and resource programs identified in the National Technical Team (NTT) report (*A Report on National Greater Sage-Grouse Conservation Measures*; NTT 2011) and alternatives that contain specific management measures for conservation of GRSG habitat.
- Resources and resource programs that do not contain specific management direction for GRSG that may be indirectly affected by proposed management actions will be identified and discussed only to the degree required to fully understand the range of effects of the proposed management actions.

An additional criterion was received in public scoping comments during the scoping period (December 9, 2011, to March 23, 2012) and was added to the list of planning criteria. This comment was that state game and fish agencies have the responsibility and authority to manage wildlife.

ES.7 MANAGEMENT ALTERNATIVES

Alternatives development is the heart of the planning process. Land use planning and NEPA regulations require the BLM to formulate a reasonable range of alternatives. Alternatives development is guided by established planning criteria (as outlined in 43 Code of Federal Regulations [CFR], Part 1610).

The basic goal of alternative development is to produce feasible, distinct, potential management scenarios that:

- Address the identified major planning issues
- Explore opportunities to enhance management of resources and resource uses
- Resolve conflicts among resources and resource uses
- Meet the purpose of and need for the RMP or RMPA

Between May and September 2012, the planning team met to develop management goals and to identify objectives and actions to address the goals. The various groups, along with cooperating agencies, met numerous times throughout this period to refine their work. Through this process, the planning team developed one no action alternative (A) and three action alternatives (B, C, and D). The action alternatives were designed to address the 10 planning issues (refer to **Section 1.6.3**, Issues Identified), to fulfill the purpose and need for the RMPA (outlined in **Section 1.2**, Purpose and Need), and to meet the multiple use mandates of FLPMA (43 US Code, Section 1716).

The three resulting action alternatives (Alternatives, B, C, and D) offer a range of possible management approaches. Their purpose is to respond to planning issues and concerns identified through public scoping and to maintain or increase GRSG abundance and distribution in the planning area. While the goal is the same across alternatives, each alternative contains a discrete set of objectives, allowable uses, and management actions constituting a separate RMP amendment. The goal is met in varying degrees, with the potential for different long-range outcomes and conditions. Conservation measures in the alternatives are focused on PH and GH, depending on the alternative's objective. The PH and GH have been delineated by the NDGFD, in coordination with the BLM.

The relative emphasis given to particular resources and resource uses differs as well, including allowable uses, restoration measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives.

The alternatives are directed toward responding to USFWS-identified issues and threats to GRSG and their habitat. All of the action alternatives were developed to employ resource programs to address the USFWS-identified threats. A

complete description of all decisions proposed for each alternative is included in **Chapter 2**. Summaries of the alternatives are presented below and maps are included in **Appendix A**.

ES.7.1 Alternative A (No Action)

Alternative A meets the CEQ requirement that a no action alternative be considered. This alternative continues current management direction and prevailing conditions derived from existing planning documents. Goals and objectives for resources and resource uses are based on the 1988 North Dakota RMP and Record of Decision, along with associated amendments, activity and implementation level plans, and other management decision documents. Laws, regulations, and BLM policies that supersede RMP decisions would apply.

No PH or GH would be delineated under Alternative A. Goals and objectives for BLM-administered lands and mineral estate would not change. Appropriate and allowable uses and restrictions pertaining to such activities as mineral leasing and development, recreation, right-of-way development, and livestock grazing would also remain the same. The BLM would not modify existing or establish additional criteria to guide the identification of site-specific use levels for implementation activities.

ES.7.2 Elements Common to Alternatives B, C, and D

All action alternatives include two basic components: delineated PH and GH and required design features.

Delineate Lands as Priority and General Habitat

Under Alternatives B, C, and D, PPH and PGH data would be refined for two purposes. First, it would delineate PH and analyze actions within PH to conserve GRSG habitat functionality, or where possible, improve habitat functionality. Second, it would delineate GH and analyze actions within GH that provide for major life history function (e.g., breeding, migration, and winter survival) in order to maintain genetic diversity needed for sustainable GRSG populations. The areas delineated as PH and GH would be the same under each alternative; however, the allowable uses and management actions within PH and GH may vary between alternatives to meet the goal of the RMPA and objectives of the alternative.

Required Design Features

Required design features (RDFs) are means, measures, or practices intended to reduce or avoid adverse environmental impacts. This RMPA proposes a suite of design features that would establish the minimum specifications for certain activities, such as water developments, mineral development, and fire and fuels management), and would mitigate adverse impacts. These design features would be required to provide a greater level of regulatory certainty than through implementation of BMPs.

In general, the RDFs are accepted practices that are known to be effective when implemented properly at the project level. However, their applicability and overall effectiveness cannot be fully assessed, except at the project-specific level, when the project location and design are known. Because of site-specific circumstances, some features may not apply to some projects (e.g., a resource is not present on a given site) or may require slight variations from what is described in the RMPA (e.g., a larger or smaller protective area). All variations in design features would require appropriate analysis and disclosure as part of future project authorizations. Additional mitigation measures may be identified and required during individual project development and environmental review. The proposed RDFs are presented in **Appendix B**, Greater Sage-Grouse Habitat Required Design Features and Best Management Practices.

ES.7.3 Alternative B

GRSG conservation measures in *A Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) were used to form BLM management direction under Alternative B. Management actions by the BLM, in concert with other state and federal agencies, and private landowners play a critical role in the future trends of GRSG populations. To ensure BLM management actions are effective and based on the best available science, the National Policy Team created a NTT in August of 2011. The BLM's objective for chartering this planning strategy was to develop new or revised regulatory mechanisms, through RMPs, to conserve and restore the GRSG and its habitat on BLM-administered lands range-wide over the long term. Conservation measures under Alternative B are focused on PH (areas that have the highest conservation value to maintaining or increasing sage-grouse populations). These conservation measures include protections such as right-of-way exclusion and fluid mineral leasing closure.

ES.7.4 Alternative C

During scoping for the National Greater Sage-Grouse Planning Strategy, individuals and conservation groups submitted management direction recommendations for protection and conservation of GRSG and habitat at the range-wide level. These recommendations, in conjunction with resource allocation opportunities and internal sub-regional BLM input, were reviewed in order to develop BLM management direction for GRSG under Alternative C. Conservation measures under Alternative C are focused on both PH and GH (seasonal or year-round habitat outside of PH).

ES.7.5 Alternative D (Agency Preferred)

Alternative D, the agency-preferred alternative, seeks to allocate limited resources among competing human interests, land uses, and the conservation of natural resource values, while sustaining and enhancing ecological integrity across the landscape, including plant, wildlife, and fish habitat. This alternative incorporates local adjustments to *A Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) to provide a balanced level of protection,

restoration, enhancement, and use of resources and services to meet ongoing programs and land uses. Conservation measures under Alternative D are focused on both PH and GH.

ES.8 ENVIRONMENTAL CONSEQUENCES

The purpose of the environmental consequences analysis in this RMPA/EIS is to determine the potential for significant impacts of the federal action on the human environment. CEQ regulations for implementing NEPA state that the human environment is interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment (40 CFR, Part 1508.14). The federal action is the BLM's selection of an RMPA that will provide a consistent framework for its management of the GRSG and its habitat on BLM-administered lands. This would be in concert with its allocation of resources, in accordance with the multiple-use and sustained yield mandates of FLPMA.

Management actions proposed in **Chapter 2** are primarily planning-level decisions and typically would not result in direct on-the-ground changes. However, by planning for uses on BLM-administered surface estate and federal mineral estate during the planning horizon for the North Dakota RMP, this impact analysis focuses on impacts that could eventually result in on-the-ground changes. Impacts for some resources or resource uses, such as livestock grazing and off-highway vehicle use, could be confined to the BLM-administered surface estate. Other impacts, such as energy and minerals and requirements to protect GRSG from such activity, could apply to all BLM-administered federal mineral estate (including split-estate). Some BLM management actions may affect only certain resources under certain alternatives. This impact analysis in **Chapter 4**, Environmental Consequences, identifies impacts that may enhance or improve a resource as a result of management actions, as well as those impacts that have the potential to impair a resource.

This page intentionally left blank.

Chapter 1
Introduction

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The Federal Land Policy and Management Act of 1976 (FLPMA) directs the United States Department of the Interior (DOI), Bureau of Land Management (BLM) to develop and periodically revise or amend its resource management plans (RMPs), which guide management of BLM-administered lands.

In March 2010, the US Fish and Wildlife Service (USFWS) published its listing decision for the Greater Sage-Grouse (GRSG) as "Warranted but Precluded" (75 *Federal Register* 13910, March 23, 2010). Inadequacy of regulatory mechanisms was identified as a major threat in the USFWS finding on the petition to list the GRSG under the Endangered Species Act (ESA). The USFWS has identified conservation measures in RMPs as the principal regulatory mechanism for protecting GRSG on BLM-administered lands. Based on the identified threats to the GRSG and the USFWS timeline for making a listing decision on this species, the BLM needs to incorporate objectives and adequate conservation measures into RMPs to conserve GRSG and avoid the potential of its being listed as a threatened or endangered species under the ESA. In response to the USFWS findings, the BLM will evaluate the adequacy of its RMPs and will address, as necessary, amendments to RMPs throughout the range of the GRSG.

Consistent with national policy, the BLM is preparing several environmental impact statements (EISs), with associated plan amendments. These documents will address a range of alternatives focused on specific conservation measures across the range of the GRSG. Several on-going RMP revisions will also be addressing specific conservation measures. The plan amendments will be coordinated under two administrative planning regions across the entire range of the GRSG. The Rocky Mountain Region and the Great Basin Region boundaries are drawn roughly to correspond with the threats identified by the USFWS in the 2010 listing decision, along with the Western Association of Fish

and Wildlife Agencies (WAFWA) management zones framework (Stiver et al. 2006). The management zones reflect ecological and biological issues and similarities. In addition, management challenges within management zones are similar and GRSG and their habitats are likely responding similarly to environmental factors and management actions. The Rocky Mountain Region consists of land use plans in North Dakota, South Dakota, Wyoming, and Colorado and in portions of Montana and Utah. The Great Basin Region consists of land use plans in California, Nevada, Oregon, and Idaho and in portions of Utah and Montana.

As identified above, this change in direction is the result of the March 2010 publication of the USFWS 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered. In this document, the USFWS concluded that the GRSG is warranted for listing as a threatened or endangered species. The USFWS reviewed the status and threats to the GRSG in relation to the five listing factors provided in Section 4(a)(1) of the ESA. The USFWS determined that factor A, "the present or threatened destruction, modification, or curtailment of the habitat or range of the Greater Sage-Grouse," and factor D, "the inadequacy of existing regulatory mechanisms," both posed "a significant threat to the Greater Sage-Grouse now and in the foreseeable future" (75 *Federal Register* 13910, March 23, 2010). This plan amendment, along with the other plans cited above, proposes to address both listing factors A and D (above) and proposes to provide consistency in the management of GRSG habitat.

This plan amendment addresses GRSG habitat within the BLM North Dakota Field Office (NDFO) The BLM Montana State Office has mapped this habitat preliminarily, in coordination with the North Dakota Game and Fish Department (NDGFD). GRSG habitat falls into one of the two following categories:

- **Preliminary Priority Habitat (PPH)—**Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations. These areas include breeding, late brood-rearing, and winter concentration areas.
- **Preliminary General Habitat (PGH)—**Areas of seasonal or year-round habitat outside of priority habitat.

Through the land use planning process and plan amendment, the BLM will refine PPH and PGH data to (1) delineate priority habitat (PH) and analyze actions within PH areas to conserve GRSG habitat functionality, or where possible, improve habitat functionality; and (2) identify general habitat (GH) areas and analyze actions within GH areas that provide for major life history function (e.g., breeding, migration, and winter survival) in order to maintain genetic diversity needed for sustainable GRSG populations.

Range-wide, approximately 51 percent of sagebrush habitat within GRSG management zones is BLM-administered land; within the NDFO, approximately three percent of GRSG habitat is on BLM-administered lands. Changes in management of GRSG habitats are needed to avoid the continued decline of populations that are anticipated across the species' range. Range-wide, adaptive management strategies will focus on areas affected by threats to GRSG habitat, such as wildfire, energy development, disease, and infrastructure development, depending on the threats within each subregion of the Rocky Mountain and Great Basin regions. The BLM administers a large portion of GRSG habitat within the affected states; because of this, changes in its management of GRSG habitats is anticipated to have a considerable impact on existing GRSG populations across the range of GRSG.

1.2 PURPOSE AND NEED

The BLM is preparing RMP amendments with associated EISs for RMPs containing GRSG habitat. This effort responds to the USFWS's March 2010 "warranted, but precluded" ESA listing petition decision. Inadequacy of regulatory mechanisms was identified as a significant threat in the USFWS finding on the petition to list the GRSG. The USFWS identified the principal regulatory mechanism for the BLM as conservation measures embedded in RMPs. Changes in management of GRSG habitats are necessary to avoid the continued decline of populations that are anticipated across the species' range. These plan amendments (BLM plans being amended across the entire GRSG range) would focus on areas affected by threats to GRSG habitat identified by the USFWS in the March 2010 listing decision. A threats cross-walk table is included in **Chapter 2**, Proposed Action and Alternatives, to show what threats are being addressed in the range of alternatives for this RMP Amendment (RMPA)/EIS.

The purpose for the RMP amendments is to identify and incorporate appropriate conservation measures to conserve, enhance and/or restore GRSG habitat by reducing, eliminating, or minimizing threats to that habitat.

Because BLM administers a large portion of GRSG habitat within the affected states, changes in BLM management of GRSG habitats are anticipated to have a considerable beneficial impact on present and future GRSG populations and could reduce the need to list the species as threatened or endangered under the ESA.

1.3 PROPOSED ACTION

This proposed North Dakota Greater Sage-Grouse RMPA/EIS provides future management direction to maintain or increase GRSG abundance and distribution by conserving, enhancing, or restoring the sagebrush ecosystem on which populations depend throughout the North Dakota portion of WAFWA Management Zone (MZ) I (Stiver et al. 2006). Overall, MZ I includes all of Montana (except the Dillon Field Office), North Dakota, South Dakota, and

northeastern Wyoming. However, this RMPA amendment provides management direction only for the NDFO.

Proposed amendments to the North Dakota RMP (BLM 1988a) would include allowable uses and management actions for select resources and resource uses. Allowable uses are those that are allowed, restricted, or prohibited and may include stipulations. Allowable uses also identify lands where specific uses are excluded to protect resource values. Management actions include measures that will guide future and day-to-day activities to conserve GRSG and GRSG habitat. In addition, this amendment identifies required design features (RDFs) and best management practices (BMPs). Implementation decisions generally constitute site-specific on-the-ground actions and are not addressed in the North Dakota Greater Sage-Grouse RMPA/EIS.

The decisions to be made are (1) to delineate PH and GH and (2) to identify the management actions, restrictions, and constraints that would be placed on allowable uses on BLM-administered lands to conserve, restore, and enhance GRSG habitat.

1.4 DESCRIPTION OF THE GREATER SAGE-GROUSE PLANNING AREA

1.4.1 Overview

The planning area for the North Dakota Greater Sage-Grouse RMPA/EIS is composed of BLM-administered lands, US Department of Agriculture (USDA), Forest Service (Forest Service) lands, State of North Dakota lands, USFWS-managed lands, and private lands (**Table 1-1**, Land Ownership within the Planning Area). These lands are in Bowman, Slope, and Golden Valley Counties in southwestern North Dakota (**Figure 1-1**, Project Planning Area, **Appendix A**, Figures).

The planning area incorporates the PPH, the historic GRSG distribution zone (PGH), as well as additional lands not designated as PPH or PGH. Though the planning area includes private lands, the decision area includes only BLM federal surface and federal minerals in this amendment. Management direction and actions outlined in this EIS apply only to these BLM-administered lands in the planning area and to federal mineral estate under BLM jurisdiction that may lie beneath other surface ownership. Unlike other RMPAs that are part of the National Greater Sage-Grouse Planning Strategy, for this amendment, the Forest Service is not a cooperating agency; therefore, the North Dakota Greater Sage- Grouse RMPA/EIS does not address a range of alternatives for Forest Service surface/federal minerals.

Table 1-1
Land Ownership within the Planning Area

	Bowman County		Slope County		Golden Valley County		Planning Area		
	PPH Acres	PGH Acres	PPH Acres	PGH Acres	PPH Acres	PGH Acres	Planning Area Acres[1]	PPH Acres	PGH Acres
Surface Ownership									
BLM	32,900	80	0	0	0	0	33,030	32,900	80
Forest Service	0	11	56,691	26,608	9,858	3,244	140,432	66,549	29,863
State lands	15,281	5,047	5,318	5,824	951	0	40,894	21,550	10,871
Private	213,230	111,508	102,105	88,140	19,987	1,368	741,607	335,322	201,016
Water	2,778	2	1,926	469	45	0	6,416	4,749	471
USFWS	0	0	0	0	0	0	638	0	0
Total	**264,189**	**116,648**	**166,040**	**121,041**	**30,841**	**4,612**	**963,017**	**461,070**	**242,301**
Federal Mineral Estate[2]									
Total	**68,232**	**39,815**	**81,988**	**65,869**	**17,071**	**4,221**	**396,053**	**167,291**	**109,905**

Source: BLM 2012a

[1]Planning area acres include additional acres that are not PPH or PGH on BLM-administered lands.

[2] Federal mineral estate under BLM jurisdiction that may lie beneath other surface ownership

The current GRSG habitat on BLM-administered lands in the NDFO consists of 32,900 acres of PPH (seven percent of all PPH in the planning area) and 80 acres of PGH (less than 1 percent of all PGH in the planning area). PPH and PGH were mapped in cooperation with the NDGFD. **Table 1-1** provides acres of PPH and PGH by landowner, and **Figure 1-1** (**Appendix A**) includes areas mapped as PPH and PGH.

1.5 BLM PLANNING PROCESS

FLPMA requires the BLM to use RMPs as tools by which "present and future use is projected" (43 United States Code [USC], Section 1701 [a][2]). FLPMA's implementing regulations for planning, 43 Code of Federal Regulations (CFR) Part 1600, state that land use plans are a preliminary step in the overall process of managing BLM-administered lands. The regulations state that the plans are "designed to guide and control future management actions and the development of subsequent, more detailed and limited scope plans for resources and uses" (43 CFR Part 1601.0-2). Public participation and input are important components of land use planning.

The BLM uses a nine-step planning process when developing or revising RMPs, as required by 43 CFR, Part 1600, and planning program guidance in the BLM handbook H-1601-1, *Land Use Planning Handbook* (BLM 2005). The planning process is designed to identify the uses of BLM-administered lands desired by the public and to consider these uses to the extent that they are consistent with the laws established by Congress and the policies of the executive branch of the federal government.

Once an RMP is approved, a plan may be changed through amendment. An amendment is initiated by the need to consider monitoring and evaluation findings, new data, new or revised policy, or a change in circumstances. It may also be initiated by a proposed action that may result in a change in the scope of resource uses or a change in the terms, conditions, and decisions of the approved plan. If a decision is made to prepare a document per the National Environmental Policy Act of 1969, as amended (NEPA), the amending process follows the same procedure required for preparation and approval of the plan, but the focus is limited to that portion of the plan being amended (43 CFR Part 1610.5-5).

The planning process is issue driven and is undertaken to resolve management issues and problems, as well as to take advantage of management opportunities. The BLM uses the public scoping process to identify planning issues to revise or modify an existing plan. The scoping process (see **Section 1.6.1**, The Scoping Process) is also used to introduce the public to preliminary planning criteria, which set the parameters for conducting the planning process.

1.5.1 Implementation of Land Use Plans

When an approved land use plan or land use plan amendment decision document (e.g., decision record) is signed, most of the land use plan decisions in the plan are effective immediately and require no additional planning or NEPA analysis. Upon approval of the land use plan, subsequent implementation decisions are put into effect by developing activity-level or project-specific implementation plans. An activity-level plan typically describes multiple projects in detail that will lead to on-the-ground action. These plans traditionally focus on single resource programs (e.g., habitat management plans, allotment management plans, recreation management plans, etc.). Implementation decisions are made with the appropriate level of NEPA analysis along with any procedural and regulatory requirements for individual programs.

The BLM develops strategies to facilitate implementation of land use plans. An implementation strategy lists prioritized decisions that will help achieve the desired outcomes of one or more land use plans and can be implemented given existing or anticipated resources. Developing implementation strategies enables the BLM to prioritize the preparation of implementation decisions. Implementation strategies can include such steps as (1) developing a framework to portray the work; (2) identifying priorities for a given timeframe; (3)

developing a budget for a given timeframe; and (4) developing an outreach strategy to support implementation.

1.5.2 Monitoring

The regulations in 43 CFR 1610.4-9 require that land use plans establish intervals and standards for monitoring, based on the sensitivity of the resource decisions involved. Land use plan monitoring is the process of tracking the implementation of land use planning decisions (implementation monitoring) and collecting data/information necessary to evaluate the effectiveness of land use planning decisions (effectiveness monitoring). The level and intensity of monitoring will vary, depending on the sensitivity of the resource or area and the scope of the proposed management activity. See **Chapter 2** for more information related to monitoring in North Dakota Greater Sage-Grouse RMPA/EIS.

1.6 SCOPING AND IDENTIFICATION OF ISSUES

1.6.1 The Scoping Process

Scoping is an early and open process for determining the scope, or range, of issues to be addressed and for identifying the significant issues to consider in the planning process. Scoping is designed to meet the public involvement requirements of FLPMA and NEPA. It identifies the affected public and agency concerns and defines the relevant issues and alternatives that will be examined in detail in the plan amendment. A planning issue is defined as a major controversy or dispute regarding management or uses on BLM-administered lands that can be addressed through a range of alternatives.

A 60-day public scoping period was initiated on December 9, 2011, with the publication in the *Federal Register* of a notice of intent to begin a planning effort. The scoping period was extended through a notice of extension, published February 10, 2012, and ended on March 23, 2012. This cooperative process included soliciting input from interested state and local governments, tribal governments, other federal agencies and organizations, and individuals to identify the scope of issues to be addressed in the plan amendment and to assist in formulating reasonable alternatives.

The scoping process is an excellent method for opening dialogue between the BLM and the public about managing GRSG and their habitats on BLM-administered lands. The process also identifies the concerns of those who have an interest in this subject and in the GRSG habitats. As part of the scoping process, the BLM also requested that the public submit nominations for potential Areas of Critical Environmental Concern (ACECs) for GRSG and their habitat.

Scoping included an open-house meeting in Bowman, North Dakota on January 17, 2012. In addition, news releases notified the public of the scoping period and invited them to provide written comments. Public comments obtained during

the scoping period were used to define the relevant issues that would be addressed by a reasonable range of alternatives in the North Dakota Greater Sage-Grouse RMPA/EIS.

The *National Greater Sage-Grouse Planning Strategy Scoping Summary Report* (BLM 2012b) is available at the project website for the national conservation effort: http://www.blm.gov/wo/st/en/prog/more/sagegrouse.html. The discussion below provides an overview of the scoping results both range-wide and specific to North Dakota.

1.6.2 Scoping Comments

A total of 272 unique written submissions for the Rocky Mountain Region, which includes North Dakota, and 585 unique written submissions for the Great Basin Region were received during the public scoping period. Submissions included a total of 7,472 unique comments. In addition to unique submissions, 30,397 form letters were received.

In the Greater Sage-Grouse Scoping Summary Report, North Dakota and South Dakota are combined for the analysis. The majority of the 7,472 unique comments received (5,253) were applicable range-wide. In total, 1,196 unique comments were specific to the Rocky Mountain Region, and of these, 14 were specific to North Dakota and South Dakota.

Commenter Affiliation

Individual members of the public did not submit any comments specific to North Dakota and South Dakota during the scoping period; representatives from the commercial sector accounted for 25 percent of the commenters and nonprofit or citizen groups represented 63 percent. Federal and local government agencies submitted no comments, and state government agencies represented 12 percent of commenters.

Number of Comments by Process Category

Of the 14 comments received specific to North Dakota and South Dakota, nine (64 percent) were related to a planning issue that is addressed in the North Dakota Greater Sage-Grouse RMPA/EIS. These issues are summarized in **Section 1.6.3**, Issues Identified, and are discussed in Chapter 3 of the Scoping Summary Report. It should be noted that some comments addressed multiple planning issues. In addition, five comments (36 percent) were related to issues that are addressed in the North Dakota Greater Sage-Grouse RMPA/EIS but do not fall within a specific planning issue category. These comments included general comments on the BLM planning process, alternatives development, collaboration, and requirements of NEPA and other regulations.

1.6.3 Issues Identified

Issues to be addressed in the North Dakota Greater Sage-Grouse RMPA/EIS were identified by the public and the agencies during the scoping process for the range-wide planning effort. The issues identified in the Scoping Summary Report

and other resource and use issues outlined in the *BLM Land Use Planning Handbook and Manual* (H-1610-1; BLM 2005) were considered in developing the alternatives brought forward for analysis. Range-wide issues identified in the Scoping Summary Report that are applicable for North Dakota are included in **Table 1-2**, Range-Wide Planning Issues for the North Dakota Field Office.

Table 1-2
Range-Wide Planning Issues for the North Dakota Field Office

Issue	Planning Issue Category	Planning Issue
1.	Greater Sage-Grouse and habitat	How would the BLM use the best available science to delineate PPH, PGH, and no-habitat categories and accurately monitor the impact of land uses on GRSG?
2.	Energy and Mineral Development	How would energy and mineral development, including renewable energy, be managed within GRSG habitat, while recognizing valid existing rights?
3.	Livestock Grazing	What measures would the BLM put into place to protect and improve GRSG habitat, while maintaining permitted grazing use?
4.	Vegetation Management	How would the BLM conserve, enhance, or restore GRSG habitat, such as sagebrush communities, and minimize or prevent the introduction or spread of noxious weeds and invasive species?
5.	Lands and Realty	What opportunities exist to adjust BLM-administered land ownership that would increase management efficiency for GRSG and habitat?
6.	Social, Economic, and Environmental Justice	How could the BLM promote or maintain activities that provide social and economic benefit to local communities, while providing protection for GRSG habitat?
7.	Recreation and Travel Management	How would motorized, nonmotorized, and mechanized travel be managed to provide access to federal lands and a variety of recreation opportunities, while protecting GRSG habitat?
8.	Fire Management	What measure should be undertaken to manage fuels and wildland fires, while protecting GRSG habitat?
9.	Special Management Areas	What special management areas would be designated by the BLM to benefit the conservation, enhancement, and restoration of GRSG and habitat?
10.	Drought/Climate Change	How would the BLM incorporate the impacts of a changing climate on GRSG habitat?

Issues Specific to North and South Dakota

Issues discussed in the comments for North Dakota and South Dakota were GRSG habitat, energy and mineral development, livestock grazing, and water resources (as related to West Nile virus and GRSG). No additional unique

comment themes were identified outside of the issues identified in the range-wide analysis (**Table 1-2**).

1.6.4 Issues Considered but Not Further Analyzed

National Policy or Administrative Action

Policy or administrative actions are those that the BLM implements because they are standard operating procedure, federal law requires them, or they are BLM policy. They are, therefore, issues that are eliminated from detailed analysis in this planning effort. Administrative actions do not require a planning decision to implement.

The following issues were determined to be outside the scope of the range-wide planning effort, including the North Dakota Greater Sage-Grouse RMPA/EIS:

- **Hunting Greater Sage-Grouse—**Many commenters questioned why GRSG hunting is allowed if the bird is in need of protection. Hunting is an allowed use on BLM-administered lands and is regulated by state wildlife agencies. Some states still allow limited GRSG hunting; however, the NDGFD has not had a hunting season for GRSG for the past five years (including 2012). Comments regarding hunting relate to state-regulated actions and are outside the scope of the plan amendment.
- **Predator control—**Many commenters stated that predator control was needed to protect GRSG from predation. The State of North Dakota possesses primary authority and responsibility for managing the wildlife within the state, while the BLM is responsible for managing habitat. Consistent with a memorandum of understanding (MOU) between the BLM and USDA, Animal and Plant Health Inspection Service-Wildlife Services, the BLM would continue to work with the NDGFD to meet state wildlife population objectives. Predator control is allowed on BLM-administered lands and is regulated by the NDGFD; these comments therefore relate to state-regulated actions and are outside the scope of the plan amendment. The BLM will continue to work with agencies, such as the NDGFD, to address current predation of GRSG. The BLM-administered lands in the planning area will remain open to predator control under state laws.
- **Warranted but precluded decision—**Commenters questioned population levels and the need to incorporate range-wide conservation measures. Others questioned the effectiveness of ESA listing as a method of species conservation. These comments relate to decisions under the purview of the USFWS and are not addressed in this plan amendment.

- **Elimination of livestock grazing—**Commenters asked that grazing be limited or completely stopped on all National System of Public Lands managed by the BLM due to detrimental ecosystem effects. Others stated that national grazing policies should be reformed as the requirements are too limiting and impact ranchers' livelihoods. In addition, some commenters state that grazing provides habitat enhancements for certain sensitive species. Decisions about livestock grazing national policies are outside the scope of this amendment and are not made in this planning effort.

  However, for the purposes of this document, the reduction of livestock (i.e., permitted grazing use) in GRSG habitat within the field office is considered in an alternative. This is consistent with Instruction Memorandum (IM) 2012-169, *RMP Alternative Development for Livestock Grazing* (BLM 2012c). Note that this document is specific to PPH and PGH, not an entire planning area. Additionally, IM MT-2012-042, *Guidance to Address Alternative Development in Livestock Grazing Permit Renewals*, directs the BLM in North Dakota to analyze a no grazing alternative as part of the grazing permit renewal process (BLM 2012d).

- **Renewable energy policies—**Commenters stated concerns about renewable energy development, including economic instability due to government subsidies and risk of wildlife deaths, specifically bats and birds. General policy decisions about renewable energy management on BLM-administered lands will be determined by national policy and are not addressed in this plan amendment.

Range-Wide Issues Not Carried Forward

The following range-wide issues are not being carried forward in the North Dakota Greater Sage-Grouse RMPA/EIS:

- **Fish and Wildlife—**GRSG are addressed under the topic of special status species, along with other relevant special status species, but general fish and wildlife management is not an issue for this plan amendment.
- **Water and Soil—**Management of soil and water is not a main issue that would drive alternatives design for this amendment; however, management activities that impact these resources are addressed in this EIS (e.g., oil and gas, and grazing).
- **Wild Horses and Burros—**There are no wild horses and burros, or wild horse and burro management areas in the NDFO; therefore, this issue is not relevant to this plan amendment.

1.6.5 Issues Beyond the Scope of the Plan

Issues beyond the scope of the RMP planning process are those not related to decisions that would occur in the planning process (i.e. issues relating to

addressing the threats to GRSG). They include decisions that are not under the BLM's jurisdiction or that are beyond the capability of the BLM to resolve as part of the plan amendment. Issues identified in this category are the following:

- New wilderness or Wilderness Study Area proposals
- Eliminating grazing, mineral development, and off-highway vehicle (OHV) use on all BLM-administered lands
- Activities and uses beyond the jurisdiction of the BLM
- Changing existing laws, policies, and regulations
- Availability of funding and personnel for managing programs and for NEPA procedures and costs

Lands with Wilderness Characteristics

The purpose and need of the National Greater Sage-Grouse Planning Strategy is limited to making land use planning decisions specific to the conservation of GRSG habitats. No decisions related to the management of lands with wilderness characteristics will be made as part of this planning effort; therefore, management of lands with wilderness characteristics is considered outside the scope of this RMPA process. As part of the original FLPMA Section 603-mandated inventories, inventories were conducted for the NDFO beginning in 1978. The initial phase of inventories resulted in all lands within North Dakota being dropped from further wilderness consideration (the only solid block of BLM-administered lands within the planning area acres is also a developed oil and gas field).

1.7 DEVELOPMENT OF PLANNING CRITERIA

Planning criteria are based on appropriate laws, regulations, BLM manual sections, and policy directives. Criteria are also based on public participation and coordination with cooperating agencies, other federal agencies, state and local governments, and Indian tribes. Planning criteria are the standards, rules, and factors used as the parameters to resolve issues and develop alternatives. Planning criteria are prepared to ensure decision making is tailored to the issues and to ensure that the BLM avoids unnecessary data collection and analysis.

- The BLM will use the USFWS's *Greater Sage-grouse (Centrocercus urophasianus) Conservation Objectives: Final Report* (USFWS 2013), WAFWA's *Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats* (Connelly et al. 2004), US Geological Society's (USGS) *Summary of Science, Activities, Programs and Policies that Influence the Rangewide Conservation of Greater Sage-Grouse* (*Centrocercus urophasianus*) (Manier et al. 2013), and any other appropriate resources to identify GRSG habitat requirements and BMPs.

- The approved RMP amendments will be consistent with the BLM's National Sage-Grouse Conservation Strategy.
- The approved RMP amendments will comply with FLPMA, NEPA, and Council on Environmental Quality (CEQ) regulations at 40 CFR, Parts 1500-1508, and DOI regulations at 43 CFR, Part 46, and 43 CFR, Part 1600; the BLM H-1601-1 Land Use Planning Handbook, "Appendix C: Program-Specific and Resource-Specific Decision Guidance Requirements" for affected resource programs; the 2008 BLM NEPA Handbook (H-1790-1; BLM 2008a); and all other applicable BLM policies and guidance.
- The RMP amendments will be limited to making land use planning decisions specific to the conservation of GRSG habitat.
- The BLM will consider allocations and prescriptive standards to conserve GRSG habitat, as well as objectives and management actions to restore, enhance, and improve GRSG habitat.
- The RMP amendments will recognize valid existing rights.
- Lands addressed in the RMP amendments will be BLM-administered lands (including surface estate/split estate lands) managed by the BLM in GRSG habitats. Any decisions in the RMP amendments/revisions will apply only to BLM-administered lands.
- The BLM will use a collaborative and multijurisdictional approach, where appropriate, to determine the desired future condition of BLM-administered lands for the conservation of GRSG and their habitats.
- As described by law and policy, the BLM will strive to ensure that conservation measures are as consistent as possible with other planning jurisdictions within the planning area boundaries.
- The BLM will consider a range of reasonable alternatives, including appropriate management prescriptions that focus on the relative values of resources, while contributing to the conservation of the GRSG and its habitat.
- The BLM will analyze socioeconomic impacts of the alternatives, using an accepted input-output quantitative model, such as IMPLAN.
- The BLM will endeavor to use current scientific information, research, and technologies and the results of inventory, monitoring, and coordination to determine appropriate local and regional management strategies that will enhance or restore GRSG habitat.
- For BLM-administered lands, all activities and uses within GRSG habitats will follow existing land health standards. Guidelines for livestock grazing and other programs that have developed guidelines will be applicable to all alternatives for BLM-administered lands.

- The BLM will consult with Native American tribes to identify sites, areas, and objects important to their cultural and religious heritage within GRSG habitats.
- The BLM will coordinate with state, local, and tribal governments to ensure that it considers provisions of pertinent plans, seeks to resolve inconsistencies between state, local, and tribal plans, and provides ample opportunities for state, local, and tribal governments to comment on the development of amendments or revisions.
- The RMP amendments will be based on the principles of adaptive management.
- Reasonable foreseeable development scenarios (RFDS) and planning for fluid minerals will follow BLM Handbook H-1624-1 (BLM 1990) and current fluid minerals manual guidance for fluid mineral (oil and gas, coal-bed methane, oil shale) and geothermal resources.
- The RMP amendments will be developed using an interdisciplinary approach to prepare RFDSs, to identify alternatives, and to analyze resource impacts, including cumulative impacts on natural and cultural resources and the social and economic environment.
- The most current, approved, BLM corporate spatial data will be supported by current metadata and will be used to ascertain GRSG habitat extent and quality. Data will be consistent with the principles of the Information Quality Act of 2000.
- State game and fish agencies' GRSG data and expertise will be used to the fullest extent practicable in making management determinations on federal lands.
- Analysis of impacts in the plan amendments will address the resources and resource programs identified in the National Technical Team (NTT) report (*A Report on National Greater Sage-Grouse Conservation Measures*; NTT 2011) and alternatives that contain specific management measures for conservation of GRSG habitat.
- Resources and resource programs that do not contain specific management direction for GRSG that may be indirectly affected by proposed management actions will be identified and discussed only to the degree required to fully understand the range of effects of the proposed management actions.

An additional criterion was received in public scoping comments during the scoping period (December 9, 2011 to March 23, 2012) and was added to the list of planning criteria. This comment was that state game and fish agencies have the responsibility and authority to manage wildlife.

1.8 RELATIONSHIP TO OTHER POLICIES, PLANS, AND PROGRAMS

Currently, lands within the NDFO are managed according to the North Dakota RMP/EIS and Record of Decision (ROD) (BLM 1988a). This RMPA is a necessary step in the overall process of managing BLM-administered lands, specifically to include new guidance concerning the conservation of GRSG habitat. As a result, this planning process must recognize the many ongoing programs, plans, and policies that are being implemented by the BLM or other land managers and government agencies. The BLM will be consistent with other management actions whenever possible. Plans that need to be considered during GRSG planning are listed below.

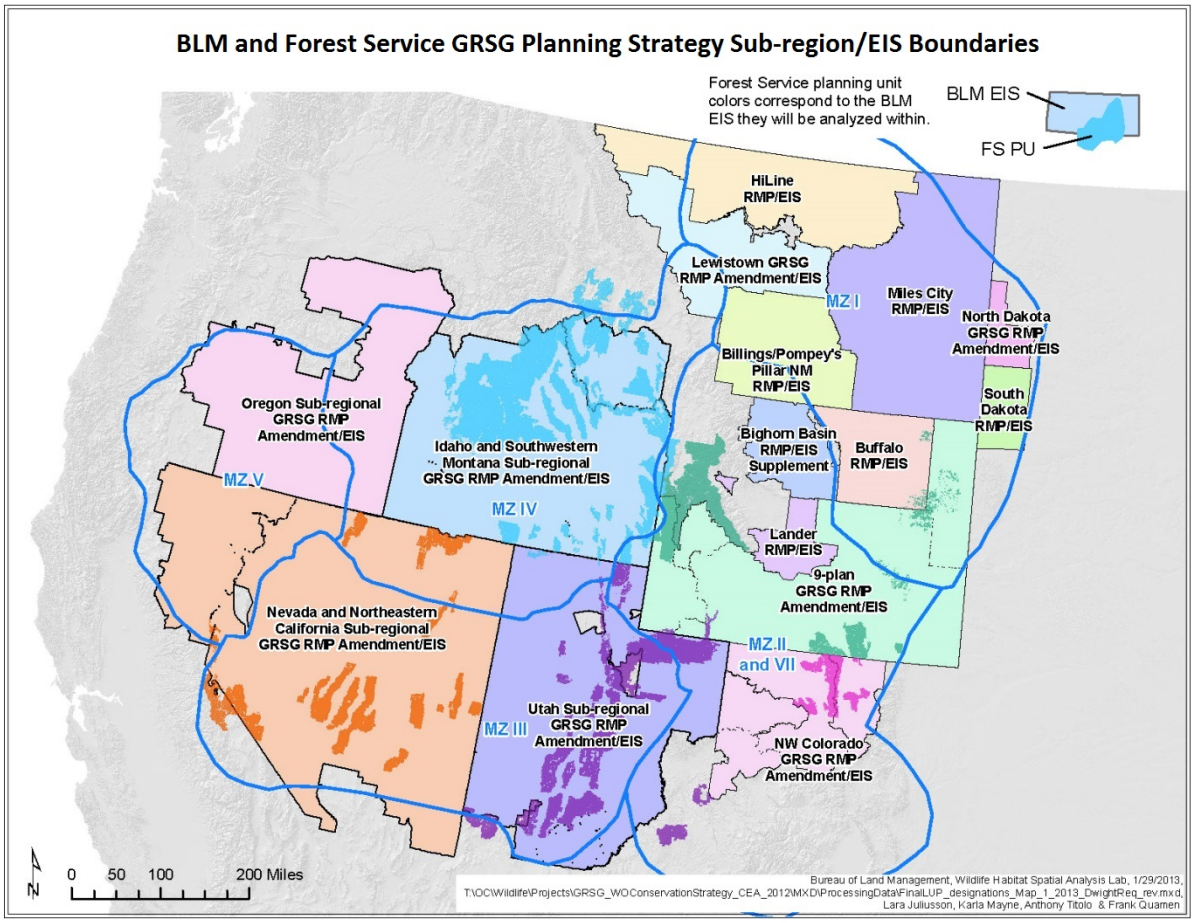
1.8.1 National Greater Sage-Grouse Planning Strategy

On December 9, 2011, a Notice of Availability was published in the *Federal Register* to initiate the GRSG Planning Strategy across nine western states, including Northeast California, Oregon, Nevada, Idaho, Utah, and Southwest Montana in the Great Basin Region and Northwest Colorado, Wyoming, Montana, South Dakota, and North Dakota in the Rocky Mountain Region (see **Diagram 1-1**, BLM and Forest Service GRSG Planning Strategy Sub-region/EIS Boundaries). The BLM is the lead agency for this planning effort. On February 10, 2012, the BLM published a Notice of Correction that changed the names of the regions that are coordinating the EISs, extended the scoping period, and added 11 Forest Service land management plans to this process. This North Dakota Greater Sage-Grouse RMPA/EIS is 1 of 15 separate EISs that are currently being conducted to analyze and incorporate specific conservation measures across the range of the GRSG, consistent with National BLM policy.

On December 27, 2011, the BLM Washington Office released IM No. 2012-044, which directed all of the planning efforts across the GRSG range to consider all applicable conservation measures when revising or amending its RMPs in GRSG habitat, including the measures developed by the NTT that were presented in their December 2011 document – *A Report on National Greater Sage-Grouse Conservation Measures*. The BLM's IM-2012-044 directs all planning efforts associated with the national strategy to consider and analyze (as appropriate) the conservation measures presented in the NTT Report.

Along with the applicable measures that were outlined in the NTT Report, planning efforts associated with this National GRSG Planning Strategy will also analyze applicable conservation measures that were submitted to the BLM from various state governments and from citizens during the public scoping process. It is the goal of the BLM to make a final decision on these plans by the end of 2014 so that adequate regulatory mechanisms are integrated into the land use plans before the USFWS makes a listing decision in 2015.

Diagram 1-1
BLM and Forest Service GRSG Planning Strategy Sub-region/EIS Boundaries



1.8.2 Instruction Memorandum No. 2012-043, *Greater Sage-Grouse Interim Management Policies and Procedures*

This IM provides interim conservation policies and procedures to the BLM field officials to be applied to ongoing and proposed authorizations and activities that affect the GRSG and its habitat (BLM 2012e). This direction ensures that interim conservation policies and procedures are implemented when field offices authorize or carry out activities on public land while the BLM develops and decides how to best incorporate long-term conservation measures for GRSG into applicable Land Use Plans. This direction promotes sustainable GRSG populations and conservation of its habitat while not closing any future options in the NDFO before the North Dakota Greater Sage-Grouse RMPA/EIS can be completed.

1.8.3 National Level Programmatic EISs and Agreements

- *Final Environmental Impact Statement Vegetation Treatment on BLM Lands in Thirteen Western States* (BLM 1991; common to the proposed plan and draft alternatives)

- *Final Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement and Associated Record of Decision* (BLM 2007)
- National-level MOUs

1.8.4 Relevant Plan Amendments

- *Final Environmental Impact Statement for the Northern Great Plains Management Plans Revision* (Forest Service 2001)
- *Fire/Fuels Management Plan Environmental Assessment/Plan Amendment for Montana and the Dakotas* (BLM 2003a)
- *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management for Montana and the Dakotas Record of Decision* (BLM 1997)

1.8.5 National Grasslands Leasing Decisions

In June 2003, the Dakota Prairie Grasslands/Montana State Office Oil and Gas Leasing ROD (BLM 2003b) was signed. This ROD documented the Forest Service's decision concerning which specific lands (Forest Service surface/federal mineral) it authorized the BLM to offer for lease. The ROD incorporated the lease terms and stipulations determined necessary to mitigate effects on surface resources. This ROD covers the Little Missouri and Cedar River National Grasslands of the Dakota Prairie Grasslands. It also documented the BLM's decision to offer and issue leases on the lands that are included in the Forest Service's decision, and on all nonfederal surface/federal minerals (split estate) lands within the administrative boundary of the oil and gas leasing project area.

Where the surface is administered by the Forest Service and the mineral estate is also federally owned, the Forest Service and the BLM share the responsibility for enforcing mineral leasing policies and regulations. Where the surface is not in federal ownership but the minerals are federally owned, the BLM manages the mineral estate. Each lease may contain special stipulations in accordance with federal regulations and as identified in the 2003 ROD.

For the nonfederal surface and federal minerals, the adoption by the BLM of the same lease stipulations and mitigation measures selected by the Forest Service was to ensure consistency in managing lands and resources within the boundaries of the Dakota Prairie Grasslands. Simultaneously, it incorporates nonfederal surface owner interests. This was an effort to collectively address impacts and apply lease stipulations consistently, based on resource considerations, within the grasslands boundary.

North Dakota Greater Sage-Grouse RMPA/EIS—The planning area for the North Dakota Greater Sage-Grouse RMPA/EIS includes portions of the Dakota Prairie Grassland National Forest. However, the North Dakota Greater

Sage-Grouse RMPA/EIS does not address a range of alternatives for Forest Service surface/federal minerals. The 2003 ROD will continue to define the current management for oil and gas leasing on Forest Service surface; the decisions that the BLM made in regard to the split estate lands (nonfederal surface/federal minerals) will vary among the alternatives (with the 2003 ROD decision being the No Action Alternative). This results in all action alternatives having management actions for split estate lands within the grasslands boundary that will be different than the current management on Forest Service-administered lands.

The NDFO and the Dakota Prairie Grasslands National Forest have been coordinating regarding GRSG management within the National Grasslands; however, the Forest Service will be initiating a separate analysis of GRSG. If it is determined that the *Land and Resource Management Plan for the Dakota Prairie Grasslands* needs to be amended, the appropriate level of NEPA will be completed. This analysis will not be initiated in time to include in this planning process.

1.8.6 Greater Sage-Grouse (*Centrocercus urophasianus*) Conservation Objectives Final Report

The USFWS created a Conservation Objectives Team (COT) of state and USFWS representatives to develop range-wide conservation objectives for the GRSG. These objectives define the degree to which threats need to be reduced or ameliorated to conserve GRSG so that it is no longer in danger of extinction or likely to become in danger of extinction in the foreseeable future. The Greater Sage-Grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report (released in March 2013) is the outcome of the COT's efforts (USFWS 2013).

This report delineates reasonable objectives, based upon the best scientific and commercial data available at the time of its release, for the conservation and survival of GRSG. The report was prepared to provide additional information for consideration pertinent to future decision making relative to GRSG. The report will also serve as guidance to federal land management agencies, state GRSG teams, and others in focusing efforts to achieve effective conservation for this species.

1.8.7 Summary of Science, Activities, Programs, and Policies that Influence the Range-Wide Conservation of Greater Sage-Grouse (*Centrocercus urophasianus*)

To augment this planning document at a biologically meaningful scale for GRSG, a Baseline Environmental Report (BER) of GRSG was produced by the US Geological Society (USGS) for BLM (Manier et al. 2013). The BER is a science support document that provides information to put planning units and issues into the context of the larger WAFWA Sage-Grouse management zones. The BER examines each threat identified in the USFWS's listing decision published

on March 15, 2010. For each threat, the BER summarizes the current, scientific understanding of various impacts to GRSG populations and habitats. When available, the BER also reports patterns, thresholds, indicators, metrics, and measured responses that quantify the impacts of each specific threat.

1.8.8 Management Plan and Conservation Strategies for Greater Sage-Grouse in North Dakota

The purpose and need for the North Dakota Greater Sage-Grouse RMPA/EIS is consistent with the goal of the *Management Plan and Conservation Strategies for Greater Sage-Grouse in North Dakota*, which is to provide for long-term conservation and enhancement of sagebrush steppe/mixed-grass prairie habitats in North Dakota in a manner that will support a self-sustaining GRSG population, a diversity and abundance of other wildlife species, and human uses. This Draft RMPA/EIS also addresses many of the threats and conservation strategies identified in the NDGFD Management Plan, with the exception of items such as conversion of private lands to cropland, harvest management, and weather. The COT report also contains similar threats/conservation strategies as the NDGFD Management Plan.

1.8.9 Off-Highway Vehicle Record of Decision and Proposed Plan Amendment for Montana, North Dakota, and Portions of South Dakota

In the Montana-Dakotas region, the BLM has limited travel to existing roads and trails since the Off-Highway Vehicle ROD and Proposed Plan Amendment for Montana, North Dakota, and Portions of South Dakota was signed in 2003 (BLM 2003a). Therefore, travel in the NDFO planning area is already "managed as limited" and this designation will remain the same among all alternatives in the North Dakota Greater Sage-Grouse RMPA/EIS. The following provides an explanation of the BLM's travel management process and the next steps for travel management once a ROD is signed:

1. Although travel has been limited (e.g., no cross-country travel allowed), additional detailed route inventory information still needs to be collected in order to complete site-specific travel planning once this ROD is signed. This data collection will provide the information needed to fully evaluate the impacts of these routes on other resource allocations, uses and to the public, in addition to the GRSG.
2. Once the inventories are underway and/or completed, the BLM will initiate travel and transportation implementation plans. The plans will undergo a NEPA analysis that includes further public involvement.
3. Through this subsequent NEPA and planning process, the BLM will consider road and trail permanent and seasonal closures, as well as area closures. The decision to close routes or areas (e.g., around

leks) to OHV use in the travel and transportation plans would be based on the overall goal of protecting, preserving and enhancing GRSG and their habitats.

1.8.10 County Plans

The following county plans have been reviewed for consistency with this amendment:

- Bowman County Comprehensive Plan Update: 2012 (Bowman County 2012)
- Slope County Comprehensive Plan (Slope County 2010)
- Golden Valley County Comprehensive Plan Update: 2012 (Golden Valley County 2012)

The primary goals, objectives, and strategies common to these plans that would be relevant to the alternatives being analyzed in the North Dakota Greater Sage-Grouse RMPA/EIS relate to maintaining the farming and ranching sectors, and also maintaining the environmental integrity while encouraging the wise and proper development of natural resources. The county plans recognize the importance of their natural areas and provide strategies or objectives that support the proper planning for resource development.

Chapter 2
Proposed Action and Alternatives

CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter details Alternatives A through D for the North Dakota Greater Sage-Grouse RMPA/EIS. It includes references to maps (**Appendix A**) identifying where actions would be applicable. The proposed alternatives were formulated in response to issues and concerns identified through public scoping. This is an effort to maintain or increase GRSG abundance and distribution by conserving, enhancing, or restoring the sagebrush ecosystem on which populations depend throughout WAFWA MZ I of the Rocky Mountain Region (Stiver et al. 2006). Decisions in this RMPA pertain to 33,030 acres of BLM-administered surface land and 396,053 acres of federal subsurface mineral estate in the planning area (shown in **Figure 1-1**, **Appendix A**).

The No Action Alternative (Alternative A) represents the continuation of current management direction and proposes no new plan or management actions. This alternative is required by CEQ regulations and provides a baseline for comparing the other alternatives (CEQ 1981). The BLM developed the action alternatives (B, C, and D) by considering issues and concerns raised during the public scoping period. The BLM also used planning criteria and guidance applicable to managing resources and resource uses relevant to GRSG habitat. Alternatives B, C, and D describe proposed changes to current management, as well as any existing management that would be carried forward. These alternatives provide a range of choices for resolving the planning issues identified in **Chapter 1**.

The BLM recognizes that social, economic, and environmental issues cross land ownership lines, and that extensive cooperation is needed to address issues of mutual concern. To the extent possible, these alternatives were developed using input from public scoping comments and cooperating agencies.

2.2 INTRODUCTION TO ALTERNATIVES

Decisions in this RMPA consist of allowable uses and management actions necessary for maintaining or increasing GRSG abundance and distribution on BLM-administered lands. These critical determinations guide future land management actions and subsequent site-specific implementation actions to conserve, enhance, or restore the sagebrush ecosystem in the planning area.

Components of Alternatives

Goals are broad statements of desired (RMP-wide and resource- or resource-use-specific) outcomes and are not quantifiable or measurable. Objectives are specific, measurable desired conditions or outcomes intended to meet goals. While the goal of this RMPA is the same across all alternatives, objectives typically vary, resulting in different allowable uses and management actions for some resources and resource uses.

Allowable uses and management actions are designed to achieve objectives. Allowable uses delineate which uses are permitted, restricted, or prohibited and may include stipulations or restrictions. Allowable uses also identify lands where specific uses are excluded to protect resource values, or where certain lands are open or closed in response to legislative, regulatory, or policy requirements. Management actions are measures that guide day-to-day and future activities. Implementation decisions are site-specific on-the-ground actions and are not addressed in this RMPA.

Purpose of Alternatives Development

Alternatives development is the heart of the planning process. Land use planning and NEPA regulations require the BLM to formulate a reasonable range of alternatives. Alternatives development is guided by established planning criteria (as outlined in 43 CFR Part 1610).

The basic goal of alternatives development is to produce feasible, distinct, potential management scenarios that:

- Address the identified major planning issues
- Explore opportunities to enhance management of resources and resource uses
- Resolve conflicts between resources and resource uses
- Meet the purpose of and need for the RMP or RMPA

Pursuit of this goal provides the BLM and the public with an appreciation for the diverse ways in which conflicts over resources and resource uses might be resolved. Also, it offers the BLM State Director a reasonable range of alternatives from which to make an informed decision. The components and broad aim of each alternative considered for the North Dakota Greater Sage-Grouse RMPA/EIS are discussed below.

2.3 ALTERNATIVES DEVELOPMENT FOR THE NORTH DAKOTA GREATER SAGE-GROUSE PLAN AMENDMENT

The North Dakota Greater Sage-Grouse RMPA/EIS planning team employed the BLM planning process (outlined in **Chapter 1**) to develop a reasonable range of alternatives for the RMPA. The BLM complied with NEPA and the CEQ implementing regulations at 40 CFR, Part 1500, in developing the alternatives for this RMPA/EIS. This included seeking public input and analyzing reasonable alternatives. Where necessary, the alternatives include management options for the planning area that would modify or amend decisions made in the North Dakota RMP and ROD, as amended (BLM 1988a). This was done to meet the planning criteria, to address issues and comments from cooperating agencies and the public, or to provide a reasonable range of alternatives. Since this is a plan amendment specific to address GRSG conservation, many decisions from the North Dakota RMP and ROD are acceptable and reasonable; in these instances, there is no need to develop management prescriptions for alternatives.

The BLM considered public input received during the scoping process to ensure that all issues and concerns would be addressed, as appropriate, in developing the alternatives. The planning team developed planning issues to be addressed in the RMPA, based on broad concerns or controversies related to conditions, trends, needs, and existing and potential uses of planning area lands and resources.

2.3.1 Develop a Reasonable Range of Alternatives

Between May and September 2012, the planning team met to develop management goals and to identify objectives and actions to address the goals. The various groups, along with cooperating agencies, met numerous times throughout this period to refine their work. Through this process, the planning team developed one no action alternative (A) and three action alternatives (B, C, and D). The action alternatives were designed to:

- Address the 10 planning issues (refer to **Section 1.6.3**, Issues Identified)
- Fulfill the purpose and need for the RMPA (outlined in **Section 1.2**, Purpose and Need)
- Meet the multiple use mandates of the FLPMA (43 USC Part 1732).

2.4 RESULTING RANGE OF ALTERNATIVES

The three resulting action alternatives offer a range of possible management responses to planning issues and public concerns. Also the alternatives would work toward maintaining or increasing GRSG abundance and distribution in the planning area. While the goal is the same across alternatives, each alternative contains a discrete set of objectives, allowable uses, and management actions constituting a separate RMPA. The goal is met in varying degrees, with the

potential for different long-range outcomes and conditions. Conservation measures in the alternatives focus on PH and GH areas, depending on the alternative's objective. The PH and GH have been delineated by the NDGFD in coordination with the BLM.

The relative emphasis given to particular resources and resource uses differs as well, for allowable uses, restoration measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives.

The alternatives are directed toward responding to USFWS-identified issues and threats to GRSG and their habitat. All of the action alternatives employ resource programs to address the USFWS-identified threats (USFWS 2013). **Table 2-1**, USFWS-Identified Threats to GRSG and Their Habitat and Applicable BLM RMP Resource Programs for Addressing Threats, identifies the threats and the applicable BLM resource programs in RMPs for addressing the threats.

Table 2-1
USFWS-Identified Threats to GRSG and Their Habitat and Applicable BLM RMP Resource Programs for Addressing Threats

USFWS-identified Threat to GRSG and Their Habitat (*threats not known to be present are not listed*)	**Applicable BLM RMP Resource Program to Address the Threat**
Oil and Gas	Program: Fluid Minerals Decisions: Identify open and closed (no lease areas to fluid mineral leasing; identify open areas with no surface occupancy (NSO), controlled surface use (CSU), and timing limitation (TL) stipulations.
Infrastructure	Program: Lands and Realty – Rights-of-Way (ROWs) Decisions: Issue ROW grants; identify ROW avoidance or exclusion areas; issue permits and leases to authorize use of the lands (for example, agricultural, occupancy, storage).
	Program: Range Management Decisions: Management of range improvements.
	Program: Comprehensive Trails and Travel Management – Roads Decisions: Identify travel management areas; identify modes of access and travel; identify areas open, limited, or closed to OHVs.
Invasive Species	Program: Vegetation Decisions: Control, suppress, or eradicate weeds; restrict allowable uses; use active management or treatment.
Wildfire	Program: Wildland Fire Management Decisions: Make changes to fire management strategies; identify areas suitable and unsuitable for wildland fire use; identify priority areas for suppression.

Table 2-1
USFWS-Identified Threats to GRSG and Their Habitat and Applicable BLM RMP Resource Programs for Addressing Threats

USFWS-identified Threat to GRSG and Their Habitat (*threats not known to be present are not listed*)	**Applicable BLM RMP Resource Program to Address the Threat**
Grazing	Program: Range Management Decisions: Identify acres open and closed to grazing; establish animal unit months (AUMs); manage grazing systems.
	Program: Special Status Species Decisions: Identify habitat management.
Agriculture	Program: Lands and Realty Decisions: Identify lands for acquisition, retention, and disposal.
Disease	Program: All applicable programs Decisions: Establish design features and BMPs.
Urbanization	Program: Lands and Realty Decisions: Identify retention and disposal areas.
Coal/Strip Mining	Program: Coal Decisions: Identify suitable and unsuitable areas for coal development; identify areas withdrawn from leasable mineral development.
Prescribed Fire	Program: Wildland Fire Management Decisions: Establish fire management strategies; identify areas suitable and unsuitable for prescribed fire use.
	Program: Vegetation Decisions: Conduct vegetation treatments through prescribed fire.
Human	Program: Recreation Decisions: Issue special recreation permits (SRP).
	Program: Lands and Realty Decision: Grant ROW; identify ROW avoidance or exclusion areas; identify lands for retention, and disposal; issue permits and leases to authorize use of the lands (for example, agricultural, occupancy, storage).
	Program: Minerals Decision: Identify areas as open or closed to leasable mining; identify open areas with NSO, CSU, and TL stipulations; petition to withdraw lands from locatable mineral development; establish terms, conditions, or special considerations; identify open and closed areas to mineral materials disposal.
	Program: Comprehensive Trails and Travel Management – Roads Decisions: Identify travel management areas; identify areas open, limited, or closed to OHVs.
Conifer Encroachment	Program: Vegetation Decisions: Conduct vegetation treatments.

Table 2-1
USFWS-Identified Threats to GRSG and Their Habitat and Applicable BLM RMP Resource Programs for Addressing Threats

USFWS-identified Threat to GRSG and Their Habitat (*threats not known to be present are not listed*)	**Applicable BLM RMP Resource Program to Address the Threat**
Water Development	Program: Range Management Decisions: Identify number, location, and type of range water developments.
Hard Rock Mining	Program: Locatable Minerals Decisions: Petition to withdraw lands from locatable mineral development; establish terms, conditions, or special considerations.

Source: USFWS 2010

Select differences among the four alternatives are described in **Table 2-2,** Comparative Summary of Alternatives. **Table 2-3**, Description of Alternatives A, B, C, and D, provides a complete description of proposed decisions for each alternative, including the project goal and objectives, allowable uses, and management actions for individual resource programs. Figures in **Appendix A** show the differences among alternatives. In some instances, varying levels of management overlap a single polygon due to management prescriptions from different resource programs.

2.4.1 Management Common to All Alternatives

The BLM carried forward to all of the proposed alternatives those allowable uses and management actions from the North Dakota RMP and ROD that remain valid and do not require revision. Other decisions are common only to the action alternatives (B, C, and D).

Although each alternative emphasizes a slightly different mix of management for resources and resource uses, all four alternatives contain the following elements:

- Comply with state and federal laws, regulations, policies, and standards, including FLPMA multiple-use mandates.
- Implement actions originating from laws, regulations, and policies and conform to day-to-day management, monitoring, and administrative functions not specifically addressed.
- Honor valid existing rights, which include any leases, claims, or other use authorizations established before a new or modified authorization, change in land designation, or new or modified regulation is approved. Existing fluid mineral leases are managed through conditions of approval (COAs).

- Collaborate with adjacent landowners, federal and state agencies, tribes, communities, other agencies, and other individuals and organizations, as needed, to monitor and implement decisions to achieve desired resource conditions.
- Provide for human safety and property protection from wildfire.

In addition to these shared elements, allowable uses and management actions common to all four alternatives (as indicated by a single cell across the table row) are listed in **Table 2-3.**

2.4.2 Alternative A (No Action)

Alternative A meets the CEQ requirement that a no action alternative be considered. This alternative continues current management direction and prevailing conditions derived from existing planning documents. Goals and objectives for resources and resource uses are based on the 1988 North Dakota RMP and ROD, along with associated amendments, activity and implementation level plans, and other management decision documents. Laws and regulations that supersede RMP decisions would apply.

No PH or GH would be delineated under Alternative A. Goals and objectives for BLM-administered lands and mineral estate would not change. Appropriate and allowable uses and restrictions pertaining to such activities as mineral leasing and development, recreation, ROW development, and livestock grazing would also remain the same. The BLM would not modify existing or establish additional criteria to guide the identification of site-specific use levels for implementation activities.

2.4.3 Elements Common to Alternatives B, C, and D

Alternatives B, C, and D have two basic components: delineated PH and GH and RDFs.

Delineate Lands as Priority and General Habitat

Under Alternatives B, C, and D, PPH and PGH data would be refined to (1) delineate PH and analyze actions within PH to conserve GRSG habitat functionality, or where possible, improve habitat functionality; and (2) delineate GH and analyze actions within GH that provide for major life history function (e.g., breeding, migration, or winter survival) to maintain genetic diversity needed for sustainable GRSG populations. The areas delineated as PH and GH would be the same under each alternative; however, the allowable uses and management actions within PH and GH may vary between alternatives to meet the goal of the RMPA and objectives of the alternative.

Required Design Features

RDFs are means, measures, or practices intended to reduce or avoid adverse environmental impacts. This RMPA/EIS proposes a suite of design features that would establish the minimum specifications for water developments, certain

mineral development, and fire and fuels management and would mitigate adverse impacts. These design features would be required to provide a greater level of regulatory certainty than through implementing BMPs.

In general, the design features are accepted practices that are known to be effective when implemented properly at the project level. However, their applicability and overall effectiveness cannot be fully assessed except at the project-specific level when the project location and design are known. Because of site-specific circumstances, some features may not apply to some projects (e.g., when a resource is not present on a given site) or may require slight variations from what is described in the RMPA/EIS (e.g., a larger or smaller protective area). All variations in design features would require appropriate analysis and disclosure as part of future project authorizations. Additional mitigation measures may be identified and required during individual project development and environmental review. The proposed RDFs are presented in **Appendix B**, Greater Sage-Grouse Habitat Required Design Features and Best Management Practices.

2.4.4 Alternative B

GRSG conservation measures in *A Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) were used to form BLM management direction under Alternative B. Management actions by the BLM, in concert with other state and federal agencies and private landowners, play a critical role in the future trends of GRSG populations. To ensure BLM management actions are effective and based on the best available science, the National Policy Team created a NTT in August 2011. The BLM's objective was to provide a starting point to be used in BLM's RMPs to conserve and restore the GRSG and its habitat long term and range-wide on BLM-administered lands. Conservation measures under Alternative B are focused on PH (areas that have the highest conservation value for maintaining or increasing sage-grouse populations).

Table 2-2 summarizes select proposed decisions and includes details of all proposed decisions. **Appendix B** provides RDFs and **Appendix C**, Oil and Gas Stipulations, describes stipulations for oil and gas leasing and surface-disturbing activities. Key components of Alternative B are discussed below.

Travel and Transportation Management. Alternative B would limit motorized travel to existing roads, primitive roads, and trails at a minimum of approximately 33,030 acres until travel management planning is complete and routes are either designated or closed. Under Alternative B, route construction in PH would be limited to realignments of existing designated routes, except to access valid existing rights; this would require additional mitigation for disturbances greater than three percent for that area. Alternative B would emphasize restoration of nondesignated roads, primitive roads, and trails in PH.

Lands and Realty. PH would be designated as ROW exclusion areas for new land use authorizations (approximately 32,900 acres) and GH would be

designated as ROW avoidance areas for new land use authorizations (approximately 80 acres). Lands within PH would be recommended for mineral withdrawal, and other withdrawals in PH would need to be consistent with GRSG conservation measures.

Range Management. Grazing would be allowed on all lands identified as suitable (approximately 32,945 acres). Alternative B would consider retiring permitted grazing use on allotments in PH when the current permittee is willing. Within PH, GRSG habitat objectives and management considerations would be incorporated into all BLM grazing allotments through Allotment Management Plans (AMPs) or permit renewals. The BLM would prioritize completion of land health assessments in PH and would implement actions to modify grazing management to meet GRSG habitat requirements. Within PH, Alternative B would only allow treatments that conserve, enhance, or restore GRSG habitat for increasing forage for livestock. Structural range improvements and livestock management tools in PH would need to be designed to conserve, enhance, or restore GRSG habitat through and improved grazing management system relative to GRSG objectives.

Energy and Mineral Development. PH areas would be closed to fluid mineral leasing (approximately 61,197 acres), and existing parcels in PH would not be eligible for leasing nominations following expiration or termination. However, exploration would be allowed in PH, with approved drilling methods. Existing leases in PH would be subject to conservation measures through RMP implementation decisions and on completion of the environmental record of review. Surface coal mining would be considered unsuitable (approximately 87,443 acres), and no subsurface coal mining disturbances or facilities would be allowed in PH. All PH (approximately 46,397 acres) would be closed to mineral materials and nonenergy leasable minerals, and would be recommended for withdrawal for locatable minerals.

Fire and Fuels Management. In PH, the BLM would design and implement fuels treatments and suppression, with an emphasis on protecting sagebrush ecosystems. Sagebrush canopy cover would not be reduced by less than 15 percent, unless a fuels management objective were to require additional reduction in sagebrush cover to meet strategic protection of PH and to conserve habitat quality for the species.

Habitat Restoration/Vegetation Management. The BLM would prioritize implementation of restoration projects. Decisions would be based on environmental variables that improve chances for project success in areas most likely to benefit GRSG. The BLM would make meeting habitat restoration objectives within PH areas the highest restoration priority.

Special designations. GRSG habitat would not be designated as an ACEC. GRSG PH and GH areas would be protected and managed consistent with the identified management actions and constraints in this alternative.

2.4.5 Alternative C

During scoping for the National Greater Sage-Grouse Planning Strategy, individuals and conservation groups submitted management direction recommendations for protecting and conserving GRSG and habitat at the range-wide level. These recommendations, in conjunction with resource allocation opportunities and internal subregional BLM input, were reviewed in order to develop BLM management direction for GRSG under Alternative C. Conservation measures under Alternative C are focused on both PH and GH (seasonal or year-round habitat outside of PH) areas.

Table 2-2 summarizes select proposed decisions and includes details of all proposed decisions. **Appendix B** provides RDFs and **Appendix C** describes stipulations for oil and gas leasing and surface-disturbing activities. Key components of Alternative C are discussed below.

Travel and Transportation Management. Similar to Alternative B, Alternative C would limit motorized travel to existing roads, primitive roads, and trails at a minimum of approximately 33,030 acres. Route construction in PH and GH would be limited to realignments of existing designated routes. Alternative C would have the most restrictive requirements for constructing routes to existing valid rights, requiring a four-mile buffer from leks (GRSG display and breeding grounds). Like Alternative B, this alternative would also emphasize restoration of nondesignated roads, primitive roads, and trails in PH. Alternative C would have the most restrictions on travel and transportation.

Lands and Realty. Under Alternative C, PH and GH would be designated as ROW exclusion areas of approximately 32,980 acres. Lands within PH and GH would be recommended for mineral withdrawal, and other withdrawals in PH and GH would need to be consistent with GRSG conservation measures. Alternative C would have the most restrictions on ROW development and withdrawals.

Range Management. Alternative C would reduce livestock grazing, which would be allowed on all lands identified as suitable (approximately 32,945 acres). However, livestock grazing would be reduced on all grazing allotments within the Big Gumbo area (large block of BLM-administered land shown in **Figure 2-10**, Grazing Allotments Alternative C, **Appendix A**) by 50 percent. Within PH, GRSG habitat objectives and management considerations would be incorporated into all BLM grazing allotments through AMPs or permit renewals. The BLM would prioritize completion of land health assessments in PH. Alternative C would provide the most restrictions on forage treatments and range improvements by allowing only treatments or improvements that conserve, enhance, or restore GRSG habitat in both PH and GH.

Energy and Mineral Development. Under Alternative C, PH and GH areas would be closed to fluid mineral leasing (approximately 66,293 acres); existing parcels in PH would not be eligible for leasing nominations following expiration

or termination. Exploration would be allowed only in PH and GH. Existing leases in PH and GH would be subject to conservation measures as COAs, during the project and well permitting stages, and through RMP decisions on completion of the environmental record of review. Management of coal, mineral materials, nonenergy leasable minerals, and locatable minerals would be similar to that under Alternative B except applied to GH as well as PH. Surface and subsurface coal mining would be considered unsuitable (approximately 166,207 acres). Alternative C would have the most restrictions on energy and mineral development.

Fire and Fuels Management. This is similar to management under Alternative B; however, all management would apply to both PH and GH.

Habitat Restoration/Vegetation Management. The BLM would prioritize implementation of restoration projects. This would be based on environmental variables that improve chances for project success in areas most likely to benefit GRSG. The BLM would make meeting habitat restoration within PH and GH the highest priority. Alternative C would provide the most opportunities for restoration and vegetation management.

Special Designations. All PH would be designated as an ACEC to protect GRSG habitat (32,900 acres; see **Appendix D**, Area of Critical Environmental Concern Evaluation of Relevance and Importance Criteria). Management actions for the ACEC would be consistent with the management actions/constraints identified under this alternative to protect GRSG habitat.

2.4.6 Alternative D (Agency Preferred)

Alternative D, the agency-preferred alternative, seeks to allocate limited resources among competing human interests, land uses, and the conservation of natural resource values. At the same time, it would sustain and enhance ecological integrity across the landscape, including plant, wildlife, and fish habitat. This alternative incorporates local adjustments to *A Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) to provide a balanced level of protection, restoration, enhancement, and use of resources and services to meet ongoing programs and land uses. Conservation measures under Alternative D are focused on both PH and GH.

Table 2-2 summarizes select proposed decisions and includes details of all proposed decisions. **Appendix B** provides RDFs and **Appendix C** describes stipulations for oil and gas leasing and surface-disturbing activities. Key components of Alternative D are discussed below.

Travel and Transportation Management. Similar to Alternative B, Alternative D would limit motorized travel to existing roads, primitive roads, and trails at a minimum of approximately 33,030 acres. Similar to Alternative B, route construction in PH and GH would be limited to realignments of existing designated routes. However, construction of access to existing rights would be

less restrictive. Alternative D would emphasize restoration of nondesignated roads, primitive roads, and trails in both PH and GH.

Lands and Realty. Under Alternative D, PH would be designated as ROW avoidance areas of approximately 32,900 acres; wind energy authorizations would be excluded from PH areas. GH would be open to ROW development and would be evaluated on a case-by-case basis. No lands would be recommended for mineral withdrawal.

Range Management. Grazing would be allowed on all lands identified as suitable (approximately 32,945 acres). Within PH, GRSG habitat objectives and management considerations developed with the NDGFD and USFWS would be incorporated into all BLM grazing allotments through AMPs or permit renewals. Similar to Alternative B, the BLM would prioritize completion of land health assessments in PH, and Alternative D would allow forage treatments and range improvements in PH that conserve, enhance, or restore GRSG habitat.

Energy and Mineral Development. PH and GH would be open to oil and gas leasing and development; however, surface occupancy and use would be prohibited within PH (NSO) and have specific constraints in GH (CSU). Geophysical exploration and development restrictions would be applied to protect leks. Existing leases in PH and GH would be subject to conservation measures through RMP implementation decisions and on completion of the environmental record of review. Operating constraints would also be applied to existing leases as COAs. Surface mining of coal in PH would be considered unsuitable (approximately 87,443 acres). Subsurface coal mining disturbances and facilities would be allowed in PH only if facilities could not be located outside these areas. Management of mineral materials, nonenergy leasable minerals, and locatable minerals would be similar to that under Alternative B.

Fire and Fuels Management. This would be similar to management under Alternative B; however, sagebrush canopy cover would not be reduced less than eight percent, unless a fuels management objective were to require additional reduction in sagebrush cover. This would be required to meet strategic protection of PH and to conserve habitat quality for the species.

Habitat Restoration/Vegetation Management. This would be similar to management under Alternative B; however, the BLM would prioritize implementation of restoration projects to include reducing conifer encroachment as well as benefiting other priority species. The BLM would make meeting habitat restoration objectives within PH areas the highest restoration priority, along with other priority species.

Special Designations. GRSG habitat would not be designated as an ACEC. GRSG PH areas would be protected and managed consistent with the identified management actions and constraints.

2.5 REGIONAL MITIGATION STRATEGY

Mitigation strategies, which take into account the mitigation hierarchy (avoid, minimize, restore, offset), are an important tool for ensuring the BLM meets their GRSG resource objectives while continuing to honor our multiple-use mission. The BLM priority is to mitigate impacts to an acceptable level onsite, to the extent practical, through avoidance (not taking a certain action or parts of an action), minimization (limiting the degree or magnitude of the action and its implementation), rectification (repairing, rehabilitating, or restoring the affected environment), or reduction of impacts over time (preservation and maintenance operations during the life of the action). While mitigating impacts for proposed projects to an acceptable level onsite is typically analyzed and determined through site-specific, implementation-level NEPA documents and their commensurate decision documents, the analysis and mitigation for project level activities would be tiered to the analysis and mitigation proposed throughout each of the action alternatives in this RMPA. **Appendix E**, Regional Mitigation Strategy, provides the approach to the regional mitigation strategy.

2.6 MONITORING FOR THE GREATER SAGE-GROUSE PLANNING STRATEGY

BLM's planning regulations, specifically 43 CFR 1610.4-9 require that land use plans establish intervals and standards for monitoring, based on the sensitivity of the resource decisions. Land use plan monitoring is the process of tracking the implementation of land use plan decisions (implementation monitoring) and collecting data/information necessary to evaluate the effectiveness of land use plan decisions (effectiveness monitoring). For GRSG, these types of monitoring are also described in the criteria found in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (50 CFR Vol. 68, No. 60). One of the Policy criteria evaluates whether provisions for monitoring and reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided.

A guiding principle in the BLM National Sage-grouse Conservation Strategy (DOI 2004) is that, "the Bureau is committed to sage-grouse and sagebrush conservation and will continue to adjust and adapt our National Sage-grouse Strategy as new information, science and monitoring results evaluate effectiveness over time." In keeping with the WAFWA Sage-grouse Comprehensive Conservation Strategy (Stiver et al. 2006) and the Greater Sage-grouse Conservation Objectives: Final Report (USFWS 2013), BLM would monitor implementation and effectiveness of conservation measures in GRSG habitats.

On March 5, 2010 the 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered were posted as a Federal Register notice (75 FR 13910 14014). This notice stated:

> "…the information collected by BLM could not be used to make broad generalizations about the status of rangelands and management actions. There was a lack of consistency across the range in how questions were interpreted and answered for the data call, which limited our ability to use the results to understand habitat conditions for sage-grouse on BLM lands."

Standardization of monitoring methods and implementation of a defensible monitoring approach (within and across jurisdictions) will resolve this situation. The BLM and other conservation partners use the resulting information to guide implementation of conservation activities.

Monitoring strategies for GRSG habitat and populations must be collaborative, as habitat occurs across jurisdictional boundaries (52 percent BLM, 31 percent private, 8 percent Forest Service, 5 percent state, 4 percent tribal and other Federal lands; 75 FR 13910), and because state fish and wildlife agencies have primary responsibility for population level management of wildlife, including population monitoring. Therefore, population efforts would continue to be conducted in partnership with state fish and wildlife agencies. The BLM is currently in the process of finalizing a Monitoring Framework which will be included in the Proposed RMP Amendment/Final EIS. This framework will describe the process that the BLM will use to monitor implementation and effectiveness of RMP decisions. The Monitoring Framework will include: methods, data standards, and intervals of monitoring at broad and mid scales; consistent indicators to measure and metric descriptions for each of the scales (see Habitat Assessment Framework (HAF) and Assessment, Inventory and Monitoring (AIM) core indicators); analysis and reporting methods; and the incorporation of monitoring results into adaptive management. The need for fine and site-scale specific habitat monitoring may vary by area depending on existing conditions, habitat variability, threats, and land health. Indicators at the fine and site scales would be consistent with the HAF; however the values for the indicators could be adjusted for regional conditions. The major components of the Monitoring Framework can be found in **Appendix F**, Greater Sage-Grouse Monitoring Framework, of this Draft RMPA/EIS.

More specifically, the framework will discuss how the BLM would monitor and track implementation and effectiveness of planning decisions (e.g., tracking of waivers, modifications, site level actions). The BLM would monitor the effectiveness of RMP decisions in meeting management and conservation objectives. Effectiveness monitoring would include monitoring disturbance in habitats as well as landscape habitat attributes. To monitor habitats the BLM would measure and track attributes of occupied habitat, PH, and GH at the broad scale, and attributes of habitat availability, patch size, connectivity, linkage areas, edge effect, and anthropogenic disturbances at the mid-scale. Disturbance monitoring would measure and track changes in the amount of sagebrush in the landscape and changes in the anthropogenic footprint including the change in the

density of energy development. The framework will also include methodology for analysis and reporting for Field Offices/States/BLM Districts including geospatial and tabular data for disturbance mapping (e.g., geospatial footprint of new permitted disturbances) and effectiveness of management actions.

The monitoring data would provide the indicator estimates for adaptive management. The BLM would adjust management decisions through an adaptive management process.

2.7 ADAPTIVE MANAGEMENT

Adaptive management is a decision process that promotes flexible resource management decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps with adjusting resource management directions as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. On February 1, 2008, the DOI published its Adaptive Management Implementation Policy (522 DM 1). The adaptive management strategy presented within this EIS complies with this policy.

In relation to the BLM's National Greater Sage-grouse Planning Strategy, adaptive management would help identify if GRSG conservation measures presented in this EIS contain the needed level of certainty for effectiveness. If principles of adaptive management are incorporated into the conservation measure in the plan (to ameliorate threats to a species), then there is a greater likelihood that a conservation measure or plan would be effective in reducing threats to that species. The following provides the BLM adaptive management strategy for the North Dakota Greater Sage-Grouse RMPA/EIS.

2.7.1 Adaptive Management and Monitoring

This EIS contains a monitoring framework plan (**Appendix F**) which includes an effectiveness monitoring component. The BLM intends to use the data collected from the effectiveness monitoring to identify any changes in habitat conditions related to the goals and objectives of the plan and other range-wide conservation strategies (DOI 2004; Stiver et al. 2006; USFWS 2013). When available from WAFWA and/or state wildlife agencies, information about population trends would be considered with effectiveness monitoring data (taking into consideration the lag effect response of populations to habitat changes [Garton et al. 2011]). The information collected through the Monitoring Framework Plan outlined in **Appendix F** would be used by the BLM to determine when adaptive management hard and soft triggers (discussed below) are met.

2.7.2 Adaptive Management Plan

The BLM would develop an adaptive management plan to provide certainty that unintended negative impacts to GRSG would be addressed before consequences become severe or irreversible and to provide regulatory certainty to the USFWS that appropriate action would be taken by the BLM. This adaptive management plan would:

- identify science based soft and hard adaptive management triggers applicable to each population or subpopulation within the planning area,
- address how the multiple scale data from the Monitoring Framework Plan (**Appendix F**) would be used to gauge when adaptive management triggers are met, and
- charter an adaptive management working group to assist with responding to soft adaptive management triggers.

Adaptive Management Triggers

Adaptive management triggers are essential for identifying when potential management changes are needed in order to continue meeting GRSG conservation objectives. The BLM would use a continuum of trigger points (soft and hard triggers), which would enhance BLM's ability to effectively manage GRSG habitat. The soft and hard triggers that would be delineated in the adaptive management plan would (at a minimum):

- be based upon the best available science,
- be tied to the populations/demographics,
- take into account the importance of various seasonal habitat types, and
- not be limited to a single time "window".

Soft triggers indicate when the BLM would consider adjustments to resource/resource use management. An adaptive management working group would help identify the causal factors as to what prompted the soft adaptive management trigger. The group would also provide recommendations to the appropriate BLM authorizing official (decision maker) regarding the applicable management response to address this trigger (e.g., effective mitigation, restoration, reclamation, and in some instances, a RMP amendment or revision). When organizing the adaptive management working group, the BLM would invite participation from BLM, USFWS, local governments, and applicable state fish and game agencies.

Hard triggers indicate when the BLM would take immediate action to stop the continued deviation from conservation objectives. These actions could include one or more of the following (which may require subsequent NEPA:

- Temporary closures (as directed under BLM IM No. 2013-035),
- Immediate implementation of interim management policies and procedures through the BLM directives system, and
- Initiation of a new RMP amendment to consider changes to the existing RMP decisions.

2.8 ALTERNATIVES ELIMINATED FROM DETAILED ANALYSIS

The following alternatives were considered, but not carried forward for detailed analysis because (1) they would not fulfill requirements of FLPMA or other laws or regulations, (2) they did not meet the purpose and need, (3) they were already part of a plan, policy, or administrative function, or (4) they did not fall within the limits of the planning criteria. The FLPMA requires the BLM to manage BLM-administered lands and resources in accordance with the principles of multiple use and sustained yield. This includes recognizing the nation's needs for domestic sources of minerals, food, timber, and fiber. Moreover, the BLM is required by law to recognize existing valid rights on BLM-administered lands and to manage BLM-administered lands in accordance with existing laws. These include the General Mining Law of 1872 and the Mining and Minerals Policy Act of 1970.

2.8.1 National Technical Team Conservation Measures Not Applicable to North Dakota

No management actions from *A Report on National Greater Sage-Grouse Conservation Measures* concerning wild horse and burros are carried forward because there are no wild horse or burro herds managed by the NDFO.

2.8.2 Eliminate Livestock Grazing from BLM-Administered Lands

An alternative eliminating livestock grazing from all National System of Public Lands managed by the BLM in the planning area was not analyzed in detail. In accordance with IM 2012-169 and BLM's Land Use Planning Handbook, the BLM considered what range of alternatives was necessary to address unresolved conflicts among available resources. As a result of this process, an alternative reducing grazing use by 50 percent in the Big Gumbo area was developed in coordination with the USFWS and NDGFD. No issues or conflicts have been identified during this land use planning effort that require the complete elimination of livestock grazing within the planning area for their resolution. Where appropriate, removal of livestock and adjustments to livestock use, have been incorporated into this planning effort. Because the BLM has considerable discretion through its grazing regulations to determine and adjust stocking levels, seasons-of-use, and grazing management activities, and to allocate forage to uses of the BLM-administered lands in RMPs, the analysis of an alternative to entirely eliminate grazing is not needed.

The North Dakota Greater Sage-Grouse RMPA/EIS planning area is located in the northwestern portion of the Great Plains Ecoregion (EPA 2011a) and the rangelands in the planning area are classified as mixed-grass prairie. The

rangelands of the Great Plains have a long evolutionary history of grazing and grazing is accepted by grassland ecologists as a keystone process of the grassland ecosystem (Fuhlendorf and Engle 2001; Milchunas et al. 1988; Knapp et al. 1999). There is also agreement among many scientists and natural resource managers that some level of grazing disturbance is necessary to assure the ecological integrity of the mixed-grass prairie ecosystem (Parks Canada 2002).

In addition to the inherent role of large herbivore grazing in maintaining ecosystem health within the planning area, current resource conditions on BLM-administered land, including range vegetation, watershed, and wildlife and sage grouse habitat, as reflected in land health assessments, do not warrant prohibition of livestock grazing throughout the entire planning area. Following initial surveyed forage allocations, land health evaluations, inventories and monitoring data (vegetative and levels of use) have been the basis for increasing or decreasing permitted use. Through this process, the planning area has changed the grazing allocations on allotments to ensure the healthy ecological systems are provided for future generations.

In particular, of the 32,945 acres in the planning area that have been assessed, 29,728 acres (90 percent) meet the Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Montana, North Dakota, and South Dakota (BLM 1997). For the 3,217 acres not meeting one or more standards, current livestock uses were determined to be a causal factor on 1,309 acres. On these acres, corrective actions have been taken and progress is being made toward meeting standards. In the future, suitable measures, which could include reduction or elimination of livestock grazing, could become necessary in specific situations where livestock grazing causes or contributes to conflicts with the protection and/or management of other resource values or uses, including GRSG habitat needs. Such determinations would be made during site-specific activity planning or permit renewal and the associated environmental review. These determinations would be based on several factors, including monitoring studies, GRSG and other wildlife habitat conditions and needs, review of current range and wildlife management science, input from livestock operators and the interested public, and ability to meet the Standards for Rangeland Health.

With the exception of the Big Gumbo area, most of the BLM-administered land tracts in the planning area are small in size, isolated, and scattered. Eliminating livestock grazing on BLM-administered lands would require extensive fencing to segregate it from private lands to prevent unauthorized livestock grazing. In some cases, maintenance of fences along public property boundaries would be very difficult and impractical due to terrain features. Additionally, the extensive fencing would create many new barriers for wildlife and GRSG movements. Also, eliminating livestock grazing on BLM-administered lands may accelerate

agricultural conversion of native range and GRSG habitat on adjacent private lands as ranchers attempt to replace lost forage base.

2.9 CONSIDERATIONS FOR SELECTING A PREFERRED ALTERNATIVE

The proposed alternatives offer a range of discrete strategies for resolving deficiencies in existing management, exploring opportunities for enhanced management, and addressing issues identified through internal assessment and public scoping related to maintain or increase GRSG abundance and distribution on BLM-administered lands. Comments submitted by other government agencies, public organizations, state and tribal entities, and interested individuals were given careful consideration. Public scoping enabled the BLM to identify and shape important issues pertaining to GRSG habitat, energy development, livestock grazing, West Nile virus, potential ACECs, public land access, and other program areas. Cooperating agencies reviewed and provided comments at critical intervals during the alternatives development process.

NEPA regulations developed by the CEQ require the BLM to identify a preferred alternative in the RMPA/EIS. Formulated by the planning team, the preferred alternative represents those goals, objectives, and actions determined to be most effective at resolving planning issues and balancing resource use at this stage of the process. While collaboration is critical in developing and evaluating alternatives, the final designation of a preferred alternative remains the exclusive responsibility of the BLM.

The identification of a preferred alternative does not constitute a commitment or decision in principle, and there is no requirement to select the preferred alternative or any of the separate individual alternatives as they are presented in the Draft EIS within the ROD. The BLM has the discretion to select any of the alternatives as the agency's preferred alternative and can modify the preferred alternative between the Draft EIS and the Final EIS, as long as the actions presented in the proposed alternative within the Proposed RMP Amendment/ Final EIS are analyzed somewhere in the previous Draft EIS.

2.9.1 Recommendations and Resulting Actions

The Alternative D (Agency-Preferred Alternative) indicates the agency's preliminary preference. The Preferred Alternative does not represent a final BLM decision and may change between publication of the Draft and Final RMPA/EIS based on comments received on the Draft RMPA/EIS, new information, or change in BLM policies or priorities. The BLM selected the Preferred Alternative based on the following criteria:

1. Satisfy statutory requirements
2. Reflect the best combination of decisions to achieve the BLM goals and policies
3. Represent the best solution to the purpose and need

4. Provide the best approach to addressing key planning issues
5. Consider cooperating agencies and BLM specialists" recommendations

2.10 SUMMARY COMPARISON OF ALTERNATIVES

This section summarizes and compares Alternatives A through D considered in the EIS. Combined with the appendices and maps, **Table 2-2** provides the differences among the alternatives relative to what they establish and where they occur. The table compares the differences with the most potential to affect resources among the alternatives.

Decisions made under this RMPA/EIS are anticipated to be subsequently implemented. Restrictions on resource uses (e.g., closed to leasing) made through this RMPA apply for the life of the North Dakota RMP. Actions taken or authorized by the BLM during RMP implementation would comply with RDFs and BMPs (**Appendix B**) and with stipulations for oil and gas leasing and surface-disturbing activities (**Appendix C**). The stipulations are considered part of all four alternatives, and the RDFs and BMPs are part of Alternatives B, C, and D.

Table 2-2
Comparative Summary of Alternatives

Resources/Resource Uses	Alternative A (No Action)	Alternative B	Alternative C	Alternative D (Agency Preferred)
Planning Area – BLM Surface (no PH/GH delineation) (acres)	**33,030**	**50**	**50**	**50**
PH – All ownerships (acres)	0	461,070	461,070	461,070
PH – BLM (acres)	**0**	**32,900**	**32,900**	**32,900**
GH – All ownerships (acres)	0	242,301	242,301	242,301
GH – BLM (acres)	**0**	**80**	**80**	**80**
Livestock Grazing (BLM surface)				
AUMs	5,780	5,780	3,739	5,780
Acres open for all classes of livestock grazing (acres)	32,945	32,945	32,945	32,945
Acres not allocated to livestock grazing (acres)	85	85	85	85
Comprehensive Travel and Transportation Management (BLM surface acres)				
Limited to existing routes for motorized and mechanized travel	33,030	33,030	33,030	33,030
Lands and Realty (BLM surface acres acres)				
ROW exclusion areas	0	32,900	32,980	0
ROW avoidance areas	0	80	0	32,900
Available for disposal	3,436	80	0	80
Coal (acres)				
Unsuitable for surface mining and surface mining operations	0	87,443	166,207	87,443
Acceptable for coal leasing	242,743	155,300	76,536	155,300
Fluid Mineral Leasing (Federal minerals under BLM, State, Private surface acres)				
Closed to fluid mineral leasing (no lease)	0	61,197	66,293	0
Open to fluid mineral leasing	73,435	12,238	7,142	73,435

Table 2-2
Comparative Summary of Alternatives

Resources/Resource Uses	Alternative A (No Action)	Alternative B	Alternative C	Alternative D (Agency Preferred)
Standard terms and conditions (i.e., not subject to NSO or CSU stipulations)	25,130	12,238	7,142	7,142
NSO	9,780	0	0	61,197
CSU	21,235	0	0	5,096
TL	38,504	0	0	0
Locatable Minerals, Mineral Materials, and Non-Energy Solid Leasable Minerals (Federal minerals under BLM, State, Private surface acres)				
Recommend for withdrawal from locatable mineral entry	0	46,397	49,970	0
Open to locatable mineral exploration or development	56,681	10,284	6,711	56,681
Closed to mineral materials disposal	0	46,397	49,970	46,397
Open for consideration for mineral materials disposal	56,681	10,284	6,711	10,284
Closed to non-energy solid leasable mineral exploration and development	0	46,397	49,970	0
Open for consideration of non-energy solid leasable mineral exploration or development	56,681	10,284	6,711	56,681
Areas of Critical Environmental Concern (acres)				
Greater Sage-Grouse ACEC	0	0	32,900	0

2.10.1 How to Read Table 2-3

The following describes how **Table 2-3**, below, is written and formatted to show the land use plan decisions proposed for each alternative.

In accordance with Appendix C of the BLM's *Land Use Planning Handbook* (H-1601-1), land use plan and plan amendment decisions are broad-scale decisions that guide future land management actions and subsequent site-specific implementation decisions (BLM 2005). Land use plan decisions fall into two categories, which establish the base structure for desired outcomes (goals and objectives), and allowable uses and actions to achieve outcomes.

- Goals are broad statements of desired outcomes that usually are not quantifiable.
- Objectives identify specific desired outcomes for resources. They may be quantifiable and measurable and may have established timeframes for achievement, as appropriate.
- Allowable uses identify uses, or allocations, that are allowable, restricted, or prohibited on BLM-administered lands and mineral estate.
- Actions identify measures or criteria to achieve desired objectives, including actions to maintain, restore, or improve land health.

The alternatives direction/management actions in **Table 2-3** are organized by resource programs identified in the NTT report (*A Report on National Greater Sage-Grouse Conservation Measures*; NTT 2011). In general, only those resources and resource uses that have been identified as planning issues have notable differences between the alternatives in **Table 2-3**.

Data from geographic information systems (GIS) have been used in developing acreage calculations and for generating many of the figures. Calculations in this EIS are rounded and are dependent upon the quality and availability of data. Data were collected from a variety of sources, including the BLM, collaborative partners, stakeholders, and cooperating agencies. Given the scale of the analysis, the compatibility constraints between datasets, and lack of data for some resources, all calculations are approximate and serve for comparison and analytic purposes only. Likewise, the figures are provided for illustrative purposes and subject to the limitations discussed above. The BLM may receive additional GIS data; therefore, the acreages may be recalculated and revised at a later date.

This page intentionally left blank.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
RMPA Goal: Maintain and/or increase GRSG abundance and distribution by conserving, enhancing, or restoring the sagebrush ecosystem upon which populations depend, in cooperation with other conservation partners.			
Objectives: • Maintain or improve breeding habitat and/or nest sites for threatened and endangered (T&E) species and migratory birds of high federal interest. • Improve nesting and winter habitat for GRSG.	Objectives: • Protect PH from anthropogenic (human-caused) disturbances that would reduce distribution or abundance of GRSG. o Manage or restore PH so that at least 70% of the land cover provides adequate sagebrush habitat to meet GRSG needs. o Manage PH so that discrete anthropogenic disturbances cover less than 3% of the total GRSG habitat.	Objective: • Protect PH from anthropogenic disturbances that would reduce distribution or abundance of GRSG.	Objective: • Same as Alternative C.
Habitat Delineation: No similar delineation.	Habitat Delineation: Delineate PH[2] to encompass the 100% Breeding Bird Density map: 32,900 BLM surface acres (7% of total PH acres[3]). Since mapping 75% of breeding bird density map misses the majority of GRSG habitat in ND, 100% was used. See **Figure 1-1** (**Appendix A**).	Habitat Delineation: Same as Alternative B.	Habitat Delineation: Same as Alternative B.
Habitat Delineation: No similar delineation.	Habitat Delineation: Delineate GH to encompass the remainder of the habitat: 80 BLM surface acres.	Habitat Delineation: Same as Alternative B.	Habitat Delineation: Same as Alternative B.
ALTERNATIVES DIRECTION/MANAGEMENT ACTIONS			
Travel and Transportation Management			
Action: BLM-administered lands are designated limited yearlong for motorized wheeled vehicles (motorized wheeled cross-country travel is restricted to existing roads and trails; BLM 2003a). See **Figure 2-1**, Travel and Transportation Management Alternatives A-D (**Appendix A**).	Action: In PH and GH, limit motorized travel to existing roads, primitive roads, and trails at a minimum, until such time as travel management planning is complete and routes are either designated or closed. See **Figure 2-1** (**Appendix A**).	Action: Same as Alternative B. See **Figure 2-1** (**Appendix A**).	Action: Same as Alternative B. See **Figure 2-1** (**Appendix A**).
Action: Through site-specific planning, the BLM would designate roads and trails for motorized use. Roads and trails would be inventoried, mapped, and analyzed to the degree necessary to evaluate and designate the roads and trails as open, seasonally open, or closed (BLM 2003a).	Action: In PH, travel management would evaluate the need for permanent or seasonal road or area closures.	Action: Same as Alternative B except applies to both PH and GH.	Action: In PH, travel management would evaluate the need for permanent or seasonal road or area closures where vehicle use is causing or would cause adverse effects upon habitat.

[1] Goals and objectives for resources and resource uses are based on the 1988 North Dakota RMP and ROD, along with associated amendments, activity and implementation level plans, and other management decision documents. Sources for management actions are provided where applicable.
[2] For the alternatives, the terms PH and GH are being used; PPH and PGH habitats were mapped in each state for interim management, and are explained in **Chapter 3**, Affected Environment. However, for the alternatives, habitat would be delineated and therefore not "preliminary".
[3] See **Chapter 1** for table of acres in planning area.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
Action: Through site-specific planning, the BLM would designate roads and trails for motorized use. Roads and trails would be inventoried, mapped, and analyzed to the degree necessary to evaluate and designate the roads and trails as open, seasonally open, or closed (BLM 2003a).	Action: In PH, complete activity level travel plans within five years of the ROD. During activity level planning, where appropriate, designate routes in PH with current administrative/agency purpose or need to administrative access only.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative C.
No similar action.	Action: In PH, limit route construction to realignments of existing designated routes if that realignment has a minimal impact on sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety.	Action: In PH and GH, limit route construction to realignments of existing designated routes if that realignment has a minimal impact on sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety. Mitigate any impacts with methods that have been demonstrated to be effective to offset the loss of GRSG habitat.	Action: In PH, limit route construction to realignments of existing designated routes if that realignment has a minimal impact on sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety. Allow new routes/realignments in PH and GH during site-specific travel planning if it improves GRSG habitat and resource conditions.
No similar action.	Action: In PH, use existing roads, or realignments as described above to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3% for that area, then evaluate and implement additional, effective mitigation necessary to offset the resulting loss of sage-grouse habitat (see Objectives).	Action: Same as Alternative B, except applies to PH and GH - using a 4-mile buffer from leks to determine road route.	Action: In PH, use existing roads, or realignments as described above to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary,
No similar action.	Action: In PH, allow no upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road.	Action: In PH and GH, allow no upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless it is necessary for motorist safety, or eliminates the need to construct a new road. Any impacts shall be mitigated with methods that have been demonstrated to be effective to offset the loss of GRSG habitat	Action: Same as Alternative B, except applies to PH and GH.
No similar action.	Action: In PH, conduct restoration of roads, primitive roads and trails not designated in travel management plans.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B, except applies to PH and GH – when travel plans are complete.
No similar action.	When reseeding roads, primitive roads and trails in PH, use appropriate seed mixes and consider the use of transplanted sagebrush.	When reseeding closed roads in PH and GH, primitive roads and trails, use appropriate native seed mixes and require the use of transplanted sagebrush.	Same as Alternative B, except applies to PH and GH.
Recreation			
Action: Approve or deny use authorization as requested by the public for all competitive recreational and commercial uses, and as required for private and group uses; provide special designations as needed to preserve future options (BLM 1988a).	Action: Only allow SRPs that would have neutral or beneficial effects to PH.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
Lands and Realty			
Rights-of-Way			
Action: 33,030 acres of BLM-administered land surface are open for consideration of ROWs (67,571 acres in the North Dakota RMP for the entire NDFO). ROWs on the following areas would be avoided unless there is no reasonable alternative: environmental sensitive areas such as crucial wildlife habitats, wetlands, slump areas, and extensive wooded areas (BLM 1988a). See **Figure 2-2**, Rights-of-Way Alternative A (**Appendix A**).	Action: PH would be managed as exclusion area for new ROW authorizations. See **Figure 2-3**, Rights-of-Way Alternative B (**Appendix A**). Consider the following: • Subject to valid existing rights: where new ROWs associated with valid existing rights are required, co-locate new ROWs within existing ROWs or where it best minimizes GRSG impacts. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3% for that area, then make additional effective mitigation necessary to offset the resulting loss of GRSG habitat.	Action: PH and GH would be managed as exclusion areas for new ROW authorizations. See **Figure 2-4**, Rights-of-Way Alternative C (**Appendix A**). Consider the following: • Subject to valid existing rights: where new ROWs associated with valid existing rights are required, co-locate new ROWs within existing ROWs or where it best minimizes GRSG impacts. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3% for that area, then make additional mitigation that has been demonstrated to be effective to offset the resulting loss of sage-grouse habitat. Action: Do not site wind energy development in PH and GH.	Action: PH would be managed as ROW avoidance area. See **Figure 2-5**, Rights-of-Way Alternative D (**Appendix A**). • Where new ROWs are required, co-locate new ROWs within existing ROWs or where it best minimizes impacts to GRSG and GRSG habitat. Action: Make PH exclusion area for new ROW wind energy authorizations.
No similar action.	Action: In PH, evaluate and take advantage of opportunities to remove, bury, or modify existing power lines within priority sage-grouse habitat areas.	Action: Same as Alternative B except applies to both PH and GH.	Action: When addressing ROW authorizations in PH identify and evaluate opportunities to remove, bury or modify existing power lines within PH.
Action: Current FLMPA ROWs have a stipulation that when the use has been discontinued or abandoned, the site must be reclaimed and restored by the grant holder (43 CFR 2807.19).	Action: In PH, where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
Action: 33,030 acres of BLM-administered land surface (67,571 in the North Dakota RMP for the entire NDFO) are open for consideration of ROWs. ROWs on the following areas would be avoided unless there is no reasonable alternative: environmental sensitive areas such as crucial wildlife habitats, wetlands, slump areas, and extensive wooded areas (BLM 1988a).	Action: Make GH avoidance areas for new ROWs.	Action: See above (GH ROW exclusion areas).	Action: ROWs would be allowed in GH with appropriate mitigation and conservation measures identified within the terms of the authorization to minimize surface disturbing and disruptive activities. Action: GH would be managed as a Wind Energy ROW avoidance area.
Action: ROWs would be placed within or adjacent to existing ROW whenever possible given engineering and environmental constraints (BLM 1988a).	Action: Where new ROWs are necessary in GH, co-locate new ROWs within existing ROWs where possible.	Action: No similar action.	Action: Same as Alternative B.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
Action: In the planning area, 33,030 acres of BLM-administered land surface (67,571 in the North Dakota RMP for the entire NDFO) are open for consideration for authorized uses.	No similar action.	No similar action.	Action: PH would be avoidance areas for leases/land use authorizations - which could be for agricultural, occupancy, or filming. Leases/land use authorizations would be allowed in GH with appropriate mitigation and conservation measures identified within the terms of the authorization to minimize surface disturbing and disruptive activities.
Land Tenure Adjustment			
Action: Evaluate lands for possible disposal or exchange giving high relative weight for retention to lands that have T&E species or habitats, contain high-quality riparian habitat, or contain plant and animal populations of exemplary natural communities of high interest to the state (BLM 1988a). See **Figure 2-6**, Retention/Disposal Alternative A (**Appendix A**). Action: Public land in the Big Gumbo consolidation area is available for exchange only (BLM 1988a). Action: 3,436 acres of BLM-administered land surface are available for disposal in the planning area (BLM 1988a).	Action: Retain public ownership of PH. See **Figure 2-7**, Retention/Disposal Alternative B and D (**Appendix A**). Consider exceptions where: • There is mixed ownership, and land exchanges would allow for additional or more contiguous federal ownership patterns within the priority sage-grouse habitat area. • Under priority sage-grouse habitat areas with minority federal ownership, include an additional, effective mitigation agreement for any disposal of federal land. As a final preservation measure consideration would be given to pursuing a permanent conservation easement.	Action: Same as Alternative B, without exceptions for disposal to consolidate ownership that would be beneficial to GRSG (and applies to PH and GH). See **Figure 2-8**, Retention/Disposal Alternative C (**Appendix A**).	Action: Same as Alternative B. See **Figure 2-7** (**Appendix A**).
Action: Follow the State Director criteria for acquisition (**Appendix G**, Land Pattern Review and Land Adjustment); this includes criteria for Special Status Species.	Action: Where suitable conservation actions cannot be achieved in PH, seek to acquire state and private lands with intact subsurface mineral estate by donation, purchase or exchange in order to best conserve, enhance or restore sage-grouse habitat.	Action: Strive to acquire important private lands in ACECs (PH). Acquisition would be prioritized over easements.	Action: PH would be a priority in consideration of land acquisitions. Consider GRSG for all land tenure actions.
Recommend Land Withdrawals			
Action: No areas currently withdrawn from minerals on BLM surface.	Action: Recommend lands within PH areas for mineral withdrawal.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative A.
Action: Review withdrawals to determine whether, and for how long, the withdrawal would be consistent with the objective of the programs for which the lands were withdrawn and for consistency with other relevant programs. Revoke those not needed (BLM 1988a).	Action: In PH, do not recommend withdrawal proposals not associated with mineral activity unless the land management is consistent with GRSG conservation measures. (For example, in a proposed withdrawal for a military training range buffer area, manage the buffer area with GRSG conservation measures.)	Action: In PH and GH, do not approve withdrawal proposals not associated with mineral activity unless the land management is consistent with sage-grouse conservation measures. (For example, in a proposed withdrawal for a military training range buffer area, manage the buffer area with sage-grouse conservation measures that have been demonstrated to be effective.)	Action: Same as Alternative B.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
Range Management			
Action: Grazing would be allowed on all lands identified as suitable (approximately 32,945 acres) (BLM 1988a). See **Figure 2-9**, Grazing Allotments Alternatives A, B and D (**Appendix A**). Action: Allocate up to an estimated 5,780 AUMs to livestock in the long term (BLM 1988a). (Livestock use is set at 25% of average annual forage production.)	Action: Maintain retirement of permitted grazing use as an option in PH when the current permittee is willing to retire grazing on all or part of an allotment. Analyze the adverse impacts of no livestock use on wildfire and invasive species threats in evaluating retirement proposals. See **Figure 2-9** (**Appendix A**). Action: Allocate up to an estimated 5,780 AUMs to livestock in the long term.	Action: Maintain retirement of permitted grazing use as an option in PH and GH when the current permittee is willing to retire grazing on all or part of an allotment. Action: Livestock grazing would be reduced on all grazing allotments within the Big Gumbo area by 50% (2,041 AUMs). See **Figure 2-10** Grazing Allotments Alternative C (**Appendix A**). Action: Allocate up to an estimated 3,739 AUMs to livestock in the long term.	Action: Same as Alternative A. See **Figure 2-9** (**Appendix A**).
Action: Montana/Dakotas Standards for Rangeland Health Standards #5: Habitats are maintained and/or restored, where appropriate, for healthy, productive and diverse populations of native plant and animal species (BLM 1997).	Action: Within PH, incorporate GRSG habitat objectives and management considerations into all BLM grazing allotments through AMPs or permit renewals.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B except develop standards with State of North Dakota and USFWS. Within PH, incorporate State of North Dakota GRSG habitat objectives and management considerations into all BLM grazing allotments through AMPs or permit renewals.
No similar action.	Action: In PH, work cooperatively on integrated ranch planning within GRSG habitat so operations with deeded/BLM allotments can be planned as single units.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
Action: Areas with Category I allotments are the highest priority for processing authorizations, actively managing uses, and monitoring achievement of land health standards (BLM IM 2009-018, Process for Setting Priorities for Issuing Grazing Permits and Leases).	Action: Prioritize completion of land health assessments and processing grazing permits within PH. Focus this process on allotments that have the best opportunities for conserving, enhancing or restoring habitat for GRSG. Utilize Ecological Site Descriptions (ESDs) to conduct land health assessments to determine if standards of rangeland health are being met.	Action: Same as Alternative B except applies to both PH and GH.	Action: Prioritize completion of land health assessments and processing grazing permits within PH, other priority species habitat areas, and important riparian habitat. Focus this process on allotments that have the best opportunities for conserving, enhancing or restoring habitat for GRSG or other priority species including T&E species. Utilize ESDs and other tools (e.g., proper functioning condition (PFC) protocols, water quality information, and vegetation, habitat, riparian, monitoring data, etc.) to conduct land health assessments to determine if standards of rangeland health are being met.
Action: No specific GRSG habitat objectives in North Dakota RMP. Montana/Dakotas Standards for Rangeland Health Standards #5: Habitats are maintained and/or restored, where appropriate, for healthy, productive and diverse populations of native plant and animal species (BLM 1997). As indicated by: • Plants and animals are diverse, vigorous and reproducing satisfactorily. • Spatial distribution of species is suitable to ensure reproductive capability; these species may include special status species (threatened, endangered,	Action: In PH, conduct land health assessments that include (at a minimum) indicators and measurements of structure/condition/composition of vegetation specific to achieving GRSG habitat objectives. If local/state seasonal habitat objectives are not available, use GRSG habitat recommendations from Connelly et al. 2000 and Hagen et al. 2007.	Action: Same as Alternative B except applies to both PH and GH.	Action: In PH, conduct land health assessments that include (at a minimum) indicators and measurements of structure/condition/composition of vegetation specific to achieving GRSG habitat objectives. Local objectives would be developed at the field office level in partnership with NDGFD and USFWS, and incorporated into AMPs or livestock grazing permits as appropriate incorporating best available science.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
candidate, species of special concern). • Species diversity (plants, animals, insects, and microbes) is present. • Connectivity of habitat or presence of corridors to prevent habitat fragmentation.			
Implementation Management Action After Land Health Evaluations			
No similar action.	Action: Develop specific objectives to conserve, enhance or restore PH based on ESDs and assessments (including within wetlands and riparian areas). If an effective grazing system that meets GRSG habitat requirements is not already in place, analyze at least one alternative that conserves, restores or enhances GRSG habitat in the NEPA document prepared for the permit renewal.	No similar action.	Action: Same as Alternative B.
No similar action.	Action: In PH, manage for vegetation composition and structure consistent with ecological site potential and within the reference state to achieve GRSG seasonal habitat objectives.	Action: In PH and GH, manage for vegetation composition and structure consistent with ecological site potential and within the reference state to achieve GRSG habitat objectives.	Action: In PH, manage for vegetation composition and structure consistent with GRSG seasonal habitat objectives. ESDs can help determine whether or not the GRSG seasonal habitat objectives are consistent with the ecological site potential within the reference state. GRSG seasonal habitat objectives and ecological site potential within reference states are not always going to be the same.
Action: Implement grazing systems where necessary as determined from monitoring results (BLM 1988a).	Action: In PH, implement management actions (grazing decisions, AMP/Conservation Plan development, or other agreements) to modify grazing management to meet seasonal GRSG habitat requirements (Connelly et al. 2011a). Consider singly, or in combination, changes in: 1. Season or timing of use; 2. Numbers of livestock (includes temporary non-use or livestock removal); 3. Distribution of livestock use; 4. Intensity of use; and 5. Type of livestock (e.g., cattle, sheep, horses, llamas, alpacas and goats).	Action: In PH and GH, Implement management actions (grazing decisions, AMP/Conservation Plan development, or other plans or agreements) to modify grazing management to meet seasonal sage-grouse habitat requirements (Connelly et al. 2011a). Consider singly, or in combination, changes in: 1. Season, timing, and/or frequency of livestock use; 2. Numbers/AUMs of livestock (includes temporary non-use or livestock removal); 3. Distribution of livestock use; 4. Intensity of livestock use; and 5. Type of livestock (e.g., cattle, sheep, horses, llamas, alpacas and goats).	Action: In PH, implement management actions (grazing decisions, AMP/Conservation Plan development, or other agreements) to modify grazing management to meet State of North Dakota seasonal GRSG habitat requirements, where allotment evaluations indicate land health assessments are not being met due to livestock. Consider singly, or in combination, changes in: 1. Season or timing of use; 2. Numbers of livestock (includes temporary non-use or livestock removal); 3. Distribution of livestock use; 4. Intensity of use; and 5. Type of livestock (e.g., cattle, sheep, horses, llamas, alpacas and goats).
Action: Efforts to manage public rangeland under drought conditions would be directed first to allotments with resource concerns such as "I" category allotments. Specific allotments in the "M" and "C" categories can also be considered high priority when resource values or conditions so require. Regardless of the category assigned to an	Action: During drought periods, prioritize evaluating effects of the drought in PH relative to their needs for food and cover. Since there is a lag in vegetation recovery following drought, ensure that post-drought management allows for vegetation recovery that meets GRSG needs in PH areas.	Action: During drought periods, prioritize evaluating effects of the drought in PH and GH relative to their biological needs, as well as drought effects on un-grazed reference areas. Since there is a lag in vegetation recovery following drought, ensure that post-drought management allows for vegetation recovery that meets sage-grouse	Action: During drought periods, prioritize evaluating effects of the drought in PH relative to their needs for food and cover. Management would continue to be in accordance with the Montana-Dakotas Drought Policy (**Appendix H**).

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
allotment, operators should be aware of the procedures and flexibilities available for dealing with drought conditions (BLM 2004a; **Appendix H**, Drought Policy).		needs in sage-grouse habitat areas based on GRSG habitat objectives.	
Riparian Areas and Wet Meadows			
Action: Improve functioning-at-risk and non-functioning riparian areas and wetlands towards PFC. Maintain PFC riparian and wetland areas.	Action: Manage riparian areas and wet meadows for PFC within PH. • Within PH and GH, manage wet meadows to maintain a component of perennial forbs with diverse species richness relative to site potential (e.g., reference state) to facilitate brood rearing. Also conserve or enhance these wet meadow complexes to maintain or increase amount of edge and cover within that edge to minimize elevated mortality during the late brood rearing period.	Action: Manage riparian areas and wet meadows for PFC within PH and GH. • Within PH and GH, manage wet meadows to maintain a component of perennial forbs with diverse species richness and productivity relative to site potential (e.g., reference state) to facilitate brood rearing. At least 6 inches of stubble height must remain on all riparian/meadow area herbaceous species at all times. Also conserve or enhance these wet meadow complexes to maintain or increase the amount of edge and cover within that edge to minimize elevated mortality during the late brood-rearing period.	Action: Where riparian and wetland areas are already meeting standards they would be maintained in that condition or better. Where a site's capability is less than PFC, BLM would manage to achieve or move towards capability. • Within PH and GH, manage wet meadows to maintain a component of perennial forbs with diverse species richness relative to site potential (e.g., reference state) to facilitate brood rearing.
Action: Maintain PFC riparian and wetland areas.	Action: In PH, where riparian areas and wet meadows meet PFC, strive to attain reference state vegetation relative to the ESD. • Example: Within PH, reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by GRSG in the hot season (summer).	Action: Same as Alternative B except applies to both PH and GH.	Action: In PH, where riparian areas and wet meadows meet PFC, strive to move towards GRSG habitat objectives within capabilities of the reference state vegetation relative to the ESD. • Example: Within PH, reduce where necessary hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques, seasonal use, or livestock distribution changes where necessary to reduce pressure on riparian or wet meadow vegetation used by GRSG in the hot season (summer).
Action: Water sources would be developed where needed (as indicated by monitoring) to improve livestock distribution and wildlife habitat. Development of range improvements on erodible soils would be avoided during the period April through June (BLM 1988a).	Action: Authorize new water development for diversion from spring or seep source only when PH would benefit from the development. This includes developing new water sources for livestock as part of an AMP/conservation plan to improve GRSG habitat.	Action: Authorize no new water developments for diversion from spring or seep sources within PH and GH.	Action: Authorize new water development for diversion from spring or seep source only when PH would be maintained or benefit from the development. This includes developing new water sources for livestock as part of an AMP/conservation plan to improve GRSG habitat.
Action: Water sources would be developed where needed (as indicated by monitoring) to improve livestock distribution and wildlife habitat (BLM 1988a).	Action: Analyze springs, seeps and associated pipelines to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within PH. Make modifications where necessary, considering impacts to other water uses when such considerations are neutral or beneficial to GRSG.	Action: Analyze springs, seeps and associated water developments to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within PH and GH. Make modifications where necessary, including dismantling water developments.	Action: Analyze springs, seeps and associated pipelines at time of grazing lease renewal to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within PH. Make modifications where necessary, considering impacts to other water uses when such considerations are neutral or beneficial to GRSG.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
Treatments to Increase Forage for Livestock/Wild Ungulates			
Action: Conduct land treatments where outlined in activity plans as necessary for effective range management (600 acres were tentatively identified for treatments in North Dakota Grazing EIS; BLM 1988a). Action: Certain pesticides, biological and other control means are authorized on BLM-administered lands (BLM 2007).	Action: In PH, only allow treatments that conserve, enhance or restore GRSG habitat (this includes treatments that benefit livestock as part of an AMP/Conservation Plan to improve GRSG habitat).	Action: In PH and GH, ensure that vegetation treatments create landscape patterns which most benefit sage-grouse. Only allow treatments that are demonstrated to benefit GRSG and retain sagebrush height and cover consistent with GRSG habitat objectives (this includes treatments that benefit livestock as part of an AMP/Conservation Plan to improve sage-grouse habitat).	Action: In PH, allow treatments that conserve, enhance or restore GRSG habitat as well as other priority species habitat (this includes treatments that benefit livestock as part of an AMP/Conservation Plan to improve GRSG habitat).
No similar action.	Action: Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to PH to determine if they should be restored to sagebrush or habitat of higher quality for GRSG. If these seedings are part of an AMP/ Conservation Plan or if they provide value in conserving or enhancing the rest of the PH, then no restoration would be necessary. Assess the compatibility of these seedings for GRSG habitat or as a component of a grazing system during the land health assessments.	Action: Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to PH and GH to determine if they should be restored to sagebrush or habitat of higher quality for sage-grouse. If these seedings provide value in conserving or enhancing GRSG habitats, then no restoration would be necessary. Assess the compatibility of these seedings for sage-grouse habitat during the land health assessments.	Action: Same as Alternative B.
Structural Range Improvement and Livestock Management Tools			
Action: Management fences would be constructed where necessary to support grazing systems or treatments. All fences would be designed to protect and/or benefit wildlife. Development of range improvements on erodible soils would be avoided during the period April through June (BLM 1988a). Action: Waters necessary for wildlife and adversely affected by uncontrolled livestock use would be fenced. Gaps would be provided for livestock use. Development of range improvements on erodible soils would be avoided during the period April through June (BLM 1988a).	Action: In PH, design any new structural range improvements and location of supplements (salt or protein blocks) to conserve, enhance, or restore GRSG habitat through an improved grazing management system relative to GRSG objectives. Structural range improvements, in this context, include but are not limited to: cattle guards, fences, exclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments. Potential for invasive species establishment or increase following construction must be considered in the project planning process and monitored and treated post-construction.	Action: Avoid all new structural range developments and location of supplements (salt or protein blocks) in PH and GH unless independent peer-reviewed studies show that the range improvement structure or nutrient supplement placement benefits GRSG. Structural range developments, in this context, include but are not limited to cattle guards, fences, exclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments. Potential for invasive species establishment or increase following construction must be considered in the project planning process and monitored and treated post-construction. Consider the comparative cost of changing grazing management instead of constructing additional range developments.	Action: Same as Alternative B.
Action: Water sources would be developed where needed (as indicated by monitoring) to improve livestock distribution and wildlife habitat (BLM 1988a).	Action: When developing or modifying water developments in PH, use applicable RDFs (**Appendix B**) to mitigate potential impacts from West Nile virus.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
Action: Management fences would be constructed where necessary to support grazing systems or treatments. All fences would be designed to protect and/or benefit	Action: In PH, evaluate existing structural range improvements and location of supplements (salt or protein blocks) to make sure they conserve, enhance or	Action: In PH and GH, evaluate existing structural range improvements and location of supplements (salt or protein blocks) to make sure they conserve, enhance or	Action: In PH, evaluate existing structural range improvements and location of supplements (salt or protein blocks) during grazing lease renewal process to

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
wildlife. Development of range improvements on erodible soils would be avoided during the period April through June (BLM 1988a).	restore GRSG habitat. • To reduce outright GRSG strikes and mortality, remove, modify or mark fences in high risk areas within PH based on proximity to lek, lek size, and topography. • Monitor for, and treat invasive species associated with existing range improvements.	restore GRSG habitat. • Remove, modify or mark fences in high risk areas of moderate or high risk of GRSG strikes within PH based on proximity to lek, lek size, and topography • Monitor for, and treat invasive species associated with existing range improvements.	make sure they conserve, enhance or restore GRSG habitat. • To reduce outright GRSG strikes and mortality, remove, modify or mark fences in high risk areas within PH based on proximity to lek, lek size, and topography. • Monitor for, and treat invasive species associated with existing range improvements.
FLUID MINERALS			
Unleased Federal Fluid Mineral Estate			
Action: Make available for leasing, under necessary special stipulations and Montana BLM Standard Stipulations, 206,811 acres[4] of Federal oil and gas (BLM 1988a). See **Appendix C** for stipulations. See **Figure 2-11**, Unleased Fluid Mineral Leasing Categories Alternative A (**Appendix A**).	Action: Close PH to fluid mineral leasing. Upon expiration or termination of existing leases, do not accept nominations/expressions of interest for parcels within priority areas. See **Figure 2-12**, Unleased Fluid Mineral Leasing Categories Alternative B (**Appendix A**).	Actions: Close PH and GH to fluid mineral leasing. Upon expiration or termination of existing leases, do not accept nominations/expressions of interest for parcels within PH or GH areas. See **Figure 2-13**, Unleased Fluid Mineral Leasing Categories Alternative C (**Appendix A**).	Action: Open to oil and gas leasing and development; however, surface occupancy and use would be prohibited within PH (NSO). Upon expiration or termination of existing leases, apply NSO. See **Figure 2-14**, Unleased Fluid Mineral Leasing Categories Alternative D (**Appendix A**). Action: In GH surface occupancy and use would be subject to special operating constraints (CSU) (**Appendix C**).
No similar action.	Action: Allow geophysical exploration within PH to obtain exploratory information for areas outside of and adjacent to priority sage-grouse habitat areas. Action: Allow geophysical operations only by helicopter-portable drilling methods and in accordance with seasonal timing restrictions and/or other restrictions that may apply.	Action: Allow geophysical exploration within PH and GH to obtain exploratory information for areas outside of and adjacent to sage-grouse habitat areas. Action: Only allow geophysical operations by helicopter-portable drilling methods and in accordance with seasonal timing restrictions and/or other restrictions that may apply. Geophysical exploration shall be subject to seasonal restrictions that preclude activities in breeding, nesting, brood rearing and winter habitats during their season of use by GRSG.	Action: Same as Alternative B.
Leased Federal Fluid Mineral Estate			
Action: Review all lands (206,811 acres) that fall within identified resource concern areas (Map 4 of North Dakota RMP) and attach necessary oil and gas stipulations (BLM 1988a). Action: No seismic exploration, construction, or other development allowed within 2 miles of strutting grounds between March 1 and June 15. NSO within 0.25 mile of	Action: In PH, apply the following conservation measures through RMP implementation decisions (e.g., approval of an APD, Sundry Notice, etc.) and upon completion of the environmental record of review (43 CFR 3162.5), including appropriate documentation of compliance with NEPA. In this process evaluate, among other things: (1) Whether the conservation measure is "reasonable" (43	Action: In PH and GH, apply the following conservation measures as COA at the project and well permitting stages, and through RMP implementation decisions and upon completion of the environmental record of review (43 CFR 3162.5), including appropriate documentation of compliance with NEPA. In this process evaluate, among other things: (1) Whether the conservation measure is	Action: During implementation level review and decisions, (e.g., approval of an APD, Sundry Notice, etc.) and upon completion of the environmental record of review (43 CFR 3162.5), including appropriate documentation of compliance with NEPA. In this process evaluate, among other things: (1) Whether the conservation measure is "reasonable" (43 CFR 3101.1-2) with the valid existing

[4] These acres are from the 1988 North Dakota ROD (BLM 1988a) and include all federal minerals. See **Table 2-2** and **Section 3.7**, Fluid Minerals, in **Chapter 3** for current acres and breakdown by surface ownership.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
active GRSG strutting grounds (BLM 1988a). Action: TL within 2 miles of GRSG display grounds (from 3/1-6/15). NSO within 0.25 mile of center of GRSG display grounds (BLM 2003b). Action: Also follow standards and guidelines found in *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development.* (DOI and USDA 2007). *Note: COA means a site-specific requirement included in an approved Application for Permit to Drill (APD) or Sundry Notice that may limit or amend the specific actions proposed by the operator. COAs minimize, mitigate, or prevent impacts to public lands or other resources. BMPs may be incorporated as a COA (Source – Onshore Oil and Gas Order Number 1, II. Definitions).*	CFR 3101.1-2) with the valid existing rights; and (2) Whether the action is in conformance with the approved RMP. Conservation Measure #1: Do not allow new surface occupancy on federal leases within PH, this includes winter concentration areas during any time of the year. Consider an exception: • If the lease is entirely within PH, apply a 4-mile NSO around the lek, and limit permitted disturbances to 1 per section with no more than 3% surface disturbance in that section. • If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to 1 per section with no more than 3% surface disturbance in that section. Require any development to be placed at the most distal part of the lease from the lek, or, depending on topography and other habitat aspects, in an area that is less demonstrably harmful to GRSG. Conservation Measure #2: Apply a seasonal restriction on exploratory drilling that prohibits surface-disturbing activities during the nesting and early brood-rearing season in all PH during this period. Conservation Measure #3: Closely examine the applicability of categorical exclusions in PH. If extraordinary circumstances review is applicable, BLM would determine whether or not those circumstances exist. Conservation Measure #4: Complete Master Development Plans in lieu of APD-by-APD processing for all but wildcat wells. Conservation Measure #5: When permitting APDs on existing leases that are not yet developed, the proposed surface disturbance cannot exceed 3% for that area. Consider an exception if: • Additional, effective mitigation is demonstrated to offset the resulting loss of GRSG (see Objectives). o When necessary, conduct additional, effective mitigation in 1) PH or – less preferably – 2) GH (dependent upon the area-specific ability to increase GRSG populations). o Conduct additional, effective mitigation	"reasonable" (43 CFR 3101.1-2) with the valid existing rights; and (2) Whether the action is in conformance with the approved RMP. Conservation Measure #1: Same as Alternative B except applies to both PH and GH. Conservation Measure #2: Apply a seasonal restriction on exploratory drilling that prohibits surface-disturbing activities during the nesting and brood-rearing season in PH and GH during this period. This seasonal restriction shall also to apply to related activities that are disruptive to GRSG, including vehicle traffic and other human presence. Conservation Measure #3: Same as Alternative B except applies to both PH and GH. Conservation Measure #4: Same as Alternative B except applies to both PH and GH. Conservation Measure #5: When permitting APDs on existing leases that are not yet developed, the proposed surface disturbance cannot exceed 3% per section for that area. Consider an exception if: • Additional, effective mitigation is demonstrated to offset the resulting loss of GRSG (see Objectives). o When necessary, conduct additional, effective mitigation in PH and GH (dependent upon the area-specific ability to increase GRSG populations). o Conduct additional, effective mitigation first within the same population area where the impact is realized, and if not possible then conduct mitigation within the same MZ as the impact, per 2006 WAFWA Strategy – pg. 2-17. Conservation Measure #6: Same as Alternative B except applies to both PH and GH. Conservation Measure #7: Same as Alternative B except applies to both PH and GH. Conservation Measure #8: Same as Alternative B except applies to both PH and GH. Conservation Measure #9: Same as Alternative B except applies to both PH and GH.	rights; and (2) Whether the action is in conformance with the approved RMP. Conservation Measure #1: The following operating constraints would be applied to existing leases as COA in PH and GH. Exceptions may be granted by the BLM Authorized Officer if an environmental review demonstrates that effects could be mitigated to an acceptable level, habitat for the species is not present in the area, or portions of the area can be occupied without affecting a particular species. Exceptions may also be granted where the short-term effects are mitigated by the long-term benefits. The BLM may add additional site-specific restrictions as deemed necessary by further environmental analysis and as developed through coordination with other federal, state, and local regulatory and resource agencies. a) Surface disturbing/disruptive activities would prevent or minimize disturbance to GRSG or their habitat. Except as identified above or during emergency situations, activities would not compromise the functionality of the habitat. b) Continuous noise (related to long-term operations and/or activities) would be no greater than 49 decibels at 0.25 mile from the perimeter of the lek. c) Temporary noise (related to installation, maintenance, one-time use, emergency operations, etc.) exceeding 49 decibels at 0.25 mile from the perimeter of a lek or surface disturbing/disruptive activities may be allowed, but only from 10 a.m. to 4 p.m. between March 15 and May 15. d) Manage water developments to reduce the spread of West Nile virus within GRSG habitat areas. e) Site and/or minimize linear ROW to reduce disturbance to sagebrush habitats. f) Maximize placement of new utility developments (power lines, pipelines, etc.) and transportation routes in existing ROWs. g) Power lines would be buried, eliminated, designed or sited in a manner which does not impact GRSG. h) Placement of other high profile structures,

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
	first within the same population area where the impact is realized, and if not possible then conduct mitigation within the same MZ as the impact, per 2006 WAFWA Strategy – pg. 2-17. Conservation Measure #6: Require unitization when deemed necessary for proper development and operation of an area (with strong oversight and monitoring) to minimize adverse impacts to GRSG according to the Federal Lease Form, 3100-11, Sections 4 and 6. Conservation Measure #7: Identify areas where acquisitions (including subsurface mineral rights) or conservation easements, would benefit GRSG habitat. Conservation Measure #8: For future actions, require a full reclamation bond specific to the site in accordance with 43 CFR 3104.2, 3104.3, and 3104.5. Ensure bonds are sufficient for costs relative to reclamation that would result in full restoration of the lands to the condition it was found prior to disturbance. Base the reclamation costs on the assumption that contractors for the BLM would perform the work. Conservation Measure #9: Make applicable RDFs (**Appendix B**) mandatory as COA within PH.		exceeding 10 feet in height, would be eliminated, designed or sited in a manner which does not impact GRSG. i) Remote monitoring of production facilities must be utilized and all permit applications must contain a plan to reduce the frequency of vehicle use. j) Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, top-soiling and re-vegetating cut and fill slopes. Utilize native grass species mix which includes sagebrush and forbs. k) Restore disturbed areas at final reclamation to pre-disturbance conditions or desired plant community. Utilize native grass species mix which includes sagebrush and forbs. l) Permanent (longer than 2 months) structures which create movement must be designed or sited to minimize impacts to GRSG. m) Consider use of off-site mitigation within the same PH area (e.g., creation of sagebrush habitat, improving brood rearing habitat, or purchase conservation easements) with proponent dollars to offset habitat losses (Washington Office -IM 2008-204). n) Consider creation of a "Mitigation Trust Account" when impacts cannot be avoided, minimized, or effectively mitigated through other means. If approved by the BLM, the proponent may contribute funding to maintain habitat function based on the estimated cost of habitat treatments or other mitigation needed to maintain the functions of impacted habitats. Off-site mitigation would only be considered when no feasible options are available to adequately mitigate within and immediately adjacent to the impacted site, or when the off-site location would provide more effective mitigation of the impact than can be achieved on-site.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
Solid Minerals			
Coal			
No similar action. The North Dakota RMP examined 24 Coal Screening Areas as having coal development potential (none of these 1,009,648 acres evaluated were within the planning area). Although the planning area was not identified as having coal development potential, it was also not identified as unsuitable; therefore, any applications for coal leasing would require additional site-specific NEPA to determine suitability. See **Figure 2-15**, Coal Resources Alternative A (**Appendix A**).	Action: *Surface mines* - In PH, find unsuitable all surface mining of coal under the criteria set forth in 43 CFR 3461.5. See **Figure 2-16**, Coal Resources Alternative B (**Appendix A**).	Action: Same as Alternative B except applies to both PH and GH. See **Figure 2-17**, Coal Resources Alternative C (**Appendix A**).	Action: In PH, apply the requirement of 43 CFR 3461 to determine unsuitability; then, if criteria set forth in 43 CFR 3461.5 are met, find unsuitable all surface mining of coal. See **Figure 2-18**, Coal Resources Alternative D (**Appendix A**).
Action: Although the planning area was not identified as having coal development potential, it was also not identified as unsuitable; therefore, any applications for coal leasing would require additional site-specific NEPA.	Action: *Sub-surface mines* - Grant no new mining leases unless all surface disturbances (appurtenant facilities) are placed outside of PH.	Action: Same as Alternative B except applies to both PH and GH.	Action: Place any new appurtenant facilities associated with Federal coal lease outside of PH. Where new appurtenant facilities cannot be located outside the PH, co-locate new facilities within existing disturbed areas. If this is not possible, then build any new appurtenant facilities to the absolute minimum standard necessary.
No existing coal leases.	Action: For coal mining operations on existing leases: • *Sub-surface mining:* In PH, place any new appurtenant facilities outside of priority areas. Where new appurtenant facilities associated with the existing lease cannot be located outside the PH, co-locate new facilities within existing disturbed areas. If this is not possible, then build any new appurtenant facilities to the absolute minimum standard necessary.	Action: Same as Alternative B except applies to both PH and GH.	No existing leases.
No existing coal leases.	Action: In GH, apply minimization of surface-disturbing or disrupting activities (including operations and maintenance) where needed to reduce the impacts of human activities on important seasonal GRSG habitats. Apply these measures during activity level planning. • Use additional, effective mitigation to offset impacts as appropriate (determined by local options/needs).	No similar action.	Action: Same as Alternative B.
Locatable Minerals			
Action: All the federally-reserved locatable mineral deposits, excluding acquired minerals and minerals that are withdrawn to protect resource values and uses, are open to mineral entry (BLM 1988a). See **Figure 2-19**, Locatable Minerals Alternatives A and D (**Appendix A**).	Action: In PH, propose withdrawal from mineral entry based on risk to the GRSG and its habitat from conflicting locatable mineral potential and development. See **Figure 2-20**, Locatable Minerals Alternative B (**Appendix A**). • Make any existing claims within the withdrawal	Action: Same as Alternative B except applies to both PH and GH. See **Figure 2-21**, Locatable Minerals Alternative C (**Appendix A**).	Action: In PH, proposed actions under Plans of Operations and Notices would be analyzed on a case-by-case basis in cooperation with the State of North Dakota, and BMPs (**Appendix B**) needed to prevent unnecessary or undue degradation would be applied. See **Figure 2-19**

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
Action: Manage the locatable, salable, and non-energy leasable minerals program to at least the minimum acceptable levels addressed in the maintenance and operations guidelines, as established for the Montana BLM organization (BLM 1988a).	area subject to validity exams or buy out. Include claims that have been subsequently determined to be null and void in the proposed withdrawal. • In Plans of Operations required prior to any proposed surface disturbing activities, include the following: o Additional, effective mitigation in perpetuity for conservation (In accordance with existing policy, Washington Office IM 2008-204). Example: purchase private land and mineral rights or severed subsurface mineral rights within the priority area and deed to US Government). o Consider seasonal restrictions if deemed effective. Action: BMPs needed to prevent unnecessary or undue degradation would be applied (**Appendix B**).		(**Appendix A**). **Note**: Locatable mineral exploration and development under the mining laws are not authorized under the discretion of the Field Manager, but Notices and Plans of Operation are reviewed to prevent unnecessary or undue degradation to resources.
Mineral Materials			
Action: All the federally-reserved salable and non-energy leasable mineral deposits are available for application (BLM 1988a). See **Figure 2-22**, Mineral Materials Alternative A (**Appendix A**).	Action: Close PH to mineral material sales. See **Figure 2-23**, Mineral Materials Alternatives B and D (**Appendix A**).	Action: Same as Alternative B except applies to both PH and GH. See **Figure 2-24**, Mineral Materials Alternative C (**Appendix A**).	Action: Same as Alternative B. See **Figure 2-23** (**Appendix A**).
Action: No North Dakota RMP direction; however, under the provisions of US 43 CFR 3601.40-43, BLM may require submission of mining and reclamation plans before beginning any environmental review or issuing a mineral materials contract or permit.	Action: In PH, restore salable mineral pits no longer in use to meet GRSG habitat conservation objectives.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
Nonenergy Leasable Minerals			
Action All the federally-reserved salable and non-energy leasable mineral deposits are available for application (BLM 1988a).	Action: Close PH to non-energy leasable mineral leasing. This includes not permitting any new leases to expand an existing mine.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
Action: Manage the locatable, salable, and non-energy leasable minerals program to at least the minimum acceptable levels addressed in the maintenance and operations guidelines, as established for the Montana BLM organization (BLM 1988a).	Action: For existing non-energy leasable mineral leases in PH, follow the same RDFs applied to Fluid Minerals (**Appendix B**), when wells are used for solution mining.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
Mineral Split Estate			
Action: The BLM manages 700 million acres of subsurface mineral estate nationwide, including approximately 58 million acres where the surface is privately owned. In many cases, the surface rights and mineral rights were severed under the terms of the Nation's homesteading laws. These and other Federal laws, regulations, and BLM policy directives, some noted below, give managers the authority and direction for administering the development of Federal oil and natural gas resources beneath privately owned surface. **Planning and Leasing** • Must involve the public when preparing land use plans and amendments. • Must notify the public when oil and gas lease sales have been scheduled. **Permitting** • Encourages the lessee/operator to contact the surface owner as early as possible when operations are contemplated. • Requires the lessee/operator to certify that a good faith effort has been made to negotiate a surface use agreement with the surface owner. **Drilling and Production** • Conducts compliance inspections, consults with surface owner as appropriate, and takes enforcement action when necessary to ensure permit compliance. **Surface Reclamation** • Must carefully consider the surface owner's views on reclamation requirements and seek concurrence that final reclamation is satisfactory.	Action: Where the federal government owns the mineral estate in PH, and the surface is in non-federal ownership, apply the conservation measures applied on BLM-administered lands.	Action: Same as Alternative B except applies to both PH and GH.	Action: Where the federal government owns the mineral estate in PH, and the surface is in non-federal ownership, apply the conservation measures applied on BLM-administered lands when the federal action (mineral development) occurs.
No similar action.	Action: Where the federal government owns the surface, and the mineral estate is in non-federal ownership in PH, apply appropriate Fluid Mineral RDFs (**Appendix B**) to surface development.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
Fire and Fuels Management			
Fuels Management			
Action: Prepare prescribed fire plans for vegetative manipulation where appropriate (BLM 1988a).	Action: In PH, design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems. • Do not reduce sagebrush canopy cover to less than 15% unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of PH and conserve habitat quality for the species. Closely evaluate the benefits of the fuel break against the additional loss of sagebrush cover in future NEPA documents. • Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present in a priority area. • Allow no treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and would maintain winter range habitat quality. • Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape could be considered, in stands where cheatgrass is a very minor component in the understory. • Monitor and control invasive vegetation post-treatment. • Rest treated areas from grazing for two full growing seasons unless vegetation recovery dictates otherwise. • Require use of native seeds for fuels management treatment based on availability, adaptation (site potential), and probability of success. Where probability of success or native seed availability is low, non-native seeds may be used as long as they meet GRSG habitat objectives. • Design post fuels management projects to ensure	Action: In PH and GH, design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems. • Do not reduce sagebrush canopy cover to less than 15% (Connelly et al. 2000; Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of PH and GH and conserve habitat quality for the species. • Closely evaluate the benefits of the fuel break against the additional loss of sagebrush cover in the environmental assessment process. • Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present. • Allow no fuels treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and would maintain winter range habitat quality. • Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush and other xeric sagebrush species; Connelly et al. 2000; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape could be considered, in stands where cheatgrass is a very minor component in the understory (Brown 1982). • Design post fuels management projects to ensure long term persistence of seeded or pre-treatment native plants, including sagebrush. This may require temporary or long-term changes in livestock grazing management, travel management, or other activities to achieve and maintain the desired condition of the fuels management project (Eiswerth and Shonkwiler 2006).	Action: Same as Alternative B, except the percent canopy cover would be 8%. Across their range, female GRSG usually select sagebrush patches for nests with shrub canopy cover of 15-25%, and avoid sparse or excessively dense patches (Connelly et.al. 2000). However, in southwestern North Dakota, hens may have to select different nest-site characteristics to maintain adequate canopy cover because of restricted patches of remaining sagebrush habitats, all of which are similar in habitat quality (Herman-Brunson 2007).

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
	long term persistence of seeded or pre-treatment native plants. This may require temporary or long-term changes in livestock grazing management, travel management, or other activities to achieve and maintain the desired condition of the fuels management project.		
No similar action.	Action: Design fuels management projects in PH to strategically and effectively reduce wildfire threats in the greatest area. This may require fuels treatments implemented in a more linear versus block design.	No similar action.	Action: Design fuels management projects in PH to strategically and effectively reduce wildfire threats in the greatest area.
No similar action.	Action: In PH, during fuels management project design, consider the utility of using livestock to strategically reduce fine fuels, and implement grazing management that would accomplish this objective. Consult with ecologists to minimize impacts to native perennial grasses.	No similar action.	Action: Same as Alternative B.
Fire Operations			
Action: Control wildfires on BLM-administered lands (BLM 1988a).	Action: In PH, prioritize suppression, immediately after life and property, to conserve the habitat. See **Appendix I**, GRSG Wildfire and Invasive Species Habitat Assessment, which would be completed to help further refine fire management actions once this plan is completed.	Action: Same as Alternative B except applies to both PH and GH. See **Appendix I**, which would be completed to help further refine fire management actions once this plan is completed.	Action: Same as Alternative B. See **Appendix I** which would be completed to help further refine fire management actions once this plan is completed.
No similar action.	Action: In GH, prioritize suppression where wildfires threaten PH.	No similar action.	Action: Same as Alternative B.
No similar action.	Action: Follow RDFs (Washington Office IM 2013-128) (**Appendix B**).	Action: Same as Alternative B except applies to both PH and GH. Follow RDFs in **Appendix B**.	Action: Follow the most current BMPs/RDFs for fire and fuels (**Appendix B**).
Emergency Stabilization and Rehabilitation			
No similar action.	Action: In PH, prioritize native seed allocation for use in GRSG habitat in years when preferred native seed is in short supply. This may require reallocation of native seed from emergency stabilization and rehabilitation (ES&R) projects outside of PH to those inside it. Use of native plant seeds for ES&R seedings is required based on availability, adaptation (site potential), and probability of success. Where probability of success or native seed availability is low, non-native seeds may be used as long as they meet GRSG habitat conservation objectives. Re-establishment of appropriate sagebrush species/subspecies and important understory plants, relative to site potential, shall be the highest priority for rehabilitation efforts.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
No similar action.	Action: In PH, design post ES&R management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing, and travel management, etc., to achieve and maintain the desired condition of ES&R projects to benefit GRSG.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
No similar action.	Action: In PH, consider potential changes in climate when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
Habitat Restoration/Vegetation Management			
Action: Follow direction in Integrated Vegetation Management Handbook; no specific management action from North Dakota RMP.	Action: Prioritize implementation of restoration projects in PH based on environmental variables that improve chances for project success in areas most likely to benefit GRSG. • Prioritize restoration in seasonal habitats that are thought to be limiting GRSG distribution and/or abundance.	Action: Prioritize implementation of restoration projects in PH and GH based on environmental variables that improve chances for project success in areas most likely to benefit GRSG (Meinke et al. 2009). Action: Prioritize restoration in seasonal habitats that are thought to be limiting sage-grouse distribution and/or abundance and where factors causing degradation have already been addressed (e.g., changes in livestock management).	Action: Prioritize implementation of restoration projects in PH, including projects to reduce conifer encroachment, based on environmental variables that improve chances for project success in areas most likely to benefit GRSG as well as other priority species. • Prioritize restoration in seasonal habitats that are thought to be limiting GRSG distribution and/or abundance. Action: Consideration for other threatened, endangered or sensitive species would be evaluated in addition to GRSG when prioritizing restoration projects.
No similar action.	Action: Include GRSG habitat parameters as defined by Connelly et al. (2000), Hagen et al. (2007) or if available, state GRSG conservation plans and appropriate local information in habitat restoration objectives. Make meeting these objectives within PH the highest restoration priority.	Action: Include sage-grouse habitat objectives in habitat restoration projects. Make meeting these objectives within PH and GH the highest restoration priority.	Action: Include GRSG habitat parameters as defined by State of North Dakota Sage-Grouse Conservation plans and appropriate local information in habitat restoration objectives. Make meeting these objectives within PH the highest restoration priority, along with other priority species habitat.
No similar action.	Action: In PH, require use of native seeds for restoration based on availability, adaptation (ecological site potential), and probability of success. Where probability of success or adapted seed availability is low, non-native seeds may be used as long as they support GRSG habitat objectives.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
No similar action.	Action: Design post restoration management to ensure long term persistence in PH. This could include changes in livestock grazing management, travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits GRSG.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.

Table 2-3
Description of Alternatives A, B, C, and D

Alterative A (No Action)[1]	Alternative B	Alternative C	Alternative D (Agency Preferred)
No similar action.	Action: In PH, consider potential changes in climate when proposing restoration seedings when using native plants. Consider collection from the warmer component of the species current range when selecting native species.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
No similar action.	Action: In PH, restore native (or desirable) plants and create landscape patterns which most benefit GRSG.	Action: In PH and GH, exotic seedings would be rehabbed, inter-seeded, restored to recover sagebrush in areas to expand occupied habitats.	Action: In PH, restore native (or desirable) plants and create landscape patterns which most benefit GRSG, as well as other priority species.
No similar action.	Action: Make re-establishment of sagebrush cover and desirable understory plants (relative to ecological site potential) the highest priority for restoration efforts in PH.	Action: Same as Alternative B except applies to both PH and GH.	Action: Make re-establishment of sagebrush cover and desirable understory plants (relative to ecological site potential) a high priority for restoration efforts in PH. Prioritize areas for juniper removal to benefit GRSG habitat.
No similar action.	Action: In PH fire prone areas, where sagebrush seed is required for GRSG habitat restoration, consider establishing seed harvest areas that are managed for seed production and are a priority for protection from outside disturbances.	Action: Same as Alternative B except applies to both PH and GH.	Action: Same as Alternative B.
Areas of Critical Environmental Concern			
Action: Although there are no current ACECs, the direction the NDFO RMP is to make ACEC designations where critical resource values cannot be protected through other management actions (BLM 1988a).	Action: No ACECs would be designated in this alternative.	Action: PH would be designated as a GRSG ACEC to protect habitat (32,900 acres) (**Appendix D**). Management actions for the GRSG ACEC would be the conservation actions/constraints identified in Alternative C above to protect GRSG habitat. See **Figure 2-25**, ACEC Alternative C (**Appendix A**).	Action: No ACECs would be designated in this alternative.

2.11 COMPARISON OF ALLEVIATED THREATS TO GRSG IN NORTH DAKOTA BY ALTERNATIVE

Table 2-4, Summary of Impacts to GRSG in North Dakota, presents a comparison summary of impacts to GRSG from management actions proposed for the four management alternatives. **Section 4.2**, Special Status Species – Greater Sage-Grouse in **Chapter 4** provides a more detailed impact analysis.

Table 2-4
Summary of Impacts to GRSG in North Dakota[1]

Resource/Resource Use	Alternatives A - D
Summary of Impacts to GRSG from Isolated/Small populations	Alternative A does not delineate any PH or GH; however, all action alternatives delineate PH and GH. The action alternatives are in agreement with the following conservation measures identified in the COT report specific to Priority Areas for Conservation (PAC): • Retain GRSG habitats within PACs. • If PACs are lost to catastrophic events, implement appropriate restoration efforts. • Restore and rehabilitate degraded GRSG habitats in PACs.
Summary of Impacts to GRSG from Agriculture/Urbanization	Across all action alternatives, the BLM would take advantage of opportunities to consolidate GRSG habitat. Alternative A technically allows for disposal of lands; however, GRSG habitat would be considered in the analysis. Although agriculture and urbanization have been identified as threats in North Dakota, the BLM has limited management authority over those types of activities. Many of these COT objectives are outside the scope of this planning document; however, see **Chapter 5** for Sage-grouse Initiative (SGI) projects that have been completed on private lands within the GSRG habitat. The action alternatives are in agreement with the following conservation options identified in the COT report specific to ex-urban development: • Acquire and manage GRSG habitat to maintain intact ecosystems. • Do not relinquish BLM-administered lands for the purpose of urban development in GRSG habitat.
Summary of Impacts to GRSG from Oil and Gas Development	Alternative C closes PH and GH habitats to leasing and Alternatives B closes PH to leasing. Since most of the high development potential has already been leased, and due to the small amount of BLM minerals in the planning area, the surface disturbance and well densities do not change significantly among the alternatives (even between the alternatives that have no lease vs. the no-action).

[1] For a full discussion of impacts to GRSG, refer to **Section 4.2** in **Chapter 4**.

Table 2-4
Summary of Impacts to GRSG in North Dakota[1]

Resource/Resource Use	Alternatives A - D
	The action alternatives are in agreement with the following conservation measures identified in the COT report specific to energy development: • Avoid energy development in PACs (Doherty et al. 2010). Identify areas where leasing is not acceptable, or not acceptable without stipulations for surface occupancy that maintains GRSG habitats. • If avoidance is not possible within PACs due to pre-existing valid rights, adjacent development or split estate issues, development should only occur in non-habitat areas, including all appurtenant structures, with an adequate buffer that is sufficient to preclude impacts to GRSG habitat from noise and other human activities. By limiting disturbances within PH (Alternative B, C and D) and GH (Alternative C), the action alternatives would work towards the objective of reducing threats to intact shrubland. Alternative C would have more restrictions on fluid mineral development than Alternatives B and D, and Alternative A would have the fewest restrictions of all alternatives.
Summary of Impacts to GRSG from Mining	Alternatives B and C would be more protective to GRSG and GRSG habitat than Alternatives A and D (Alternative D is the same as B except locatable minerals are not withdrawn due to the very low potential). However, all the action alternatives are in agreement with the following COT conservation options: • Avoid new mining activities and/or any associated facilities within occupied habitat, including seasonal habitats.
Summary of Impacts to GRSG from Infrastructure	Alternatives B, C and D restrict ROWs in PH, which responds to the need (identified in the COT report) to stop population decline and habitat loss by eliminating activities known to negatively impact GRSG and their habitats through reduction in the threat of habitat loss, degradation and fragmentation. The action alternatives are in agreement with the following conservation objectives/options identified in the COT report specific to infrastructure: • Avoid development of infrastructure within PACs (objective). • Avoid construction of these features in GRSG habitat, both within and outside of PACs. • Restrictions limiting use of roads should be enforced.

Table 2-4
Summary of Impacts to GRSG in North Dakota[1]

Resource/Resource Use	Alternatives A - D
	Alternative A, in general, has the least protections for GRSG and GRSG habitat from development of infrastructure. All alternatives limit OHV use to existing roads and trails, but Alternative C also contains a 4-mile buffer from leks for route construction. All action alternatives have limitations on route construction and realignments to minimize impacts to GRSG.
Summary of Impacts to GRSG from Fire Management	The alternatives are in agreement with the following conservation options from the COT report: • Renew and implement IM 2011-138 (Sage-grouse Conservation Related to Wildland Fire and Fuels Management; BLM 2011a) until a decision is made on whether or not to incorporate the measure identified in the IM into RMPs. The measures in this IM are listed in **Appendix B** of this document (B.2.4 Required Design Features for Fire and Fuels).
Summary of Impacts to GRSG from Grazing	GRSG habitat considerations within livestock grazing allotments would be similar across all action alternatives. Range improvements are more restricted under Alternative B than under Alternative A. Under all alternatives, grazing would be managed to achieve the standards of rangeland health. Under Alternative A, this includes a biodiversity standard; however, under the action alternatives, specific GRSG habitat objectives would be developed (in cooperation with NDGFD and USFWS). Under the action alternatives, new range improvements would be approved if they conserve, enhance, or restore GRSG habitat.
Summary of Impacts to GRSG from Vegetation Management	The action alternatives are in agreement with the following conservation objective/conservation measures from the COT report: • Avoid sagebrush removal or manipulation in GRSG breeding or wintering habitats (objective). • Retain all remaining large intact sagebrush patches, particularly at low elevations.
Summary of Impacts to GRSG from Recreation	There are no areas open to off-road travel within the planning area in any alternative. All alternatives are in agreement with the following conservation option from the COT report: • Close important GRSG use areas to off-road vehicle use.

2.12 SUMMARY COMPARISON OF ENVIRONMENTAL CONSEQUENCES

Table 2-5, Summary Comparison of Environmental Consequences, presents a comparison summary of impacts from management actions proposed for the four management alternatives. **Chapter 4** provides a more detailed impact analysis.

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	Alternative B	Alternative C	Alternative D (*Agency Preferred*)
SPECIAL STATUS SPECIES – GREATER SAGE-GROUSE			
See **Table 2-4,** for summary of impacts to GRSG.			
LANDS AND REALTY			
No impacts; decision area would remain open to ROWs.	32,900 acres managed as ROW exclusion area and 80 acres managed as ROW avoidance area would prohibit or restrict new ROW authorizations. Could extend processing time for renewals of existing ROW authorizations and make siting of new linear or block ROWs more difficult.	ROW exclusion impacts same as Alternative B but include 80 additional acres of exclusion (32,980 total acres). In addition, prohibiting new road construction within 4 miles of active leks would limit such construction to 638 acres.	32,900 acres managed as ROW avoidance area would result in increased application processing time and costs due to the potential need to relocate facilities or due to greater design, mitigation, and siting requirements to avoid BLM-administered lands.
VEGETATION (INCLUDING NOXIOUS WEEDS; RIPARIAN AND WETLANDS)			
No ROW exclusion or avoidance areas and few measures to preclude new land use authorizations from degrading vegetative communities due to loss, alteration, and spread of	ROW exclusion areas in PH (32,900 acres) would preclude loss or alteration of vegetation, and spread of invasive weeds in these areas from development. ROW avoidance areas in GH (80	ROW exclusion areas in PH and GH (32,980 acres) would preclude loss or alteration of vegetation, and spread of invasive weeds from development in these areas.	ROW avoidance areas in PH and GH (32,980 acres) (except for managing wind energy as ROW exclusion in PH – 32,900 acres) would reduce, but not eliminate loss or alteration of vegetation,

[1] For a full discussion of impacts for any of the resources, refer to the appropriate section in **Chapter 4**.

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
invasive weeds.	acres) would likely reduce these types of disturbances to vegetation in these areas.		and spread of invasive weeds from development in these areas.
Managing vegetation and sagebrush communities by Rangeland Health Standards, and managing riparian areas for PFC would reduce impacts by livestock, such as trampling and overuse of riparian areas.	Incorporating GRSG habitat objectives and management considerations into livestock grazing management would reduce, but would not eliminate, impacts from grazing on vegetation communities. These efforts would also promote the health of GRSG habitats, including sagebrush steppe, riparian areas, and wet meadows.	Grazing AUMs would be reduced to increase herbaceous cover for GRSG benefit. Livestock use of riparian zones would be limited to maintain PFC and benefit wildlife habitat. The reduction in grazing AUMs could facilitate fuel buildup.	Impacts from grazing would be similar to Alternative B; however, increased management flexibility under this alternative may improve vegetation conditions by targeting those areas that need most protection.
Restrictions on fluid mineral leasing would protect vegetation from surface disturbance in the 9,780 acres where NSO stipulations would be applied and the 21,235 acres where CSU stipulations would be applied. Approximately 816 acres of short-term disturbance and 548 acres of long-term disturbance on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on vegetation.	PH would be closed to fluid mineral leasing, protecting vegetation in these areas from surface disturbance. Approximately 624 acres of short-term disturbance and 476 acres of long-term disturbance on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on vegetation.	PH and GH would be closed to fluid mineral leasing, resulting in impacts similar as under Alternative B. Acres disturbed would be the same as Alternative B. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on vegetation.	Applying NSO stipulations to fluid mineral leasing on PH (61,197 acres) would protect vegetation from surface disturbance. Approximately 767 acres of short-term disturbance and 530 acres of long-term disturbance on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on vegetation.

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
WILDLAND FIRE MANAGEMENT AND ECOLOGY			
No ROW exclusion or avoidance areas and few measures to preclude new land use authorizations could increase fire risk as a result of development from ROW authorizations. Some restrictions on fluid mineral surface occupancy, and seismic exploration, construction, and development near strutting grounds would decrease risk of fire due to less development, fewer vehicles, and less construction equipment, resulting in less of a chance of human ignition.	Management of PH (32,900 acres) as an exclusion area for new ROW authorizations and limitations on fluid mineral exploration and extraction in PH (61,197 acres), would indirectly affect fire management through a greater decreased risk of fire due to less development, fewer vehicles, and less construction equipment, resulting in less of a chance of human ignition.	Impacts from ROWs and fluid minerals would be similar to Alternative B, but would apply to both PH and GH (32,980 acres for ROW and 66,293 acres for fluid minerals).	ROW avoidance areas in PH and GH (32,980 acres) (except for managing wind energy as ROW exclusion in PH) and applying fluid minerals NSO stipulations on PH (61,197 acres) would indirectly affect fire management through a greater decreased risk of fire due to less development, fewer vehicles, and less construction equipment, resulting in less of a chance of human ignition.
Minimal restrictions on fuels management and fire control methods; therefore, fewer impacts on fire management and lower suppression costs.	Restrictions in PH (32,900 acres) such as seasonal closures, no treatments in known winter range, restrictions on the use of fire to treat sagebrush in low precipitation zones, could impact ability to efficiently manage fuels and could increase costs of vegetation management and fire suppression.	Impacts from seasonal closures and restrictions would be similar to Alternative B but would apply to both GH and PH (32,980 acres).	Impacts from seasonal closures and restrictions would be similar to Alternative B; however, fuels management projects in PH (32,900 acres) would be designed to incorporate greater flexibility to maximize the acreage protected.

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	Alternative B	Alternative C	Alternative D (*Agency Preferred*)
FLUID MINERALS			
There would continue to be 73,435 acres (100%) of federal oil and gas mineral estate open to oil and gas leasing. The 46,110 acres with high development potential for oil and gas would remain open to leasing, 9,583 acres (21%) of which would remain subject to an NSO stipulation, 17,427 acres (38%) of which would remain subject to a CSU stipulation, and 29,840 (65%) of which would remain subject to a TL. This represents the fewest restrictions of any alternative.	Open 12,238 acres (17%) of federal oil and gas mineral estate to future oil and gas leasing, an 83% decrease from Alternative A, and 61,197 acres (83%) of federal oil and gas mineral estate would be closed (compared with 0 acres under Alternative A). Of these closed acres, 7,056 (15%) have high potential and are unleased. These unleased high potential acres that would be closed represent approximately 100% of all unleased high potential acres in the decision area. Existing leases in areas closed to leasing would last through their lease term but would not be renewed. As a result of these closures and lease expirations, it would be difficult to access areas of high potential within the decision area. Open 7,194 unleased acres (28% of unleased acres in the decision area) to fluid mineral leasing. This includes 25 unleased acres with high oil and gas development potential and 7,169 unleased	Open 7,142 acres (10%) of federal oil and gas mineral estate to future oil and gas leasing, a 90% decrease from Alternative A, and 66,293 acres (90%) of federal oil and gas mineral estate would be closed (compared with 0 acres under Alternative A). Of these closed acres, 7,072 (15%) have high potential and are unleased. These unleased high potential acres that would be closed represent approximately 100% of all unleased high potential acres in the decision area. Existing leases in areas closed to leasing would last through their lease term but would not be renewed. As a result of these closures and lease expirations, it would be difficult to access areas of high potential within the decision area. Open 3,523 unleased acres (14% of unleased acres in the decision area) to fluid mineral leasing. All of these acres have low or no known oil and gas development potential. These unleased acres	Open 73,435 acres (100%) of federal oil and gas mineral estate to oil and gas leasing. NSO and CSU stipulations restrict future exploration by identifying where surface-disturbing activities may not occur and the manner in which they may be implemented. 61,197 acres (83%) of federal oil and gas mineral estate subject to NSO stipulations. Of these acres, 7,056 (15%) have high potential and are unleased. These unleased high potential acres that would be subject to NSO stipulations represent approximately 100% of all unleased high potential acres in the decision area. Existing leases in areas subject to NSO stipulations would be subject to these stipulations upon renewal. As a result of these stipulations, it would be difficult to access areas of high potential within the decision area. 3,671 unleased acres (14% of unleased acres in the decision

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	Alternative B	Alternative C	Alternative D (*Agency Preferred*)
	acres with low or no known oil and gas potential. These unleased acres would be open with standard stipulations. Because they have low or no known potential, allowing leasing on these acres would have a negligible impact on fluid mineral resources. All existing leases on federal oil and gas estate in PH would be subject to RDFs applied as COAs. These COAs would place additional limits on siting, design, and operations of fluid mineral development.	would be open with no stipulations. Because they have low or no known potential, allowing leasing on these acres would have a negligible impact on fluid mineral resources. All existing leases on federal oil and gas estate in PH would be subject to RDFs applied as COAs. These COAs would place additional limits on siting, design, and operations of fluid mineral development.	area) would be subject to CSU stipulations. This includes 16 unleased acres with high oil and gas development potential and 3,655 unleased acres with low or no known oil and gas potential. Open 3,523 unleased acres with standard stipulations. All of these acres have low or no known oil and gas development potential, meaning this action would have a negligible impact on fluid mineral resources in the decision area.
COAL			
No impacts; entire decision area open to coal.	There are no current coal mines, and no coal development is anticipated within GRSG habitat over the life of the North Dakota RMP. As a result, coal resources in the planning area are not expected to be impacted by management actions proposed in this RMPA. However, potential future development would be precluded in PH (87,443 acres) in Alternatives B and D, and in PH and GH (166,207 acres) in Alternative C.		
LOCATABLE MINERALS			
No impacts; entire decision are open to locatable minerals.	No locatable mineral development is anticipated within GRSG habitat over the life of the North Dakota RMP. As a result, locatable minerals in the planning area are not expected to be impacted by management actions proposed in this RMPA. However, potential future development would be precluded in PH (46,397 acres) in Alternative B, and PH and GH (49,970 acres) in Alternative C.		

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
MINERAL MATERIALS			
No closures in decision area (0 acres closed to the disposition of salable minerals), resulting in the fewest restrictions on the disposition of mineral materials.	The amount of land closed to the disposition of salable minerals would increase to 46,397 acres, resulting in more restrictions on the disposition of mineral materials.	Impacts would be similar to Alternative B, except 49,970 acres closed to the disposition of salable minerals.	Impacts would be the same as Alternative B.
COMPREHENSIVE TRAVEL AND TRANSPORTATION MANAGEMENT			
Motorized wheeled travel would continue to be limited to existing routes, cross-country travel would continue to be prohibited, and there would be no acres where new route construction would be prohibited.	In PH (32,900 acres) new roads would only be allowed where access to valid existing rights is necessary and does not currently exist; therefore, restricting new roads and/or ROWs and access in these areas.	Impacts would be similar to Alternative B. Additionally, no new road construction would be allowed within 4 miles of active GRSG leks. The 4-mile lek buffers cover 32,342 acres (98% of the decision area); meaning new road construction would be limited to 638 acres in the decision area. This would preclude the construction of new roads where they might otherwise be needed to improve access or the functionality of the route network.	Impacts would be similar to Alternative B.
RECREATION			
BLM would continue to manage for dispersed recreation activities, particularly big game hunting.	Only allowing SRPs that have a neutral or beneficial effect on PH could limit future opportunities for SRPs in PH (32,900 acres).	Impacts would be similar to Alternative B, but would apply to both PH and GH (32,980 acres).	Impacts would be similar to Alternative C.

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	Alternative B	Alternative C	Alternative D (*Agency Preferred*)
Motorized and non-motorized road and trail based recreation opportunities, and the overall recreation experience would be maintained into the foreseeable future.	Permanent or seasonal closure of travel routes, and limitations on new road development could impact recreation by limiting motorized travel on routes used for access to hunting, fishing, and other popular recreation activities.	Prohibition of new road construction would limit motorized recreational use to the existing network of roads and trails. There would be no opportunity to accommodate any increase in recreational use or mitigate user conflicts by adding additional routes.	Impacts would be similar to Alternative B.
Potential impacts on recreation during construction and operation of facilities in ROWs. Impacts on recreation users from oil and gas development would include activities and disturbance related to exploration, development, and operations, but would likely decline as the trend for new developments continues to decline.	A long-term reduction in the amount of acres in PH (32,900 acres) dedicated to ROWs through exclusion areas and above-ground linear features, such as transmission lines and pipelines, would improve recreation opportunities. Closure of PH (61,197 acres) to fluid mineral development would eliminate the potential for new oil and gas development conflicting with recreation users.	Impacts from ROW development would be similar to Alternative B, but would apply to both PH and GH (32,980 acres). Impacts from fluid mineral development would be similar to Alternative B, but would apply to both PH and GH (66,293 acres).	ROW avoidance areas in PH and GH (32,980 acres) (except for managing wind energy as ROW exclusion in PH – 32,900 acres) would reduce, but not eliminate development conflicting with recreation users. NSO and CSU stipulations on fluid mineral development may minimize potential impacts on recreation by reducing disturbance related to these activities.
RANGE MANAGEMENT			
Disturbance to livestock including dust, displacement, and noxious weeds, could result from development of ROWs.	Management of PH as ROW exclusion area (32,900 acres) could slightly reduce the potential for disturbance of livestock, which covers the majority of the allotments in the planning area	Impacts from grazing would be similar to Alternative B but would be applied across PH and GH (32,980 acres). Due to restrictions on ROW development and reduction of	PH managed as a ROW avoidance area (32,900 acres) and additionally, as an exclusion area for new wind energy ROW authorizations would minimize surface disturbing and activities

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
	(and 26 out of 27 allotments in GRSG habitat).	grazing in PH, disruption of grazing from lands and realty actions would be limited.	disruptive to grazing.
Limited reasonably foreseeable development of oil and gas would result in minimal impacts on range management. 0 acres open to grazing and closed to fluid mineral development (BLM surface and federal minerals). Potential conflict could occur with fluid mineral development.	Limited reasonably foreseeable development of oil and gas would result in minimal impacts on range management. 30,370 acres open to grazing and closed to fluid mineral development (BLM surface and federal minerals). Potential for disturbance or conflicts with livestock grazing from fluid mineral development reduced.	Limited reasonably foreseeable development of oil and gas would result in minimal impacts on range management. 30,450 acres open to grazing and closed to fluid mineral development (BLM surface and federal minerals). Potential for disturbance or conflicts with livestock grazing from fluid mineral development reduced.	Limited reasonably foreseeable development of oil and gas would result in minimal impacts on range management. 30,370 acres open to grazing and NSO for fluid mineral development (BLM surface and federal minerals). Potential for disturbance or conflicts with livestock grazing from fluid mineral development reduced.
Changes to grazing management would occur for areas not meeting land health standards (approximately 1,309 acres as of last assessment).	Management actions to modify grazing management to meet seasonal GRSG habitat requirements could result in increased time and costs to be permitted or impact ability to fully utilize permitted AUMs. Structural range improvements in PH would be permitted, but costs and time to construct these structures may be increased due to requirements to make structures conserve or enhance GRSG habitat.	Permitted level of AUMs in PH would be reduced by 50% in the Big Gumbo area resulting in a total of 3,739 permitted AUMS in the planning area. The reduction of permitted grazing level has the potential to result in economic impacts on permittees. The reduction may also impact ability of permittees current seasonal rotations or other management strategies that utilize both public and private lands.	Impacts from grazing management would be similar to Alternative B; however, GSRG habitat requirements developed for North Dakota would be implemented.

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
Vegetation could be managed to improve forage and impacts on range management from vegetation management would be minimal.	Implementation of projects to remove non-native species and improve habitat in PH could improve livestock forage but may also result in the need to adjust grazing management with potential for increased costs or time for permittees.	Impacts from vegetation management would be similar to Alternative B, but would apply to PH and GH. However, overall impacts would be reduced due to the reduction in grazing.	Similar to Alternative B, changes to livestock grazing systems could be required for post restoration management with potential impacts on costs or time for management by permittees. Projects to reduce conifer encroachment would also benefit range management by improving forage conditions in the long term.
AREAS OF CRITICAL ENVIRONMENTAL CONCERN			
No impacts; no ACEC would be designated.	Same as Alternative A.	The BLM would establish a 32,900-acre ACEC to protect GRSG habitat. Management within the new ACEC would be equivalent to the management actions proposed under Alternative B, but with the reduction in grazing and road closures within 4 miles of a lek.	Same as Alternative A.
AIR RESOURCES			
No changes to criteria air pollutant or hazardous air pollutant emissions would occur.	57% decrease in projected new producing wells on federal oil and gas estate would have the potential to result in fewer impacts due to decreased emissions associated with exploration and development of fluid minerals.	Impacts would be similar as under Alternative B, with slightly fewer new wells projected.	14% decrease in projected new producing wells on federal oil and gas estate would have the potential to result in fewer impacts due to decreased emissions associated with exploration and development of fluid minerals.

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
CLIMATE			
No changes to greenhouse gas (GHG) emissions would occur.	57% decrease in projected new producing wells on federal oil and gas estate would have the potential to result in fewer impacts due to decreased GHG emissions associated with exploration and development of fluid minerals.	Impacts would similar as under Alternative B, with slightly fewer new wells projected	14% decrease in projected new producing wells on federal oil and gas estate would have the potential to result in fewer impacts due to decreased GHG emissions associated with exploration and development of fluid minerals.
SOIL RESOURCES			
Motorized use of existing roads and trails would result in the potential for disturbance and compaction of soils.	Some reduction in routes and limitations on new routes as well as upgrades to existing routes could result in the potential for reduction of disturbance and compaction of soils in PH (32,900 acres).	Impacts on soil resources would be similar to Alternative B, although impacts would be further reduced since protections would apply to both PH and GH (32,980 acres), and the BLM would apply additional mitigation requirements.	Impacts would be similar to Alternative B, though increased management flexibility under this alternative may improve soil resources by targeting those areas that need most protection.
Soil conditions could continue to be degraded where land use authorizations were approved.	Managing 32,900 acres as ROW exclusion and 80 acres as ROW avoidance areas would reduce impacts to soil resources from surface disturbing activities related to ROW development.	Managing 32,980 acres as ROW exclusion and 0 acres as ROW avoidance areas would reduce impacts to soil resources from surface disturbing activities related to ROW development.	Managing 0 acres as ROW exclusion (except wind energy exclusion areas in PH) and 32,980 acres as ROW avoidance areas would reduce impacts to soil resources from surface disturbing activities related to ROW development.
Restrictions on fluid mineral leasing would protect soil resources from surface	PH (61,197acres) would be closed to fluid mineral leasing, protecting soil resources in these	Impacts from closing fluid minerals would be similar to Alternative B, but would apply to	Applying NSO stipulations on PH (61,197 acres) would protect soil resources from surface

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	Alternative B	Alternative C	Alternative D (*Agency Preferred*)
disturbance in the 9,780 acres where NSO stipulations would be applied and the 21,235 acres where CSU stipulations would be applied. Approximately 816 acres of short-term disturbance and 548 acres of long-term disturbance on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on soils.	areas from surface disturbance and compaction. Approximately 624 acres of short-term disturbance and 476 acres of long-term disturbance on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on soils.	both PH and GH (66,293 acres). Approximately 621 acres of short-term disturbance and 475 acres of long-term disturbance on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on soils.	disturbance and compaction. Approximately 767 acres of short-term disturbance and 530 acres of long-term disturbance on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on soils.
WATER RESOURCES			
Erosion into waterways could occur as a result of grazing; however, implementing and meeting the Standards for Rangeland Health and Guidelines would minimize these impacts.	Incorporating GRSG habitat objectives and management considerations into livestock grazing management could reduce, but would not eliminate, impacts from grazing on water resources. Impacts would be similar to Alternative A.	Reduced grazing AUMs could increase the potential for cleaner surface flows into waterways and improve access to water sources.	Impacts would be similar to Alternative B.
Restrictions on fluid mineral leasing would protect water resources from potential erosion and contamination in the 9,780 acres where NSO stipulations would be applied and the 21,235 acres where CSU stipulations	PH (32,900 acres) would be closed to fluid mineral leasing, protecting water resources in these areas from potential erosion and contamination. Approximately 624 acres of short-term disturbance and 476	Impacts from closing fluid minerals would be similar to Alternative B, but would apply to both PH and GH (32,980 acres). Approximately 621 acres of short-term disturbance and 475 acres of long-term disturbance	Applying NSO stipulations on PH (61,197 acres) would protect water resources from potential erosion and contamination. Approximately 767 acres of short-term disturbance and 530 acres of long-term disturbance

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
would be applied. Approximately 816 acres of short-term disturbance and 548 acres of long-term disturbance on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on water resources.	acres of long-term disturbance on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on water resources.	on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on water resources.	on BLM-administered lands. However, limited reasonably foreseeable development of oil and gas would result in minimal impacts on water resources.
SPECIAL STATUS SPECIES – OTHER SPECIES OF ISSUE			
No ROW exclusion or avoidance areas and few measures to preclude new land use authorizations from impacting species and habitat related to human disturbance and infrastructure.	ROW exclusion areas in PH (32,900 acres) would preclude future impacts from human disturbance and infrastructure in these areas from development. ROW avoidance areas in GH (80 acres) would likely reduce these types of impacts in these areas.	ROW exclusion areas in PH and GH (32,980 acres) would preclude future impacts from human disturbance and infrastructure in these areas.	ROW avoidance areas in PH and GH (32,980 acres) (except for managing wind energy as ROW exclusion in PH) would reduce future impacts from human disturbance and infrastructure from development in these areas.
Managing vegetation and sagebrush communities by Rangeland Health Standards, and managing riparian areas for PFC would reduce special status species habitat alteration by livestock.	Incorporating GRSG habitat objectives and management considerations into livestock grazing management would reduce, but would not eliminate, impacts from grazing on vegetation communities. These efforts would also promote the health of potential habitats, including sagebrush steppe, riparian areas, and wet meadows.	Grazing AUMs would be reduced to increase herbaceous cover for GRSG benefit. Livestock use of riparian zones would be limited to maintain PFC and benefit special status species habitat. The reduction in grazing AUMs could reduce rangeland health by facilitating fuel buildup.	Impacts from grazing would be similar to Alternative B, though increased management flexibility under this alternative may improve habitat conditions by targeting those areas that need most protection.

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
Impacts could continue to occur on 73,435 acres where BLM-administered surface lands and split -estate would be open to fluid mineral leasing. Of these, 19,569 acres of Sprague's pipit distribution would be open to fluid mineral leasing. Impacts would be reduced on BLM-administered and split estate lands where NSO (9,780 acres), CSU (21,235 acres), or TL (38,504 acres) constraints would be applied. NSO and/or CSU would be applied on 31,014 acres of Sprague's pipit distribution.	61,197 acres of BLM-administered and split-estate lands would be closed to fluid mineral leasing and conservation measures would be applied on leased fluid mineral estate and split-estate lands. These actions would reduce the likelihood and extent of impacts on the distribution of Sprague's pipit caused by fluid mineral development.	66,293 acres, all of which would be Sprague's pipit distribution, would be closed to fluid mineral leasing and conservation measures would be applied on leased fluid mineral estate and split estate lands. These actions would reduce the likelihood and extent of impacts caused by fluid mineral development.	No lands would be closed to fluid mineral leasing, but 61,197 acres, all of which is Sprague's pipit distribution, would be open to leasing, subject to an NSO stipulation. The BLM would apply CSU and TL stipulations on the same GH areas as Alternative A. In addition, a number of operational constraints would be applied to existing leases as COAs in PH, which would reduce impacts on other special status species in these areas.
Fire and fuels management would not specifically protect sagebrush vegetation, although prescribed burning may be used where appropriate in support of resource management objectives, including improving special status species habitat condition.	Proposed modifications to fire and fuel management in PH (32,900 acres) would result in an increase in the protection of sagebrush vegetation and would thereby protect habitat for species that rely on this habitat.	Impacts from proposed modifications to fire and fuel management would be similar to Alternative B but would occur over a larger area, both PH and GH (32,980 acres).	Impacts from proposed modifications to fire and fuel management would be similar to Alternative B; however, fuels management projects in PH would be designed to incorporate greater flexibility to maximize the acreage protected.
Application of Integrated Vegetation Management Handbook policies would improve vegetation management in sagebrush habitat, thereby likely improving habitat	Requiring the use of native seeds, designing post-restoration management to ensure the long-term persistence of the restoration efforts, considering changes in climate, and	Impacts from habitat restoration and vegetation management would be similar to Alternative B but would occur over a larger area, both PH and GH.	Impacts from habitat restoration and vegetation management would be similar to Alternative B; however, consideration of other threatened, endangered, or sensitive species may change the

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	Alternative B	Alternative C	Alternative D (*Agency Preferred*)
conditions in these areas.	monitoring and controlling invasive species would habitat conditions in these areas.		proportions of vegetation communities and habitat that would be protected in certain instances.
RENEWABLE ENERGY			
0 acres of lands with "Good" or better wind potential would be affected by ROW exclusion or avoidance areas. All lands with such potential would continue to be open for ROW applications on a case-by-case basis, and there would continue to be no restrictions from ROW allocations on wind energy development.	32,900 acres would be managed as ROW exclusion, and 80 acres would be managed as ROW avoidance, including 3,606 acres considered to have "Good" or better wind potential. As a result, 97%of lands with "Good" or better wind potential that are open for ROW applications under Alternative A would become exclusion or avoidance areas under Alternative B, likely precluding wind energy development on BLM-administered lands.	32,980 acres would be managed as ROW exclusion areas and would not be open for ROW applications (no areas would be managed as ROW avoidance). Within this ROW exclusion area, 3,686 of these acres are considered to have "Good" or better wind potential. As a result, 99%of lands with "Good" or better wind potential that are open for ROW applications under Alternative A would become exclusion areas under Alternative C, likely precluding wind energy development on BLM-administered lands.	Impacts would be the same as Alternative B.
SOCIAL AND ECONOMIC CONDITIONS			
Existing contributions from oil and gas development on federal mineral estate in the decision area would continue. Effects from levels of production and anticipated levels of exploration and development would support	Existing development would enable current contributions to continue from oil and gas development on federal mineral estate in the decision area. However, future development within PH found on unleased	Existing development would enable current contributions to continue from oil and gas development on federal mineral estate in the decision area. Future development of unleased federal mineral estate would be	Existing development would enable current contributions to continue from oil and gas development on federal mineral estate in the decision area. However, NSO stipulations within PH would apply to future

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
approximately 116 jobs and $4 million in labor income. Use of allocated forage on allotments in the planning area would continue to generate an estimated 10 jobs (direct, indirect, and induced) and $113,000 in labor income (direct, indirect, and induced) on an average annual basis within the three-county impact area economy (Bowman, Golden Valley, and Slope Counties). This figure includes direct contributions of seven jobs, which would comprise about 5.6% of employment in this agricultural economic sector for the area.	federal mineral estate with high potential would not occur since all federal mineral estate within PH would be closed to fluid mineral leasing. Effects from levels of production and anticipated levels of exploration and development would support approximately 114 jobs and $4 million in labor income. Impacts from grazing would be the same as under Alternative A.	restricted on PH as described in Alterative B. Restrictions would also be applied to GH; therefore, limitations on future development would be similar to those described in Alternatives B, but increased in intensity. Effects from levels of production and anticipated levels of exploration and development would support approximately 114 jobs and $4 million in labor income. Reducing AUMs by 50% on all allotments within the Big Gumbo area would decrease employment from 10 to 6 total jobs (direct, indirect, and induced), and decrease labor income from $113,000 to $73,000 (direct, indirect, and induced) on an average annual basis within the impact area economy. This estimate includes a direct employment decrease from seven jobs to four jobs, which would correspond to a decrease from 5.6 to 3.4% of employment in this sector.	leases and would preclude economic benefits from future development. Effects from levels of production and anticipated levels of exploration and development would support approximately 115 jobs and $4 million in labor income. Impacts from grazing would be the same as under Alternative A.

Table 2-5
Summary Comparison of Environmental Consequences[1]

Alternative A *(No Action)*	**Alternative B**	**Alternative C**	**Alternative D** (*Agency Preferred*)
ENVIRONMENTAL JUSTICE			
While minority and low-income populations exist in the area, the alternatives are not expected to have a disproportionately high and adverse human health or environmental effects on these communities. Impacts on local communities are expected to be negligible, and there is no reason to suspect that any impacts would disproportionately affect minority and low income populations.			

This page intentionally left blank.

Chapter 3
Affected Environment

CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter succinctly documents the existing conditions and trends of resources in the planning area that may be affected by implementing any of the proposed alternatives described in **Chapter 2**, Proposed Action and Alternatives. The affected environment chapter provides the context for assessing potential impacts as described in **Chapter 4**, Environmental Consequences.

The planning area for the North Dakota Greater Sage-Grouse RMPA/EIS is composed of BLM, Forest Service, State of North Dakota, USFWS, and private lands (refer to **Table 1-1**) in Bowmen, Slope, and Golden Valley Counties in southwestern North Dakota. A map of the planning area is provided as **Figure 1-1** in **Appendix A**.

Though the planning area includes private lands, decisions are only made for BLM federal surface and federal minerals in this amendment. Management direction and actions outlined in this EIS apply only to these BLM-administered lands in the planning area and to federal mineral estate under BLM jurisdiction that may lie beneath other surface ownership.

3.2 ORGANIZATION OF CHAPTER 3

This chapter contains sections describing the biological, physical, and human resources of the planning area affected by implementing the alternatives outlined in this EIS. Implementation of any of the action alternatives would result in general and unquantifiable indirect beneficial effects for the following resource programs in terms of greater protection through new restrictions on surface and resource use resulting in reduced opportunities for surface disturbance or habitat disruption where they exist:

- Fish and Wildlife (other than Special Status Species)

- Visual Resources
- Cultural Resources
- Paleontological Resources

For further information on the affected environment of these resources and programs, please refer to the Affected Environment sections of the North Dakota RMP being amended by this North Dakota Greater Sage-Grouse RMPA/EIS.

The following critical elements of the human environment and resources are specifically addressed in **Chapter 3** and **Chapter 4** of the North Dakota Greater Sage-Grouse RMPA/EIS.

- Special Status Species – Greater Sage-Grouse
- Lands and Realty
- Vegetation (Including Noxious Weeds; Riparian and Wetlands)
- Wildland Fire Management and Ecology
- Fluid Minerals
- Coal
- Locatable Minerals
- Mineral Materials
- Comprehensive Travel and Transportation Management
- Recreation
- Range Management
- Areas of Critical Environmental Concern
- Air Resources
- Climate
- Soil Resources
- Water Resources
- Special Status Species – Other Species of Issue
- Renewable Energy
- Social and Economic Conditions
- Environmental Justice

Each of the above resource sections in this chapter contains a discussion existing conditions and trends:

- Existing conditions describe the location, extent, and current condition of the resource in the planning area in general and on BLM-administered lands. Conditions for a resource can vary, depending on the resource. For each resource, a general description of the existing conditions is provided for the planning area, regardless of land status. This is done to provide a regional context for the resource. Then, a more detailed description of the existing conditions is provided for the BLM-administered lands managed according to the North Dakota RMP. This is done to provide an area-specific description of the existing conditions for the resource. When possible, greater emphasis is placed on describing the existing conditions of the resource as it pertains to GRSG and their habitat.
- Trends identify the degree and direction of resource change between the present and some point in the past. If there is change, the degree and direction of resource change is characterized as moving toward or away from the current desired condition and the reasons for the change are identified. Trends can be described in quantitative or qualitative terms. Identifying the trends is done to provide an understanding of how BLM management influences the desired condition of the resource over time. It can be difficult to analyze trends for certain resources, because changes to the resource often occur due to factors beyond the control of the BLM.

The BLM reviewed the North Dakota RMP and other relevant information sources (such as maps and state GRSG conservation assessments) for existing conditions and trends for the resources listed above with respect to GRSG and their habitat. This affected environment information is summarized below and, where appropriate, noted when the information is incorporated by reference.

Data from GIS have been used in developing acreage calculations and for generating many of the figures. Calculations in this EIS are rounded and are dependent upon the quality and availability of data. Data were collected from a variety of sources, including the BLM, collaborative partners, stakeholders, and cooperating agencies. Given the scale of the analysis, the compatibility constraints between datasets, and lack of data for some resources, all calculations are approximate and serve for comparison and analytic purposes only. Likewise, the figures are provided for illustrative purposes and subject to the limitations discussed above. The BLM may receive additional GIS data; therefore, the acreages may be recalculated and revised at a later date.

3.2.1 WAFWA Management Zone Data

To augment this planning document at a biologically meaningful scale for GRSG, a Baseline Environmental Report of GRSG was produced by USGS for BLM (Manier et al. 2013). The BER is a science support document that provides information to put planning units and issues into the context of the larger

WAFWA Sage-Grouse Management Zones. The BER examines each threat identified in the USFWS's listing decision published on March 15, 2010. For each threat, the report summarizes the current, scientific understanding of various impacts to GRSG populations and habitats. When available, patterns, thresholds, indicators, metrics, and measured responses that quantify the impacts of each specific threat are reported.

As described in **Chapter 1**, the planning area for the North Dakota Greater Sage-Grouse RMPA/EIS is located in WAFWA MZ I (Stiver et al. 2006). Data from the BER are presented throughout this chapter to illuminate the location (e.g., PPH and PGH), magnitude, and extent of the threats within WAFWA MZ I that comprises the planning area. Because the BER focuses on threats to GRSG at the WAFWA management zone scale, it provides biologically meaningful data for larger scale analyses. The BER data provided in **Chapter 3** is considered in the WAFWA MZ I cumulative effects analysis for GRSG in **Chapter 5**.

The data and information included from the BER is the most accurate data available from when the data was "frozen" in time for analysis purposes; however, these scenarios remain based in present knowledge. Spatial data informing the existing conditions were compiled to establish a consistent information basis across the entire region (GRSG Management Area), but in order to attain this consistently across state, ownership, and management boundaries some local data have been omitted; therefore, there may be inconsistencies between WAFWA-level and local planning-level data. As such, these data provide a regional baseline, suitable for guiding regional mid- to long-term analysis scenarios (Manier et al. 2013).

Chapter 3 also presents data that is available at a finer scale than used in the BER's large-scale, WAFWA management zone focus. These fine-scale, local data are incorporated into the affected environment discussion to complement the BER's data, characterize the relative contributions of threats in the planning area versus the WAFWA management zones, and to set the stage for the cumulative effects analysis for GRSG.

3.3 SPECIAL STATUS SPECIES – GREATER SAGE-GROUSE

The BLM special status species are: (1) species listed or proposed for listing under the ESA, and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as BLM sensitive by the state director(s). All federal candidate species, proposed species, and delisted species in the five years following delisting will be managed as BLM sensitive species.

The BLM's policy for special status species is to: 1) conserve and/or recover T&E species and the ecosystems on which they depend so that ESA protections are no longer needed, and 2), to initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA. The BLM 6840

Manual, Special Status Species Management (BLM 2008b), sets policy for the management of candidate species and their habitat. Candidate species are considered Bureau sensitive species. The 6840 manual directs BLM to undertake conservation actions for such species before listing is warranted and also to "work cooperatively with other agencies, organizations, governments, and interested parties for the conservation of sensitive species and their habitats to meet agreed on species and habitat management goals."

The BLM 6840 Policy requires that when the BLM engages in the planning process, land use plans, and implementation plans, that strategies, restrictions and management actions necessary to conserve and/or recover listed species, as well as provisions for the conservation of Bureau sensitive species are identified. The BLM 6840 policy also requires managers to determine to the extent practicable, the distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and evaluate the significance of actions in conserving those species.

Historically, GRSG occurred in parts of 12 states within the western United States and three Canadian provinces; populations have declined throughout much of their former range and have been extirpated from fringe areas. Across their range, GRSG currently occupy 56 percent of their potential pre-settlement range, approximately 297 million acres (Schroeder et al. 2004). Current distributions of fringe populations, including North Dakota, are fragmented and increasingly disjunct from core regions of the distribution in the Great Basin and Colorado Plateau.

In response to petitions, USFWS first evaluated GRSG for listing in 2005 and determined listing was not warranted. In response to a 2007 court order, the agency again considered the GRSG and in 2010, USFWS concluded that that GRSG listing under the ESA was warranted range-wide but precluded by higher priority species (USFWS 2010).

In 2009, the BLM published management guidance for GRSG, Guidance for Greater Sage-Grouse Management and Conservation in Resource Management Plan Revisions in Management Zones 1 and 2 Within the Montana/Dakotas BLM (IM MT-2010-017). This IM provided interim guidance for conserving GRSG on BLM-administered lands in these management zones during preparation of GRSG RMPAs.

The Conservation Objectives Team, a USFWS team of federal and state wildlife officials, was tasked with developing conservation objectives by defining the degree to which the threats need to be ameliorated to conserve the GRSG, so that it no longer is warranted for listing under the ESA. The COT report (USFWS 2013) was developed by this team. The report discusses GRSG populations and sub-populations within each WAFWA management zone and describes the threats facing each population. This report was used to focus the analysis in **Chapter 4** on the threats most likely to impact GRSG in North

Dakota. According to the COT report, the known threats to GRSG in North Dakota that are present and widespread include isolation/small size, energy, and infrastructure (fire and mining are also listed as widespread; however, this is because the population also includes South Dakota where these threats are more likely to occur). Threats that are present but localized include elimination of sagebrush, agricultural conversion, weeds/annual grasses, and grazing (USFWS 2013).

The BER was produced by the USGS in cooperation with BLM, to summarize the science, activities, programs and policies influencing conservation of GRSG across their range (Manier et al. 2013). It summarizes the available primary literature on each of the threats and their impact on GRSG and provides tables of the overlap of threats, such as oil and gas leases with PPH and PGH. North Dakota is evaluated as part of WAFWA MZ I. This management zone consists of four GRSG populations as identified by Garton et al. (2011), including the Dakotas, Northern Montana, Powder River Basin, and Yellowstone Watershed populations. PPH areas for North Dakota can be seen in **Figure 3-1**, North Dakota Preliminary Sage-Grouse Habitat, in **Appendix A**.

The NTT was established by BLM to coordinate effective management actions based on best available science for GRSG conservation and restoration. *A Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) includes a discussion of threats and recommended BLM management actions for each.

3.3.1 Conditions of the Planning Area

GRSG numbers are small and the population is considered to be at high risk in North Dakota. The population is characterized by low recruitment during brood rearing, due to predation and disease (Kazcor 2008; Swanson 2009). Declines in the planning area are most likely due to cumulative effects of influences including, but not limited to, oil and gas development, conversion of native rangeland to cropland, and over-grazing in localized areas (USFWS 2013, pg. 63).

Privately-owned lands make up 66 percent of sagebrush, with BLM-administered land making up 17 percent (Knick 2011). Sagebrush cover is naturally limited in this region due to the preponderance of grassland ecosystems, and, with agricultural pressure and energy production, results in substantial habitat limitations for GRSG populations.

Availability of Sagebrush Habitat (Broad- and Mid-Scale Indicator)

The distribution of GRSG is closely aligned with the distribution of sagebrush-dominated landscapes (Schroeder et al. 2004). GRSG require large, intact and connected expanses of sagebrush shrubland to exist (Aldridge et al. 2008; Wisdom et al. 2011).

IM No. 2012-044 (BLM 2011b) directs the BLM to collaborate with state wildlife agencies to identify and map two categories of GRSG habitat:

- PPH: Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations. These areas would include breeding, late brood-rearing, and winter concentration areas; and
- PGH: Areas of occupied seasonal or year-round habitat outside of priority habitat.

For North Dakota, the BLM and NDGFD worked together to map GRSG habitat, completed in May 2012. PPH and PGH were delineated as follows:

Preliminary Priority Habitat
GRSG leks were buffered by 5.3 miles to map PPH. A 4-mile buffer would include approximately 80 percent of nesting GRSG hens; therefore, the 5.3 mile buffer captured 100 percent of the collared nesting hens, and consequently, almost all the habitat (a small amount of habitat was left on the southeast corner, but no leks nearby) (Herman-Brunson 2007). Buffering leks produced "bubbles" of PPH, and these boundaries were "softened" to form the northern and eastern edge of PPH. The western and southern boundaries are the states of Montana and South Dakota, respectively.

Preliminary General Habitat
The PGH for North Dakota is what remained for habitat on the eastern portion of the bird's range; this is the historic range for GRSG. There are no GRSG leks in the PGH area, but birds occasionally use it. There is very little BLM surface ownership in PGH (80 acres); however, there are federal subsurface minerals.

Acres of PPH and PGH within the planning area are presented in **Table 3-1**, Preliminary Priority Habitat and Preliminary General Habitat Occurring on BLM-Administered Lands and non-BLM Lands in the Planning Area. Specific information on roads, mineral leasing, and other infrastructure in GRSG habitat are included in the topic sections of **Chapter 3**.

Table 3-1
Preliminary Priority Habitat and Preliminary General Habitat Occurring on BLM-Administered Lands and non-BLM Lands in the Planning Area

Lands	PPH (acres)	PGH (acres)	Outside GRSG Habitat (acres)
BLM-administered lands	32,900	80	50
Non-BLM-administered lands	428,170	242,221	259,596
Total Planning Area	**461,070**	**242,301**	**259,646**

Source: BLM 2012a

GRSG occur primarily in the southwestern area of the planning region where shrubland, steppe, and savanna systems are present. This area has been designated as PPH because it has been identified as having the highest conservation value to maintaining sustainable GRSG populations in North Dakota. GRSG also occur in a halo around the PPH, in the regions that are characterized by grassland systems and human use, and designated as PGH. Within the planning area, there were 12 active leks in 2012 (NDGFD 2012a); leks are key spring activity areas for mating and nesting and are most often located in open areas surrounded by sagebrush cover.

The Dakotas' population of GRSG occurs on the far eastern edge of the species' range, consisting of approximately 800 square miles in North Dakota (Herman-Brunson 2007). See **Figure 3-2**, Greater Sage-Grouse Distribution and Preliminary Priority Habitat, in **Appendix A**. Though contiguous with populations in Montana, this population is small and considered to be at high risk. The minimum male count for this population was reported at 587 and the study estimated a 66 percent chance that this population would dip below 200 males in the next 100 years (Garton et al. 2011). Population counts in 2012 for North and South Dakota were approximately 300 males. The Dakotas' territory is heavily influenced by oil and gas development and conversion of native rangeland to cropland. Over-grazing in localized areas has reduced herbaceous understory cover, which can reduce nesting success (USFWS 2013, pg. 46).

Connectivity of Habitat Patches (Mid-Scale Indicator)

While the amount of habitat available to GRSG is very important, habitat pattern is just as critical to long-term survival of the species. Fragmentation of habitat into smaller patches can result in extirpation of local GRSG populations when functional connectivity among patches is lost. Leks separated by distances greater than 11 miles could be isolated due to decreased probability of dispersals from neighboring leks. Isolation and reduced connectivity increases the probability of loss of genetic diversity and extirpation from random events (Knick and Hanser 2011).

There is little information available regarding minimum sagebrush patch sizes required to support populations of GRSG. This is due in part to the migratory nature of some but not all GRSG populations, the lack of juxtaposition of seasonal habitats, and differences in local, regional, and range-wide ecological conditions that influence the distribution of sagebrush and associated understories. Where home ranges have been reported, they are extremely variable (1.5 to 238 square miles) (Connelly et al. 2011a).

GRSG populations may be nonmigratory or migratory, moving between or among seasonal use areas (Connelly et al. 2011a). GRSG in North Dakota are generally nonmigratory, though current research has found some localized movements west into Montana (Swanson 2009). The Dakotas' population occurs on the far eastern edge of GRSG range and is considered small and at

high risk (USFWS 2013, pg. 46). GRSG are thought to move east and west between the Dakotas and Montana, with Montana providing seasonal habitat for birds from North Dakota, a likely conduit for genetic connectivity with the Montana and Dakotas populations (USFWS 2013, pg. 46).

Landscape Matrix and Edge Effect (Mid-Scale Indicator)

GRSG typically occupy sagebrush vegetation but may also use a variety of other habitats (e.g., riparian meadows, agricultural lands) intermixed in a sagebrush-dominated landscape. Aldridge and Boyce (2007) found GRSG selected large expanses of sagebrush and avoided anthropogenic edges during the breeding season. Thus, the viability of fragmented habitat for GRSG is dependent upon the juxtaposition of these habitats in relation to sagebrush and the hazards to birds using these areas (Connelly et al. 2011b). Edge effects are significant elements of the threat posed by infrastructure and energy development to GRSG populations.

Anthropogenic Disturbances (Broad- and Mid-Scale Indicator)

Comparing environmental conditions and levels of human disturbance on areas of former range (extirpated range) with areas still occupied by GRSG (occupied range), Wisdom et al. (2011) identified five key factors most likely to lead to extirpation of local populations: sagebrush area, elevation, distance to transmission lines, distance to cellular towers, and land ownership. Land ownership was a surrogate for conversion of private lands to non-sagebrush land uses that have reduced habitat availability and fragmented remaining sagebrush habitat nearby. In North Dakota, conversion of sagebrush to croplands has been an important threat to GRSG populations (USFWS 2013, pg. 63). Lek abandonment was most likely to occur in areas with over 25 percent cultivated cropland within 18 miles of the lek (Aldridge et al. 2008).

As discussed below in **Section 3.4**, Lands and Realty, approximately 500 miles of transmission lines are present in PPH on BLM-administered and National Forest System land in the planning area, and approximately 9,800 miles on private and state lands in the planning area. Transmission lines, in addition to reducing habitat suitability and increasing fragmentation (Ellis 1985), can cause GRSG mortality through bird collisions with lines (Beck et al. 2006) and facilitate raptor predation of GRSG. Transmission structures and communication towers may also provide nesting sites for corvids and raptors in habitats with low vegetation and relatively flat terrain (Ellis 1984; Steenhof et al. 1993; Johnson et al. 2011). Lek count trends tend to be lower on leks within three miles of interstate highways (trend lines are lower compared to trend lines for leks located greater than three miles) (Johnson et al. 2011) but no apparent relationship has been found between lek count trends and the presence of secondary roads (Aldridge et al. 2008).

As discussed below in **Section 3.7**, Fluid Minerals, approximately 26,000 acres of oil and gas leases are present in PPH on BLM-administered land, and

approximately 16,500 acres on state or private land. Generally, oil and gas developments within two to four miles of leks and/or nesting areas had deleterious effect on populations, with the effect increasing with increasing well density (Lyon and Anderson 2003; Walker et al. 2007; Johnson et al. 2011).

Paved roads exist in most sagebrush regions in densities up to approximately 1.25 miles per 100 acres; less than five percent of the GRSG range is more than 1.5 miles from a paved road. Indirectly, interstates and major highways potentially influence more than 95 percent of priority habitats throughout the range of the species. A large proportion of these roads exist as ROWs on public lands, including 55 percent of BLM-administered PPH (Manier et al. 2013, pg. 31). In the planning area, as discussed below in **Section 3.11**, Comprehensive Travel and Transportation Management, approximately 180 miles of roads (paved or unimproved) are present in PPH on BLM-administered and National Forest System land, and approximately 760 miles are on private and state lands.

Population and Leks (Mid- and Fine-scale Indicator)

NDGFD monitors 52 lek sites in North Dakota annually (NDGFD 2012a). The lek data for 2012 show that there were 12 active leks with 72 males present in the planning area. Eight of these leks showed a decline in number of males from the previous year, while four showed an increase or no change.

3.3.2 Conditions on BLM-Administered Lands

Acres of PPH and PGH on BLM-administered lands within the planning area are presented in **Table 3-1**, along with acres on non-BLM-administered lands. BLM-administered and private lands exist in close proximity and conditions on BLM-administered lands are similar to those on non-BLM-administered lands, as discussed in **Section 3.3.1**.

Population and Leks

NDGFD monitors five lek sites in North Dakota on BLM-administered land (NDGFD 2012a). Lek data from 2012 shows that three of these leks were active, with a total of 35 males present. One of the five leks showed a decline from 2011, two showed no change, and two showed an increase in use.

3.3.3 Trends

GRSG habitat is potentially being impacted by loss of habitat due to increased drilling for oil and gas, and other mineral development in North Dakota, particularly western Bowman County. Annual rates of change show a long-term population decline in North Dakota, averaging 2.79 percent annually in the past several decades (Herman-Brunson 2007). Studies have shown nest survival rates of approximately 30 percent (Herman-Brunson 2007, Swanson 2009). Lek data collected by the NDGFD show overall declines in GRSG numbers from 299 in 1982 to 72 in 2012, a decline of 76 percent; the number of males per lek (16.5 in 1982, compared to six in 2012, a decline of 64 percent); and the number of active leks (23 to 12) in the planning area (NDGFD 2012a).

As discussed above, GRSG in North Dakota are few in number and the population is considered to be at high risk (USFWS 2013). Small populations are at higher risk of decline from habitat loss and fragmentation, primarily due to conversion to agriculture. Small populations also are more vulnerable to isolation, predation and disease, primarily West Nile virus, and degradation of habitat from oil and gas development, over-grazing, and other factors. The GRSG population in North Dakota is characterized by low recruitment during brood rearing (30 to 40 percent chick survival) primarily from predation and West Nile virus (Kazcor 2008; Swanson 2009). Threats to GRSG are discussed in more detail in **Chapter 4**.

3.4 LANDS AND REALTY

Lands and realty actions can be divided between land use authorizations and land tenure adjustments. Land use authorizations consist of ROWs, utility corridors, communication sites, and other leases or permits, while land tenure adjustments focus primarily on land exchange, acquisition (including purchase and easement acquisition), and disposal. Management and adjustment of withdrawals focuses on the establishment, management, modification, and revocation of withdrawals.

Land Use Authorizations

The most common form of authorization to permit uses of BLM-administered lands by commercial, private, or governmental entities is the ROW. A ROW grant is an authorization to use a specific piece of public land for certain projects (such as roads, pipelines, transmission lines, and communication sites). The grant authorizes rights and privileges for a specific use of the land for a specific period of time.

It is the BLM's objective to grant ROWs to any qualified individual, business, or government entity, and to direct and control the use of ROWs on BLM-administered lands in a manner that:

- protects the natural resources associated with BLM-administered lands and adjacent lands, whether private or administered by a government entity
- prevents unnecessary or undue degradation to BLM-administered lands
- promotes the use of ROWs in common, considering engineering and technological compatibility, national security, and area RMPs
- coordinates, to the fullest extent possible, all BLM actions with local, state, Native American tribal, and other federal agencies; interested individuals; and appropriate quasi-public entities (43 CFR 2801.2).

Some uses of BLM-administered lands are authorized through land use long-term land uses, and permits are used to authorize short-term uses. Private individuals and groups, as well as various businesses and government entities can hold these authorizations.

To the extent possible, linear ROWs such as roads and pipelines are routed where impacts would be least disturbing to environmental resources, taking into account point of origin, point of destination, and purpose and need of the project. The ROWs are issued with surface reclamation stipulations and other mitigation measures. Restrictions and mitigation measures may be modified on a case-by-case basis, depending upon impacts on resources. In general, the placement of major linear facilities depends upon meeting the following location criteria:

- concentrate linear facilities within, or contiguous to, existing corridors, where possible
- avoid locations that would take intensively managed forest land out of production
- avoid locations that would harass livestock or wildlife
- avoid steep topography, poor soils, or other fragile areas (such as T&E habitats)
- avoid cultural sites that are listed on, or are eligible for listing on, the National Register of Historic Places

The BLM does not require a ROW authorization in circumstances where actions are tied to leases that are part of a unit. For example, a fluid mineral leaseholder wanting to install a pipeline within a unitized area would be exempt from acquiring a ROW authorization as long as the pipeline is contained in the unit. There are 24,842 acres of unitized areas in the decision area.

Land Tenure Adjustments

Land ownership (or land tenure) adjustment refers to those actions that result in the disposal of public land, or the acquisition by the BLM of nonfederal lands or interests in land. The FLPMA requires that public land be retained in public ownership unless, as a result of land use planning, disposal of certain parcels is warranted. Tracts of land that are designated in BLM land use plans as potentially available for disposal can be conveyed out of federal ownership through an exchange or a sale. Acquisition of and interests in lands are important components of the BLM's land tenure adjustment strategy.

Withdrawals

Withdrawals are used to preserve sensitive environmental values, protect major federal investments in facilities, support national security, and provide for public health and safety. A withdrawal is a formal action that accomplishes one or more of the following actions:

- Transfers total or partial jurisdiction of federal land between federal agencies
- Segregates (closes) federal public lands to appropriation under public land laws including mineral laws
- Dedicates public land for a specific public purpose

There are three major categories of formal withdrawals: (1) congressional withdrawals, (2) administrative withdrawals, and (3) Federal Power Act or Federal Energy Regulatory Commission withdrawals. Withdrawal segregates a portion of public lands and suspends certain operations of the public land laws, such as mining claims. Certain stock driveways are also withdrawn. Federal policy now restricts all withdrawals to the minimum time and acreage required to serve the public interest, maximize the use of withdrawn lands consistent with their primary purpose, and eliminate all withdrawals that are no longer needed.

3.4.1 Conditions of the Planning Area

The planning area contains lands owned or administered by the BLM, other federal agencies (e.g., Forest Service and USFWS), various state agencies, and private land owners. **Table 3-2**, Surface Ownership within the Planning Area, shows the acreage and overall percent ownership for each land owner in the planning area. Also see **Figure 3-3**, Surface and Mineral Management Status, in **Appendix A**.

Table 3-2
Surface Ownership within the Planning Area

Surface Ownership	Planning Area (acres)	PPH (acres)		PGH (acres)	
BLM-administered lands	33,030	32,900	99.6%	80	>1%
Forest Service	140,432	66,549	47%	29,863	21%
USFWS	638	0	0%	0	0%
State Lands	40,894	21,550	53%	10,871	27%
Private	741,607	335,322	45%	201,016	27%
Water	6,416	4,749	74%	471	7%
Total Planning Area	**963,017**	**461,070**	**48%**	**242,301**	**25%**

Source: BLM 2012a
[1] Planning area acres includes additional acres that are not PPH or PGH on BLM-administered lands.

WAFWA Management Zone 1

Table 3-3, GRSG Habitat within City Limits, through **Table 3-7**, Wind Turbines within GRSG Habitat, display data compiled in a BER produced by the USGS and BLM (Manier et al. 2013). In each table, data are presented by surface management agency and their occurrence within PGH and PPH in the planning area and in MZ I. The data and information included from the BER is the most accurate data available from when the data was "frozen" in time for analysis purposes; however, these scenarios remain based in present knowledge. Spatial data informing the existing conditions were compiled to establish a consistent information basis across the entire region (GRSG Management Area), but in order to attain this consistently across state, ownership, and management boundaries some local data have been omitted; therefore, there may be inconsistencies between WAFWA-level and local planning-level data. As such, these data provide a regional baseline, suitable for guiding regional mid- to long-term analysis scenarios (Manier et al. 2013).

There are no utility corridors within the planning area (Manier et al. 2013).

Table 3-3
GRSG Habitat within City Limits

Surface Management Agency	Total Acres		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	0	9,353	0	9,300	0	53
Forest Service	60	68	0	8	60	60
Tribal and Other Federal	0	200	0	200	0	0
Private	2,500	117,300	1,000	113,200	1,500	4,100
State	0	8,100	0	7,300	0	800
Other	0	6	0	0	0	6

Source: BLM 2012a

Table 3-4
Transmission Lines within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	200	42,800	0	35,500	200	7,300
Forest Service	300	8,600	0	7,300	300	1,300
Tribal and Other Federal	0	57,000	0	56,300	0	700

Table 3-4
Transmission Lines within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
Private	16,000	511,100	6,700	452,600	9,300	58,500
State	500	45,900	0	37,800	500	8,100
Other	0	620	0	600	0	20

Source: BLM 2012a
[1]Includes transmission lines greater than 115 kilovolts (kV) and assumes a 656-foot-wide footprint

Table 3-5
Communication Towers within GRSG Habitat

Surface Management Agency	Total Number[1]		Number within PGH		Number within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	0	128	0	108	0	20
Forest Service	1	37	0	36	1	1
Tribal and Other Federal	0	167	0	167	0	0
Private	31	2,310	14	2,161	17	149
State	0	122	0	108	0	14
Other	0	10	0	10	0	0

Source: BLM 2012a
[1]Displays the number of Federal Communication Commission communication towers.

Table 3-6
Vertical Obstructions within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	0	0	0	0	0	0
Forest Service	0	0	0	0	0	0
Tribal and Other Federal	0	7	0	7	0	0
Private	0	230	0	230	0	0

Table 3-6
Vertical Obstructions within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
State	0	17	0	17	0	0
Other	0	15	0	15	0	0

Source: BLM 2012a
[1]Derived from dataset containing Federal Communication Commission communication towers and Federal Aviation Administration vertical obstructions. Excludes wind towers. Assumes a buffer of 2.47 acres around each obstruction.

Table 3-7
Wind Turbines within GRSG Habitat

Surface Management Agency	Total Number[1]		Number within PGH		Number within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	0	62	0	35	0	27
Forest Service	0	41	0	21	0	20
Tribal and Other Federal	0	32	0	21	0	11
Private	13[2]	80	0	45	17	35
State	0	62	0	34	0	28
Other	0	42	0	28	0	14

Source: BLM 2012a
[1]Derived from Federal Aviation Administration data on wind towers.
[2]Non-BER data; derived from MDU 2013

3.4.2 Conditions on BLM-Administered Lands

Land Use Authorizations

Within GRSG habitat, there are 368 acres of ROW authorizations in PPH and three acres in PGH. **Table 3-8**, Active ROW Authorizations within the Planning Area, provides a breakdown of ROW types and acres in each habitat type.

ROW Avoidance and Exclusion Areas

ROWs are issued with surface reclamation stipulations and other mitigation measures. Areas closed to mineral leasing, having a NSO restriction, or otherwise identified as unsuitable for surface disturbance or occupancy are

Table 3-8
Active ROW Authorizations within the Planning Area

Type	PPH		PGH	
	Number of Authorizations	Size (Acres)	Number of Authorizations	Size (Acres)
Road	21	136		
Power	45	122	1	3
Telephone	11	22		
Water facilities	1	2		
Oil and gas	33	86		
Total	**111**	**368**	**1**	**3**

Source: BLM 2012a

generally identified as avoidance or exclusion areas for ROWs. Restrictions and mitigation measures could be modified on a case-by-case basis for avoidance areas, depending on impacts on resources, while exclusion areas are strictly prohibited from ROW development.

There is no ROW avoidance or exclusion areas within the planning area.

ROW Corridors and Communication Sites
Utility corridors are developed to concentrate the effects of utility lines in manageable locations on BLM-administered lands. The corridors may contain power lines, transcontinental fiber optic communication cables, and trans-state gas pipelines. There are no ROW corridors in the planning area.

Communication sites contain equipment for various public and private tenants, including phone companies; local utilities; and local, state, and other federal agencies. Communication site applications are granted through a realty lease authorization rather than ROW. There are no communication sites on BLM-administered lands.

Renewable Energy
Wind and solar resource facilities are permitted with ROWs, through the Lands and Realty Program. Geothermal resources are considered fluid leasable minerals. As a result, management actions related to the Lands and Realty Program and leasable minerals could affect renewable energy resources. Special management designation areas, such as ACECs, could also affect the use of renewable energy resources by limiting the location of these facilities. There are no active renewable energy ROW authorizations within the planning area. **Section 3.20** provides a description of renewable energy resources.

Land Tenure Adjustments

Disposal

There are approximately 3,436 acres of BLM-administered land identified for disposal in the planning area, including 3,306 acres in PPH and 80 acres in PGH. There are no pending land exchanges or sales within the planning area.

Withdrawal

There are no withdrawals in the planning area.

Acquisitions

There are no proposed acquisitions in the planning area.

3.4.3 Trends

Land use authorizations (primarily ROWs) are currently very active in the NDFO, but substantially less so within the planning area. Major projects include three major crude oil pipelines. These pipelines involve two or more federal agencies and cross Lake Sakakawea, which is outside the planning area. The NDFO also has proposals for two major gathering systems; however, these are also located outside the planning area. Demand for land use authorizations in the planning area may increase due to increased oil and gas development in other parts of the field office and the need for increased pipelines to move product to rail/market. The NDFO has no new requests for communication sites.

The BLM will process land exchanges, acquisitions, easements, and potential sales within the planning area on a case-by-case basis as staff and priority workload allow. As opportunities present themselves, each proposal will be reviewed and given careful consideration to management goals and public benefit. Currently, the land tenure program within the NDFO receives very few land tenure adjustment requests per year; it is anticipated that this program will continue to experience low levels of activity.

3.5 VEGETATION (INCLUDING NOXIOUS WEEDS; RIPARIAN AND WETLANDS)

Vegetation serves multiple purposes on the landscape and provides many ecosystem services. Vegetation stabilizes soils, prevents erosion, uses carbon dioxide, releases oxygen, increases species diversity, and provides habitat and food for animals and products for human use. Many of the BLM's land management policies are directed toward maintenance of healthy vegetation communities. Vegetation can be characterized generally by ecological provinces and more specifically by plant communities. The ecological provinces and plant communities discussed below are those that provide the most important land cover across the planning area.

3.5.1 Conditions of the Planning Area

All Vegetation

The planning area occurs within two Level III Ecoregions: Northwestern Great Plains and Middle Rockies (EPA 2011a). Most of the planning area occurs within the Northwestern Great Plains ecoregion, which is characterized by semiarid rolling plains of shale, siltstone, and sandstone punctuated by occasional buttes and badlands. Rangeland is common, but spring wheat and alfalfa farming also occur; native grasslands persist in areas of steep or broken topography. Agriculture is restricted by the erratic precipitation and limited opportunities for irrigation (EPA 2010a).

The majority of the BLM-administered land in the planning area contains gentle rolling plains. Other areas, such as those around the Missouri River, contain rugged, eroded river breaks. Badlands, buttes, alluvial fans, river terraces, stream bottoms, and flat-topped benches are also present.

Annual precipitation ranges from 12 to 23 inches on the prairie. About 70 percent of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Winter precipitation in the planning area is typically snow.

Major vegetation types in this area are grasslands, sagebrush grasslands, and juniper woodlands. Grasses tend to be a mixture of cool and warm season grasses common in the Northern Great Plains. Bunch grasses grow in distinct clumps and include species such as needlegrasses, little bluestem (*Schizachyrium scoparium*), junegrass (*Koeleria* spp.), and Sandberg bluegrass (*Poa secunda*). Rhizomatous grasses produce shoots from lateral root systems and grow as a continuous carpet of vegetation. Common rhizomatous grasses include western wheatgrass (*Pascopyrum smithii*), thickspike wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*), and blue grama (*Bouteloua gracilis*).

The planning area contains numerous forbs and several species of cacti. The most common forb families are asters, legumes, and mustards. Several species of prickly pear cacti (*Opuntia* spp.) and two species of pin cushion cacti are present. Yucca (*Yucca* spp.) is common on loamy to sandy soils, especially on ridges and river breaks.

Common upland shrubs include big sagebrush (*Artemisia tridentata*), silver sagebrush (*A. cana*), and skunkbush sumac (*Rhus trilobata*). Less common upland shrubs include rubber rabbitbrush (*Ericameria nauseosa*) and sand sagebrush (*Artemisia filifolia*). Rocky Mountain juniper (*Juniperus scopulorum*) occurs as woodlands in the river breaks and can also be found scattered across steep slopes and ridges with loamy soils. A small part of the area can support forest vegetation characterized by oak (*Quercus* spp.) and aspen (*Populus* spp.). The flora of southwestern North Dakota is unique because it contains the only extensive population of big sagebrush in the state.

Riparian and Wetland

The term "riparian" is used here to include both lotic and lentic systems. Wetlands, both lotic and lentic systems, typically provide wildlife with green forage, insects, and drinking water. Green forage is especially important for many wildlife species during the summer and fall when upland vegetation has dried out. Although riparian zones account for a very small proportion of the total acreage of the planning area, the structure, food, and water provided by these communities make them the most diverse and productive wildlife habitat within the planning area.

Riparian communities occur along the major watercourses in the planning area and in association with isolated springs, seeps, and smaller streams. Along the major waterways of the Missouri, Yellowstone, and Little Missouri rivers, these communities are dominated by various mixtures of cottonwood (*Populus* spp.) and willow (*Salix* spp.) species. Other vegetation within riparian areas includes chokecherry (*Prunus virginiana*), hawthorn (*Crataegus* spp.), buffaloberry (*Shepherdia* spp.), and sandbar willow (*Salix interior*).

Lentic systems include other permanently wet or seasonably wet areas such as lakes, reservoirs, meadows, springs, and seeps. These areas are commonly found independently of defined stream channels and can occur in diverse landscape settings. Lentic systems are typically small but are extremely important ecologically. Within the planning area in Bowman County, the majority of wetlands are manmade.

The functioning condition of riparian and wetland areas is a result of the interaction of geology, soil, water, and vegetation (BLM 1998). PFC can be defined separately for lotic and lentic waters, as follows:

Lotic Waters

Lotic water is running water systems, such as rivers, streams, and springs. Riparian/wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to:

- Dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality;
- Filter sediment, capture bedload, and aid floodplain development;
- Improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action;
- Develop diverse ponding and channel characteristics to provide the habitat, water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and
- Support greater biodiversity.

Lentic waters

Lentic waters are standing water systems, such as lakes, ponds, seeps, bogs, and meadows. Lentic riparian/wetland areas are functioning properly when adequate vegetation, landform, or debris is present to:

- Dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality;
- Filter sediment and aid floodplain development;
- Improve flood water retention and groundwater recharge;
- Develop root masses that stabilize islands and shoreline features against cutting action;
- Restrict water percolation;
- Develop diverse ponding characteristics to provide the habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and
- Support greater biodiversity

Riparian/wetland areas are classified as functional-at-risk when they are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation. These areas are further distinguished based on whether or not they demonstrate an upward, static, or downward trend.

Riparian/wetland areas are classified as nonfunctional when they clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows, and thus are not reducing erosion, improving water quality, or providing other functions, as listed above.

Riparian/wetland areas are classified as being in unknown condition when the BLM lacks sufficient information to make a determination. PFC assessments completed on BLM-administered lands are described in **Section 3.5.2**, Conditions on BLM-Administered Lands.

Noxious Weeds and Invasive Species

Noxious and invasive weeds compete with native vegetation for water, space, and nutrients. The State of North Dakota's noxious weed list includes twelve species of weeds that are designated noxious by state law:

- Absinth wormwood (*Artemisia absinthium*)
- Canada thistle (*Cirsium arvense*)
- Dalmatian toadflax (*Linaria genistifolia* ssp. *dalmatica*)
- Diffuse knapweed (*Centaurea diffusa*)

- Field bindweed (*Convolvulus arvensis*)
- Leafy purge (*Euphorbia esula*)
- Musk thistle (*Carduus nutans*)
- Purple loosestrife (*Lythrum salicaria*, *Lythrum virgatum*, and all cultivars)
- Russian knapweed (*Acroptilon repens*)
- Salt cedar (*Tamarix ramosissima*, *T. chinensis*, and *T. parviflora*)
- Spotted knapweed (*Centaurea maculosa*)
- Yellow star thistle (*Centaurea solstitialis*)

Invasive plants also occur within the planning area. These include not only noxious weeds, but also other plants that are not native to the United States. The BLM considers plants invasive if they have been introduced into an environment where they did not evolve. As a result, they usually have no natural enemies to limit their reproduction and spread (Westbrooks 1998). Some invasive plants can produce significant changes to vegetation, composition, structure, or ecosystem function (Cronk and Fuller 1995). Common invasive vegetation includes smooth brome, crested wheatgrass, Kentucky bluegrass, dandelion, salsify, Japanese and downy brome, and cheatgrass.

3.5.2 Conditions on BLM-Administered Lands

All Vegetation

Acres of vegetation types within GRSG habitat on BLM-administered lands within the planning area are presented in **Table 3-9**, Vegetation Communities within GRSG Habitat on BLM-Administered Lands.

Table 3-9
Vegetation Communities within GRSG Habitat on BLM-Administered Lands

Vegetation Community	PPH (acres)	PGH (acres)	Outside of PPH/PGH (acres)
Aquatic	83	0	7
Forest and woodland systems	552	0	0
Grassland systems	17,557	79	16
Human land use	315	0	2
No data	51	0	0
Recently disturbed or modified	0	0	8
Riparian and wetland systems	1,452	0	11

Table 3-9
Vegetation Communities within GRSG Habitat on BLM-Administered Lands

Vegetation Community	PPH (acres)	PGH (acres)	Outside of PPH/PGH (acres)
Shrubland, steppe, and savanna systems	9,738	1	4
Sparse and barren systems	3,153	0	1

Source: USGS 2010

Of the BLM-administered land that is assessed annually, 90 percent meets the BLM's Standards for Rangeland Health (see **Table 3-38**, North Dakota Field Office Planning Area – Land Health Assessment). Those areas not meeting the standards have problems as a result of introduced species such as smooth brome (*Bromus inermis*), noxious weeds, or cheatgrass (*B. tectorum*). In some cases, areas have problems because of over-grazing by livestock.

Riparian and Wetland

A survey was completed in 2007 to determine riparian condition for most areas within the North Dakota RMP planning area. Approximately 25 miles of stream and 49 acres of wetlands were inventoried, representing the majority of riparian areas on BLM surface within the planning area. The survey provided baseline data of current riparian conditions (**Table 3-10**, PFC Assessment for Riparian Habitat on BLM-Administered Lands, and **Table 3-11**, PFC Assessment for Wetland Habitat on BLM-Administered Lands).

Table 3-10
PFC Assessment for Riparian Habitat on BLM-Administered Lands

PFC Rating[1]	Miles
Proper functioning condition	11.71
Functional at risk with upward trend	8.96
Functional at risk with downward trend	0.23
Functional at risk with no trend	2.03
Non-functional	2.93

Source: BLM 2010a

Table 3-11
PFC Assessment for Wetland Habitat on BLM-Administered Lands

PFC Rating[1]	Acres
Proper functioning condition	5.33
Functional at risk with upward trend	11.44
Functional at risk with downward trend	21.44
Functional at risk with no trend	4.5
Non-functional	6.69

Source: BLM 2010a

Noxious Weeds and Invasive Species

While noxious weed inventories have not consistently been completed for all BLM-administered lands in the planning area, some surveys have been conducted. Currently, the most widespread noxious weeds are leafy spurge and Canada thistle, with some amount of absinth wormwood. Some parcels within the area are almost monocultures because of the years of infestation before any treatment began. Noxious weeds have been found in a variety of locations and habitat types, with waterways and transportation systems being the major vectors of spread. Other dissemination vehicles include OHV use, wind, wildlife, livestock, and humans.

The majority of weeds on BLM-administered lands are found in Dunn County, located east of the planning area. About 120 acres here have been treated for five years with herbicide to control leafy spurge along the Little Missouri River, and 500 acres have been treated for about two years. Biological control has been tried in Dunn County to control leafy spurge, with no success.

3.5.3 Trends

All Vegetation

Between 2000 and 2008, the planning area experienced a drought. Although normal precipitation patterns resumed periodically following this period, a long-term drought pattern has emerged. The most noticeable changes are dry, open winters and hot, dry summers. Springtime moisture levels have varied, with some areas receiving above-average precipitation in some years, and other areas receiving so little moisture that a spring green-up is not apparent.

The drought reduced the production of perennial grasses. The resumption of normal spring and summer moisture has improved the vigor of grasses in some places, while leaving other areas well below normal.

Riparian and Wetland

In the planning area, riparian vegetation was adversely affected by drought but appears to be recovering rapidly. During the drought, vegetation along the Little Missouri River was less robust with less streambank cover. Fortunately, most woody vegetation along riparian areas survived the drought. The occasional die-off of sandbar willow was observed, but no massive mortality was observed on woody species.

The BLM will continue to inventory isolated parcels that will help understand the current conditions of wetlands and riparian areas. The overall trend observed in surveyed areas is upward for riparian areas and downward for wetland areas. Stockwater ponds were the primary wetland areas assessed. Continuing degradation is a concern due to invasive species, especially leafy spurge. Some areas are declining because of invasive species but other indicators are improving.

Noxious Weeds and Invasive Species

Established weed populations in many areas continue to expand, and new weed species appear within the planning area. Leafy spurge and Canada thistle continue to colonize new areas and spread at a rapid rate.

The BLM has documented a distinct increase in cheatgrass within the planning area in the latter portion of the drought (BLM 2010a). Affected by drought, fire, disturbance, and improper grazing practices, the abundance of cheatgrass has fluctuated significantly on BLM-administered lands in North Dakota. The most notable increases have occurred when a dry period is followed by a normal or wet spring/early summer. The normal weather patterns often change back to hot, dry summers and open winters. This pattern appears to favor cheatgrass, since more bare ground is present and the timing of moisture for germination is adequate.

Normally, cheatgrass abundance in the Northern Great Plains declines when normal precipitation patterns resume. The extent and severity of the drought had been exceptional to extreme in many parts of the planning area. The resumption of normal precipitation patterns has resulted in a significant decline in cheatgrass throughout the planning area (BLM 2010a).

3.6 WILDLAND FIRE MANAGEMENT AND ECOLOGY

Wildland fire is a general term describing any non-structure fire that occurs in the vegetation and/or natural fuels. Wildland fires are categorized by two types; wildfires, which are unplanned ignitions or planned ignitions that have been declared wildfires, and prescribed fires, which are planned ignitions (Wildland Fire Leadership Council 2009, pg. 7).

National BLM fire policy requires that current and desired resource conditions related to fire management be described in terms of fire regime condition class (FRCC). The current condition of a vegetative community is a function of the

degree of departure from historical fire regimes, resulting in alterations of key ecosystem components, such as species composition, structural stage, stand age, and canopy closure. This departure may have resulted from a number of factors, including fire exclusion or suppression, vegetation resources, grazing, introduction and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities (Hann and Bunnell 2001).

The *Federal Wildland Fire Management Policy* was developed by the secretaries of the departments of Interior and Agriculture in 1995 in response to dramatic increases in the frequency, size, and catastrophic nature of wildland fires in the US. The 2001 review and update of the 1995 Federal Wildland Fire Management Policy (DOI et al. 2001) consists of findings, guiding principles, policy statements, and implementation actions, and replaces the 1995 Federal Wildland Fire Management Policy as the primary interagency wildland fire policy document. This document directs federal agencies to achieve a balance between fire suppression to protect life, property, and resources, and fire use to regulate fuels and maintain healthy ecosystems. Multiple updates have been provided in memorandum and current implementation direction has been provided in the February 2009 *Guidance for Implementation of Federal Wildland Fire Management Policy* (USDA and DOI 2009). The BLM's policies follow this plan and implementation guidelines.

Wildfire has been identified as a primary factor associated with GRSG population declines. It can result in the loss of habitat and loss of a food source. Direction for fire management in GRSG habitat is provided in BLM IM 2011-138, *Sage-grouse Conservation Related to Wildland Fire and Fuels Management* (BLM 2011a).

Spread of invasive weed species is another related concern in fire management. The most significant, widespread and persistent threat is the invasion of cheatgrass into disturbed areas. Spread of invasive species can displace native species and decrease habitat quality for the GRSG (see **Section 3.5**, Vegetation (Including Noxious Weeds; Riparian and Wetlands), for further details).

3.6.1 Conditions of the Planning Area

There is the potential for wildfire to occur in the planning area, particularly during times of drought. No wildfire has been reported on BLM-administered land in the planning area in the past 20 years. However, there have been wildfires on Forest Service, state, and private lands in the planning area between 2003 and 2012 (Forest Service 2013a). The shrublands in the southwestern part of the planning region are identified as GRSG range, and as such, fire in these areas would be of particular concern (BLM 1987). Additionally, if a fire were to occur in PPH, in the southwestern corner of the planning region, GRSG breeding, late brood-rearing, and wintering could be greatly impacted.

WAFWA Management Zone 1

Table 3-12, Wildland Fire within GRSG Habitat, displays data compiled in a BER produced by the USGS and BLM (Manier et al. 2013), including the total acres of land burned in wildland fire in the planning area and MZ I over the past 12 years. The data and information included from the BER is the most accurate data available from when the data was "frozen" in time for analysis purposes; however, these scenarios remain based in present knowledge. Spatial data informing the existing conditions were compiled to establish a consistent information basis across the entire region (GRSG Management Area), but in order to attain this consistently across state, ownership and management boundaries some local data have been omitted; therefore, there may be inconsistencies between WAFWA-level and local planning-level data. As such, these data provide a regional baseline, suitable for guiding regional mid- to long-term analysis scenarios (Manier et al. 2013).

Subsequent to finalizing the data in **Table 3-12**, new data provided by the Forest Service indicates that there have been fires on National Forest System, state, and private lands between 2003 and 2012 (Forest Service 2013a). There are no acres of high probability for wildland fire within the planning area (Manier et al. 2013).

Table 3-12
Wildland Fire within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	0	96,300	0	74,300	0	22,000
Forest Service	0	8,200	0	6,400	0	1,800
Tribal and Other Federal	0	18,300	0	18,300	0	0
Private	300	527,600	0	446,600	300	81,000
State	0	46,200	0	35,600	0	10,600
Other	0	0	0	0	0	0

Source: BLM 2012a
[1]Acres calculated from wildland fires occurring between 2000 and 2012.

3.6.2 Conditions on BLM-Administered Lands

In 2004, the BLM prepared North Dakota's Fire Management Plan, which was developed as a result of the Federal Wildland Fire Management Policy and Program Review (1995, 2000), National Fire Plan (2000), and the Federal Fire Policy (2001) (BLM 2004b). The Fire Management Plan established one Fire Management Unit for all BLM-administered lands in the state of North Dakota (59,563 acres). As such, the Fire Management Unit encompasses a larger region

that that of the planning area BLM-administered lands 33,030 acres) which are concentrated in the area around PPH and PGH habitat in Bowman, Slope, and a portion of Golden Valley Counties (see **Chapter 1**). The number of acres, historic fire regime, and condition class for the Fire Management Unit is classified in terms of potential natural vegetation groups which describe the type of vegetation that will occupy a site without disturbance or climate change (USDA 2000). The planning areas lands are classified as Prairie Grasslands and the Juniper Steppe natural vegetation groups (BLM 2004b). Both of these vegetation areas are classified as FRCC II, which means the fire regimes have been moderately altered from their historical range by either increased or decreased frequency. A moderate risk of losing key ecosystem components is identified for lands in this class.

BLM-administered lands exist primarily in the southwestern region of the planning area. The majority of BLM-administered land is delineated as PPH. In this habitat, vegetation is primarily within FRCC II. Total acres of PPH and PGH on BLM-administered lands are listed by FRCC in **Table 3-13**, Planning Area Fire Regime Condition Class, and **Figure 3-4**, Planning Area Fire Regime Condition Class, in **Appendix A**.

Table 3-13
Planning Area Fire Regime Condition Class

Fire Regime Group	Fire Frequency and Severity	Non-habitat (acres)	PPH (acres)	PGH (acres)	Total BLM-administered lands
I	0-35 years; low (surface fire most common) severity	0	1,300	5	1,300
II	0-35 years; high (stand replacement) severity	41	27,068	75	27,184
III	35-100+ years; mixed severity	0	197	0	197
IV	35-100+ years; high (stand replacement) severity	0	3,253	0	3,253
V	> 200 years; high (stand replacement) severity	0	2	0	2

Source: Hann et al. 2008; BLM 2012a

Although the North Dakota RMP allows for the use of prescribed fires for vegetation manipulation as appropriate, none have been set in the past 20 years, and there are no immediate plans to implement prescribed fire on BLM-administered lands in the planning area. Due to the scattered land patterns, developing and completing a prescribe fire project would involve coordination with different agencies, private landowners, local governments and permittees (BLM 2004b). In addition, the NDFO has been classified as Category B, or an

area where wildland fire may not be desired because of current conditions (BLM 2004b).

Wildfire plays a major role in sustaining the healthy ecology of the prairie grasslands of North Dakota. However, wildland fires on BLM-administered lands in the planning area is very infrequent and, therefore, plays a very minor role in that overall ecology.

3.6.3 Trends

Wildland fire has historically occurred within the planning area, and tends to occur between late April and September, typically caused by lightning. It is likely that fires will increase in the future as climate change causes irregular weather patterns, increases the likelihood of storms, and contributes to droughts that can increase the frequency of natural, unplanned ignitions (National Conference of State Legislatures 2008). Over the past 20 years, no wildland fires have been reported on BLM-administered lands in the planning area (BLM 2004b). Between 2000 and 2012, approximately 300 acres of wildland fire have occurred on private lands (BLM 2012a). Some small fires may have occurred unreported and been suppressed by local fire departments, permittees, contractors, and residents (BLM 2004b).

3.7 FLUID MINERALS

Fluid leasable minerals include oil, gas, and geothermal heat. In general, leasable minerals are governed by the Mineral Leasing Act of 1920, as amended, which authorized specific minerals to be disposed of through a leasing system. Geothermal heat is also considered a leasable mineral and is governed by the Geothermal Steam Act of 1970. There are no geothermal resources within the planning area; therefore, geothermal resources will not be discussed in **Chapter 3** or **Chapter 4**.

The BLM reserves the right to require additional mitigation measures, in the form of COAs, after a lease is issued if doing so is necessary to fulfill the BLM's multiple-use mandate.

3.7.1 Conditions of the Planning Area

This discussion focuses on oil and gas because they are the only fluid minerals that exist within the planning area.

Coalbed natural gas potential exists within lignite formations in the planning area in what is known as the Fort Union coal region. The Potential Gas Committee estimated that the Fort Union coal region has approximately 0.5 trillion cubic feet of potentially recoverable coalbed gas resources that may be found in the lignites in this region. Based on surface acreage calculations, nearly 57 percent of the gas in these strata may lie within North Dakota. Because most of the GRSG habitat within the planning area is within the Fort Union coal region, it is reasonable to assume there is potential for recoverable coalbed gas resources in

GRSG habitat (BLM 2009a, pg. 67). However, this resource has not yet proven to be economically important in the range-wide planning area.

While coalbed natural gas activity is minimal in the planning area, a substantial amount of conventional oil and gas exploration and development is ongoing. Approximately 33 percent of Bowman County and four percent of Slope County is covered by oil and gas fields (BLM 2009a, pg. 10). There is no oil and gas activity in the portion of Golden Valley County within the planning area; therefore, the following discussion will include only Slope and Bowman Counties.

Most active oil and gas development within GRSG habitat is occurring in Bowman County in the vicinity of the Cedar Creek anticline. Oil production in Bowman County peaked in 2008 at over 1.5 million barrels (bbls) per month and has declined since then to a 2013 rate of approximately 730,000 barrels per month (North Dakota Industrial Commission 2013a, pg. 15–16). Gas production in Bowman County also peaked in 2008 at over two million MCF (thousand cubic feet) per month. It has since declined to a 2012 rate of approximately 900 thousand to one million MCF per month (North Dakota Industrial Commission 2013b, pg. 5–6). Bowman County currently has 577 wells capable of producing oil and gas (North Dakota Industrial Commission 2013c, pg. 2).

Within Bowman County, the shallow Pierre formation produces gas, and the deeper Red River and Red River B formations produce both oil and gas. At less than one percent, three percent, and two percent, respectively, of total gas produced in North Dakota in 2012, none of these formations plays a major role in North Dakota gas production (North Dakota Industrial Commission 2012a).

In 2007, the Red River formation produced 42 percent of the oil in North Dakota. This figure dropped to only one percent in 2012, due to both declining production from the formation (the natural depletion of the reservoir) and the large amount of oil now being produced by the Bakken formation, which does not reach Slope or Bowman County and does not have potential in the portion of Golden Valley County within the planning area (BLM 2009a, pg. 22; North Dakota Industrial Commission 2012b).

Slope County has some oil and gas activity as well. Oil production in Slope County remained relatively stable between 2007 and 2013 at between 30,000 and 55,000 barrels per month (North Dakota Industrial Commission 2013a, pg. 15–16). Gas production in the county peaked between 2008 and 2009 at over 200 thousand MCF per month. It has since declined to a 2013 rate of approximately 13 to 19 thousand MCF per month (North Dakota Industrial Commission 2013b, pg. 5–6). Slope County currently has 19 wells capable of producing oil and gas (North Dakota Industrial Commission 2013c, pg. 2).

There are 11 oil and gas fields within GRSG habitat. **Table 3-14**, Oil and Gas Activity by Field in the Planning Area, shows the number of wells in each field and production (by barrels of oil and MCF of gas) by field in 2011.

Table 3-14
Oil and Gas Activity by Field in the Planning Area

Field	Resource	Producing Wells	Injection Wells	2011 Production
Cedar Hills	Oil	239	240	9,025,993 barrels
Cedar Creek	Oil and Gas	41 Oil, 30 Gas	23	290,916 barrels; 1,100,876 MCF
Little Missouri	Oil and Gas	4 Oil, 30 Gas	1	12,746 barrels; 1,100,872 MCF
Horse Creek	Oil	13	2	78,388 barrels
South Horse Creek	Oil	3	0	26,163 barrels
Medicine Pole Hills	Oil	46	31	613,587 barrels
Amor	Oil	8	2	130,251 barrels
State Line	Oil	5	1	49,206 barrels
Coyote Creek	Oil	4	0	15,290 barrels
Hart[1]	Oil	0	0	0
Rhame[1]	Oil	0	0	0

Source: BLM 2012a
[1]Field is no longer producing and has no remaining active wells.

All of the fields shown in **Table 3-14** are in Bowman County. A small portion of the Cedar Hills field reaches into the southern tip of Slope County. No other fields exist in the planning area. All of the oil fields lie within the Red River and Red River B formations, and the gas fields lie within the Pierre formation.

WAFWA Management Zone 1

Table 3-15, Open to Oil and Gas Leasing within GRSG Habitat Open to Oil and Gas Leasing within GRSG Habitat, through **Table 3-19**, Oil and Gas Wells within GRSG Habitat, display data compiled in a BER produced by the USGS and BLM (Manier et. al. 2013). In each table, data are presented by surface management agency and their occurrence within PGH and PPH in the planning area and MZ I. The data and information included from the BER is the most accurate data available from when the data was "frozen" in time for analysis purposes; however, these scenarios remain based in present knowledge. Spatial data informing the existing conditions were compiled to establish a consistent information basis across the entire region (GRSG Management Area), but in order to attain this consistently across state, ownership, and management

Table 3-15
Open to Oil and Gas Leasing within GRSG Habitat

Surface Management Agency	Total Acres		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	73,435	6,763,200	100	3,970,400	30,400	2,792,800
Forest Service	92,700	768,400	29,300	484,100	63,400	284,300
Tribal and Other Federal	0	413,800	0	329,800	0	84,000
Private	35,400	8,582,500	5,000	6,510,600	30,400	2,071,900
State	400	181,000	0	98,800	400	82,200
Other	0	900	0	900	0	0

Source: BLM 2012a

Table 3-16
Closed to Oil and Gas Leasing within GRSG Habitat

Surface Management Agency	Total Acres		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	0	520,200	0	370,100	0	150,100
Forest Service	0	16,600	0	16,600	0	0
Tribal and Other Federal	0	1,595,800	0	1,594,400	0	1,400
Private	0	2,353,600	0	1,848,000	0	505,600
State	0	379,100	0	315,400	0	63,700
Other	0	0	0	0	0	0

Source: BLM 2012a

Table 3-17
Oil and Gas Leases within GRSG Habitat

Surface Management Agency	Total Acres		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	26,000	951,800	0	624,200	26,000	327,600
Forest Service	25,200	54,600	12,200	29,700	13,000	24,900
Tribal and Other Federal	0	5,000	0	5,000	0	0

Table 3-17
Oil and Gas Leases within GRSG Habitat

Surface Management Agency	Total Acres		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
Private	5,200	2,268,100	1,200	1,721,900	4,000	546,200
State	200	45,300	200	27,900	0	17,400
Other	0	0	0	0	0	0

Source: BLM 2012a

Table 3-18
Oil and Gas Leases Held by Production within GRSG Habitat

Surface Management Agency	Total Acres		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	24,500	784,500	0	673,900	24,500	110,600
Forest Service	1,827	117,800	27	80,900	1,800	36,900
Tribal and Other Federal	0	19,500	0	19,500	0	0
Private	14,400	2,055,700	400	1,819,300	14,000	236,400
State	500	16,900	0	13,500	500	3,400
Other	0	0	0	0	0	0

Source: BLM 2012a

Table 3-19
Oil and Gas Wells within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	702	30,800	2	26,200	700	4,600
Forest Service	27	3,600	9	2,100	18	1,500
Tribal and Other Federal	0	3,406	0	3,400	0	6
Private	2,200	161,800	300	140,400	1,900	21,400
State	133	17,900	13	15,400	120	2,500
Other	0	0	0	0	0	0

Source: BLM 2012a
[1]Assumes footprint of 62 square meters per well. Includes wells that are either not plugged and abandoned, or plugged and abandoned beginning October, 2001.

boundaries some local data have been omitted; therefore, there may be inconsistencies between WAFWA-level and local planning-level data. As such, these data provide a regional baseline, suitable for guiding regional mid- to long-term analysis scenarios (Manier et al. 2013).

There are no acres of oil shale leases within the planning area (Manier et al. 2013).

3.7.2 Conditions on BLM-Administered Lands

While the BLM manages 30,574 acres of surface over federal minerals within the planning area, the BLM also manages the subsurface minerals underlying 396,053 acres (41 percent) of the planning area (including federal subsurface beneath BLM-administered lands). Lands on which the surface is owned or managed by an entity other than the BLM and the subsurface is managed by the BLM are called split-estate lands. **Table 3-20**, Federal Mineral Status in the North Dakota Planning Area, breaks down the surface ownership above federal minerals in the planning area.

Table 3-20
Federal Mineral Status in the North Dakota Planning Area

Land Status	Acres
BLM Surface/Federal Minerals	30,574
Private Surface/Federal Minerals	227,020
State/Federal Minerals	1,842
National Wildlife Refuge/Federal Minerals	318
Forest Service/Federal Minerals	136,299
Total	**396,053**

Source: BLM 2012a

Because the BLM is not making decisions on federal minerals beneath surface managed by other federal agencies in this plan amendment, only federal minerals beneath BLM, private, and state surface are discussed in **Chapter 3** and **Chapter 4** as being part of the decision area.

The federal government does not always own every type of mineral in a given acre of federal mineral estate. For example, in some areas, the federal government will only own the coal rights, while a private or state entity might own the oil and gas rights. For this reason, the federal mineral estate for any specific mineral type in the decision area is different than that for all other mineral types in the decision area. The federal mineral estate for oil and gas in the decision area is 73,441 acres, as shown in **Table 3-21,** Oil and Gas Federal Mineral Status in the North Dakota Decision Area. Oil and gas potential in the tri-county area is show in **Figure 3-5**, Oil and Gas Potential, in **Appendix A**.

Table 3-21
Oil and Gas Federal Mineral Status in the North Dakota Decision Area

Land Status	Acres
BLM Surface/Federal Minerals	30,574
Private Surface/Federal Minerals	42,452
State/Federal Minerals	415
Total	**73,441**

Source: BLM 2012a

Table 3-22, Oil and Gas Potential in Relation to Greater GRSG PPH and PGH, shows the oil and gas potential within each type of habitat as well as throughout the planning area.

Table 3-22
Oil and Gas Potential in Relation to Greater GRSG PPH and PGH

Habitat Type	Development Potential			
	High (acres)	Medium (acres)	Low/No Known (acres)	Total (acres)
Total Decision Area *(BLM surface/federal minerals)*	26,731	2,002	1,841	**30,574**
Total Decision Area *(Private or state surface/federal minerals)*	19,379	5,218	18,264	**42,861**
PPH *(BLM surface/federal minerals)*	26,731	2,002	1,721	**30,454**
PPH *(Private or state surface/federal minerals)*	18,930	4,731	7,082	**30,743**
PGH *(BLM surface/federal minerals)*	0	0	80	**80**
PGH *(Private or state surface/federal minerals)*	442	327	4,247	**5,016**
Other Areas *(BLM surface/federal minerals)*	0	0	40	**40**
Other Areas *(Private or state surface/federal minerals)*	7	160	6,935	**7,102**

Source: BLM 2012a

A total of 46,110 acres (63 percent) of the federal mineral estate administered by the BLM in the planning area has high oil and gas potential. However, much of this federal mineral estate has already been leased. There are 170 existing

leases in the planning area: 130 in PPH, 16 in PGH, and five in both PPH and PGH. A total of 25,930 acres (85 percent) of federal oil and gas beneath BLM-administered surface in the planning area has been leased. Additionally, 21,487 acres (50 percent) of federal oil and gas estate beneath private or state-owned surface has been leased. **Table 3-23**, Existing Oil and Gas Leases on Federal Mineral Estate, breaks down existing leases within PPH and PGH. A total of 42,367 acres (89 percent) of existing leases in the planning area are within PPH.

Table 3-23
Existing Oil and Gas Leases on Federal Mineral Estate

Habitat Type	Acres Leased
Total Decision Area *(BLM surface/federal minerals)*	25,930
Total Decision Area *(Private or state surface/federal minerals)*	21,487
Priority Habitat (PPH) *(BLM surface/federal minerals)*	25,888
Priority Habitat (PPH) *(Private or state surface/federal minerals)*	16,479
General Habitat (PGH) *(BLM surface/federal minerals)*	42
General Habitat (PGH) *(Private or state surface/federal minerals)*	1,383
Other Areas *(BLM surface/federal minerals)*	0
Other Areas *(Private or state surface/federal minerals)*	3,625

Source: BLM 2012a

Because much of the federal mineral estate in this area has been leased, drilling activity on federal mineral estate within GRSG habitat has been decreasing since 2005 and has dropped off significantly since 2008 (**Table 3-24**, Drilling Activity within GRSG Habitat[1]). Well density in GRSG habitat ranges from 0 to 25 wells per section.

Bowman County is the only county with large blocks of BLM-administered surface. Although the BLM can limit oil and gas development on split-estate lands, the BLM has more discretion to restrict these activities where it manages the surface as well as the subsurface mineral estate. Production on federal mineral estate in Bowman County has been primarily in the Red River B formation, although there has also been significant activity in the Eagle formation (BLM 2010a, pg. 108). More information on these formations can be found above under *Conditions of the Planning Area*.

Table 3-24
Drilling Activity within GRSG Habitat[1]

Year	Wells Drilled
2005	88
2006	82
2007	38
2008	49
2009	7
2010	14
2011	2
2012	3

Source: BLM 2012a
[1]All wells are either federal wells or private wells located on a federal unit (see discussion on unitization below).

Many of the oil and gas leases in Bowman County are unitized. Unitization provides for the exploration and development of an entire geologic structure or area by a single operator so that drilling and production may proceed in the most efficient and economic manner. The two most extensive units administered by the NDFO in the Red River B formation include approximately 400 producing and service wells (e.g., water and air injection and water source wells). Roughly one-half of these wells are on BLM-administered surface lands. As of 2009, there were 101 producing or permitted gas wells in the Little Missouri Pierre Unit (within the Pierre formation). Roughly one-half of these were producing on BLM-administered surface lands. These units appear to be reaching full development, although activity is still present (BLM 2010a).

Oil and gas leases offered since March 2004 are subject to NSO and TL stipulations to protect GRSG. The NSO stipulation prohibits surface occupancy within 0.25 mile of leks. Additionally, a TL prohibits seismic, construction, or other development from occurring within two miles of leks between March 1 and June 15. Leases offered between 1987 and 2004 are subject to NSO stipulations within 500 feet of leks and a requirement to use special care to avoid nesting areas associated with leks from March 1 to June 30. Some leases within GRSG habitat date back before 1987 and may not be subject to any special stipulations to protect GRSG. **Table 3-25**, Oil and Gas Leasing Categories in PPH and PGH, breaks down the acres within BLM-administered lands by whether they are open or closed to leasing and what stipulations are applied. Because some acres may be subject to both TLs and CSU stipulations, the acres in this table will not add up to the total oil and gas federal mineral estate in the decision area.

Table 3-25
Oil and Gas Leasing Categories in PPH and PGH

Category	Total Decision Area (acres)	PPH (acres)	PGH (acres)
Open to Leasing (*BLM surface/federal minerals*)	30,574	30,494	80
Open to Leasing *(Private or state surface/federal minerals)*	42,859	30,741	5,016
Total Federal Oil and Gas Estate Open to Leasing	**73,433**	**61,235**	**5,096**
Closed to Leasing *(BLM surface/federal minerals)*	0	0	0
Closed to Leasing *(Private or state surface/federal minerals)*	0	0	0
Total Federal Oil and Gas Estate Closed to Leasing	**0**	**0**	**0**
Open to Leasing (subject to standard terms and conditions) *(BLM surface/federal minerals)*	3,238	3,117	80
Open to Leasing (subject to standard terms and conditions) *(Private or state surface/federal minerals)*	21,892	9,782	5,011
Total Federal Oil and Gas Estate subject to standard terms and conditions	**25,130**	**12,899**	**5,091**
NSO *(BLM surface/federal minerals)*	6,444	6,443	2
NSO *(Private or state surface/federal minerals)*	3,336	3,335	2
Total Federal Oil and Gas Estate subject to NSO	**9,780**	**9,778**	**4**
CSU *(BLM surface/federal minerals)*	11,742	11,742	5
CSU *(Private or state surface/federal minerals)*	9,493	9,493	3
Total Federal Oil and Gas Estate subject to CSU	**21,235**	**21,235**	**8**
Seasonal TL *(BLM surface/federal minerals)*	20,882	20,883	4
Seasonal TL *(Private or state surface/federal minerals)*	17,622	17,623	3
Total Federal Oil and Gas Estate subject to Seasonal TL	**38,504**	**38,506**	**7**

Source: BLM 2012a

As **Table 3-25** shows, all federal oil and gas estate within the decision area is open to oil and gas leasing. However, NSO stipulations apply on 9,780 acres (one percent) of the decision area, CSU stipulations apply on 21,235 acres (29 percent), and TLs apply on 38,504 acres (52 percent). A total of 25,130 acres (34 percent) of the decision area are open to leasing subject to standard terms and conditions.

Fifteen parcels on 9,036 acres of federal oil and gas estate in the planning area have been nominated for leasing since July 2011; however, all nominated parcels since that time have been deferred until this plan amendment is completed.

3.7.3 Trends

The Energy Information Administration estimates that over the next two decades both demand and prices for oil and gas will increase. These circumstances would likely result in continued industry emphasis on increasing oil supplies and searching for additional natural gas supplies in the planning area. Much of the oil and gas supply growth within the planning area is expected to come from production in existing reservoirs, with new reservoir discoveries potentially coming from the exploration of the Three Forks Formation (which is north of GRSG habitat, outside the planning area), shallow gas and biogenic gas reservoirs, and coalbed natural gas (BLM 2009a).

It is estimated that, in an unconstrained scenario, between 2010 and 2029 as many as 7,641 wells will be drilled in North Dakota (BLM 2009a, pg. 64). Up to 150 (two percent) of those wells could be coalbed gas wells within the Fort Union coal region. The potential for future coalbed natural gas development is discussed further below. Of the other 7,491 wells (98 percent), the majority are projected to be drilled in and around existing fields in the deeper portion of the Williston basin (around the Bakken formation, which is outside the planning area) and along the Cedar Creek anticline in Bowman County (BLM 2009a, pg. 64).

No coalbed gas exploration drilling plans or plans of development have been proposed by industry, and operators polled in 2009 did not submit projections of future activity or interest in future activity. Much of the potential coalbed gas drilling is likely to occur in one or two townships instead of being spread evenly over the area of potential (BLM 2009a, pg. 67–68).

3.8 COAL

The BLM manages coal through the solid leasable mineral program. Leasable minerals are governed by the Mineral Leasing Act of 1920, as amended, which authorized specific minerals to be disposed of through a leasing system.

3.8.1 Conditions of the Planning Area

North Dakota coal is considered lignite since it generally is of lower rank and has low British Thermal Units, or heating value, per ton of coal. Lignite is developed through surface mining. Most mining and production of lignite in

North Dakota has been mine-mouth production associated with coal-fired power plants (BLM 2010a, pg. 109).

Lignite mining is concentrated in the north-central portion of North Dakota and mainly occurs on privately owned mineral deposits. There is no activity within the planning area. While there is a large coal deposit within GRSG habitat in Bowman County, this deposit has not been mined and is not leased.

WAFWA Management Zone 1

Table 3-26, Coal Potential within GRSG Habitat and **Table 3-27**, Surface Coal Leases within GRSG Habitat, display data compiled in a BER produced by the USGS and BLM (Manier et al. 2013). In each table, acres are presented by surface management agency and their occurrence within PGH and PPH in the planning area and MZ I. The data and information included from the BER is the most accurate data available from when the data was "frozen" in time for analysis purposes; however, these scenarios remain based in present knowledge. Spatial data informing the existing conditions were compiled to establish a consistent information basis across the entire region (GRSG Management Area), but in order to attain this consistently across state, ownership, and management boundaries some local data have been omitted; therefore, there may be inconsistencies between WAFWA-level and local planning-level data. As such, these data provide a regional baseline, suitable for guiding regional mid- to long-term analysis scenarios (Manier et al. 2013).

Table 3-26
Coal Potential within GRSG Habitat

Surface Management Agency	Total Acres		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	8,284	2,955,400	84	2,573,200	8,200	382,200
Forest Service	96,500	688,500	29,900	426,500	66,600	262,000
Tribal and Other Federal	0	1,499,600	0	1,378,800	0	120,800
Private	471,100	18,123,200	201,000	15,403,800	270,100	2,719,400
State	26,600	1,884,500	10,900	1,567,300	15,700	317,200
Other	0	9,400	0	9,400	0	0

Source: BLM 2012a

Table 3-27
Surface Coal Leases within GRSG Habitat

Surface Management Agency	Total Acres		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	0	77,700	0	19,300	0	58,400
Forest Service	5,600	38,500	5,200	38,100	400	400
Tribal and Other Federal	0	0	0	0	0	0
Private	500	204,500	500	195,800	0	8,700
State	0	3,500	0	3,500	0	0
Other	0	0	0	0	0	0

Source: BLM 2012a

3.8.2 Conditions on BLM-Administered Lands

The BLM manages 396,053 acres of federal mineral estate (30,574 acres of BLM-administered land with federal minerals and 365,479 acres of non-BLM administered surface with federal minerals, known as "split-estate") in the planning area. Within GRSG habitat, the BLM manages 32,980 acres (five percent) of the surface and 279,248 acres (40 percent) of the subsurface minerals.

While coal potential exists on federal mineral estate within the planning area, no development has occurred.

3.8.3 Trends

No coal development is anticipated within the planning area for the next 20 years.

3.9 LOCATABLE MINERALS

Locatable minerals are minerals for which the right to explore or develop the mineral resource on federal land is established by the location (or staking) of lode or placer mining claims and is authorized under the General Mining Law of 1872. Locatable minerals include metallic minerals (such as gold, silver, copper, lead, zinc, molybdenum, uranium) and non-metallic minerals (such as fluorspar, asbestos, talc, mica, and limestone).

3.9.1 Conditions of the Planning Area

There are no locatable mineral operations within planning area (BLM 2010a, pg. 107). However, several uranium deposits exist within PGH in Bowman County. These deposits are primarily within lignites, sandstones, and carbonaceous mudstone. In the 1950s and 1960s, approximately 85,000 tons of low grade ore lignites were produced in North Dakota, resulting in 270 tons of "yellow cake"

(U308). Uranium mining in North Dakota halted in 1967. No uranium production has ever occurred within the planning area (North Dakota Geological Survey 2013).

3.9.2 Conditions on BLM-Administered Lands

The BLM manages 396,053 acres of federal mineral estate (30,574 acres of BLM-administered land with federal minerals and 365,479 acres of non-BLM administered surface with federal minerals, also known as "split-estate") in the planning area. Within GRSG habitat, the BLM manages 32,980 acres (five percent) of the surface and 279,248 acres (40 percent) of the subsurface minerals.

There is no locatable mineral development on BLM-administered lands within the planning area. There is no known locatable mineral potential within GRSG habitat.

3.9.3 Trends

The development potential of locatable minerals other than uranium within the planning area may be limited because the surficial geology is of a primarily sedimentary nature. This limits significant occurrences of mineralized zones (BLM 2010a, pg. 107).

Despite the increase in uranium prices after 2002, the low grade uranium deposits within the planning area are not expected to be developed during the next 20 years.

3.10 MINERAL MATERIALS

Mineral materials include common varieties of construction materials and aggregates, such as, sand, gravel, cinders, roadbed, and ballast material. Mineral materials are sold or permitted under the Mineral Materials Sale Act of 1947.

Sand and gravel, as construction aggregate, is an extremely important resource. The extraction of the resource varies directly with the amount of development nearby – road building and maintenance, and urban development – as sand and gravel is necessary for that infrastructure development. Even more so than other resources, however, the proximity of both transportation and markets are key elements in the development of a deposit.

3.10.1 Conditions of the Planning Area

Sand and gravel, and scoria, or clinker, are of particular interest in North Dakota. Scoria is the result of the baking of overlying rock by burning coal beds and is associated with most lignite occurrences in the planning area (BLM 1986, pg. 34). Most scoria potential within GRSG habitat is located along the Little Missouri River in Bowman and Slope Counties (BLM 2010a, pg. 6).

In 2011, one mineral materials mining operation was active in the planning area. This seven-acre operation was a gravel mine in Bowman County (North Dakota State Soil Conservation Committee 2011, pg. 1).

3.10.2 Conditions on BLM-Administered Lands

The BLM manages 396,053 acres of federal mineral estate (30,574 acres of BLM-administered land with federal minerals and 365,479 acres of non-BLM administered surface with federal minerals, also known as "split-estate") in the planning area. Within GRSG habitat, the BLM manages 32,945 acres (five percent) of the surface and 279,248 acres (40 percent) of the subsurface minerals.

While mineral materials potential exists within PPH, there is currently no development in this area. However, all of the federal mineral estate in the planning area is open to mineral materials disposal.

3.10.3 Trends

Future demand for mineral materials will vary depending upon market conditions, which differ according to economic conditions and construction activity. Construction projects within approximately 50 miles of mineral materials deposits may lead to development of these deposits. The primary driver of construction activity in the planning area is road construction for oil and gas exploration and development. As new oil and gas development in the planning area is occurring at a slow rate, it is expected that mineral materials activity will continue at roughly the same level for the next 20 years.

3.11 Comprehensive Travel and Transportation Management

Travel and transportation management is interrelated with many resources and resource uses that occur on BLM-administered lands. The transportation system throughout the planning area consists of a state highway, numerous paved and unpaved local roads, as well as unpaved primitive OHV roads and trails. See **Figure 3-6**, Transportation Routes, in **Appendix A**. BLM expects to complete a comprehensive inventory of the existing BLM transportation network as part of the North Dakota RMP revision process.

3.11.1 Conditions of the Planning Area

State Highway 12, which runs through northern Bowman County, crosses PPH and PGH. Numerous local roads and trails also traverse identified GRSG habitat. There are 1,323 total miles of motorized and non-motorized routes in PPH and 748 total miles in PGH. Highway 12 is the only major roadway in the planning area. Camp Cook Road provides paved and unpaved local access from the town of Marmarth southward along the western portion of Bowman County, while Rhame Road supports local travel south of the town of Rhame in north central Bowman County. Smaller local paved and unpaved roads, primitive roads, and trails account for the remainder of the transportation network in the planning area.

WAFWA Management Zone 1

Table 3-28, Miles of Roads within GRSG Habitat, through **Table 3-31**, Acres of Railroads within GRSG Habitat, display data compiled in a BER produced by the USGS and BLM (Manier et al. 2013). In each table, acres and miles are presented by surface management agency and their occurrence within PGH and PPH in the planning area and MZ I. The data and information included from the BER is the most accurate data available from when the data was "frozen" in time for analysis purposes; however, these scenarios remain based in present knowledge. Spatial data informing the existing conditions were compiled to establish a consistent information basis across the entire region (GRSG Management Area), but in order to attain this consistently across state, ownership, and management boundaries some local data have been omitted; therefore, there may be inconsistencies between WAFWA-level and local planning-level data. As such, these data provide a regional baseline, suitable for guiding regional mid- to long-term analysis scenarios (Manier et al. 2013).

Table 3-28
Miles of Roads within GRSG Habitat

Surface Management Agency	Total Miles		Miles within PGH		Miles within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	46	12,100	0	7,400	46	4,700
Forest Service	197	1,900	62	1,200	135	700
Tribal and Other Federal	0	6,100	0	5,800	0	300
Private	1,235	76,300	508	59,700	727	16,600
State	64	7,100	27	5,200	37	1,900
Other	0	0	0	0	0	0

Source: BLM 2012a

Table 3-29
Acres of Roads within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	600	127,800	0	79,600	600	48,200
Forest Service	2,100	19,500	700	12,300	1,400	7,200
Tribal and Other Federal	0	64,800	0	61,500	0	3,300
Private	14,000	851,200	5,900	675,000	8,100	176,200
State	700	78,900	300	58,600	400	20,300

Table 3-29
Acres of Roads within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
Other	0	300	0	300	0	0

Source: BLM 2012a
[1]Assumes footprint of 73.2 meters for interstate highways, 25.6 meters for primary and secondary highways, and 12.4 meters for other roads.

Table 3-30
Miles of Railroads within GRSG Habitat

Surface Management Agency	Total Miles		Miles within PGH		Miles within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	0	59	0	50	0	9
Forest Service	0	28	0	28	0	0
Tribal and Other Federal	0	83	0	83	0	0
Private	32	1,346	9	1,200	23	146
State	0	100	0	90	0	10
Other	0	1	0	1	0	0

Source: BLM 2012a

Table 3-31
Acres of Railroads within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	0	257	0	200	0	57
Forest Service	4	204	0	200	4	4
Tribal and Other Federal	0	600	0	600	0	0
Private	232	8,253	68	7,600	164	653
State	0	519	0	500	0	19
Other	0	1	0	1	0	0

Source: BLM 2012a
[1]Assumes footprint of 9.4 meters.

Off-Highway Vehicles

There are currently no locations in the planning area designated as open for cross-country OHV use. OHV use is limited to existing routes on 56,490 acres of BLM-administered land throughout the NDFO. BLM travel and transportation management does not currently designate existing routes as open or closed to motorized travel.

3.11.2 Conditions on BLM-Administered Lands

The noncontiguous nature of BLM-administered lands in the North Dakota planning area influences the type and use of existing transportation routes. West of Camp Cook Road, a network of privately maintained unpaved roads support oil and gas drilling operations in the 138,613-acre Big Gumbo Management Area, of which 22,164-acres are BLM-administered land. This area represents the largest contiguous acreage of BLM-administered land in the planning area as well as the densest network of travel routes on BLM-administered land. Within the Big Gumbo Management Area, there are 413 miles of motorized and non-motorized travel routes, including 110 miles on BLM-administered land. Within the entire GRSG planning area there are 2,944 miles of transportation routes, including 114 miles on BLM-administered lands within PPH. The BLM does not perform regular maintenance on any routes within the planning area. Additionally, there are 108 miles (387 acres) of routes within four miles of an active lek. Studies (e.g., Holloran 2005) demonstrate that activity such as traffic on roadways negatively affects the number of male GRSG displaying at lek sites.

3.11.3 Trends

Use of the existing transportation network in the planning area is expected to steadily increase over time. With the increased global demand for petroleum-based fuels, the creation of new roads in the planning area is expected in order to support expanded oil and gas exploration. Use of motorized vehicles on existing travel routes in the planning area is also expected to increase over time to support oil and gas exploration, provide access to prime hunting locations, and for access to private land.

3.12 RECREATION

Recreation opportunities in North Dakota are diverse. However, noncontiguous lands present management challenges. Most recreation users in the state participate in dispersed recreation activities, which include hunting, fishing, camping, biking, hiking, horseback riding, and wildlife viewing. Motorized recreational activities, such as OHV use generally takes place in conjunction with other activities. Users often participate in these activities individually or in small groups.

3.12.1 Conditions of the Planning Area

Low amounts of recreation occur in the planning area. Land in North Dakota is primarily held under private ownership. In the planning area, 741,607 acres (77 percent) are privately held. Although North Dakota state law permits foot

travel across private land in order to gain access to public lands, the scattered distribution of BLM-administered land limits the extent of public recreation opportunities throughout the planning area.

Big Game Hunting

Historically, the NDGFD issued hunting licenses for North Dakota white-tailed deer, mule deer, pronghorn antelope, moose, elk, and bighorn sheep. Due to low species populations in 2012, NDGFD suspended the hunting season for pronghorn. For other big game species, additional restrictions are placed on the time of year, location, method of take (gun, bow, muzzleloader), and daily bag and possession limits. Hunting antlerless mule deer in portions of the planning area is periodically prohibited depending on population numbers.

Through agreements between the NDGFD and private land owners, hunting is permitted on designated private parcels. Participants in the Private Land Open to Sportsmen program may enter select private parcels during the applicable hunting season and with the permitted hunting equipment. For hunters, this program can provide more contiguous lands for recreating. However, private lands in the program change frequently and comprise only a small portion of private land in the planning area.

NDGFD permits the hunting of a number of smaller upland game species, water fowl, and furbearers. However, the NDGFD has not allowed the hunting of GRSG since 2008 due to a declining species population (NDGFD 2012b).

3.12.2 Conditions on BLM-Administered Lands

Table 3-32, Recreation Activities and Participants, summarizes the distribution of recreation activities on all BLM-administered lands in the NDFO. The most popular recreation activity on BLM-administered lands in North Dakota is hunting, which accounts for 65 percent of all recreation activities.

Table 3-32
Recreation Activities and Participants[1]

Activity	Participants	Visitor Days
Camping	721	961
Picnicking	155	26
Big Game Hunting	12,986	6,287
Environmental Education	1,232	103
Wildlife Viewing	1,575	246
Hiking, Walking or Running	2,606	376
Horseback Riding	515	258
Total	**19,790**	**8,257**

Source: BLM 2010a

[1]For activities during fiscal year 2008 in the NDFO planning area.

Low amounts of recreation occur on BLM-administered lands. The scattered distribution of BLM-administered land in the planning area limits dispersed recreation opportunities such as camping, hiking, and birding. There are no developed recreational facilities, Special Recreation Management Areas (SRMA), or Extensive Recreation Management Area (ERMA) on BLM-administered lands. Moreover, the BLM does not currently have any approved or pending SRPs in the decision area.

Recreation uses on BLM-administered land where GRSG habitat exists primarily include the low-impact, dispersed activities summarized in **Table 3-32**.

3.12.3 Trends

Recreation use in the planning area, including BLM-administered lands is expected to increase over time. In particular, the NDFO anticipates more dispersed recreation activities because of the region's rural landscape, increasing national population, and increasing numbers of local employment opportunities in the energy sector. Additional factors expected to affect demand for recreation in the planning area include:

- Continued popularity of outdoor recreation as a family-oriented activity
- Increasingly active retired population with more disposable time and income
- Continued importance of hunting and other outdoor recreation activities to the local economy
- Increasing importance of outdoor recreation as other areas of the country becomes more urbanized

3.13 RANGE MANAGEMENT

The primary laws that govern livestock grazing on BLM-administered lands are the Taylor Grazing Act of 1934, FLPMA, and the Public Rangelands Improvement Act of 1978. In addition, the BLM manages grazing lands under 43 CFR Part 4100 and applicable policy.

In accordance with 43 CFR 4180, the BLM is required to meet or make progress towards meeting standards defined in the North and South Dakota Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997). Standards are statements of physical and biological condition or degree of function required for healthy sustainable rangelands. Guidelines are preferred or advisable grazing management approaches to maintaining or ensuring progress towards achieving land health standards. As required by regulation, grazing management on allotments not meeting standards would be modified to make progress toward meeting standards if livestock are a significant causal factor. Rangeland conditions which do not meet

standards could be improved with changes to allotment management, including, but not limited to:

- increasing length of rest periods between grazing periods;
- changing season of use;
- altering livestock turnout location;
- changing grazing intensity;
- changing grazing duration; and
- improving livestock distribution.

Improved livestock distribution could be achieved through construction of water developments and fences, selective salt and/or mineral placement, and changes to livestock turnout location and season of use. In some cases, fencing may be used to protect upland and/or riparian areas.

A grazing permit is the document which authorizes livestock grazing use of BLM-administered lands within an established grazing district, whereas a grazing lease is the document which authorizes livestock grazing use of BLM-administered lands outside an established grazing district (43 CFR 4100.0-5). The kind and number of livestock, the period of use (seasonal), the allotment to be used, and the amount of use in AUMs and the percent BLM-administered lands utilized are mandatory terms and conditions of every grazing permit or lease (43 CFR 4130.3). An AUM is the amount of forage necessary for the sustenance of one cow (1,000 pounds with calf) or its equivalent for one month and an allotment is an area of land designated and managed for grazing of livestock (43 CFR 4100.0-5). Various animals can graze on public lands and have varying forage requirements, which can be displayed in AUM equivalents. The most common classes of livestock in the planning area are cattle, bison (one AUM equivalent), and sheep (0.2 AUM equivalents).

3.13.1 Conditions of the Planning Area

Grazing in the planning area is concentrated in the south-western portion of the state, in Bowman County. The majority of livestock grazing occurs on open, rolling plains or river breaks. Vegetation in the river breaks varies from open grassland to juniper woodlands. Grazing allotments cover a patchwork of land ownership including private lands, BLM-administered lands, Forest Service-administered grasslands, and state lands (see **Figure 3-7**, Planning Area Grazing Allotments, in **Appendix A**). The majority of grazing allotments in the planning area are within PPH.

Local landowners are working together with the National Resource Conservation Service's (NRCS) Bowman-Slope Soil Conservation District and other partners on rangeland health. A working group called Grassing Ranchers About Sustainable Stewardship has been formed to help ranchers and other

landowners with GRSG habitat issues and facilitate agency work with landowners.

WAFWA Management Zone 1

Table 3-33, Grazing Allotments within GRSG Habitat, and **Table 3-34**, Fences within GRSG Habitat, display data compiled in a BER produced by the USGS and BLM (Manier et al. 2013). In each table, data are presented by surface management agency and their occurrence within PGH and PPH in the planning area and MZ I. The data and information included from the BER is the most accurate data available from when the data was "frozen" in time for analysis purposes; however, these scenarios remain based in present knowledge. Spatial data informing the existing conditions were compiled to establish a consistent information basis across the entire region (GRSG Management Area), but in order to attain this consistently across state, ownership, and management boundaries some local data have been omitted; therefore, there may be inconsistencies between WAFWA-level and local planning-level data. As such, these data provide a regional baseline, suitable for guiding regional mid- to long-term analysis scenarios (Manier et al. 2013).

On lands of all surface management, there is a total of 341,400 acres of grazing allotments, with 70,800 in PGH and 270,600 in PPH as displayed in **Table 3-33**.

Structural range improvements may present a risk to GRSG, particularly fences, which when not designed with special provisions for GRSG, can cause fence collisions or provide hunting raptors a place to perch. In the planning area, there are approximately 1,000 miles of fence, 700 in PGH, and 300 in PPH based on BER data.

Table 3-33
Grazing Allotments within GRSG Habitat

Surface Management Agency	Total Acres[1]		Acres within PGH		Acres within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	32,900		100	4,443,000	32,800	2,982,200
Forest Service	95,500		29,400	510,300	66,100	291,000
Tribal and Other Federal	0		0	137,200	0	10,600
Private	201,700		39,800	11,338,100	161,900	4,619,800
State	11,300		1,500	1,194,300	9,800	681,000
Other	0		0	3,100	0	300

Source: BLM 2012a

Table 3-34
Fences within GRSG Habitat

Surface Management Agency	Total Miles[1]		Miles within PGH		Miles within PPH	
	Planning Area	MZ I	Planning Area	MZ I	Planning Area	MZ I
BLM	63	30,000	59	11,300	4	18,700
Forest Service	200	7,000	100	900	98	6,100
Tribal and Other Federal	0	1,000	0	500	0	500
Private	700	32,200	500	32,100	200	100
State	48	14,000	37	3,300	11	10,700
Other	0	1,400	0	0	0	1,400

Source: BLM 2012a
[1]Derived from a dataset that identifies pasture and allotment borders on BLM and Forest Service land as potential fences.

3.13.2 Conditions on BLM-Administered Lands

Within the planning area the majority of BLM-administered land is open to grazing (32,820, over 99 percent) (see **Table 3-35**, North Dakota Field Office Planning Area – Grazing Allocation on BLM-Administered Lands). No portion of BLM-administered lands in the planning areas is closed to grazing, and approximately 85 acres (less than one percent) of the planning area are not allocated for grazing (i.e., not specified as open or closed to grazing in existing land use plans) (BLM 2012a). Currently, the BLM manages grazing on 28 grazing allotments in the planning area; 26 of these authorizations are for cattle, one is for bison, and one is for sheep. There are 5,780 authorized AUMS on these allotments. **Table 3-36**, North Dakota Field Office Planning Area – AUMs by Allotment, provides information for each allotment managed in the planning area.

Table 3-35
North Dakota Field Office Planning Area – Grazing Allocation on BLM-Administered Lands

	Non Habitat	PGH Acres	PPH Acres	Totals Acres
Open to grazing	45	80	32,820	32,945
Closed to grazing	0	0	0	0
Not allocated	5	0	80	85

Source: BLM 2012a

Table 3-36
North Dakota Field Office Planning Area – AUMs by Allotment*

Allotment No.	Allotment Name	Public AUMs	Management Category	Type Livestock	Habitat Type
07371	Bison Creek	13	C	Cattle	PPH
10590	Cedar Hills	1,629	M	Cattle	PPH
10595	Brushy Draw	53	C	Cattle	PPH
10597	Bog Creek	22	C	Bison	PPH
10627	Badger	34	C	Cattle	PPH
10631	Box Elder	318	C	Cattle	PPH
10641	Rattlesnake Butte	24	C	Cattle	PPH
10642	Long Grass	108	C	Cattle	PPH
10671	Twin Forty	12	C	Cattle	PPH
20603	Wildcat	13	C	Sheep	PPH
20608	Antler	20	C	Cattle	PPH
20610	Badlands	39	C	Cattle	PPH
20611	Spotted Mouse	11	C	Cattle	PPH
20614	Antelope Butte*	1,092	M	Cattle	PPH
20615	Little Mo	38	C	Cattle	PPH
20618	Grassy Knoll	30	C	Cattle	PPH
20633	Sevenmile	173	C	Cattle	PPH
20636	Austby	15	C	Cattle	PPH
20638	Mud Butte	100	C	Cattle	PPH
20649	Stove Top	10	C	Cattle	PPH
20650	Worser Creek	190	C	Cattle	PPH
20651	Big Gumbo	130	M	Cattle	PPH
20659	Tatanka	56	C	Cattle	PPH
20661	Latigo	100	C	Cattle	PPH
20663	Kid Creek	340	I	Cattle	PPH
20677	Cold Turkey Creek	20	C	Cattle	PGH
20678	Kalina	8	C	Cattle	PPH
20696	Border	4	C	Cattle	Non-habitat
Total	**28 Allotments**	**5,780**	**NA**	**NA**	**NA**

Source: BLM 2010a
*Note: Antelope Butte allotment AUMs displayed for the entire allotment, which includes a portion of the allotment in Montana, outside of the planning area.

Many allotments have range improvements such as fences, stock ponds, pipelines, springs, windmills, seedings, wells, and access roads for livestock management purposes.

Livestock grazing allotments are administered under three selective management categories designed to concentrate public funds and management efforts on allotments with the most significant resource conflicts and the greatest potential for improvement (BLM Manual Handbook 1740-1, BLM 2008c).

The categories include:

- Improve (I) category allotments: are managed to resolve high level resource conflicts and concerns and receive highest priority for funding and management actions.
- Maintain (M) category allotments: are managed to maintain currently satisfactory resource conditions and will be actively managed to ensure that resource values do not decline.
- Custodial (C) category allotments: are managed custodial to protect resource conditions and values.

In addition to criteria identified in the handbook, recent guidance (Washington Office IM-2009-018, BLM 2008d) provides additional criteria to be used to designate allotments as Category I, M, or C. In the planning area, one allotment is managed in the "I" category, three are in the "M" category, and the remaining 24 are in the "C" category (BLM 2010a).

On GRSG habitat (PPH and PGH), there are all or portions of 26 and one allotments respectively (**Table 3-37**, North Dakota Field Office Planning Area– Allotments and AUMs by Habitat Category). These allotments cover approximately 32,800 acres in PPH and 80 acres in PGH.

Table 3-37
North Dakota Field Office Planning Area– Allotments and AUMs by Habitat Category

	Non Habitat	PGH	PPH	Totals
Number of Active AUMS	8	20	5,752	5,780
Number of Allotments	1	1	26	28

Source: BLM 2012a

An assessment of rangeland health standards and guidelines has been made on all 28 allotments in the planning area, comprising 32,945 acres (see **Table 3-38**, North Dakota Field Office Planning Area – Land Health Assessment). Based on the most recently completed land health assessment, 29,728 acres are meeting all applicable standards and guidelines and 3,217 acres are not meeting standards. Livestock grazing on a 1,309-acre allotment was a causal factor for failing to achieve applicable standards and guidelines. Management actions have now occurred to ensure that this allotment is making progress towards achieving rangeland health standards and guidelines. No standards and guidelines assessments have been made on the 85 acres of non-allocated land in within the NDFO.

Table 3-38
North Dakota Field Office Planning Area – Land Health Assessment

	Non Habitat	PGH acres	PPH acres	Totals acres
Total acres of allotments assessed for land health standards	40	80	32,820	32,945
Acres meeting land health standards	40	0	29,688	29,728
Acres not meeting land health standards	0	80	3,137	3,217
Acres not meeting land health standards due to livestock grazing	0	0	1,309	1,309
Acres of allotments not assessed	5	0	80	85

Source: BLM 2012a

3.13.3 Trends

The two primary factors driving trends for grazing resources in the planning area are the impacts of a long-term drought and increased recreational use and recreational value of rangelands.

Permitted use levels have remained static since the last RMP was written in 1988. Current use of allotments has been down since 2000 as a result of drought (BLM 2010a). The primary factor causing lowered levels of livestock use has been inadequate reservoir water, and a secondary factor has been lowered forage production. Water development from drought cost-share and other programs has increased, resulting in additional wells and stock water pipelines on rangelands. Normally, the majority of these improvements are installed on private land but extend into BLM-administered land. Drought, fire, disturbance, and improper grazing practices can also affect the abundance of cheat grass

(*Bromus tectorum* and *Bromus japonicus*). The NDFO documented a distinct increase in cheatgrass within the planning area during 2005 through 2008 (BLM 2010a). Cheatgrass is unpalatable to livestock and wildlife except in its early growth phase. The end result is decreased productivity of overall forage levels. If drought conditions continue, alteration of grazing management practices may be required.

3.14 AREAS OF CRITICAL ENVIRONMENTAL CONCERN

ACECs are defined in FLPMA and in 43 USC 1702(a) and 43 CFR 1601.0-5(a) as areas where special management attention is required to protect and prevent irreversible damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The intent of Congress in mandating the designation of ACECs was to give priority to the designation and protection of areas containing unique and significant resource values. ACECs are areas within BLM-administered lands where special management attention is required to protect or to prevent irreparable damage to relevant values. These values identified in the ACEC nomination process must meet a set of importance criteria (BLM 1988b). The value, resource, process or natural system, or hazard present must have one of more of the following:

- More than locally significant qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern
- Qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change
- Recognition as warranting protection in order to satisfy national priority concerns or to carry out mandates of FLPMA
- Qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare
- Qualities that pose a significant threat to human life and safety or to property

An ACEC must also require special management attention to protect the identified relevant and important values. Special management attention refers to management prescriptions that are developed during preparation of an RMP or RMPA expressly to protect relevant and important values of an area from the potential effects of actions permitted by the RMP. These are management measures that would not be necessary and prescribed if the critical and important features were not present (BLM 1988b). ACECs are areas where natural processes are allowed to predominate and that are preserved for the primary purposes of research and education.

3.14.1 Conditions of the Planning Area

There are no ACECs in the planning area.

3.14.2 Conditions on BLM-Administered Lands

There are no ACECs in the planning area.

3.15 AIR RESOURCES

Air resources include air quality and air quality related values (AQRVs). The US Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including criteria air pollutants subject to National Ambient Air Quality Standards (NAAQS). Pollutants regulated under NAAQS include carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter with a diameter less than or equal to 10 microns (PM_{10}), particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2). Two additional pollutants, nitrogen oxides (NO_x) and volatile organic compounds are regulated because they form ozone in the atmosphere.

In addition to EPA federal regulations, air quality is regulated by the North Dakota Department of Health (NDDoH), Division of Air Quality. This agency develops state-specific regulations and issues air quality permits to emission sources.

Ambient air quality is affected by the type and amount of air pollutants emitted into the atmosphere, the size and topography of the air basin, prevailing meteorological conditions, and the conversion of air pollutants and other species by a complex series of chemical and photochemical reactions in the atmosphere. The levels of air pollutants are generally expressed in terms of concentration, either in units of parts per million (ppm), parts per billion (ppb), or micrograms per cubic meter ($\mu g/m^3$).

AQRVs include effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility.

3.15.1 Conditions of the Planning Area

North Dakota is in attainment for all NAAQS (EPA 2012a). The NDDoH, Division of Air Quality operates an ambient air quality monitoring network. This network monitors criteria air pollutant concentrations at six monitoring sites in western North Dakota and one site in eastern North Dakota (NDDoH 2012). The National Park Service operates an additional criteria pollutant monitoring site in the south unit of the Theodore Roosevelt National Park. In addition, NDDoH requires three major industrial sources to conduct SO_2 monitoring at eight locations in the state (NDDoH 2012). There are no monitoring sites in the planning area; the nearest monitoring sites are the National Park Service site in Billings County and an NDDoH site in Dunn County. The National Park Service site monitors for ozone, $PM_{2.5}$, and SO_2, and the Dunn County site monitors for ozone, NO_2, $PM_{2.5}$ (as of 2011), PM_{10}, and SO_2.

Table 3-39, Air Quality Monitor Values in Billings and Dunn Counties (2009-2011), shows the concentrations of monitored pollutants in the latest three years for which data has been finalized. All monitored criteria pollutant concentrations were below the NAAQS during this time period (EPA 2012b).

Table 3-39
Air Quality Monitor Values in Billings and Dunn Counties (2009-2011)

Monitored Pollutant	Averaging Time	2009	2010	2011	3-year average	NAAQs	% of NAAQS
Billings County							
Ozone	8 hours	0.056	0.061	0.057	0.058	0.075 ppm	77
SO_2	1 hour	9	6	5	6.7	75 ppb	9
$PM_{2.5}$	24 hours	10	12	10	10.7	35 μg/m³	30
$PM_{2.5}$[1]	Annual	4.1	4.7	4.1	4.3	12μg/m³	36
Dunn County							
Ozone	8 hours	0.054	0.058	0.054	0.055	0.075 ppm	74
NO_2	1 hour	11	13	8	10.7	100 ppb	11
SO_2	1 hour	10	19	10	13	75 ppb	17
PM_{10}	24 hours	52	32	74	52.7	150 μg/m³	35

Source: BLM 2012a; EPA 2012a; EPA 2012b

Air quality also may be assessed using the EPA's air quality index (AQI). The AQI is an index used for reporting daily air quality to the public. The index tells how clean or polluted an area's air is and whether associated health effects might be a concern. The EPA calculates the AQI for five criteria air pollutants regulated by the Clean Air Act: ground-level ozone, particulate matter, CO, SO_2, and NO_2. 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 (USG) –** When AQI values are between 101 and 150, members of "sensitive groups" may experience health effects. 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

[1] $PM_{2.5}$ standard was revised on March 18, 2013, and the percentage shown reflects the revised standard.

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 effects, and members of the sensitive groups may experience more serious effects.
- **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 effects.

Table 3-40, Air Quality Index Report (2009-2011), displays the number of days rated "Good" in the AQI, based on data collected from the Billings County monitor between 2009 and 2011. AQI data show there is little risk to the general public from air quality in the planning region. Air quality in the area has consistently been good for the past three years.

Table 3-40
Air Quality Index Report (2009-2011)

Year	Number of Days with AQI	Number of Days rated Good	Percent of Days Rated Good	Number of Moderate Days	Number of USG, Unhealthy, or Very Unhealthy Days
2011	365	365	100%	-	0
2010	357	353	99%	4	0
2009	365	364	99%	1	0
Total	**1,087**	**1,082**		**5**	**0**
Average		**100%**		**0%**	

Source: EPA 2012c
USG = unhealthy for sensitive groups

AQRVs include visibility, which can be degraded by regional haze due primarily to sulfur, nitrogen, and particulate emissions. Since 1980, the Interagency Monitoring of Protected Visual Environments (IMPROVE) network has measured visibility in national parks and wilderness areas. Based on trends identified from 1998 through 2008, visibility had remained stable at the Lostwood Wilderness and Theodore Roosevelt National Park IMPROVE monitor stations on the haziest days (20 percent worst days). On the 20 percent best (clearest) days, visibility at these monitors has been improving, with greater improvement at Theodore Roosevelt National Park (IMPROVE 2011).

Atmospheric deposition refers to processes in which air pollutants are removed from the atmosphere and deposited into terrestrial and aquatic ecosystems. Air pollutants can be deposited by either wet precipitation (via rain or snow) or dry

(gravitational) settling of particles and adherence of gaseous pollutants to soil, water, and vegetation. Much of the concern about deposition surrounds the secondary formation of acids and other compounds that can contribute to acidification of lakes, streams, and soils and affect other ecosystem characteristics, including nutrient cycling and biological diversity. Deposition varies with precipitation and other meteorological variables such as temperature, humidity, winds, and atmospheric stability.

The National Atmospheric Deposition Program/National Trends Network is an interagency sponsored network of monitoring stations that measures wet atmospheric deposition. The Clean Air Status and Trends Network is an interagency network of monitoring stations managed by EPA that measures dry deposition. The closest sites to the planning area that are within these networks are in Theodore Roosevelt National Park; dry deposition rates have been measured since 1998, and wet deposition rates have been measured since 2001. The annual average precipitation pH between 2004 and 2011 ranged from 5.38 to 5.81 during this time period, with an average of 5.65. Normal rain has a pH level of 5.6, while acid rain has a pH level around 4.3 (EPA 2012d).

Table 3-41, Annual Average Deposition (2004-2011), shows the wet deposition levels of sulfates, nitrates, and ammonium, as well as pH and precipitation, from 2004 to 2011 and the dry deposition levels of sulfur and nitrogen from 2004 to 2010.

Table 3-41
Annual Average Deposition (2004-2011)

Year	pH	Precipitation (centimeters)	Annual Average Wet Deposition (kg/ha/yr)			Annual Average Dry Deposition (kg/ha/yr)	
			SO_4	NO_3	NH_4	Sulfur ($SO_2 + SO_4^{2-}$)	Nitrogen ($HNO_3+NO_3+NH_4$)
2004	5.38	27.7	1.67	2.07	0.88	0.5	0.7
2005	5.58	48.2	3.34	4.14	1.82	0.5	0.6
2006	5.71	24.4	2.15	3.12	1.46	0.5	1.0
2007	5.81	35.7	2.53	3.41	2.02	NA	NA
2008	5.63	26.9	1.98	2.64	1.29	0.3	0.7
2009	5.72	34.3	2.07	2.63	1.29	0.3	0.6
2010	5.64	58.1	2.61	3.96	2.11	0.3	0.6
2011	5.75	59.7	3.04	3.45	2.11	NA	NA
Ave	5.65	39.38	2.42	3.18	1.62	0.4	0.7

Source: NADP/NTN 2012; EPA 2004-2010
SO_4=sulfates; NO_3=nitrates; NH_4=Ammonium
kg/ha/yr = kilogram/hectare/year

There are no designated Class I areas within the planning area. The nearest Class I area is Theodore Roosevelt National Park, which is approximately 45 miles northeast of the northern edge of the planning area. There are two USFWS National Wildlife Refuges within Slope County; these refuges are considered potentially sensitive Class II areas. The Stewart Lake National Wildlife Refuge is in the east-central portion of the planning area, while the White Lake National Wildlife Refuge lies approximately 10 miles east of the planning area.

3.15.2 Conditions on BLM-Administered Lands

The area managed by the NDFO is in compliance with all NAAQS (NDDoH 2011, pg. 1-2). The Billings County monitoring location is the closest air quality monitor to the BLM-administered lands. As such, this monitoring location has the best estimate to what kind of air quality is present in the planning region, and more specifically, on BLM-administered lands. The conditions on BLM-administered lands are similar to those discussed in *Conditions of the Planning Area*.

3.15.3 Trends

Quantitative data provided by the Billings and Dunn County monitors show air quality has been consistently good in the planning area (EPA 2012c). The good air quality is largely attributed to the rural nature of the planning region.

The National Park Service 2008 Annual Performance and Progress Report details air quality and AQRV trends in National Parks, including Theodore Roosevelt National Park (NPS 2009). This report shows that the haze index on haziest days and sulfate, nitrate, and ammonium concentrations in precipitation have remained stable in the 1998 to 2007 time period, while the haze index on the clearest days has improved (NPS 2009, pg. 33-39).

3.16 CLIMATE

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 persist for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity" (IPCC 2007, pg. 667). 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 (BLM 2010b). This document is often referred to as the "Climate Change SIR" and is incorporated by reference into the North Dakota Greater Sage-Grouse RMPA/EIS.

Earth has a natural greenhouse effect, wherein naturally occurring gases such as water vapor, carbon dioxide, methane, and nitrous oxide absorb and retain heat. Without the natural greenhouse effect, the earth would be approximately 60°F cooler (BLM 2010b, pg. 2-16). Climate change is caused in part by the

increase in GHGs in the atmosphere beyond naturally occurring levels[1]. Over time the amount of energy sent from the sun to the Earth's surface should be approximately the same as the amount of energy radiated back into space, leaving the temperature of the Earth's surface roughly constant. Increased levels of GHGs trap more heat in the atmosphere rather than allowing it to escape back into space.

Climate models predict that if GHGs continue to increase, the average temperature at the Earth's surface could increase from 3.2 to 7.2°F (1.8 to 4.0°C) above 1990 levels by the end of this century (EPA 2011b). An increase in the average temperature of the Earth may produce changes in sea levels, rainfall patterns, and intensity and frequency of extreme weather events. The IPCC, in its Fourth Assessment Report, stated that warming of the earth's climate system is unequivocal and that warming is very likely due to anthropogenic (human-caused) GHG concentrations (IPCC 2007, pg. 5).

3.16.1 Conditions of the Planning Area

Climate

The climate in North Dakota is characterized by its unpredictability. The state experiences blizzards, floods, droughts, tornados, hail storms, thunderstorms, high winds, severe cold spells, and extreme heat (Center for Integrative Environmental Research 2008, pg. 5).

The annual average temperature ranges from about 37°F in northeastern North Dakota to 44°F along most of the southern border. Average January temperatures range from near 0°F in the northeast to 15°F in the southwest. Average July temperatures range from 65°F in the northeast to 72°F in the south. The average number of days per year with maximum temperatures of 90°F or more range from 10 in the northeast to 24 in the west and south. Below 0°F temperatures average about 40 to 70 days each year across the state (Enz 2003).

Average annual precipitation ranges from about 14 to 22 inches from northwestern to southeastern North Dakota. Most precipitation falls as rain from April to September. The coldest months, November through February, average only about 0.50 inches per month, mostly as snow. Despite its northerly location, North Dakota's annual snowfall of 25 to 45 inches is less than other

[1] There are six GHGs tracked by the IPCC: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (State Department 2010). The latter three gases are known as high global warming potential gases due to their warming effectiveness (140 to 23,900 times greater than carbon dioxide) (State Department 2010, pg. 24). Carbon dioxide, methane, and nitrous oxide have both natural and human-generated sources, while high global warming potential gases are strictly human-generated from various industrial processes. GHG emissions are tracked as carbon dioxide equivalents, with one gram of carbon dioxide molecule counting as one and other GHG molecules counting as some multiple (EPA 2012d).

northern states. Winter snowpack averages nine to 15 inches from southwest to northeast (Enz 2003).

Greenhouse Gas Emissions

GHG emissions are generally reported at national and statewide levels. No comprehensive GHG emission inventory has been prepared for North Dakota. However, under the Greenhouse Gas Reporting Rule, facilities emitting more than 25,000 metric tons of GHGs annually are required to report their emissions. The EPA's GHG Reporting Program shows that 40 emitters in North Dakota are required to report their emissions under the program; none of these emitters are located in the planning area counties. These 40 facilities emitted over 37.6 million metric tons of carbon dioxide equivalents in 2010; 82 percent of these emissions came from power plants (EPA 2010b). As reported by the North Dakota Division of Air Quality, carbon dioxide emissions from fossil fuel combustion totaled 48.98 million metric tonnes of carbon dioxide in 2007 (this estimate did not include emissions from other GHGs).

Sources of GHG emissions include fossil fuel development, large wildfires, activities using combustion engines, and agriculture (fertilizer production and methane produced by livestock). No information on the specific GHG emission sources and their percentage contribution to overall levels is currently available for North Dakota.

3.16.2 Conditions on BLM-Administered Lands

Conditions on BLM-administered lands are similar to those described above for the planning area.

3.16.3 Trends

Climate changes over the past 100 years are well documented and climate change is expected to continue into the future. Fossil fuel combustion and other human-caused GHG-producing activities are ongoing, although public awareness and future regulations may reduce annual GHG emissions. Due to the long atmospheric lifetimes of most GHGs, climate change impacts will continue to increase for many years after GHG emissions decrease (EPA 2012d).

Over the past 100 years, annual temperature and precipitation have increased, and climate models predict that they will continue to increase through the 21st century. In the Great Plains, the average annual temperature has increased by about two degrees Fahrenheit over the past 100 years (National Conference of State Legislatures 2008). Depending on the model, in North Dakota temperature increases between three and five degrees Fahrenheit by the mid-21st century and between five and nine degrees Fahrenheit at the end of the century are predicted (US Global Change Research Program 2009, pg. 123). Precipitation is expected to increase during winter and spring, decrease slightly in the summer, and remain relatively unchanged in the fall (US Global Change Research Program 2009, pg. 125). Extreme weather events such as severe

drought and intense rainfall are expected to increase in frequency (National Conference of State Legislatures 2008). In the western portion of the state, annual median runoff is expected to decrease between two and five percent by the mid-21st century, while runoff in the northeastern part of the state is expected to increase by five to 10 percent (US Global Change Research Program 2009). Temperature increases may increase crop yields, which may encourage parts of the state not previously used for agriculture to be obtained for that purpose (National Research Council 2010).

Wildland fire risk is predicted 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 1.8°F (1°C) global average temperature increase, to be 393 percent (National Research Council 2010). Changes in timing of precipitation and earlier runoff would increase fire risks.

Climate change has caused large-scale shifts in the ranges of species and the timing of the seasons and animal migrations within ecosystems of the US. Documented changes include the arrival of spring an average of 10 days to two weeks earlier through much of the US compared to 20 years ago, and multiple bird species now migrate north earlier in the year. These shifts are expected to continue and would likely impact the GRSG as climate change continues to affect their habitat (US Climate Change Science Program 2008).

3.17 SOIL RESOURCES

Soil processes determine, to a large extent, the structure and function of ecosystems. Soil health is integral to the BLM's mandate to sustain the health, diversity, and productivity of BLM-administered lands.

The existing North Dakota RMP has the following objectives related to soils:

- Soils of the BLM-administered lands will be managed to maintain productivity and promote sustained yields while keeping erosion at minimal/acceptable levels and preventing physical or chemical degradation.
- Proposed surface-disturbing projects will be analyzed to determine suitability of soils to support or sustain such projects. They will be designed to minimize soil loss. Bureau management actions and objectives will be consistent with soil resource capabilities.

In combination with climate, soil type and quality are the primary determining factors that determine whether sagebrush can exist in a given location. Soil type and quality also determine which variety of sagebrush community is able to thrive. Since the presence of GRSG is dependent upon the presence of sagebrush, and sagebrush type and viability are dependent on soil type and quality, soils are an important element in GRSG habitat.

3.17.1 Conditions of the Planning Area

Sagebrush occurs only within the southwest corner of North Dakota and is within the Silver Sagebrush Subdivision floristic province. Miller and Eddleman (2001) describe plains silver sagebrush (*Artemisia cana* var. *cana*) as a sagebrush community type that is widespread over the northern Great Plains at elevations of 1,200 to 2,100 meters that occupy well-drained alluvial flats, terraces valley bottoms, and drainage ways.

In the NDFO GRSG planning area overall, the soil resources condition is good, with some areas demonstrating diminished, unstable, or eroded soils due to grazing and other resource uses such as mineral development.

3.17.2 Conditions on BLM-Administered Lands

Table 3-42, Major Soil Orders on BLM-Administered Lands, provides acreage numbers for soils within the BLM-administered lands that occur within the planning area.

Table 3-42
Major Soil Orders on BLM-Administered Lands

Soil Type	Total acres (33,030 total)	PPH acres (32,900 total)	PGH acres (80 total)
Undetermined	4,382	4,338	36
Clayey	148	146	0
Clayey Terrace	44	44	0
Claypan	94	94	0
Closed Depression	2	2	0
Loamy	318	313	0
Loamy Overflow	159	159	0
Loamy Terrace	256	256	0
Saline Lowland	1,598	1,598	0
Sands	2	0	0
Sandy	600	600	0
Sandy Claypan	1,945	1,918	8
Sandy Terrace	300	296	0
Shallow Clayey	17,567	17,565	0
Shallow Loamy	939	939	0
Shallow Sandy	1,526	1,525	1
Thin Claypan	1,989	1,948	35
Thin Loamy	214	214	0

Table 3-42
Major Soil Orders on BLM-Administered Lands

Soil Type	Total acres (33,030 total)	PPH acres (32,900 total)	PGH acres (80 total)
Thin Sands	674	674	0
Very Shallow	95	95	0
Wet Meadow	176	176	0

Source: BLM 2012a

Farmlands of Statewide Importance occur on BLM-administered lands within the planning area, as shown in **Table 3-43,** Summary of NRCS Farmlands on BLM-administered Lands.

Table 3-43
Summary of NRCS Farmlands on BLM-administered Lands

Farmland Classification	Total Acres	PPH Acres	PGH Acres
Prime	0	0	0
Unique	0	0	0
Statewide Importance	1,380	1,372	0

Source: BLM 2012a

3.17.3 Trends

Soil quality and quantity has degraded over time due to disturbance related to livestock grazing and mineral development. Compaction related to mineral development and in certain areas of livestock operations has also increased over time. Implementation of the BLM's Standards for Rangeland Health Guidelines has reduced the potential for soil erosion in current grazing management areas and requirements for commercial operations to reclaim and restore damaged soils have slowed or reversed soil degradation. Invasive species potentially alter soil chemistry which influences plant community succession. Vegetative community changes affect soil stability and hydrologic function.

3.18 WATER RESOURCES

This section includes a description of indicators, existing conditions, and trends for water resources. Streams and water quality are the focus of this section. Wetlands (including riparian areas) are discussed in **Section 3.1**, Vegetation (Including Noxious Weeds; Riparian and Wetlands). Water on BLM-administered lands is regulated by the Clean Water Act, Safe Drinking Water Act, Public Land Health Standards, and other laws, regulations, and policy guidance at the federal, state, and local levels.

3.18.1 Conditions of the Planning Area

The Missouri River and lakes Sakakawea and Oahe are the largest sources of surface water in North Dakota. Approximately 54,427 miles of rivers and streams exist in North Dakota. The major rivers and their tributaries include the Missouri, Yellowstone, Little Missouri, Knife, Heart, and Cannonball rivers (BLM 2010a).

Water in the planning area is used for stock watering, irrigation, and potable water. The minerals industry also uses a significant amount of water, mostly for oil and gas hydro-fracturing and dust suppression. Recreation and fish and wildlife uses are also important, but they do not consume appreciable quantities of water and are generally incidental to other uses (BLM 2010a).

3.18.2 Conditions on BLM-Administered Lands

Surface Water

The main river that flows through BLM-administered lands is the Little Missouri River. The major constituents affecting the quality of water in the Missouri River mainstem (including lakes Sakakawea and Oahe) are sodium, magnesium, calcium, sulfate, and bicarbonate. Water from the Missouri River is suitable for public supply, domestic uses, and irrigation uses (BLM 2010a).

Tributaries of the Missouri River usually have peak flows in response to snowmelt runoff and summer storms. These waters are of poorer quality due to total dissolved solids. Water from the Missouri River tributaries is marginally suitable for public supply, domestic supply, and marginal to unsuitable for irrigation use (BLM 2010a).

The Big Gumbo area is within the unglaciated Northern Great Plains physiographic province of the Missouri River Plateau (the southwest portion of Bowman County, between the Little Missouri River and the Montana state line). Rain on ice or snowpack, rain on saturated soils, or intense summer thunderstorms are the precipitation events that will typically produce runoff. Surface drainage of the area is from west to east through ephemeral channels into the Little Missouri River. Surface water is available in small quantities. Small reservoirs of between five and 12 acre-feet in size provide water for livestock and wildlife uses. Water quality is the major limiting factor for water use because of the high dissolved solids in the reservoirs and streams. Due to the relatively high sediment loads, reservoirs can be expected to last ten or twenty years before they silt in (BLM 2010a).

Ephemeral streams do not flow during an average water year, but do flow in response to large precipitation events. Intermittent streams flow during spring runoff for an average water year, but generally dry up later in the summer. Perennial streams contain some water all year for an average water year. Most of the streams on BLM-administered land are intermittent and flow from March to July. However, streams can still contain water during other months due to

stored water being fed to the streams from shallow groundwater sources or floodplains. **Table 3-44**, Streams on BLM-Administered Lands in the Planning Area, lists information for perennial and intermittent streams on BLM-administered lands in the planning area.

Table 3-44
Streams on BLM-Administered Lands in the Planning Area

Stream Name	Total Miles	Miles on BLM-Administered Land	Miles on PPH on BLM-Administered Land	Miles on PGH on BLM-Administered Land
Unnamed	3,031.06	171.42	170.61	0.59
Alkali Creek	29.26			
Bacon Creek	27.25			
Big Gumbo Creek	11.89	10.69	10.69	
Bog Creek	5.96	0.11	0.11	
Boxelder Creek	8.16	0.83	0.83	
Boyce Creek	19.74			
Buffalo Creek	5.76			
Bull Run Creek	27.55			
Butte Creek	5.35			
Cannonball Creek	20.85			
Cash Creek	15.54			
Cold Turkey Creek	20.196			
Corral Creek	7.34			
Cottonwood Creek	18.58			
Coyote Creek	27.90			
Deep Creek	47.27			
Dugout Creek	4.67			
East Fork Deep Creek	29.20			
First Creek	15.98			
Fivemile Creek	21.53	0.38	0.38	
Hay Creek	12.91			
Horse Creek	39.80			
Indian Creek	16.63			
Johny Creek	7.71			
Kid Creek	9.84	1.71	1.71	
Little Beaver Creek	23.91			
Little Missouri River	145.78	0.98	0.98	
Lone Tree Creek	21.92			
Mud Creek	14.78			
North Butte Creek	6.31			
North Fork Grand River	23.11			

Table 3-44
Streams on BLM-Administered Lands in the Planning Area

Stream Name	Total Miles	Miles on BLM-Administered Land	Miles on PPH on BLM-Administered Land	Miles on PGH on BLM-Administered Land
Sand Creek	32.31			
Second Creek	8.16			
Sevenmile Creek	22.94	2.48	2.48	
Sheep Creek	3.17			
Skull Creek	21.72	0.65	0.65	
Soda Creek	8.92			
South Butte Creek	11.48			
South Mosquito Creek	7.73			
Spring Coulee	76.40			
Spring Creek	6.33			
Third Creek	7.50			
West Fork Deep Creek	27.53			
Williams Creek	24.96			
Worser Creek	6.17	0.18	0.18	

Source: USGS 2012

Riparian areas are ecosystems that occur along rivers, streams, or waterbodies. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Typical riparian areas are lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers, streams, and shores of lakes and reservoirs with stable water levels. Excluded are such sites as ephemeral streams or washes that do not exhibit vegetation dependent on free water in the soil. Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and which, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, swamps, lakeshores, sloughs, bogs, wet meadows, estuaries, and riparian areas. Even though riparian and wetland areas occupy only a small percentage of BLM-administered land in the planning area these areas provide a wide range of functions critical to many different wildlife species, improve water quality, provide scenery, and provide recreational opportunities.

Healthy surface water sources (such as ponds, lakes, and wetlands) provide habitat for insects and animals that are predators of mosquitos. Areas that both have standing water and do not support predators of mosquitos can be areas where mosquito populations increase. The conditions of wetlands (including

riparian areas) are discussed in **Section 3.5**, Vegetation (Including Noxious Weeds; Riparian and Wetlands).

Water developments are also influential sources of water for wildlife. Water developments can function for multiple uses. They provide additional and alternative sources of water for wildlife and livestock, and can decrease use of riparian areas. Within the planning area there are water developments for use by recreation, livestock, or wildlife.

Water Quality

Water quality, as defined by the Clean Water Act, includes all the physical, biological, and chemical characteristics which affect existing and designated beneficial uses. The State of North Dakota is required to identify which beneficial uses a water body currently supports or could support in the future. Water quality standards are established to protect the beneficial uses of the state's waters. Beneficial uses are identified for specific waters. Designated beneficial uses for water bodies include municipal or domestic supply, aquatic life, propagation of wildlife, irrigation, livestock watering, recreation, and industrial supply (BLM 2010a). Water must meet federal and state standards to be used for the beneficial uses designated for the water, and water that does not meet these standards is considered to be impaired.

The State of North Dakota is required by Section 303(d) of the Clean Water Act to identify waters that are water quality impaired because of failing to meet their designated beneficial uses. Section 303(d) requires that each state develop a list of water bodies that fail to meet water quality standards and delineate stream segments and listing criteria for all streams. The 303(d) list of impaired waters is updated biannually, and the state is required to develop a total maximum daily load allocation for each pollutant of concern. There are no impaired streams on BLM-administered lands (BLM 2012a).

Upland and riparian land health conditions greatly influence water quality. Conditions that affect water quality can be summarized as the amount of near-stream vegetation, channel shape, and hydrology. Many of these conditions are interrelated and many vary considerably across the landscape. Management activities involving ROW disturbance, grazing, and fire in the planning area create situations that alter these conditions, thereby altering water quality.

Groundwater

Groundwater is more evenly distributed throughout the state than surface water. Most wells finished in aquifers yield small quantities of water that generally are not large enough for commercial uses but are adequate for domestic and livestock uses. Most rural and municipal water users in North Dakota depend on ground water for their domestic water source (BLM 2010a).

The quality of the groundwater is a function of the chemical makeup of the underground formation containing the water. Springs and seeps occur in areas

where water from aquifers reaches the surface. Many springs begin in stream channels; others flow into small ponds or marshy areas that drain into channels. Some springs and seep areas form their own channels that reach flowing streams, but other springs lose their surface expression and recharge alluvial fill material or permeable stratum.

Springs and seeps are important to aquatic habitats because of the perennial base flow they provide to a stream. The outflow from springs in summer usually helps to maintain lower water temperatures. In winter, especially in small streams, base flow helps to maintain an aquatic habitat in an otherwise frozen environment.

Springs have been disturbed either by management activities that have affected the volume of water available to the vegetation and soils where springs begin, or by activities that have affected the vegetation and soils directly. Activities, such as grazing, water developments, recreation use, road construction, and vegetation management, have affected spring systems in the past. Activities such as well drilling or blasting can affect springs by reducing the amount of water in their aquifers or by affecting subsurface flow patterns.

3.18.3 Trends

The BLM manages a small number of scattered, small tracts of lands. Percentage-wise, the BLM-administered lands are a small portion of the total lands across the planning area. Overall, the BLM-administered surface lands are not a major contributor to water quality.

3.19 SPECIAL STATUS SPECIES – OTHER SPECIES OF ISSUE

Special status species are those species with populations that have declined to the point of substantial federal or state agency concern. These declines may result from habitat loss or modification or from changes in competition, predation, disease, or overharvest. Habitat loss and modification from human activities are the primary causes of declining populations, particularly of species that are highly adapted to specific ecological niches. Such species may or may not be legally protected by federal or state agencies. The BLM's policy for special status species is to: 1) conserve and recover T&E species and the ecosystems on which they depend so that ESA protections are no longer needed, and 2) to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA. The BLM 6840 Manual, Special Status Species Management (BLM 2008b), sets policy for the management of candidate species and their habitat. Candidate species are considered BLM sensitive species. The 6840 manual directs the BLM to conserve special status species and the ecosystems on which they depend to reduce the likelihood and need for future listing under the ESA. The 6840 manual also directs the BLM to undertake conservation actions for such species before listing is warranted and also to, "work cooperatively with other agencies, organizations, governments,

and interested parties for the conservation of sensitive species and their habitats to meet agreed on species and habitat management goals."

The BLM 6840 Policy requires that when the BLM engages in the planning process, land use plans, and implementation plans, that strategies, restrictions and management actions necessary to conserve and/or recover listed species, as well as provisions for the conservation of Bureau sensitive species are identified. The BLM 6840 policy also requires managers to determine to the extent practicable, the distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and evaluate the significance of actions in conserving those species.

3.19.1 Conditions of the Planning Area

The planning area occurs within the WAFWA MZ 1 of the Northwestern Great Plains Level III Ecoregion (Stiver et al. 2006, pg. 1-11; EPA 2011a). This ecoregion is characterized by semiarid rolling plains of shale, siltstone, and sandstone punctuated by occasional buttes and badlands. Rangeland is common, small grain farming, some row crops, and hayland also occur; native grasslands persist in areas of steep or broken topography. Agriculture is restricted by the erratic precipitation and limited opportunities for irrigation (EPA 2010a, pg. 7). For more detailed information regarding the conditions of the planning area refer to **Section 3.5,** Vegetation (Including Noxious Weeds; Riparian and Wetlands).

Potentially occurring special status species, including status, habitat, and likelihood of occurrence, are presented in **Table 3-45**, Federally Listed Species with the Potential to Inhabit the Planning Area and **Table 3-46**, North Dakota Field Office BLM Sensitive Species with the Potential to Inhabit the Planning Area.

3.19.2 Conditions on BLM-Administered Lands

GRSG habitat on BLM-administered lands includes 32,900 acres of PPH and 80 acres of PGH, and extends into three North Dakota counties (Bowman, Golden Valley, and Slope). GRSG habitat has the potential to provide habitat to a variety of special status species (**Table 3-1**). Potentially occurring BLM sensitive species and likelihood of occurrence are presented in **Table 3-46**. No federally-listed or BLM sensitive plant species are known to inhabit the planning area, including BLM-administered lands.

3.19.3 Trends

Some of the special status species are in decline due to habitat fragmentation, spread of noxious weeds, lack of fire on the landscape or fire suppression, use conflicts (such as recreation, OHV use, energy development, and livestock grazing) and infrastructure development (BLM 2010a, pg. 227).

Table 3-45
Federally Listed Species with the Potential to Inhabit the Planning Area

Common Name	Scientific Name	Status[1]	General Habitat Description	Likelihood of Occurrence on BLM-administered lands
Mammals				
Black-footed ferret	*Mustela nigripes*	FE	Black-footed ferret populations are intimately tied to and only found in association with prairie dogs. Limited to habitat used by black-tailed prairie dogs, black-footed ferret typically inhabits grasslands, steppe, and shrub steppe, relying on abandoned prairie dog burrows for shelter. Only large complexes (several thousand acres of closely spaced colonies) can support and sustain a breeding population. Currently, no black-tailed prairie dog complexes fitting the acreage requirements for a viable black-footed ferret population exist in North Dakota.	Unlikely to occur – not known to occupy BLM surface lands
Gray wolf	*Canis lupus*	FE	Historically, the gray wolf occupied almost all habitats in North America, including the Great Plains. In modern times, the gray wolf has been restricted to habitats with low densities of roads and people. The forested areas in north central and northeast North Dakota are likely habitat for the gray wolf; however, they may appear anywhere.	Potential to occur (transient) – not known to occupy BLM surface lands. No known breeding populations within North Dakota
Birds				
Interior least tern	*Sternula antillarum athalassos*	FE	From late April to August, terns use barren to sparsely vegetated sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines. Terns can be found near the Yellowstone and Missouri Rivers.	Unlikely to occur – not known to occupy BLM surface lands
Piping plover	*Charadrius melodus*	FE	In the Great Plains, piping plovers inhabit barren sand and gravel shores of rivers and lakes. Plovers avoid dense vegetation. Nearly all natural lakes used by plovers in North Dakota are alkaline in nature and have salt-encrusted, white beaches. Such alkali lakes	Unlikely to occur – not known to occupy BLM surface lands

Table 3-45
Federally Listed Species with the Potential to Inhabit the Planning Area

Common Name	Scientific Name	Status[1]	General Habitat Description	Likelihood of Occurrence on BLM-administered lands
			are selected due to their sparse vegetation. Beaches used by piping plovers generally are 10 to 40 yards wide. Piping plovers also use barren river sandbars. In North Dakota, this habitat type is found on the Missouri and Yellowstone Rivers.	
Whooping crane	*Grus americana*	FE	Whooping cranes inhabit shallow wetlands characterized by cattails, bulrushes, and sedges. They can also be found in upland areas, especially during migration.	Potential to occur (migratory) – not known to occupy BLM surface lands
Fish				
Pallid sturgeon	*Scaphirhynchus albus*	FE	Pallid sturgeon is found in large turbid rivers including the Missouri and Yellowstone rivers. They use all channel types, primarily straight reaches with islands. They primarily use areas with substrates containing sand (especially bottom sand dune formations) and fines (93% of observations).	Unlikely to occur – not known to occupy BLM waterways
Plants				
Western prairie-fringed orchid	*Plantanthera praeclara*	FT	Western prairie-fringed orchids are found in moist tallgrass prairies and sedge meadows. In North Dakota, is the orchids commonly cohabit with sedges, reedgrass, and rushes or where those plants meet big bluestem, little bluestem, and switchgrass. The western prairie-fringed orchid is well adapted to survive fires.	Unlikely to occur – not known to occupy BLM surface lands

Source: USFWS 2012, BLM 2010a
[1]FE Federally listed as endangered
FT Federally listed as threatened

Table 3-46
North Dakota Field Office BLM Sensitive Species with the Potential to Inhabit the Planning Area

Common Name	Scientific Name	Global Rank[1]/ State Rank	NDGFD Rank[2]	General Habitat Description	Likelihood of Occurrence on BLM-administered lands
Mammals					
Townsend's big-eared bat	*Corynorhinus townsendii*	G4 SNR	Not Ranked	Townsend's big-eared bats are commonly found in mesic habitats characterized by coniferous and deciduous forests.	Potential to occur
Long-legged myotis	*Myotis volans*	G5 SU	Level 3	Normally found in rugged terrain, long-legged myotic roost alone or in small groups in rock crevices and under tree bark. This species has a strong association with coniferous trees.	Potential to occur
Long-eared myotis	*Myotis evotis*	G5 SU	Level 3	Normally found in rugged terrain, long-eared myotis roost alone or in small groups in rock crevices and under tree bark, typically in coniferous trees, and hibernate in caves and abandoned mines.	Potential to occur
Black-tailed prairie dog	*Cynomys ludovicianus*	G3, G4 SU	Level 1	Black-tailed prairie dog inhabit short- and mixed grasslands, usually well grazed lands. They are generally confined to prairie communities with relatively flat topography.	Known to occur
Swift fox	*Vulpes velox*	G3 S1	Level 2	Swift fox inhabit large tracts of short- and mixed-grass prairie.	Unlikely to occur
Birds					
Baird's sparrow	*Ammodramus bairdii*	G4 SU	Level 1	Baird's sparrows inhabit extensive tracts of native mixed-grass prairie or lightly grazed pastures.	Potential to occur
Black tern	*Chlidonias niger*	G4 SU	Level 1	Black terns inhabit shallow wetlands surrounded by grassland.	Unlikely to occur

Table 3-46
North Dakota Field Office BLM Sensitive Species with the Potential to Inhabit the Planning Area

Common Name	Scientific Name	Global Rank[1]/ State Rank	NDGFD Rank[2]	General Habitat Description	Likelihood of Occurrence on BLM-administered lands
Brewer's sparrow	*Spizella breweri*	G5 S3	Level 3	Brewer's sparrows inhabit big sagebrush patches within short-grass prairie.	Potential to occur
Burrowing owl	*Athene cunicularia*	G4 SU	Level 2	Burrowing owls inhabit short-grass or grazed mixed-grass prairie with burrows dug by mammals present.	Potential to occur
Chestnut-collared longspur	*Calcarius ornatus*	G5 SU	Level 1	Chestnut-collared longspur inhabit grazed or hayed mixed-grass prairie, short-grass prairie.	Known to occur
Common loon	*Gavia immer*	G5 S4	Not Ranked	Common loons inhabit riparian areas and herbaceous wetlands surrounded by grasslands but are also found in clear lakes containing both shallow and deep water.	Unlikely to occur
Dickcissel	*Spiza americana*	G5 SU	Level 2	Dickcissels inhabit alfalfa, sweet clover, and other brushy grasslands.	Potential to occur
Ferruginous hawk	*Buteo regalis*	G4 SU	Level 1	Ferruginous hawks inhabit large tracts of native prairie.	Known to occur
Franklin's gull	*Larus pipixcan*	G4, G5 SU	Level 1	Franklin's gulls inhabit large wetlands with semi-open emergent cover, often feeds in cultivated agricultural fields.	Unlikely to occur
Golden eagle	*Aquila chrysaetos*	G5 S3	Level 2	Golden eagles inhabit rugged portions of the badlands, buttes over-looking native prairie, large trees, and are often found associated with prairie dog towns.	Potential to occur
Grasshopper sparrow	*Ammodramus savannarum*	G5 SNR	Level 1	Grasshopper sparrows inhabit idle or lightly grazed tall or mixed-grass prairie, shrub prairie meadows, and hayfields.	Potential to occur

Table 3-46
North Dakota Field Office BLM Sensitive Species with the Potential to Inhabit the Planning Area

Common Name	Scientific Name	Global Rank[1]/ State Rank	NDGFD Rank[2]	General Habitat Description	Likelihood of Occurrence on BLM-administered lands
Greater Sage-Grouse	*Centrocercus urophasianus*	G4 SU	Level 2	GRSG inhabit the big sagebrush ecosystem.	Known to occur
Lark bunting	*Calamospiza melancorys*	G5 SNR	Level 1	Lark buntings inhabit sagebrush communities or mixed-grass prairie interspersed with shrubs, roadsides, and retired cropland.	Potential to occur
Le Conte's sparrow	*Ammodramus leconteii*	G4 SU	Level 2	Le Conte's sparrow inhabit fens, wet meadows, and marshes of sedge grasses.	Potential to occur
Loggerhead shrike	*Lanius ludovicianus*	G4 SU	Level 2	Loggerhead shrikes inhabit open country with thickets of small trees, shrubs, and shelterbelts.	Potential to occur
Long-billed curlew	*Numenius americanus*	G5 S2	Level 1	Long-billed curlew inhabit short-grass prairie or shrub steppe prairie on gently rolling terrain.	Potential to occur
Marbled godwit	*Limosa fedoa*	G5 SU	Level 1	Marbled godwits forage in a variety of wetlands, nest commonly on grazed native prairie.	Potential to occur
McCown's longspur	*Calcarius mccownii*	G4 S2	Level 3	McCown's longspurs inhabit arid, short-grass prairie or heavily grazed mixed-grass prairie.	Potential to occur
Nelson's sharp-tailed sparrow	*Ammodramus nelsonii*	G5 SU	Level 1	Nelson's sharp-tailed sparrows inhabit fens, shallow-marsh and wet meadow zones of wetlands.	Unlikely to occur
Northern goshawk	*Accipiter gentilis*	G5 SU	Not Ranked	Northern goshawks inhabit riparian areas surrounded by mixed-grass prairie.	Unlikely to occur
Peregrine falcon	*Falco peregrinus*	G4, T4 S1	Level 3	Peregrine falcons inhabit expanses of native prairie, badland complexes, and open waterways.	Potential to occur

Table 3-46
North Dakota Field Office BLM Sensitive Species with the Potential to Inhabit the Planning Area

Common Name	Scientific Name	Global Rank[1]/ State Rank	NDGFD Rank[2]	General Habitat Description	Likelihood of Occurrence on BLM-administered lands
Sedge wren	*Cistothorus platensis*	G5 SU	Level 2	Sedge wrens inhabit wet meadows of tall grasses and sedges.	Unlikely to occur
Sprague's pipit	*Anthus spragueii*	G4 S3	Level 1	Sprague's pipits inhabit extensive tracts of native mixed-grass prairie, ungrazed or lightly grazed prairie.	Known to occur
Swainson's hawk	*Buteo swainsoni*	G5 SU	Level 1	Swainson's hawks inhabit native prairie and cropland with thickets of trees.	Potential to occur
Upland sandpiper	*Bartramia longicauda*	G5 SNR	Level 1	Upland sandpipers inhabit dry, open mixed-grass prairie.	Potential to occur
White-faced ibis	*Plegadis chihi*	G5 SU	Not Ranked	White-faced ibis inhabit forested and herbaceous wetlands, riparian areas, marshes, swamps, ponds and rivers.	Unlikely to occur
Willet	*Catoptrophorus semipalmatus*	G5 SU	Level 1	Willets inhabit a variety of wetlands associated with upland native grassland.	Potential to occur
Wilson's phalarope	*Phalaropus tricolor*	G5 SU	Level 1	Wilson's phalarope inhabit shallow wetlands and mudflats, nest in the margins of wetlands.	Potential to occur
Yellow rail	*Coturnicops noveboracensis*	G4 S2	Level 1	Yellow rail inhabit fens or wet meadows with emergent vegetation, shallow water, and moist soil.	Unlikely to occur
Fish					
Blue sucker	*Cycleptus elongatus*	G3, G4 S3	Level 1	Blue suckers inhabit deep areas with swift current on medium to large turbid rivers where the bottom is normally sand or gravel. They use confluence areas of larger tributaries for spawning.	Potential to occur

Table 3-46
North Dakota Field Office BLM Sensitive Species with the Potential to Inhabit the Planning Area

Common Name	Scientific Name	Global Rank[1]/ State Rank	NDGFD Rank[2]	General Habitat Description	Likelihood of Occurrence on BLM-administered lands
Northern redbelly x Finescale dace	*Phoxinus eos x phoxinus neogaeus*	G5 S4	Level 2	Northern redbelly x Finescale dace are found in pools and slow moving water in small streams where the bottom substrate is normally silted, with vegetation.	Potential to occur
Paddlefish	*Polyodon spathula*	G4 SNR	Level 2	Paddlefish are typically found in slow-flowing portions of large rivers.	Unlikely to occur
Pearl dace	*Semotilus/Margariscus margarita*	G5 S3	Level 1	Pearl dace are found in pools of streams and small rivers, usually with sand or gravel bottom. They may also be found in ponds and lakes.	Potential to occur
Sicklefin chub	*Macrhybopis meeki*	G3 S2	Level 1	Sicklefin chub inhabit large turbid rivers, usually with a sand or gravel bottom.	Potential to occur
Sturgeon chub	*Macrhybopis gelida*	G3 S2	Level 1	Sturgeon chub inhabit medium to large turbid rivers, usually with a sand or gravel bottom.	Potential to occur
Reptiles					
Greater short-horned lizard	*Phrynosoma hernandesi*	G5 SNR	Level II	Greater short-horned lizards inhabit semi-arid, short-grass prairie in rough terrain.	Potential to occur
Snapping turtle	*Chelydra serpentine*	G5 SNR	Level II	Snapping turtles inhabit backwaters along medium to large rivers, smaller reservoirs, stock ponds, smaller streams with permanent flowing water, intermittent streams with perennial pools, and are often associated with sandy or muddy bottoms.	Known to occur

Table 3-46
North Dakota Field Office BLM Sensitive Species with the Potential to Inhabit the Planning Area

Common Name	Scientific Name	Global Rank[1]/ State Rank	NDGFD Rank[2]	General Habitat Description	Likelihood of Occurrence on BLM-administered lands
Spiny softshell	*Apalone spinifers*	G5 SNR	Not ranked	Spiny softshell turtles primarily inhabit riverine habitat such as large rivers and river impoundments, but are also found in lakes, ponds along rivers, pools along intermittent streams, bayous, irrigation canals, and oxbows.	Potential to occur
Western hog-nosed snake	*Heterodon nasicus*	G5 SNR	Level I	Western hog-nosed snakes inhabit areas with sandy or gravelly soils, including prairies, sandhills, wide valleys, river floodplains, open montane woodland, semi-agricultural areas (but not intensively cultivated land), and margins of irrigation ditches.	Potential to occur
Amphibians					
Great Plains toad	*Bufo cognatus*	G5 SNR	Not ranked	Great Plains toads inhabit grasslands, semi-desert shrub-lands, open floodplains, and agricultural areas, typically in stream valleys.	Potential to occur
Northern leopard frog	*Rana pipiens*	G5 SNR	Not ranked	Northern leopard frogs inhabit mixed-grass prairies and associated wetlands.	Potential to occur
Plains spadefoot	*Spea bombifrons*	G5 SNR	Level I	Plains spadefoot inhabit dry grasslands with sandy or loose soil near permanent or temporary bodies of water.	Known to occur
Western toad	*Bufo boreas*	G4 NS	Not ranked	Western toads inhabit upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams.	Potential to occur

Table 3-46
North Dakota Field Office BLM Sensitive Species with the Potential to Inhabit the Planning Area

Common Name	Scientific Name	Global Rank[1]/ State Rank	NDGFD Rank[2]	General Habitat Description	Likelihood of Occurrence on BLM-administered lands
Invertebrates					
Dakota skipper	*Hesperia dacotae*	G5 SNR	Not ranked	Dakota skippers inhabit high quality native prairie containing a high diversity of wildflowers and grasses. In the western part of North Dakota, the skipper can be found in ungrazed or lightly grazed 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.	Unlikely to occur

Source: USFWS 2012, BLM 2010a
[1]G Global ranking
S State ranking
T Subspecies or variety ranking
1 Critically imperiled
2 Imperiled
3 Vulnerable
4 Apparently secure
5 Secure
NR Not ranked
U Unrankable
[2] Level I - Species have high level of conservation priority
Level II - Species have moderate level of conservation priority
Level III - Species have moderate level of conservation priority but are believed to be peripheral or do not breed in North Dakota

3.20 RENEWABLE ENERGY

Renewable energy projects on BLM-administered lands throughout the US include wind, solar, geothermal, and biomass projects and the siting of transmission facilities needed to deliver this power to the consumer. Geothermal heat is also considered a leasable mineral and is governed by the Geothermal Steam Act of 1970. There are no geothermal resources within the planning area; therefore, geothermal resources will not be discussed in **Chapter 3** or **Chapter 4**.

As of 2010, the BLM's renewable energy policy is directed by the following regulations and executive orders:

- The Energy Policy Act of 2005 (Title II, § 211), which requires the DOI to approve at least 10,000 megawatts of renewable energy on public lands by 2015;
- Executive Order 13212, Actions to Expedite Energy-Related Projects, which requires federal agencies to expedite review of energy project applications; and
- Secretarial Order 3285, which requires the DOI to identify and prioritize specific locations best suited for large-scale renewable energy production.

Additionally, the BLM has specific guidance for certain types of renewable energy. The main IM are summarized here:

- IM 2011-003, Solar Energy Development Policy (BLM 2011c), establishes policy for the processing of ROW applications for solar energy development projects on BLM-administered lands and evaluating the feasibility of installing solar energy systems on BLM administrative facilities and projects.
- IM 2009-043, Wind Energy Development Policy (BLM 2008e), provides updated guidance on processing ROW applications for wind energy projects on BLM-administered lands.
- IM 2011-061, Solar and Wind Energy Applications – Pre-Application and Screening (2011d), establishes screening criteria used by the BLM to assist in prioritizing the processing of and in determining what actions to take on new and existing solar and wind energy development ROW applications. The processing of applications with the least environmental resource conflicts should facilitate the development of environmentally responsible solar and wind energy projects on BLM-administered lands, consistent with the provisions of the Secretarial Order.
- IM 2004-227, Biomass Utilization Strategy (BLM 2004c), updated in July 2005, provides sets of goals to help focus and increase

utilization of biomass from BLM-administered lands. In June 2005, the final rule in the Federal Register revised the authority of 48 CFR Part 1452 by adding 1452.237-71, which is a new contract clause for removal and utilization of woody biomass generated as a result of land management service contracts whenever ecologically and lawfully appropriate. The BLM issued IM 2009-120 in May 2009, which updated the contract clause for utilization for woody biomass (BLM 2009b).

Solar and wind projects are authorized via the ROW process. ROW applications for development on BLM-administered lands must be accompanied by a processing fee as set forth in 43 CFR 7 2804.14. ROW applications are generally accepted and processed on a first-come, first-served basis. The ROW regulations (43 CFR 2804.23[c]) provide authority for offering BLM-administered lands under competitive bidding procedures for ROW authorizations. The BLM may initiate a competitive process if a land use planning decision has specifically identified an area for competition or, when two or more applications are submitted for the same facility or system. The BLM may also consider other public interest and technical factors in determining whether to offer lands for competitive leasing. Competitive bidding follows procedures required by 43 CFR 2804.23(c).

3.20.1 Conditions of the Planning Area

WAFWA Management Zone 1

There are no acres of solar or wind energy ROWs in the planning area (Manier et al. 2013). The data and information included from the BER is the most accurate data available from when the data was "frozen" in time for analysis purposes; however, these scenarios remain based in present knowledge. Spatial data informing the existing conditions were compiled to establish a consistent information basis across the entire region (GRSG Management Area), but in order to attain this consistently across state, ownership, and management boundaries some local data have been omitted; therefore, there may be inconsistencies between WAFWA-level and local planning-level data. As such, these data provide a regional baseline, suitable for guiding regional mid- to long-term analysis scenarios (Manier et al. 2013).

Below is a summary of renewable energy interest in North Dakota.

Solar

No interest on a commercial scale in solar energy has occurred in Montana; fewer annual days of sunshine and the low angle of the sun during the winter contribute to low solar development in the state.

Wind Energy

Some commercial wind developments have been constructed in the eastern and central parts of the state of North Dakota and there has also been some

sporadic interest in wind farms in the western part of the state. A 19.5-megawatt wind project with 13 turbines is in operation at Rhame, in southwestern Bowman County (MDU 2013). The project is not located on BLM-administered lands.

Biomass

North Dakota may have good prospects for biomass development using its agricultural resources and land base. The growth of this energy development will still be hampered in North Dakota by lack of easy access to large consumption markets.

3.20.2 Conditions on BLM-Administered Lands

The National Renewable Energy Laboratory only considers solar resources to be viable when they occur at intensities of 6.0 kilowatt hours per square meter per day (kWh/m^2/day), and allocate designations of "Good," "Excellent," or "Premium." Solar potential on BLM-administered land in the NDFO is below 6.0 kWh/m^2/day. Therefore, no BLM-administered lands in the planning area are considered likely to be pursued by commercial energy developers for utility scale solar (that is, ≥20 MW [megawatts] electricity that will be delivered into the electricity transmission grid [Manier et al. 2013]).

The National Renewable Energy Laboratory places lands in categories of "Good", "Excellent," or "Outstanding" potential when wind resources occur at intensities of 400 watts per square meter or higher. On BLM-administered land in North Dakota there are 3,730 acres of Class 4, Good Wind Potential, 3,606 acres of which is found in PPH and 85 acres of which is found in PGH. **Table 3-47**, Wind Potential on Slopes <15% on BLM-administered Lands, shows the wind potential for all the BLM-administered Lands in NDFO.

Table 3-47
Wind Potential on Slopes <15% on BLM-administered Lands

Wind Potential (at 80 meters)	Totals acres	PPH acres	PGH acres
Class 1, Poor (0-200)	0	0	0
Class 2, Marginal (200-300)	11,074	11,074	0
Class 3, Fair, (300-400)	16,198	16498	0
Class 4, Good (400-500)	3,730	3,606	85
Class 5, Excellent (500-600)	0	0	0
Class 6, Outstanding (600+)	0	0	0
Class 7, Superb (800-1,600)	0	0	0

Source: BLM 2012a

3.20.3 Trends

Within the planning area, greater pressure to develop renewable energy resources on the BLM-administered lands will occur as a result of public energy policy coming from individual states or the federal government. The development of more energy-efficient technologies for wind, biomass, and solar power will continue to grow with increasing regulation and price of fossil fuels and the increasing demand for energy products. In North Dakota, the source of renewable energy will most likely be wind energy, as North Dakota is ranked as the sixth state in wind energy potential (National Renewable Energy Laboratory 2011).

3.21 SOCIAL AND ECONOMIC CONDITIONS

This section discusses the social and economic conditions of the planning area. These conditions are discussed in greater detail in the North Dakota Field Office Greater Sage-Grouse RMPA/EIS Socioeconomic Baseline Assessment Report prepared in support of the planning effort (Forest Service 2013b).

Changes in BLM management of GRSG habitats are anticipated to have a considerable impact on existing GRSG populations and have the potential to affect local social and economic conditions. There are numerous characteristics that influence and shape the nature of local social and economic conditions such as the local population, the presence of or proximity to large cities or regional population centers, types of longstanding industries, predominant land and water features, and unique area amenities. The characteristics of North Dakota counties containing GRSG habitat influence the relationship between BLM-administered lands and local social and economic activity.

Changes in BLM management of BLM-administered lands can have social and economic effects that extend beyond the immediate boundaries of the lands they manage, affecting the social and economic conditions of neighboring counties and communities. Individual counties and communities may respond to change differently than the larger region; consequently a multidimensional approach is used to analyze the impacts of the proposed GRSG conservation measures. For this analysis, social and economic conditions, current conditions and trends are presented for a three-county region which includes Bowman, Golden Valley, and Slope counties, and for the individual counties within this three-county area. Data is provided for the state as a whole as a reference region where appropriate.

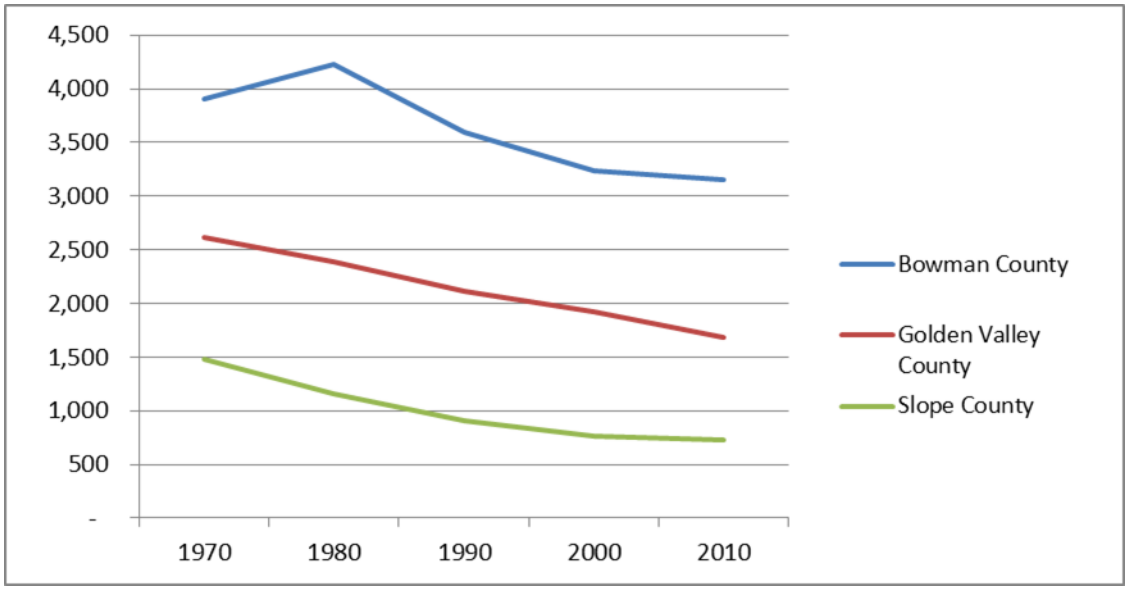
3.2.1 Existing Conditions

Population Change

While total US population grew by 24 percent between 1970 and 2010, the three-county impact area experienced a 16 percent decline. Over the past four decades Golden Valley and Slope counties' populations have fallen by 20 percent, while Bowman was reported to have fallen by 12 percent

(**Diagram 3-1**, Population Change for the Three-County Impact Area). Population declines within the three-county region have gradually tapered off over the last decade as the total population within the region decreased by 375 people, or just over six percent.

Diagram 3-1
Population Change for the Three-County Impact Area



Source: US Department of Commerce 2005, 2000, and 2010

Although annual average population loss in Bowman and Slope counties was 0.3 and 0.5 percent respectively between 2000 and 2010, Golden Valley continued to experience a decline of 1.3 percent on an annual average basis.

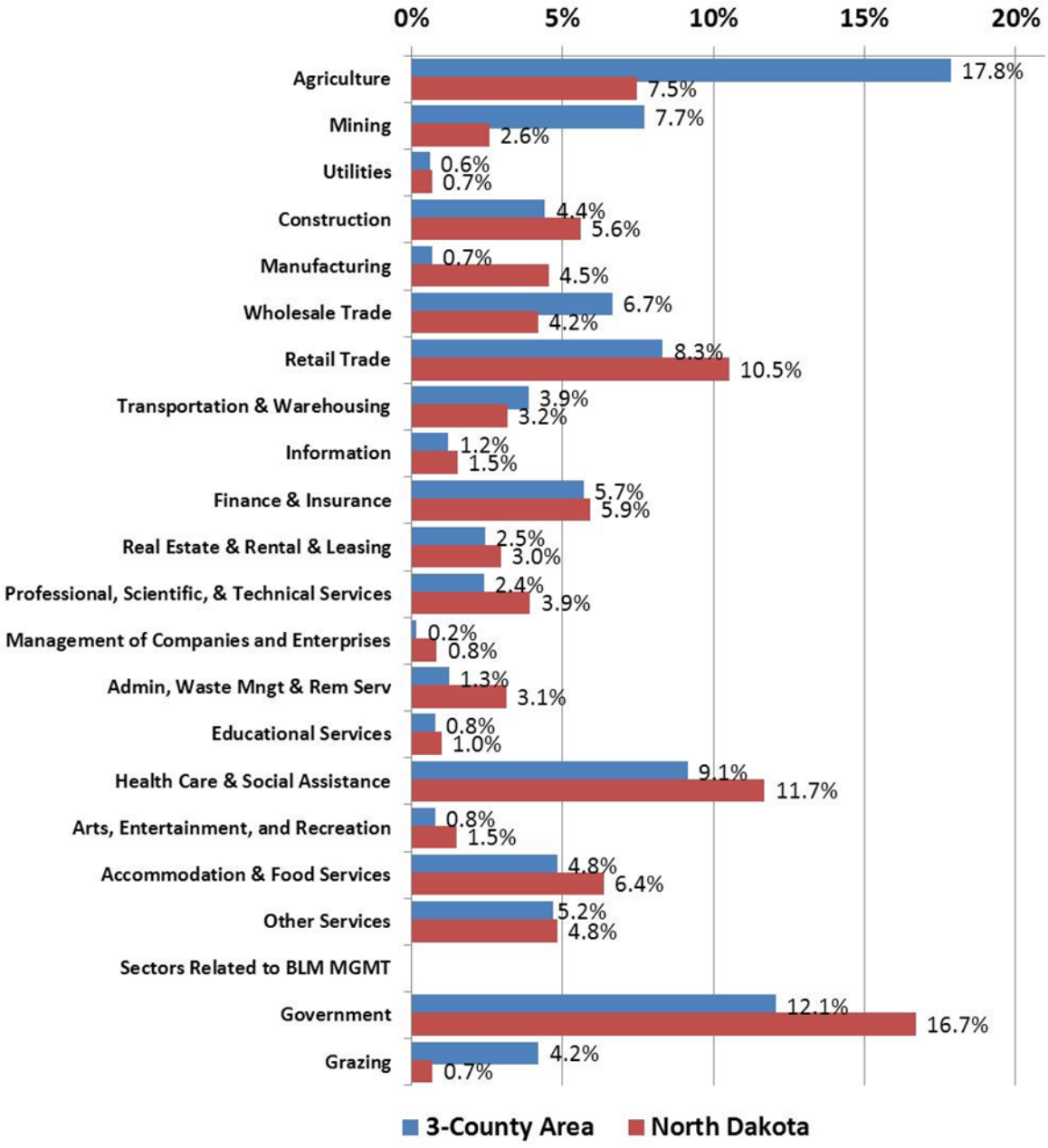
Employment and Economic Specialization

Average annual unemployment in the three-county impact area has remained relatively constant over the last decade, with unemployment in each of the three counties remaining below state and national averages. While national unemployment in the United States rose from four percent in 2000 to 9.6 percent in 2010, Bowman, Golden Valley, and Slope counties were reported to have had an average annual unemployment rate of 2.6 percent, 3.0 percent, and 1.6 percent respectively in 2010, while unemployment was 3.8 percent in North Dakota and 9.6 percent for the United States (Bureau of Labor Statistics 2011).

Employment within the three-county impact area is distributed amongst economic sectors and displayed (**Diagram 3-2**, Employment Distribution in the Three-County Impact Area and North Dakota) relative to statewide employment in these sectors. Of particular interest are the Government Grazing, and Oil and Gas sectors which are directly related to BLM land management. The government sector includes all federal, state and local employment, the grazing sector includes both cattle and sheep ranching, and the

Oil and Gas sector includes extraction, drilling, and support activities. It should be noted that the contributions from BLM represent only a portion of the industry employment displayed in these three sectors within **Diagram 3-2**. Further discussion of the contributions to these sectors from BLM management is presented in the sections on grazing and oil and gas below.

Diagram 3-2
Employment Distribution in the Three-County Impact Area and North Dakota



Source: IMPLAN 2010

Using the ratio of the percent employment in each industry in the region of interest (three-county impact area) to the percent of employment in that industry for a larger reference region (the state of North Dakota) reveals whether labor specialization exists within the impact area. For a given industry, when the percent employment in the impact area is greater than in the reference region, local employment specialization exists in that industry (Forest Service 1998). Identification of employment specialization within the impact area provides a frame of reference the contributions of BLM-administered lands within the three-county impact area. Applying this criterion to 2010 data reveals that the project area can be characterized as most specialized in the agricultural sectors, which include those sectors related to livestock grazing. Since BLM-administered lands within the three-county area provide local livestock producers with forage to supplement other sources of feed, a portion of this specialization can be attributable to BLM management.

Community Well-Being

Community well-being relates to the economic, social, cultural, and political components of community life which allows residents to fulfill their basic needs, while creating an enjoyable place for citizens to live. While many factors contribute to quality of life in a region, unemployment, poverty and personal income are the most commonly used social indicators of well-being. As discussed above in the employment section, labor participation in Bowman, Golden Valley, and Slope counties is high, with average annual unemployment rates which have persistently been lower than state and national averages over the last decade.

Following the Office of Management and Budget's Directive 14, the US Census Bureau uses a set of predetermined income thresholds which vary by family size and composition to detect who is poor. If the total income for a family or an unrelated individual falls below the relevant threshold, then the family or unrelated individual is classified as being "below the poverty level." While poverty rates for individuals and families at the state (12.3 percent and 7.2 percent) and national (13.8 percent and 10.1 percent) level remained high in 2010, poverty in the three-county area was reported to be less prevalent with only nine percent of individuals and 5.7 percent of families living below the poverty level. Poverty at the county level varied across the three counties, with Bowman reporting the lowest rates and Golden Valley reporting the highest. In 2010, 6.7 percent of individuals and 3.9 percent of families in Bowman County, 10.5 percent of individuals and 8.9 percent of families in Slope County, and 13 percent of individuals and 8.9 percent of families in Golden Valley County were estimated to be living in poverty (US Department of Commerce 2012a).

Components of Personal Income

Examining trends within personal income provides insight to the area economy and its connection to BLM-administered lands within the three-county impact area. There are three major sources of personal income: (1) labor earnings or

income from the workplace, (2) investment income, or income received by individuals in the form of rent, dividends, or interest earnings, and (3) transfer payment income or income received as Social Security, retirement and disability income or Medicare and Medicaid payments.

Total personal income (TPI) and per capita personal income (PCPI) are two widely used measures of economic well-being within communities. From 1970 to 2010, annual TPI in the three-county impact area increased from $171 million to $268 million, and annual PCPI increased from $21,560 to $48,339 (all measures adjusted for inflation to 2011 dollars). This translates to a TPI increase of 56 percent and a PCPI increase of 124 percent over this time period (US Department of Commerce 2012a). While PCPI is a useful measure of economic well-being it should be examined alongside changes in real earnings per job. Since PCPI includes income from 401(k) plans as well as other non-labor income sources like transfer payments, dividends, and rent, it is possible for per capita income to rise, even if the average wage per job declines over time. While PCPI rose between 1970 and 2010 by 124 percent, average earnings per job rose by 9.6 percent (from $37,552 to $41,155; values adjusted for inflation to 2011 dollars) (US Department of Commerce 2012b). While moderate increases in PCPI can be attributable to increased labor earnings, increased non-labor income within the region also contributed to the large increase in PCPI.

Labor earnings were the largest source of TPI in the three-county area, accounting for 62.1 percent of all income in 2010. Labor earning's share of TPI has decreased from 1970 to 2010 (from 75.2 to 62.1 percent) while the share of non-labor income has risen (from 24.8 to 37.9 percent). As a share of TPI, investment income and transfer payments rose from 15.9 to 22.8 and 8.8 to 15.2 percent, respectively, over this forty-year time period. Although transfer payments' share of TPI rose during this period, data indicated this increase was only slightly due to increases in income maintenance payments related to welfare or unemployment. The data shows the share of income maintenance increased from 0 to 2.1 percent while the share of age related transfer payments in the form of retirement, disability insurance, and Medicare decreased from 23.4 to 17.7 percent (US Department of Commerce 2012a).

Area Economic conditions related to Grazing

From 1970 to 2010, employment in the Farm sector (including livestock grazing) decreased by 36 percent (from 1,315 to 838 jobs), with nearly 84 percent of Farm employment in 2010 attributable to farm proprietors. Although employment has been declining, the farm sector continued to support 4,497 jobs (or 18.6 percent of total employment) in the three-county area in 2010 (US Department of Commerce 2012a). In 2011, livestock production in North Dakota accounted for one-sixth of the state's total cash receipts and was valued at more than a billion dollars (USDA 2012). According to agricultural statistics collected by the state, the three-county area was reported to have an inventory

of 101,500 head of cattle and 7,600 head of sheep in 2011 (**Table 3-48**, Cattle and Sheep Inventory and Estimated Annual Forage Requirement in Impact Area Counties).

Table 3-48
Cattle and Sheep Inventory and Estimated Annual Forage Requirement in Impact Area Counties

Region	All Cattle (number of animals)	Sheep (number of animals)
Bowman County	49,500	3,700
Golden Valley County	22,500	2,700
Slope County	29,500	1,200
Three-County Total	*101,500*	*7,600*
North Dakota Total	**1,690,000**	**73,000**

Source: USDA 2012

The BLM estimates the grazing potential of each allotment permitted for grazing under ideal forage conditions, but determines the number of AUMs allocated each year based on range conditions. Currently, the BLM allocates 5,781 AUMs annually on allotments potentially affected by conservation measures under this RMPA. On an average annual basis almost all of the allocated use is actually used contributing about 10 jobs (direct, indirect and induced) and $113,000 in labor income to the impact area economy. Direct employment to the grazing sector amounts to approximately seven jobs, which account for 5.6 percent of employment in the grazing sector depicted in **Diagram 3-2** (IMPLAN 2010).

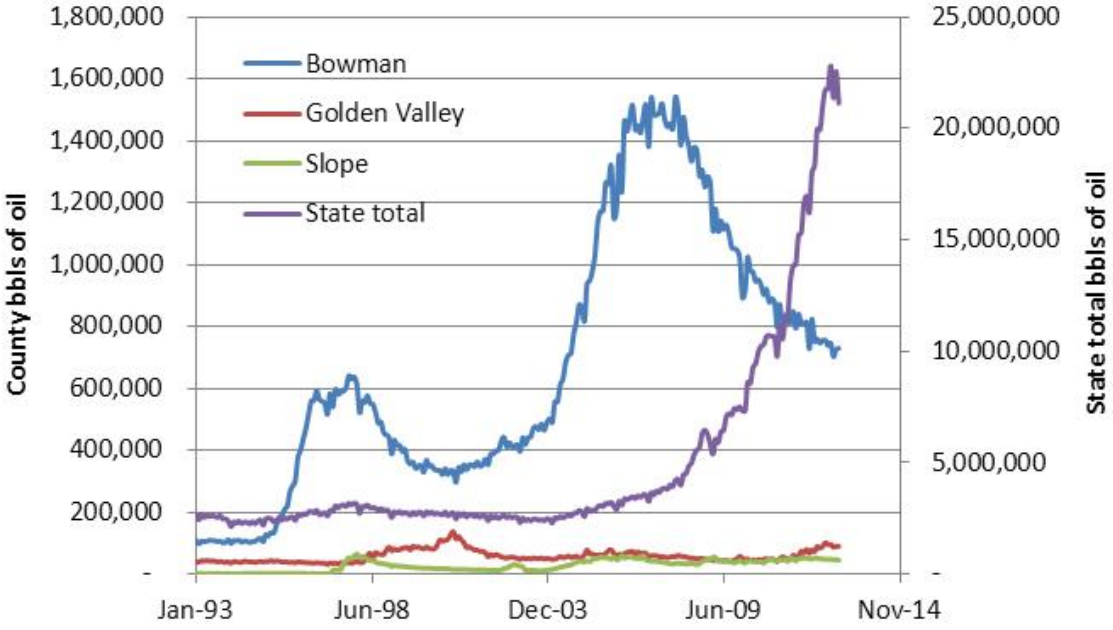
Area Economic Conditions Related to Oil and Gas

Oil and gas development, which includes the extraction of oil and gas, drilling of wells, and support activities, has significantly increased in North Dakota over the last decade as exploration in the Northwestern Bakken formation has intensified (State of North Dakota 2013a). North Dakota is consistently ranked one of the US's top oil and gas producing states; In 2011, North Dakota ranked fourth in the nation in crude oil production (seven percent of US total production) and 18th in natural gas production (0.4 percent of US total production) (US Energy Information Administration 2013a), producing more than 113 bbls of oil and MCF of natural gas in 2010. As of November, 2012 the State's role as a crude oil producer within the nations has increased to the second largest producer behind Texas, producing 10 percent of the nation's domestic supply. This increase in production is driven in most part by development in the Bakken formation which does not overlap with the project area. In 2011 North Dakota contained 0.9 percent of the nation's crude oil producing wells (4,574) and less than 0.5 percent of the nation's natural gas

producing wells (239) (US Energy Information Administration 2013b). The decision area contains 3.3 percent of these oil wells and 22.7 percent of these gas wells (DOI 2011).

Annual production can vary considerably within a region and across counties. From 2002 to 2012 annual oil production increased by almost 700 percent across the state while increasing by 84 percent within the three counties containing GRSG habitat (**Diagram 3-3**, Oil Production in the Three-County Impact Area and North Dakota). Although it alsomarks a decrease in oil production within Bowman County between 2005 and 2012 shown in **Diagram 3-3**. In 2012 Bowman County produced nine million bbls of oil and 11.2 million MCF of natural gas, Golden Valley produced one million bbls of oil and 650 thousand MCF of natural gas, and Slope County produced 591 thousand bbls of oil and 321 thousand MCF of natural gas (State of North Dakota 2013b).

Diagram 3-3
Oil Production in the Three-County Impact Area and North Dakota



Source: State of North Dakota 2013b

The exploration, development, and production of oil and gas is important to the three-county analysis area's economy, and has been directly attributed with supporting six percent of the planning area's employment and 11 percent of its labor income (IMPLAN 2010). In 2010 IMPLAN reported that the economic activity associated with oil and gas drilling, extraction, and support activities in the three-county analysis area supported 261 jobs and more than $24 million in employee wages and proprietor's income. Currently there are 231 wells on BLM-administered lands in the decision area that produce oil and gas.

Employment and income supported by production from these wells (about three bbls of oil and 525 MCF of gas) is estimated at 20 jobs and $728,000 in labor income (including direct, indirect and induced contributions across all sectors of the three county impact area economy). Contributions to employment in the Oil and Gas Sector are about 16 jobs (direct, indirect and induced) which constitutes six percent of employment in this sector.

Revenue Sharing and Distributions to Counties

The oil and gas industry in North Dakota also contributes to the state and its local economies through the taxes they pay to the federal and state governments. These governmental revenues include personal and corporate income taxes, sales and use taxes, severance and production taxes, as well as rents on leased land not held by production. In 2009, North Dakota's oil and gas industry was directly attributed with generating $821.8 million in government revenue, with the majority of revenue earned from leasing public domain minerals. These funds are spent to fund schools and invest in public works projects such as road improvements, health care facilities and infrastructure needs. Overall, local governments across the state received an estimated $86.5 million in property taxes, $8.4 million in federal mineral re-distributions, and $46 million in re-distributions from state severance taxes in 2009 (Bangsund and Leistritz 2010).

The re-distribution of a portion of these funds back to Bowman, Golden Valley, and Slope counties contributes to employment and income within the region as these funds are spent to fund schools and invest in public works projects. Recent estimates of general government revenue in the three county area indicate that approximately $19,600,000 was allocated in 2012 from taxes, intergovernmental revenue (grants, distributions from other governments, etc.) and charges for services (social services, library, clerks, etc.) (US Department of Commerce 2007). Estimates of current royalty distributions, as discussed in detail below, indicate that approximately 30 percent of this general revenue can be attributed to production on BLM-administered lands within the three county area.

Currently, a portion of federal royalties from production that occurs on public domain and acquired mineral estate (49 and 25 percent respectively) are allocated back to the state of North Dakota who then allocates 50 percent of those revenues back to counties where the oil and gas development occurred. Using estimates of current production for wells on BLM mineral estate, it is estimated that the three-county area received approximately $6.3 million in distributions. As a result of these payments, approximately 114 jobs and $3.9 million in labor income (direct, indirect and induced) were generated in the impact area economy based on IMPLAN analysis.

Non Market Values

Generally, goods and services can be traded in markets where interactions between buyers and sellers dictate the price, or value, of a good through the unit prices and quantities sold. BLM-administered lands produce a wide range of environmental goods and services from which society benefits. Some goods, like forage for cattle, can easily be valued because livestock feed can be bought and sold in markets. Other resources provided by these lands, like recreational opportunities, ecological processes, and habitat for unique species cannot be bought and sold in traditional markets, which is why they are often characterized as non-market goods. Measuring the value of these non-market goods is important because these resources tend to be undervalued and estimates can enable management to make more informed decisions regarding their use to more accurately reflect their true value to society.

Non-market values can be broken down into two categories, use and non-use values. The use-value of a non-market good is the value to society from the direct use of the asset; these values are derived from North Dakota BLM-administered lands through recreational activities such as hiking, bird watching and OHV use. The use of non-market goods often requires consumption of associated market goods, such as lodging and gas.

Non-use, or passive use, values of a non-market good reflect the value of an asset beyond its current use. These can be described as existence, option and bequest values. Existence values are the amount society is willing to pay to guarantee that an asset simply exists. An existence value for BLM-administered lands might be the value of knowing that undisturbed GRSG habitat exists or the value associated with undeveloped scenic landscapes. In addition to implicit existence values, society's willingness to pay to preserve resources for future use attaches additional passive use values. The potential benefits people would receive from future use are referred to as option values when future use is expected to occur within the same generation and bequest values when preservation allows future generations to benefit from the resource use. Within the NDFO, bequest and option values might exist for numerous plant and animal species, landscapes, heritage sites, and recreational trails. While use and non-use values exist for these lands, the methodologies for measuring these values can be difficult to apply, making evaluation during the planning process not feasible. However, this does not preclude their consideration.

3.22 ENVIRONMENTAL JUSTICE

Executive Order 12898 requires federal agencies to "identify and address the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." According to the CEQ Environmental Justice Guidelines for NEPA (1997), "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the

minority population percentage in the general population or other appropriate unit of geographic analysis… 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."

The ethnic and racial composition of North Dakota, the three-county impact area, and individual counties in 2010 are displayed in **Table 3-49**, Population by Race and Ethnicity (2010), below. North Dakota's 2010 population was reported to be significantly less diverse than the general US population (74 percent white), with individuals identifying themselves as white accounting for 89 percent of the state's population. Shares of racial and ethnic minority groups at the state level, with the exception of American Indians, were less than their share of the overall US population. While North Dakota's population has a larger share of individuals identifying themselves as American Indian alone, American Indians living within the three-county area represent 0.5 percent of the area's total population (US Department of Commerce 2012a). While the data indicates that the area has small shares of minority racial and ethnic groups, these populations do meet the CEQ's definition of minority populations.

Table 3-49
Population by Race and Ethnicity (2010)

	White	Black or African American	American Indian & Alaska Native	Asian	Native Hawaiian & Other Pacific Islander	Some other race	Two or more race	Hispanic (of any race)
United States	74.0%	12.5%	0.8%	4.7%	0.2%	5.5%	2.4%	15.7%
Montana	89.4%	1.0%	5.2%	0.9%	0.1%	0.1%	1.4%	2.0%
Three County Area	98.5%	0.0%	0.5%	0.0%	0.0%	0.3%	0.7	1.9%
Bowman County	98.5%	0.0%	0.2%	0.0%	0.0%	0.6%	0.7%	2.5%
Golden Valley County	97.7%	0.0%	1.4%	0.0%	0.0%	0.0%	1.0%	1.0%
Slope County	100%	0.0%	0.0%	0.0%	0.0%	0.%	0.0%	1.2%

Source: US Department of Commerce 2012a

In addition to race, concentrations of people living under the poverty level are of interest when considering the environmental justice implications of the proposed action. CEQ guidance on identifying low-income populations states "agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect." As discussed above in *Community Well-being* in **Section 3.21**, the three counties included in this analysis had lower poverty rates for individuals and families than general poverty rates for the state and country. Thus, the census data indicates that low income populations, as defined by CEQ, do not exist within the planning area.

This page intentionally left blank.

Chapter 4
Environmental Consequences

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter presents the likely direct and indirect impacts on the human and natural environment that could occur from implementing the alternatives presented in **Chapter 2** (Proposed Action and Alternatives). Cumulative impacts from the proposed alternatives are presented **Chapter 5** (Cumulative Effects). This chapter is organized by topic, similar to **Chapter 3** (Affected Environment). Each topic area includes a method of analysis section that identifies indicators, methods, and assumptions; a discussion of the nature and type of effects; a summary of effects common to all alternatives; and an analysis of impacts for each of the four alternatives. A separate section describing irretrievable or irreversible commitment of resources is presented at the end of the chapter. Indicators are factors that describe resource condition and change and can help the BLM determine trends over time. The section on methods and assumptions describes methodologies and assumptions for assessing impacts specific to the resource or resource use. These are in addition to those general assumptions and methodologies listed in **Sections 4.1.1**, Analytical Assumptions, and **4.1.2**, General Methodology for Analyzing Impacts. The nature and type of effects section describes in general terms impacts on resources or resource uses from allowable uses or restrictions on allowable uses. Impacts for each alternative describe how the indicators would change the magnitude of the nature and type of effect.

All management actions proposed in **Chapter 2** are planning-level decisions and do not result in direct, on-the-ground actions. However, by planning for uses on BLM-administered surface estate and federal mineral estate during the planning horizon for the North Dakota RMP, this impact analysis focuses on impacts that could eventually result in on-the-ground changes. Impacts for some resources or resource uses, such as livestock grazing and OHV use, could be confined to the BLM-administered surface estate. Other impacts, such as energy and minerals development and requirements to protect GRSG from such

activity, could apply to all BLM-administered federal mineral estate (including split estate). Some BLM management actions may affect only certain resources under certain alternatives. This impact analysis identifies impacts that may enhance or improve a resource as a result of management actions, as well as those impacts that have the potential to impair a resource. If an activity or action is not addressed in a given section, no impacts are expected, or the impact is expected to be negligible based on professional judgment.

The BLM manages BLM-administered lands for multiple uses in accordance with the FLPMA. Land use decisions are made to protect the resources while allowing for different uses of those resources, such as energy and mineral development, OHV use, recreation, and livestock grazing. When there are conflicts among resource uses or when a land use activity could result in unacceptable or irreversible impacts on the environment, the BLM may restrict or prohibit some land uses in specific areas. To ensure that the BLM meets its mandate of multiple use in land management actions, the impacts of the alternatives on resource uses are identified and assessed as part of the planning process. The projected impacts on land use activities, and the environmental impacts of land uses, are characterized and evaluated for each of the alternatives.

Impact analysis is a cause-and-effect process. The detailed impact analyses and conclusions are based on the BLM planning team's knowledge of resources and the project area; reviews of existing literature; and information provided by experts in the BLM, other agencies, and interest groups, as well as by concerned citizens. The baseline used for the impact analysis is the current condition or situation, as described in **Chapter 3**. Impacts on resources and resource uses are analyzed and discussed in detail commensurate with resources issues and concerns identified throughout the process. Occasionally, impacts are described using ranges of potential impacts or in qualitative terms.

4.1.1 Analytical Assumptions

Several assumptions were made to facilitate the analysis of the projected impacts. These assumptions set guidelines and provide reasonably foreseeable projected levels of development that would occur within the North Dakota Sage-Grouse RMPA/EIS planning area during the planning period. These assumptions should not be interpreted as constraining or redefining the management objectives and actions proposed for each alternative, as described in **Chapter 2**. The following general assumptions apply to all resource categories. Any specific resource assumptions are provided in the *Methods and Assumptions* section for that resource.

- Each alternative in **Chapter 2** constitutes a possible RMPA and could be implemented.

- Implementing actions from any of the RMPA alternatives would be in compliance with all valid existing rights, federal regulations, BLM policies, and other requirements.
- Implementation-level actions necessary to execute the land use plan-level decisions in this RMPA would be subject to further environmental review, including NEPA, as appropriate.
- Direct and indirect impacts of implementing the RMPA may occur on all lands in the planning area; however, impacts would primarily occur on the decision area lands.
- The discussion of impacts is based on the best available data. Knowledge of the planning area and professional judgment, based on observation and analysis of conditions and responses in similar areas, are used to infer environmental impacts where data are limited.
- Stipulations for fluid mineral leasing (i.e., NSO, CSU, and TL) and activities associated with fluid mineral leasing (e.g., truck-mounted drilling, stationary drill rigs in unison, geophysical exploration equipment off designated routes, and construction of wells and pads) would be applied as specified to BLM-administered lands overlying the federal mineral estate. In addition, stipulations may be applied to private lands overlying federal mineral estate (known as split estate). Within the decision area, the BLM administers 30,574 of surface over federal mineral acres and 42,867 acres of federal fluid minerals underlying split estate, for a total of 73,441 acres of federal fluid federal mineral estate.
- RDFs apply to certain activities (i.e., water developments, mineral development, and fire fuels management) conducted by the BLM. RDFs would not apply to locatable minerals. BMPs would be applied to locatable minerals as appropriate and to the extent allowable by law. Because the BLM does not have jurisdiction over split estate lands for activities not related to fluid mineral leasing and development, RDFs apply only to the 33,030 acres of BLM surface in the decision area. RDFs do apply to fluid minerals on split estate lands.
- Restrictions on land use authorizations are identified as ROW avoidance or ROW exclusion, although TL restrictions may also be applied and would restrict construction activities during the specified timeframes. Because the BLM does not have jurisdiction over split estate lands for land use authorizations, ROW avoidance and ROW exclusion restrictions apply only to the 33,030 acres of BLM surface in the decision area.
- Data from GIS have been used in developing acreage calculations and to generate the figures in **Appendix A**. Calculations depend on

the quality and availability of data. Most calculations in this RMPA are rounded to the nearest 10 acres or 0.1-mile. Given the scale of the analysis, the compatibility constraints between datasets, and lack of data for some resources, all calculations are approximate and are for comparison and analytic purposes only. Readers should not infer that they reflect exact measurements or precise calculations. Likewise, the figures in **Appendix A** are provided for illustrative purposes and are subject to the limitations discussed above. The BLM may receive additional GIS data; therefore, acreages may be recalculated and revised.

Oil & Gas Reasonable Foreseeable Development Scenario

The RFDS, presented below in **Table 4-1**, Estimated Number of Wells and Associated Disturbance, lists projected future oil and gas exploratory and development activity and associated disturbance through 2029 based on the management actions (constraints) for each of the alternatives in **Table 2-3**. Factors used to project future activities include (but are not limited to) a review of published oil and gas resource information (including a number of on-line databases) for the area, a call for data from oil and gas operators, a review of petroleum technology research and development, geophysical activity, and limitations on access and infrastructure. It must be emphasized that the reasonable foreseeable development projections presented in **Table 4-1** are possible and/or likely to happen and should not be considered to be worst-case scenarios, but reasonable and science-based projections of the anticipated oil and gas activity (BLM 2013). Additionally, the BLM-administered well pads and acres for short and long-term surface disturbance in **Table 4-1** is primarily located in PH. On lands outside PH, there was less than one well projected; therefore, most of the development is associated with PH (this is where most of the high potential oil and gas is found and where most of the existing leases are located).

Table 4-1
Estimated Number of Wells and Associated Disturbance

Alternatives and Totals	Total Pads	Total Wells	BLM-Administered Pads	BLM-Administered Wells	Total Acres	BLM-Administered Acres
Disturbance Associated with Existing Wells Pads and Projected Active Well Pads (Short-Term Disturbance[1])						
Alternative A - new exploratory and development well pads/wells	384	384	60	60	2,071	337
Alternative A - existing and projected well pads/wells	894	894	231	231	2,455	479
Alternative A - Total Well Pads/Wells	*1,278*	*1,278*	*291*	*291*	*4,526*	*816*

Table 4-1
Estimated Number of Wells and Associated Disturbance

Alternatives and Totals	Total Pads	Total Wells	BLM-Administered Pads	BLM-Administered Wells	Total Acres	BLM-Administered Acres
Alternative B - new exploratory and development well pads/wells	352	352	26	26	1,899	145
Alternative B - existing and projected well pads/wells	894	894	231	231	2,455	479
Alternative B - Total Well Pads/Wells	*1,246*	*1,246*	*257*	*257*	*4,354*	*624*
Alternative C - new exploratory and development well pads/wells	352	352	25	25	1,899	142
Alternative C - existing and projected well pads/wells	894	894	231	231	2,455	479
Alternative C - Total Well Pads/Wells	*1,246*	*1,246*	*256*	*256*	*4,354*	*621*
Alternative D - new exploratory and development well pads/wells	376	376	51	51	2,028	288
Alternative D - existing and projected well pads/wells	894	894	231	231	2,455	479
Alternative D - Total Well Pads/Wells	*1,270*	*1,270*	*282*	*282*	*4,483*	*767*
Disturbance Associated with Existing Wells Pads and Projected Producing Well Pads (Long-Term Disturbance[2])						
Alternative A - new producing well pads/wells	314	314	49	49	772	125
Alternative A - existing and projected well pads/wells	793	793	211	211	2,144	422
Alternative A - Total Well Pads/Wells	*1,107*	*1,107*	*259*	*259*	*2,915*	*548*
Alternative B - new producing well pads/wells	289	289	21	21	708	54
Alternative B - existing and projected well pads/wells	793	793	211	211	2,144	422
Alternative B - Total Well Pads/Wells	*1,081*	*1,081*	*232*	*232*	*2,851*	*476*
Alternative C - new producing well pads/wells	289	289	21	21	707	53
Alternative C - existing and projected well pads/wells	793	793	211	211	2,144	422
Alternative C - Total Well Pads/Wells	*1,081*	*1,081*	*232*	*232*	*2,851*	*475*

Table 4-1
Estimated Number of Wells and Associated Disturbance

Alternatives and Totals	Total Pads	Total Wells	BLM-Administered Pads	BLM-Administered Wells	Total Acres	BLM-Administered Acres
Alternative D - new producing well pads/wells	308	308	42	42	756	107
Alternative D - existing and projected well pads/wells	793	793	211	211	2,144	422
Alternative D - Total Well Pads/Wells	*1,101*	*1,101*	*252*	*252*	*2,899*	*530*

[1] Short-term disturbance is a calculation of the cumulative disturbance that would occur to the end of the plan from the new wells projected in the North Dakota Reasonable Foreseeable Development Scenario for oil and gas, plus those presently considered to be active (unplugged and unreclaimed).
[2] Long-term disturbances is a calculation of unreclaimed disturbance that would be present at the end of 2029.
Source: BLM 2013

4.1.2 General Methodology for Analyzing Impacts

Potential impacts or effects are described in terms of type, context, duration, and intensity, which are generally defined as follows:

- *Type of Impact* – Because types of impacts can be interpreted differently by different people, this chapter does not differentiate between beneficial and adverse impacts (except in cases where such characterization is required by law, regulation, or policy). The presentation of impacts for key planning issues is intended to provide the BLM decision maker and reader with an understanding of the multiple use tradeoffs associated with each alternative. The impact analysis presents the effects caused by the action and the reader is left to interpret if that is a beneficial or adverse impact. Different readers may interpret the effect as either adverse or beneficial.
- *Context* – Context describes the area or location (site specific, local, planning-area wide, or regional) in which the impact would occur. Site-specific impacts would occur at the location of the action, local impacts would occur within the general vicinity of the action area, planning area-wide impacts would affect a greater portion of the planning area, and regional impacts would extend beyond the planning area boundaries.
- *Duration* – Duration describes the length of time an effect would occur, either short term or long term. Duration is defined as follows, unless a specific duration is provided under a resource or resource use. Short term is defined as anticipated to begin and end within the first five years after the action is implemented. Long term

is defined as lasting beyond five years to the end of or beyond the planning time frame of the North Dakota RMP.

- *Intensity* – Rather than categorize impacts by intensity (e.g., major, moderate, and minor), this analysis discusses impacts using quantitative data wherever possible (e.g., miles, acres, etc.). Where quantifiable data are unavailable, impacts are characterized qualitatively.
- *Direct and Indirect Impacts* – Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place. Indirect impacts result from implementing an action or alternative but usually occur later in time or are removed in distance and are reasonably certain to occur.

Analysis shown under Alternative A may be referenced in the other alternatives with such statements as "impacts would be the same as, or similar to, Alternative A" or "impacts would be the same as Alternative A, except for...," as applicable.

Irreversible and irretrievable commitment of resources is discussed in **Section 4.23**, Irreversible and Irretrievable Commitment of Resources. Irreversible commitments of resources result from actions in which resources are considered permanently changed. Irretrievable commitments of resources result from actions in which resources are considered permanently lost.

4.1.3 Incomplete or Unavailable Information

The CEQ established implementing regulations for NEPA, requiring that a federal agency identify relevant information that may be incomplete or unavailable for an evaluation of reasonably foreseeable significant adverse effects in an EIS (40 CFR 1502.22). If the information is essential to a reasoned choice among alternatives, it must be included in an EIS unless the cost of obtaining the information is exorbitant. Knowledge and information is, and would always be, incomplete, particularly with infinitely complex ecosystems considered at various scales.

The best available information pertinent to the decisions to be made was used in developing the RMPA. Considerable effort has been taken to acquire and convert resource data from the BLM and outside sources into digital format for use in the RMPA.

Certain information was unavailable for use in developing this RMPA because inventories have either not been conducted or are incomplete. Some of the major types of data that are incomplete or unavailable include:

- Field inventory of soils and water conditions
- Field inventory of vegetation composition

- Field inventory of wildlife and special status species occurrence and condition

For these resources, estimates were made concerning the number, type, and significance of these resources based on previous surveys and existing knowledge. In addition, some impacts cannot be quantified given the proposed management actions. Where this gap occurs, impacts are projected in qualitative terms or, in some instances, are described as unknown. Subsequent project-level analysis would provide the opportunity to collect and examine site-specific inventory data required to determine appropriate application of RMP-level guidance. In addition, ongoing inventory efforts by the BLM and other agencies in the planning area continue to update and refine information used to implement this RMPA.

4.2 SPECIAL STATUS SPECIES – GREATER SAGE-GROUSE

4.2.1 Methods and Assumptions

Indicators

Indicators of impacts on GRSG are as follows:

- Acres of sagebrush habitat
- Acres of short and long-term surface disturbance (oil and gas)
- Connectivity of habitat patches
- Direct disturbance to GRSG

Assumptions

The analysis includes the following assumptions:

- Three general categories of anthropogenic disturbance (to habitats) or disruption (to animals) would be the most influential on GRSG and their habitat: 1) disturbance/disruption from casual use; 2) disturbance/disruption from permitted activity; and 3) changes in habitat condition, such as from fire or weed invasion.
- BMPs, RDFs, COAs, and standard operating procedures are used for analysis and would be implemented to reduce impacts on GRSG. These are subject to modification based on subsequent guidance and new science.
- Short-term effects are defined as those that would occur over a timeframe of two years or less, and long-term effects would occur over longer than two years.
- Under Alternative A, land tenure adjustments would be subject to current disposal/exchange/acquisition criteria, which include retaining lands with threatened or endangered species, high quality

riparian habitat, or plant and animal populations or natural communities of high interest – this would include GRSG.

- Ground-disturbing activities could positively or negatively modify habitat, or cause loss or gain of individuals, depending on the amount of area disturbed, the nature of the disturbance, the species affected, and the location of the disturbance (e.g., juniper reduction treatments are ground-disturbing but could positively modify habitat in the long term).
- BLM-administered oil and gas well pads are primarily located in PH. On lands outside PH, there is less than one well projected (see **Table 4-1**); therefore, most of the development is associated with PH.

4.2.2 Nature and Type of Effects

Factors related to the decline in GRSG distribution and abundance include habitat loss and degradation, disease and predation, chemicals and changes in land use (USFWS 2010, pg. 14). Habitat loss and fragmentation reduces the land area available to support GRSG, and also increases opportunities for other types of disturbance, such as human traffic, wildfire, and spread of invasive plant species. The GRSG impacts section is arranged to focus on the COT report threats identified for North Dakota.

COT Report Threats – Isolated/Small Populations, Agriculture, and Ex-Urban Development

Impacts from Land Tenure Decisions

GRSG in North Dakota are restricted to approximately 800 square miles in western Bowman County, western Slope County, and extreme southern Golden Valley County. GRSG in North Dakota are largely non-migratory, although there may be some short seasonal movements between summer and winter habitats, primarily between Montana and North Dakota (NDGFD 2005; Swanson 2009). As a small population with limited suitable habitat, North Dakota GRSG are especially vulnerable to the effects of isolation and habitat fragmentation.

Land tenure adjustments or withdrawals made in GRSG habitat could reduce the habitat available to sustain GRSG populations, unless provisions were made to ensure that GRSG conservation remained a priority under the new land management regime. Land exchanges designed to decrease fragmentation of GRSG habitat would help GRSG populations (NTT 2011, pg. 13-14).

COT Report Threat – Energy and Mining

Impact from Mineral Resources

Energy development requires construction of roads, well pads, wells and other infrastructure, with associated noise, traffic and lights, that disturb wildlife and

alter, degrade or displace native ecosystems. Wildlife is displaced by energy development infrastructure, with power lines and roads having the largest effects according to a meta-analysis of prairie grouse populations (Hagen 2010). GRSG population declines resulted from avoidance of infrastructure during one or more seasons, reduced productivity, and/or reduced survival (Naugle et al. 2011).

Industrial activity associated with the development of surface mines and infrastructure (e.g., roads and power lines) could result in noise and human activity that disrupt the habitat and life-cycle of GRSG. The number of displaying GRSG on two leks within 1.25 miles of active mines in northern Colorado declined by approximately 94 percent over a five-year period following an increase in mining activity, though some recovery was subsequently observed (Remington and Braun 1991, cited in Manier et al. 2013 pg. 71; Braun 1998). All studies which assessed impacts of energy development on GRSG found negative effects, whereas no studies reported a positive influence of development on populations or habitats (Naugle et al. 2011). Studies consistently reported that breeding populations of GRSG were negatively impacted at conventional well pad densities (defined in the study as four to eight pads per square mile), with declines in lek attendance by male GRSG ranging from 13 to 79 percent associated with these well densities. A recent summary of studies investigating GRSG response to natural gas development reported impacts on leks from energy development were most severe when infrastructure occurred near leks and that impacts remained discernible out to distances up to four miles (Manier et al. 2013, pg. 51).

An observed 21 percent decline in GRSG population between pre- and post-mine development was primarily attributed to decreased nest success and adult female annual survival; the treatment effect was more noticeable closer to gas field infrastructure. Annual survival of individuals reared near gas field infrastructure (yearling females and males) was significantly lower than control individuals that were not reared near infrastructure (Holloran et al. 2010, cited in Manier et al. pg. 59).

Despite significant closures of BLM-administered lands to oil and gas leasing within GRSG habitat (720,800 acres in PPH and 4,164,700 acres in PGH in MZ I, according to Manier et al. 2013, Table 12, pg. 55), current leases are substantial across GRSG ranges in BLM MZ I, which includes the planning area. Potential for development is based on locations of geologic fields for traditional oil and gas, distributed extensively across eastern portions of GRSG range (Manier et al. 2013, pg. 51). Mining of various federal mineral resources currently directly affects approximately 3.5 percent of potential GRSG habitat within MZ I, with indirect effects potentially affecting larger portions in some areas. Restrictions on mineral leasing in GRSG habitat would reduce disturbance to the species by reducing these disturbances.

Potential restrictions on use of GRSG habitat could include NSO, CSU and TL stipulations. NSO stipulations would prevent habitat loss, fragmentation and disturbance in GRSG habitat, while CSU would avoid breeding habitat and other sensitive areas, and TL would avoid nest disturbance by restricting use during certain times of year. However, if mineral resources can be recovered from drilling into the subsurface from an adjacent private landholding, habitat degradation, noise disturbance and other impacts from drilling will still occur in the planning area and the stipulations may be ineffective in protecting GRSG.

COT Report Threat – Infrastructure

Impact from Lands and Realty

Transmission lines and major power lines are widespread throughout the range of GRSG. GRSG generally respond negatively to increased human infrastructure in sagebrush habitats, including roads, power lines and communication towers (Knick and Connelly 2011; Johnson et al. 2011). Although transmission line and power line construction does not generally result in substantial direct habitat loss, it would temporarily disturb individual GRSG and habitat along the ROW. Following construction, GRSG avoidance of vertical structures, potentially due to raptors perching on the structures, may result in habitat exclusion via behavioral response. One study reported that the frequency of raptor/GRSG interactions during the breeding season increased 65 percent and golden eagle interactions alone increased 47 percent in an area in pre- and post-transmission line comparisons (Ellis 1985). GRSG have been observed to avoid brood-rearing habitats within three miles of power lines (LeBeau 2012). Higher densities of power lines within four miles of a lek negatively influence lek attendance (Walker et al. 2007). Additionally, the tendency of GRSG to fly relatively low, and in low light or when harried, may put them at high risk of collision with power lines (Beck et al. 2006, cited in Manier et al. 2013, pg. 50).

ROW exclusion areas would prohibit all development of ROWs, while ROW avoidance areas would consider on a case-by-case basis whether an ROW should be allowed. This flexibility may be advantageous where federal and private land-ownership areas are mixed and exclusion areas may result in more widespread development on private lands.

Impacts from Travel and Transportation Management

Ecological impacts of roads and motorized trails include mortality due to collisions, behavior modifications due to noise, activity and/or habitat loss, alteration of physical environment, leaching of nutrients, erosion, spread of invasive plants, and alteration by humans due to accessibility. GRSG avoid nesting and summering near major roads (for example, paved secondary highways), and traffic disturbances. Research suggests that roads within 4.7 miles of leks negatively influence male lek attendance, with larger roads having greater effects (Connelly et al. 2004; Johnson et al. 2011). Increased length of road, increased traffic levels on roads, and traffic activity during the early morning on

roads within approximately two miles of leks all negatively influence male lek attendance (Holloran 2005; LeBeau 2012; Forman and Alexander 1998; Lyon and Anderson 2003, cited in Manier et al. 2013, pg. 44, 50).

Closing and reclaiming unused, minimally used and/or unnecessary (e.g., redundant) roads in and around GRSG habitat will reduce disturbance to GRSG in those habitats as well as increase the amount of GRSG habitat when the roads are reclaimed (NTT 2011, pg. 11-12).

COT Report Threat – Fire

Impacts from Fire

Fire is particularly damaging to sagebrush ecosystems. Big sagebrush does not re-sprout after a fire, but is replenished by wind-dispersed seed from adjacent unburned stands or seeds in the soil. Depending on the species and the size of a burn, sagebrush can reestablish within five years of a burn, but a return to a full pre-burn community cover can take 13 to 100 years (Connelly et al. 2004). While wildfire likely played an important historical role in creating a mosaic of habitat for GRSG, current land-use patterns have restricted the system's ability to support wildfire. Slow rates of re-growth and recovery of sagebrush after disturbance, coupled with high rates of disturbance and conversion to introduced plant cover are largely responsible for the accumulating displacement and degradation of the sagebrush ecosystem (Manier et al. 2013, pg. 4-6).

Fire suppression may be used to maintain habitat for GRSG (NTT 2011, pg. 25-27). Fire suppression may preserve the condition of some vegetation communities, as well as habitat connectivity. This is particularly important in areas where fire frequency has increased as a result of weed invasion, or where landscapes are highly fragmented. Fire also increases opportunities for invasive species, such as cheatgrass (*Bromus tectorum*), to expand (Balch et al. 2012), and fire suppression may limit this expansion.

Controlled burning may be prescribed to treat fuel buildup and can assist in the recovery of sagebrush habitat in some vegetation types. Re-seeding with native plants and long-term monitoring to ensure the production of GRSG cover and forage plants, would assist vegetation recovery (NTT 2011, pg. 26-27). Re-evaluation of controlled burning, fuels management and fire suppression policies is intended to protect sagebrush ecosystem and the GRSG that depend on it.

COT Report Threat – Grazing and Range Management

Impacts from Range Management

Livestock grazing is the most widespread land use across the sagebrush biome (Connelly et al. 2004, pg. 7-29). Livestock grazing can affect soils, vegetation, water and nutrient availability by consuming or altering vegetation, redistributing nutrients and plant seeds, trampling soils and vegetation, and disrupting microbial composition (Connelly et al. 2004, pg. 7-29 – 7-32). Livestock may

also trample nests and disturb GRSG behavior (Beck and Mitchell 2000, Coates 2007, pg. 28, 33).

At unsustainable levels of grazing, impacts can lead to loss of vegetative cover, reduced water infiltration rates, decreased plant litter, increased bare ground, reduced nutrient cycling, decreased water quality, increased soil erosion, and reduced overall habitat quality for wildlife, including GRSG (Knick et al. 2011). Properly managed grazing, however, may protect GRSG by reducing fuel load (Connelly et al. 2004, pg. 7-30).

Structural range improvements such as fences represent potential movement barriers (especially woven-wire fences), predator perches or travel corridors, and are a potential cause of direct mortality to GRSG (Braun 1998). Grazing restrictions that protect sagebrush ecosystem health would enhance habitat for GRSG populations.

COT Report Threat – Vegetation Management (Sagebrush Elimination, Conifer Invasion, Invasive Species)

Impacts from Vegetation Management and Habitat Restoration

Current treatments and active vegetation management typically focus on vegetation composition and structure for fuels management, habitat management and/or productivity manipulation for improving the habitat and forage conditions for ungulates and other grazers, using surface (soil) stabilization to manipulate vegetation composition or increase productivity, or to remove invasive plants (Knick et al. 2011). Distribution of these treatments can affect the distribution of GRSG and sagebrush habitats locally and across a region.

Invasive plants are thought to alter plant community structure and composition, productivity, nutrient cycling, and hydrology, and may competitively exclude native plant populations. In particular, invasive plants can reduce and eliminate vegetation that GRSG use for food and cover, resulting in habitat loss and fragmentation, and may also increase the risk of wildfire. An assortment of nonnative annuals and perennials and native conifers are currently invading sagebrush ecosystems. Expansion of conifer woodlands, especially juniper (*Juniperus* spp.), also threaten GRSG because they do not provide suitable habitat, and further, mature trees displace shrubs, grasses and forbs required for GRSG through competition for resources; juniper expansion is also associated with increased bare ground and potential for erosion, and offers additional perch sites for raptors; thus, woodland expansion may also represent expansion of raptor predation threat, similarly to perches on power lines and other structures (Connelly et al. 2004).

Landscapes with large, intact patches of sagebrush are preferred to avoid edge effects; in addition, GRSG require habitats including a diversity of herbaceous species and healthy native grasses, making management for high condition

important (Knick et al. 2011). Given the limited distribution of sagebrush and the cost of habitat restoration, management plans that protect intact sagebrush and restore impacted areas strategically to enhance existing habitats (i.e., increase connectivity of intact sagebrush) have the best chance of increasing high quality sagebrush cover (Connelly et al. 2004; Beck and Mitchell 2000, cited in Manier et al. 2013, pg. 108). Sagebrush-promoting vegetation treatments would increase the amount and quality of GRSG habitat.

COT Report Threat – Recreation

Impacts from Recreation

Recreational use of GRSG habitat may be benign in some situations, but may also result in human disturbance of birds or nesting sites, degradation of sagebrush habitat, or poaching (NTT 2011, p. 12). Activities such as camping, bicycling, off-road vehicle use and hunting utilizing the extensive network of BLM roads and trails impact sagebrush and GRSG by generating noise and dust, spreading invasive plants, and altering wildlife behavior (Knick et al. 2011). In addition, as discussed under travel and transportation above, road and trail use may directly cause GRSG mortality via collisions with vehicles. Closing or seasonally restricting roads used by recreationalists in and around seasonal GRSG habitats may reduce the impacts on wildlife. Restricting access to important habitat areas based on seasonal use and coincident with GRSG activities would also protect GRSG (Knick et al. 2011; NTT 2011, pg. 11).

4.2.3 Impacts Common to All Alternatives

There are no impacts which are common to all alternatives.

4.2.4 Alternative A

COT Report Threat – Isolated/Small Populations, Agriculture, and Ex-Urban Development

Impacts from Land Tenure Decisions

Though 3,436 acres of BLM-administered land are available for disposal, land tenure adjustments would be subject to current disposal/exchange/acquisition criteria, which include retaining lands with threatened or endangered species, high quality riparian habitat, or plant and animal populations or natural communities of high interest; this would likely include retention of areas with GRSG, and would thus retain occupied habitats under BLM management. Retaining land under BLM jurisdiction would avoid the possibility of habitat conversion to agriculture, urbanization, or other uses that would remove sagebrush habitat, though conversions could still occur on adjacent private lands.

Although this alternative would likely retain lands within planning area, it is not a requirement of the current North Dakota RMP (i.e., the lands are technically

available for disposal and if an isolated parcels contained no GRSG habitat it could be disposed of or exchanged); therefore, it would not meet COT Report Conservation Option 5 under Ex-Urban Development to "not relinquish public lands… in GRSG habitat". Acquisitions of GRSG habitat would still be allowed, so COT Report Conservation Option 2 under Ex-Urban Development could be met but there is no emphasis on it.

Impacts from ACECs
No ACECs would be designated under Alternative A, and therefore no impacts on GRSG or their habitats from management for ACECs.

COT Report Threats – Energy and Mining

Impacts from Fluid Minerals
Under Alternative A, NSO stipulations would be applied within one-quarter-mile of active leks and no seismic exploration or other development would be allowed within two miles of leks between March 1 and June 15. Currently, no acres in the planning area are closed to fluid mineral leasing, while 73,435 BLM-administered acres are open to leasing. Of these, 25,130 acres are under standard terms and conditions, while 9,780 acres are NSO, 21,235 acres are CSU, and 38,504 acres are under timing limitations. As shown below in **Table 4-2**, Disturbance Associated with Existing Wells Pads and Projected Active Well Pads under Alternative A, 291 current and projected pads under existing leases on BLM land are anticipated to disturb 816 acres in the short term, with 259 pads anticipated to disturb 548 acres long-term. As discussed above under *Nature and Type of Effects*, mineral exploration and extraction directly disturb GRSG and their habitat, although leasing restrictions would reduce these impacts by disturbing/degrading fewer acres of sagebrush habitat, and reducing direct disturbance of birds on BLM-managed minerals. However, if the resources are drilled from adjacent private lands/minerals, disturbance could still occur and the stipulations would not be as effective in protecting GRSG.

The existing oil and gas stipulations (e.g., 1/4 mile NSO and timing limit) would not work towards meeting the COT Report Conservation Measures 1 and 2 under Energy Development: avoid energy development in PACs (no PH or GH in this alternative) or, if not possible to avoid, development should occur only on non-habitat areas. The current NSO, CSU, and TL restrictions in place for GRSG will help meet Conservation Measure 3 "…the development should occur in the least suitable habitat for GRSG…".

Table 4-2
Disturbance Associated with Existing Wells Pads and Projected Active Well Pads under Alternative A

	Total Pads	Total Wells	BLM-Administered Pads	BLM-Administered Wells	Total Acres	BLM-Administered Acres
Short-Term Disturbance[1]						
New exploratory and development well pads/wells	384	384	60	60	2,071	337
Existing and projected well pads/wells	894	894	231	231	2,455	479
Total well pads/wells	*1,278*	*1,278*	*291*	*291*	*4,526*	*816*
Long-Term Disturbance[2]						
New producing well pads/wells	314	314	49	49	772	125
Existing and projected well pads/wells	793	793	211	211	2,144	422
Total well pads/wells	*1,107*	*1,107*	*259*	*259*	*2,915*	*548*

[1] Short-term disturbance is a calculation of the cumulative disturbance that would occur to the end of the plan from the new wells projected in the North Dakota Reasonable Foreseeable Development Scenario for oil and gas, plus those presently considered to be active (unplugged and unreclaimed).
[2] Long-term disturbances is a calculation of unreclaimed disturbance that would be present at the end of 2029.
Source: BLM 2013

Impacts from Solid Minerals

Under Alternative A, 242,743 acres would be available for consideration for coal mining (of this, 30,408 acres are BLM surface), although there are no existing coal leases and no current interest in federal coal resources in GRSG habitat. For locatable minerals, mineral materials, salable minerals and on-energy leasable minerals, a total of 56,681 BLM-administered acres would continue to be open to leasing and development, and impacts on GRSG and habitat described under *Nature and Type of Effects* would continue. Although there are current no mines on BLM minerals, the planning area is open to mining, so therefore does not meet the COT Report Conservation Option 1 under Mining to "avoid **new** mining activities and/or any associated facilities within occupied habitat, including seasonal habitats".

COT Report Threat – Infrastructure

Impacts from Lands and Realty

Alternative A includes no specific lands and realty management related to GRSG or their habitat, although some measures to site ROWs in a way that minimizes surface disturbance and avoids environmentally sensitive areas would be applied. There are currently no ROW exclusion or avoidance areas within the planning area for GRSG. If no other lines are built within the decision area, impacts to GRSG may be relatively minor.

However, since the entire area is open to ROWs, there are no specific actions that would make progress toward meeting the COT Report Conservation Option 1 under Infrastructure to "avoid construction of these features in GRSG habitat, both within and outside of PACs". The current RMP direction to avoid environmentally sensitive areas would partially meet the COT Report Conservation Option 2 to either bury powerlines or consolidate new structure with existing features.

Impacts from Travel and Transportation Management

BLM-administered lands would continue to allow limited yearlong use for motorized wheeled vehicles, restricted to existing roads and trails on 33,030 acres (see **Chapter 1** for more detail on the OHV ROD). Through site-specific planning, BLM would inventory, map and designate roads and trails as open, seasonally open, or closed. Through this process, important wildlife habitat areas, including GRSG habitat, could be protected, though there is currently no direct protection for GRSG or GRSG habitat from travel and transportation management under Alternative A. Fragmentation and direct impacts described under *Nature and Type of Effects* would likely continue, though the extent of these impacts is not clear in the absence of projected road-building needs. Since this alternative carries forward the Limited designation (OHVs limited to existing road and trails) from the Montana-Dakotas OHV ROD, it would meet the COT Report Conservation Option 1 under Recreation to: "Close important GRSG use areas to off-road vehicle use." Off-road vehicle use has not been allowed in the planning area since 2003.

COT Report Threat – Fire

Impacts from Fire and Fuels Management

Fire and fuels management under Alternative A would not specifically protect GRSG or their habitat, although prescribed burning may be used where appropriate in support of resource management objectives, including improving vegetation conditions in GRSG habitat. Though it would not be an RMP action under this alternative, BLM would still meet the COT Report Conservation Option 4 under Fire to: Renew and implement the BLM IM 2011-138 Sage-grouse Conservation Related to Wildlife Fire and Fuels Management…" The part it would not meet is incorporating this IM direction into an RMP-level action; BLM would still use the applicable practices from the IM.

COT Report Threats – Grazing and Range Management Structures

Impacts from Range Management

Under Alternative A, 32,945 acres in the planning area would continue to be open for livestock grazing, with 5,781 available AUMs, while 85 acres would remain unallocated for grazing. Livestock grazing would continue to be managed through existing grazing plans, with methods and guidelines from the existing RMP followed to maintain ecological conditions according to Standards for

Rangeland Health, which include maintaining healthy, productive and diverse populations of native plants and animals. The Montana/Dakotas Drought Policy (**Appendix H**) would be followed to prevent impacts on rangelands under drought conditions. Continuation of these policies would not specifically protect GRSG habitat, though could provide indirect benefits through preservation of existing sagebrush habitat.

Riparian habitats would be managed to achieve PFC and livestock would be restricted from riparian areas. Together, these management actions would help to improve riparian vegetation health and reduce impacts caused by livestock, such as trampling and overuse of riparian areas. As a result, seasonal habitats for GRSG would be improved or preserved where they are applied.

Range improvements would be designed to meet both wildlife and range objectives, and would include building or modifying fences to permit passage of wildlife. One range improvement is currently planned, a 7-mile pipeline in the Antelope Butte Allotment. In addition, all interior non-wildlife friendly fences have been replaced within the Big Gumbo Allotment within the past five years. Development of range improvements on erodible soils would be avoided in springs. Although not directly created to protect GRSG, these approaches would protect GRSG habitat by reducing the likelihood of surface disturbance in sensitive areas.

With the current Biodiversity Standard in the Standards for Rangeland Health, this alternative would help meeting Conservation Option 1 under Grazing to "ensure that allotments meet ecological potential and wildlife habitat requirements…" However, this alternative would not fully meet Conservation Option 3 to "Incorporate sage-grouse habitat needs or habitat characteristics into relevant resource and allotment management plans…" since there are no GRSG specific standards developed.

COT Report Threats – Vegetation Management (Sagebrush Elimination, Conifer Invasion, Invasive Species)

Impacts from Habitat Restoration and Vegetation Management

Under Alternative A, Integrated Vegetation Management Handbook policies would be followed and would provide providing guidance on which treatments and chemicals can be used. Application of these policies would improve vegetation management in sagebrush habitat thereby improving habitat conditions for GRSG. Although there is no specific RMP direction under Alternative A, current and planned vegetation management projects in the planning area do include conifer reduction in the southern portion of the area, without the use of prescribed fire. This project would improve habitat for GRSG.

This alternative would meet COT Report Conservation Objective under Pinyon-juniper Expansion to: "Remove pinyon-juniper from areas of sagebrush that are most likely to support sage-grouse (post-removal)…"

COT Report Threat – Recreation

Impacts from Recreation
Alternative A includes no specific recreation management related to GRSG or their habitat. Potential impacts on GRSG from recreational use would be as discussed above under *Nature and Type of Effects*. Although there are no developed recreation facilities in the planning area, this alternative would not meet the COT Report Conservation Option 2 under Recreation to "Avoid development of recreational facilities… in sage-grouse habitats" because future development would not be precluded.

4.2.5 Alternative B

COT Report Threat – Isolated/Small Populations, Agriculture, and Ex-Urban Development

Impacts from Land Tenure Decisions
No lands in PH would be available for disposal under Alternative B and if conservation actions cannot be achieved, the BLM would seek to acquire lands with intact subsurface mineral estate. Retaining land under BLM jurisdiction would avoid the possibility of habitat conversion to agriculture, urbanization, or other uses that would remove sagebrush habitat, though these conversions could still occur on adjacent private lands. Alternative B would meet the COT Report Conservation Option 5 under Ex-Urban Development to "…not relinquish public lands…", and it would also meet Conservation Option 2 to: "Acquire and manage sage-grouse habitat to maintain intact ecosystems".

Impacts from ACECs
Impacts would be the same as Alternative A.

COT Report Threats – Energy and Mining

Impacts from Fluid Minerals
Restrictions on fluid mineral leasing and development proposed under Alternative B would result in beneficial impacts on GRSG compared to Alternative A. Under Alternative B, 61,197 acres in the planning area would be closed to fluid mineral leasing, while 12,238 acres of BLM-administered lands would remain open to leasing. PH would be closed to new fluid mineral leasing, existing leases would not be renewed, and conservation measures would be applied as conditions of permit approvals. These proposed policies would result in a decrease in the number of acres of GRSG habitat that would be impacted by fluid mineral leasing and development compared to Alternative A, and a

reduction in the likelihood of impacts from fluid mineral exploration and development described under *Nature and Type of Effects*.

As shown below in **Table 4-3**, Disturbance Associated with Existing Wells Pads and Projected Active Well Pads under Alternative B, 257 current and projected pads under existing leases on BLM-administered land are anticipated to disturb 624 acres, a 12 percent drop from Alternative A that disturbs 192 fewer acres of habitat. In the long term, 72 fewer acres would be disturbed, and fewer habitats would be fragmented, compared to Alternative A. The difference in acreage from Alternative A is small because much of the mineral resource in NDFO is already under existing leases.

Table 4-3
Disturbance Associated with Existing Wells Pads and Projected Active Well Pads under Alternative B

	Total Pads	Total Wells	BLM-Administered Pads	BLM-Administered Wells	Total Acres	BLM-Administered Acres
Short-Term Disturbance[1]						
New exploratory and development well pads/wells	352	352	26	26	1,899	145
Existing and projected well pads/wells	894	894	231	231	2,455	479
Total Well Pads/Wells	*1,246*	*1,246*	*257*	*257*	*4,354*	*624*
Long-Term Disturbance[2]						
New producing well pads/wells	289	289	21	21	708	54
Existing and projected well pads/wells	793	793	211	211	2,144	422
Total Well Pads/Wells	*1,081*	*1,081*	*232*	*232*	*2,851*	*476*

[1] Short-term disturbance is a calculation of the cumulative disturbance that would occur to the end of the plan from the new wells projected in the North Dakota RFD for oil and gas, plus those presently considered to be active (unplugged and unreclaimed).
[2] Long-term disturbances is a calculation of unreclaimed disturbance that would be present at the end of 2029.
Source: BLM 2013

Alternative B meets COT Report Conservation Measures 1-3 to: avoid energy development in PACs (new leases), use adequate buffers for valid existing rights, and use reasonable alternative avoidance measures (see actions in **Table 2-3** under Alternative B for Unleased and Leased Fluid Mineral in **Chapter 2** for all conservation measures). As mentioned above, this would result in 12 percent reduction in disturbed acres from Alternative A.

Impacts from Solid Minerals

The limitations proposed under Alternative B would result in beneficial impacts, compared to Alternative A, on GRSG and their habitat associated with solid mineral exploration and extraction activities described under *Nature and Type of Effects*. All surface mining of coal would be found to be unsuitable in PH (87,443 acres); subsurface mining could only be allowed if all surface disturbance and

facilities were place outside PH. PH would be recommended for withdrawal from locatable mineral entry. For non-energy leasable minerals, PH would be closed to leasing and to mineral material sales. BMPs would be applied to existing leases and locatable mineral claims, and restoration would be required for existing salable mineral pits.

These policies would decrease the number of acres potentially impacted by solid mineral development compared to Alternative A, and a reduction in the likelihood of disturbance and fragmentation impacts from solid mineral exploration and extraction described under *Nature and Type of Effects*. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on GRSG or their habitat but it would preclude any potential future development.

This alternative would meet the COT Report Conservation Option 1 under Mining to: "Avoid new mining activities and/or associated facilities within occupied habitats, including seasonal habitats."

COT Report Threat – Infrastructure

Impacts from Lands and Realty
Establishing ROW exclusion and avoidance areas would protect GRSG habitat in areas where they are applied as described above under *Nature and Type of Effects*. Under Alternative B, PH areas would be managed by the BLM as ROW exclusion areas (32,900 acres). GH would be managed by the BLM as ROW avoidance areas (80 acres). Such management would increase the number of acres of GRSG habitat that would be protected by lands and realty management compared to Alternative A.

The net impact of the ROW exclusion area is less because a portion of the PH is a unitized oil and gas field (this means facilities such as roads and pipelines needed for the development of the field are covered under a separate agreement between the operator and the BLM vs. the realty program). All other utilities would be subject to the ROW exclusion (PH) and avoidance (GH) areas.

By making PH a ROW exclusion area this alternative would partially meet the COT Report Conservation Option to: "Avoid construction of these features in sage-grouse habitat…" This partially meets because there would still be construction of some of these features for valid existing rights.

Impacts from Travel and Transportation Management
Travel and transportation management under Alternative B would likely result in beneficial impacts on GRSG and their habitat, compared to Alternative A, from roads and motorized vehicles by limiting traffic on existing roads in PH and GH, evaluating the need to permanently or seasonally close roads or areas to traffic in PH, and restoring roads not designated in travel management plans in

PH. Although the extent of permanent or seasonal road closures and the reclaiming of undesignated roads is unknown, these provisions make Alternative B more likely to result in beneficial impacts on GRSG as described under *Nature and Type of Effects* compared to Alternative A, though the extent of these impacts is not clear in the absence of projected road-building needs and/or closures.

Since this alternative carries forward the Limited designation (OHVs limited to existing road and trails) from the Montana-Dakotas OHV ROD, it would meet the COT Report Conservation Option 1 under Recreation to: "Close important sage-grouse use areas to off-road vehicle use." Off-road vehicle use has not been allowed in the planning area since 2003.

COT Report Threat – Fire

Impacts from Fire and Fuels Management

Fire and fuel management policies proposed under Alternative B would be designed to protect sagebrush ecosystems by maintaining sagebrush cover, applying seasonal restrictions, protecting winter range, and requiring use of native seeds. Post-fuels treatments and ES&R management would be designed to ensure long-term persistence of seeded areas and native plants. BLM would prioritize suppression in PH, though it is unknown to what extent firebreaks or post-fire restoration will be employed in the planning area. Although fire is still a threat listed in the COT report, fires have only burned two percent of the entire planning area in the past 10 years (or about 21,000 acres). These proposed modifications to fire and fuel management would result in an increase in the protection of sagebrush ecosystems compared to Alternative A, and a reduction in the likelihood of adverse impacts from fire and fuels management described under *Nature and Type of Effects*.

BLM would meet the COT Report Conservation Option 4 under Fire to: "Renew and implement the BLM IM 2011-138 Sage-grouse Conservation Related to Wildlife Fire and Fuels Management…" Many of the other Conservation Options for Fire in the COT report are included as RDFs in **Appendix B** and are applicable to Alternatives B-D. Alternative B also meets the Conservation Measures 2 and 5 to: eliminate intentional fires in sagebrush habitats and immediately suppressing fire in all sagebrush habitat.

COT Report Threats – Grazing and Range Management Structures

Impacts from Range Management

Under Alternative B, BLM would implement a number of management actions in PH to incorporate GRSG habitat objectives livestock grazing management, though there would be no change to the acreage open for grazing or available AUMs. For example, at the implementation level, BLM may consider changes in grazing practices or systems to ensure allotments meet rangeland health

standards or can restrict new grazing infrastructure in GRSG habitat. These changes could reduce grazing intensity or change the season of use. In addition, changes in number of livestock or season of use within riparian and wet meadows can reduce impacts in these important seasonal habitats. Together, these efforts would result in beneficial impacts from grazing on GRSG and habitat described under *Nature and Type of Effects* compared to Alternative A.

With the current Biodiversity Standard in the Standards for Rangeland Health, this alternative would help meeting Conservation Option 1 under Grazing to "ensure that allotments meet ecological potential and wildlife habitat requirements…" This alternative states to incorporate GRSG habitat objectives and management considerations into all allotments through AMPs or permit renewals, and would thus work towards meeting Conservation Option 3 to "Incorporate sage-grouse habitat needs or habitat characteristics into relevant resource and allotment management plans…" Conservation Measures 2, 4, and 5 also have similar management actions under this alternative (e.g., work cooperatively on integrated ranch planning, prioritize completion of Standards for Rangeland Health within PH, and manage for vegetation composition and structure consistent with ecological site potential).

COT Report Threats – Vegetation Management (Sagebrush Elimination, Conifer Invasion, Invasive Species)

Impacts from Habitat Restoration and Vegetation Management
Habitat restoration and vegetation management actions under Alternative B would aim to improve GRSG habitat and prioritize restoration efforts to benefit GRSG habitats. As a result, the restoration and management of vegetation actions would enhance GRSG habitat relative to Alternative A by requiring the use of native seeds, designing post-restoration management to ensure the long-term persistence of the restoration efforts, considering changes in climate, and monitoring and controlling invasive species. It is unknown how many vegetation management projects would be undertaken in the decision area to prioritize restoration of GRSG habitat.

This alternative would meet COT Report Conservation Objective under Pinyon-juniper Expansion to: "Remove pinyon-juniper from areas of sagebrush that are most likely to support sage-grouse (post-removal)…" as well as Conservation Measure 1 under Invasive Plant Species to" "Retain all remaining large intact sagebrush patches…"

COT Report Threat – Recreation

Impacts from Recreation
Management proposed under Alternative B would result in beneficial impacts from organized recreation as described under *Nature and Type of Effects* on GRSG and their habitat, compared to Alternative A, by limiting issuance of SRPs

in PH. However, impacts from dispersed recreation, such as hiking, biking, or equestrian activities, would continue to disturb vegetation and GRSG in the areas where they occur.

Although there are no developed recreation facilities in the planning area, this alternative would not meet the COT Report Conservation Option 2 under Recreation to "Avoid development of recreational facilities… in sage-grouse habitats" because there is no specific action addressing future recreation development (not an issue in this part of the NDFO); however, SRPs would only be issued if they were neutral or beneficial to PH. See *Impacts from Travel and Transportation Management* sections for Conservation Option 1.

4.2.6 Alternative C

COT Report Threat – Isolated/Small Populations, Agriculture, and Ex-Urban Development

Impacts from Land Tenure Decisions

No lands in PH and GH would be available for disposal under Alternative C. Retaining land under BLM jurisdiction would avoid the possibility of habitat conversion to agriculture, urbanization, or other uses that would remove sagebrush habitat, though these conversions could still occur on adjacent private lands. Private land may be acquired in ACECs to enhance GRSG conservation value of existing lands. Although it is uncertain how much private land could be acquired to enhance GRSG habitat under Alternative C, this policy has the potential to increase the acreage of enhanced sagebrush compared Alternative A, as no such measures have been provided under Alternative A. Alternative C would meet the COT Report Conservation Option 5 under Ex-Urban Development to "…not relinquish public lands…", and it would also meet Conservation Option 2 to: "Acquire and manage sage-grouse habitat to maintain intact ecosystems".

Impacts from ACECs

An ACEC to protect GRSG would be designated as sagebrush reserves on PH, covering 32,900 acres. GRSG populations and habitat within areas designated as ACECs would be protected by increased management focus and restrictions on surface-disturbing activities in these areas.

COT Report Threats – Energy and Mining

Impacts from Fluid Minerals

Fluid minerals management under Alternative C would be similar to that described for Alternative B, but would include several more restrictive conservation measures, thereby enhancing protection of GRSG habitat and populations compared to Alternative A. In addition, actions would be applied to both PH and GH, which would increase the area of GRSG habitat that would be

protected. For example, under Alternative C, 66,293 acres in the planning area would be closed to fluid mineral leasing, while 7,142 BLM-administered acres within PH would remain open to leasing. Of these, 7,142 acres would be under standard terms and conditions. As shown below in **Table 4-4**, Disturbance Associated with Existing Wells Pads and Projected Active Well Pads under Alternative C, 231 current and projected pads under existing leases on BLM-administered land are anticipated to disturb 621 acres short-term, 195 fewer than Alternative A. In the long term, 73 fewer acres would be disturbed compared to Alternative A. These are approximately the same reductions achieved under Alternative B. The change in acreage from Alternative A is small because much of the mineral resource in NDFO is already under existing leases.

Table 4-4
Disturbance Associated with Existing Wells Pads and Projected Active Well Pads under Alternative C

	Total Pads	Total Wells	BLM-Administered Pads	BLM-Administered Wells	Total Acres	BLM-Administered Acres
Short-Term Disturbance[1]						
New exploratory and development well pads/wells	352	352	25	25	1,899	142
Existing and projected well pads/wells	894	894	231	231	2,455	479
Total Well Pads/Wells	*1,246*	*1,246*	*256*	*256*	*4,354*	*621*
Long-Term Disturbance[2]						
New producing well pads/wells	289	289	21	21	707	53
Existing and projected well pads/wells	793	793	211	211	2,144	422
Total Well Pads/Wells	*1,081*	*1,081*	*232*	*232*	*2,851*	*475*

[1] Short-term disturbance is a calculation of the cumulative disturbance that would occur to the end of the plan from the new wells projected in the North Dakota RFD for oil and gas, plus those presently considered to be active (unplugged and unreclaimed).
[2] Long-term disturbances is a calculation of unreclaimed disturbance that would be present at the end of 2029.
Source: BLM 2013

Alternative C meets COT Report Conservation Measures 1-3 to: avoid energy development in PACs (new leases), use adequate buffers for valid existing rights, and use reasonable alternative avoidance measures (see actions in **Table 2-3** under Alternative C for Unleased and Leased Fluid Mineral in **Chapter 2** for all conservation measures). This alternative would result in approximately 12 percent drop of disturbed acres from Alternative A; even though Alternative C makes PH and GH no-lease areas, the acreages and well numbers are not very different from Alternative B (where PH is a no lease) because of the location of existing leases.

Impacts from Solid Minerals
Impacts from solid minerals management would be the same as Alternative B, but would be applied to a larger area (PH and GH). Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on GRSG or their habitat but it would preclude any potential future development. This alternative would meet the COT Report Conservation Option 1 under Mining to: "Avoid new mining activities and/or associated facilities within occupied habitats, including seasonal habitats."

COT Report Threat – Infrastructure

Impacts from Lands and Realty
Similar to Alternative B, the measures proposed under Alternative C would reduce the impacts of ROWs on GRSG habitat. PH and GH would be ROW exclusion areas (32,980 acres), including for wind energy. Other impacts would be the same as under Alternative B. Management of ROW exclusion areas would result in beneficial impacts (described under the *Nature and Type of Effects*) on sagebrush and vegetation which support GRSG and other wildlife, compared to Alternative A. As under Alternative B, public ownership would be maintained in PH, but without the exceptions provided under Alternative B. ROW exclusion areas could have the unintended side-effect of shifting ROW development onto adjacent private lands.

As with Alternative B, the net impact of the ROW exclusion area is less because a portion of the PH is a unitized oil and gas field (see Alternative B). By making PH and GH a ROW exclusion area this alternative would partially meet the COT Report Conservation Option to: "Avoid construction of these features in sage-grouse habitat…" This partially meets because there would still be construction of some of these features for valid existing rights.

Impacts from Travel and Transportation Management
Impacts from travel and transportation management would be similar to Alternative B, although impacts to GRSG habitat (as described under the *Nature and Type of Effects*) would be greater by 80 additional acres since protections would apply to both PH and GH. Site-specific travel planning to be completed in the next five years would designate specific roads and trails to be open, closed, or seasonally closed in the planning area.

Since this alternative carries forward the Limited designation (OHVs limited to existing road and trails) from the Montana-Dakotas OHV ROD, it would meet the COT Report Conservation Option 1 under Recreation to: "Close important sage-grouse use areas to off-road vehicle use." Off-road vehicle use has not been allowed in the planning area since 2003.

COT Report Threat – Fire

Impacts from Fire and Fuels Management
Impacts from fire and fuels management would be largely similar to those described for Alternative B, but would be applied to a slightly larger area (PH and GH), and would thus provide greater protection for GRSG and their habitat over the long term, though it is unknown to what extent firebreaks or post-fire restoration would be employed in the planning area. Although fire is still a threat listed in the COT report, fires have only burned two percent of the entire planning area in the past 10 years (or about 21,000 acres).

BLM would meet the COT Report Conservation Option 4 under Fire to: "Renew and implement the BLM IM 2011-138 Sage-grouse Conservation Related to Wildlife Fire and Fuels Management…" Many of the other Conservation Options for Fire in the COT report are included as RDFs in **Appendix B** and are applicable to Alternatives B-D. Alternative C also meets the Conservation Measures 2 and 5 to: eliminate intentional fires in sagebrush habitats and immediately suppressing fire in all sagebrush habitat.

COT Report Threats – Grazing and Range Management Structures

Impacts from Range Management
Impacts from range management would be similar to those described for Alternative B. In addition, grazing would be reduced by 50 percent on all allotments within the Big Gumbo area (2,041 AUMs) and 3,740 AUMs would be available in other areas. By reducing AUMs, Alternative C would reduce the risk of trampling and loss of herbaceous understory cover in GRSG nesting habitat, but could contribute to increased fuel loading and risk of wildfire in these areas. New water developments for diversion from seeps or springs would not be authorized, which would prevent impacts on riparian areas and seasonal GRSG habitat by avoiding livestock traffic and loss of water flow to these areas. Other impacts would be similar to those described for Alternative B.

With the current Biodiversity Standard in the Standards for Rangeland Health, this alternative would help meeting Conservation Option 1 under Grazing to "ensure that allotments meet ecological potential and wildlife habitat requirements…" This alternative states to incorporate GRSG habitat objectives and management considerations into all allotments through AMPs or permit renewals, and would thus work towards meeting Conservation Option 3 to "Incorporate sage-grouse habitat needs or habitat characteristics into relevant resource and allotment management plans…" Conservation Measures 2, 4, and 5 also have similar management actions under this alternative (e.g., work cooperatively on integrated ranch planning, prioritize completion of Standards for Rangeland Health within PH, and manage for vegetation composition and structure consistent with ecological site potential).

COT Report Threats – Vegetation Management (Sagebrush Elimination, Conifer Invasion, Invasive Species)

Impacts from Habitat Restoration and Vegetation Management
Impacts from habitat restoration and vegetation management would be largely similar to those described for Alternative B, but would be applied to a slightly larger area (80 additional acres of GH). It is unknown how many vegetation management projects would be undertaken in the decision area for conservation or restoration of GRSG habitat.

This alternative would meet COT Report Conservation Objective under Pinyon-juniper Expansion to: "Remove pinyon-juniper from areas of sagebrush that are most likely to support sage-grouse (post-removal)…" as well as Conservation Measure 1 under Invasive Plant Species to" "Retain all remaining large intact sagebrush patches…"

COT Report Threat – Recreation

Impacts from Recreation
Impacts from recreation management under Alternative C would be the same as under Alternative B.

Although there are no developed recreation facilities in the planning area, this alternative would not meet the COT Report Conservation Option 2 under Recreation to "Avoid development of recreational facilities… in sage-grouse habitats" because there is no specific action addressing future recreation development (not an issue in this part of the NDFO); however, SRPs would only be issued if they were neutral or beneficial to PH and GH. See *Impacts from Travel and Transportation Management* sections for Conservation Option 1.

4.2.7 Alternative D

COT Report Threat – Isolated/Small Populations, Agriculture, and Ex-Urban Development

Impacts from Land Tenure Decisions
No lands in PH would be available for disposal under Alternative D. Impacts from land tenure decisions would be the same as Alternative B. Alternative D would meet the COT Report Conservation Option 5 under Ex-Urban Development to "…not relinquish public lands…", and it would also meet Conservation Option 2 to: "Acquire and manage GRSG habitat to maintain intact ecosystems".

Impacts from ACECs
Impacts would be the same as Alternative A.

COT Report Threats – Energy and Mining

Impacts from Fluid Minerals

Under Alternative D, all PH would be open to leasing subject to an NSO stipulation. These lands would cover 61,197 acres. BLM would apply restrictions on geophysical exploration and development to protect leks and nesting habitat. Conservation measures would be different from those described for Alternative B, and incorporate noise and surface disturbance reduction, West Nile virus prevention, and guidance for mitigation. Such management would reduce disturbance to GRSG populations and habitats associated with fluid mineral development relative to Alternative A. However, if the resources are drilled from adjacent private lands/minerals, disturbance could still occur and the stipulations would not be as effective in protecting GRSG.

As shown below in **Table 4-5**, Disturbance Associated with Existing Wells Pads and Projected Active Well Pads under Alternative D, 282 current and projected pads under existing leases on BLM-administered land are anticipated to disturb 767 acres short term, 49 fewer than Alternative A. In the long term, 18 fewer acres would be disturbed and fragmented compared to Alternative A. These reductions would conserve more GRSG habitat than Alternative A, but substantially less than Alternatives B or C.

Table 4-5
Disturbance Associated with Existing Wells Pads and Projected Active Well Pads under Alternative D

	Total Pads	Total Wells	BLM-Administered Pads	BLM-Administered Wells	Total Acres	BLM-Administered Acres
Short-Term Disturbance[1]						
New exploratory and development well pads/wells	376	376	51	51	2,028	288
Existing and projected well pads/wells	894	894	231	231	2,455	479
Total Well Pads/Wells	*1,270*	*1,270*	*282*	*282*	*4,483*	*767*
Long-Term Disturbance[2]						
New producing well pads/wells	308	308	42	42	756	107
Existing and projected well pads/wells	793	793	211	211	2,144	422
Total Well Pads/Wells	*1,101*	*1,101*	*252*	*252*	*2,899*	*530*

[1] Short-term disturbance is a calculation of the cumulative disturbance that would occur to the end of the plan from the new wells projected in the North Dakota RFD for oil and gas, plus those presently considered to be active (unplugged and unreclaimed).
[2] Long-term disturbances is a calculation of unreclaimed disturbance that would be present at the end of 2029.
Source: BLM 2013

Alternative B meets COT Report Conservation Measures 1-3 to: avoid energy development in PACs (new leases), use adequate buffers for valid existing rights, and use reasonable alternative avoidance measures (see actions in **Table 2-3** under Alternative B for Unleased and Leased Fluid Mineral in **Chapter 2** for all conservation measures).

Impacts from Solid Minerals

Impacts under Alternative D would be similar to those described for Alternative B. For locatable mineral development, proposed actions would be analyzed on a case-by-case basis in cooperation with the State of North Dakota and BMPs applied to avoid unnecessary degradation of GRSG habitat. These actions would not eliminate impacts, but would result in beneficial impacts from locatable mineral development compared to Alternative A, including those described under *Nature and Type of Effects*. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on GRSG or their habitat but it would preclude any potential future development.

This alternative would meet the COT Report Conservation Option 1 under Mining to: "Avoid new mining activities and/or associated facilities within occupied habitats, including seasonal habitats."

Impacts from Lands and Realty

Lands and realty management proposed under Alternative D would provide increased protection of GRSG and their habitat compared to Alternative A. PH would be managed as ROW avoidance areas (32,900 acres), although PH would be a ROW exclusion area for wind energy permits. No ROW exclusion areas would be established, to allow for management flexibility and avoid displacing ROWs onto private land. These measures would improve management and would result in beneficial impacts from ROW development as described under *Nature and Type of Effects*, compared to Alternative A. ROWs would be allowed in GH (80 acres) with appropriate mitigation measures. Other measures and impacts would be as described under Alternative B.

The net impact of the ROW exclusion area is less because a portion of the PH is a unitized oil and gas field (this means facilities such as roads and pipelines needed for the development of the field are covered under a separate agreement between the operator and the BLM vs. the realty program). All other utilities would be subject to the ROW avoidance area in PH.

By making PH a ROW avoidance area this alternative would partially meet the COT Report Conservation Option to: "Avoid construction of these features in sage-grouse habitat…" This partially meets because there would still be construction of some of these features for valid existing rights and it is not an exclusion area (except for wind energy).

Impacts from Travel and Transportation Management
Measures proposed under Alternative D would result in beneficial impacts on GRSG habitat compared to Alternative A. Many management actions would be similar to Alternative B, with increased management flexibility incorporated to improve management and target those areas that need most protection. Other measures would be as described under Alternative B, but would apply to both PH and GH (80 additional acres). Overall, management under Alternative D would result in beneficial impacts on GRSG and their habitat from activities associated with travel and transportation in the planning area compared to Alternative A.

Since this alternative carries forward the Limited designation (OHVs limited to existing road and trails) from the Montana-Dakotas OHV ROD, it would meet the COT Report Conservation Option 1 under Recreation to: "Close important sage-grouse use areas to off-road vehicle use." Off-road vehicle use has not been allowed in the planning area since 2003.

COT Report Threat – Fire

Impacts from Fire and Fuels Management
Fuels treatment policies and restrictions would be designed and implemented as described in Alternative B, except sagebrush canopy cover would not be reduced to less than eight percent. In addition, fuels management projects in PH would be designed to incorporate greater flexibility to maximize the acreage protected. These proposed modifications to fire and fuel management would result in an increase in the protection of sagebrush ecosystems compared to Alternative A, and a reduction in the likelihood of adverse impacts from fire and fuels management described under *Nature and Type of Effects*, though it is unknown to what extent firebreaks or post-fire restoration would be employed in the planning area. Although fire is still a threat listed in the COT report, fires have only burned two percent of the entire planning area in the past 10 years (or about 21,000 acres), and no fires were located on BLM-administered lands.

BLM would meet the COT Report Conservation Option 4 under Fire to: "Renew and implement the BLM IM 2011-138 Sage-grouse Conservation Related to Wildlife Fire and Fuels Management…" Many of the other Conservation Options for fire in the COT report are included as RDFs in **Appendix B** and are applicable to Alternatives B-D. Alternative D also meets the Conservation Measures 2 and 5 to: eliminate intentional fires in sagebrush habitats and immediately suppressing fire in all sagebrush habitat.

COT Report Threats – Grazing and Range Management Structures

Impacts from Range Management
Management under Alternative D would be similar to that described for Alternative B, with increased collaboration with stakeholders to improve rangeland health and increased tools available to improve flexibility in management. As such, impacts would likely be similar to Alternative B, though increased management flexibility may improve management by targeting those areas that need most protection.

With the current Biodiversity Standard in the Standards for Rangeland Health, this alternative would help meeting Conservation Option 1 under Grazing to "ensure that allotments meet ecological potential and wildlife habitat requirements…" This alternative states to incorporate GRSG habitat objectives and management considerations into all allotments through AMPs or permit renewals, and would thus work towards meeting Conservation Option 3 to "Incorporate sage-grouse habitat needs or habitat characteristics into relevant resource and allotment management plans…" Conservation Measures 2, 4, and 5 also have similar management actions under this alternative (e.g., work cooperatively on integrated ranch planning, prioritize completion of Standards for Rangeland Health within PH, and manage for vegetation composition and structure consistent with ecological site potential).

COT Report Threats – Vegetation Management (Sagebrush Elimination, Conifer Invasion, Invasive Species)

Impacts from Habitat Restoration and Vegetation Management
Impacts from habitat restoration and vegetation management under Alternative D would be similar to Alternative B. However, this alternative includes consideration of other threatened, endangered, or sensitive species in addition to GRSG, which may reduce protection for GRSG and their habitat in certain instances of competing priorities. In addition, conifer encroachment treatments would improve GRSG habitat.

This alternative would meet COT Report Conservation Objective under Pinyon-juniper Expansion to: "Remove pinyon-juniper from areas of sagebrush that are most likely to support sage-grouse (post-removal)…" as well as Conservation Measure 1 under Invasive Plant Species to" "Retain all remaining large intact sagebrush patches…"

COT Report Threat – Recreation

Impacts from Recreation
Impacts from recreation management under Alternative D would be the same as Alternative B.

Although there are no developed recreation facilities in the planning area, this alternative would not meet the COT Report Conservation Option 2 under Recreation to "Avoid development of recreational facilities… in sage-grouse habitats" because there is no specific action addressing future recreation development (not an issue in this part of the NDFO); however, SRPs would only be issued if they were neutral or beneficial to PH. See *Impacts from Travel and Transportation Management* sections for Conservation Option 1.

4.2.8 Impacts Summary

Table 4-6, Comparison of Alleviated Threats to GRSG in North Dakota by Alternative, provides a summary comparison how each alternative alleviates COT Report Threats to GRSG Listed as "Present and Widespread" and "Present but Localized" for North Dakota.

Table 4-6
Comparison of Alleviated Threats to GRSG in North Dakota by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
COT Report Threat – Isolated/Small Populations, Agriculture, and Ex-urban Development[1]				
Acres delineated as PH	0	32,900	32,900	32,900
Acres delineated as GH	0	80	80	80
Summary of Impacts to GRSG from Isolated/Small populations	Alternative A does not delineate any PH or GH. However, all action alternatives delineate PH and GH; constraints placed on other resources/uses are listed below and these vary by alternative. PH for North Dakota was mapped to include 100% breeding bird density because of this population is on the fringe of the habitat and is a very small population. The action alternatives are in agreement with the following conservation measures identified in the COT report specific to PACs: • Retain GRSG habitats within PACs. • If PACs are lost to catastrophic events, implement appropriate restoration efforts. • Restore and rehabilitate degraded GRSG habitats in PACs.			
Areas identified for disposal (acres)	3,436	80	0	80
Summary of Impacts to GRSG from Agriculture/ Urbanization	Across all action alternatives, the BLM would take advantage of opportunities to consolidate GRSG habitat. Alternative A technically allows for disposal of lands; however, GRSG habitat would be considered in the analysis. Although agriculture and urbanization have been identified as threats in North Dakota, the BLM has limited management authority over those types of activities. Many of these COT objectives are outside the scope of this planning document; however, see **Chapter 5** for SGI projects that have been completed on private lands within the GSRG habitat. The action alternatives are in agreement with the following conservation options identified in the COT report specific to ex-urban development: • Acquire and manage GRSG habitat to maintain intact ecosystems. • Do not relinquish public lands for the purpose of urban development in GRSG habitat.			

[1] Urbanization is listed as **Not Known to be Present** in the COT Report threats list; however, the alternatives for NDFO contain actions under the realty program that would address this issue (e.g., no disposal of BLM-administered lands within PH).

Table 4-6
Comparison of Alleviated Threats to GRSG in North Dakota by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
COT Report Threat – Energy and Mining				
Unleased Fluid Minerals				
Areas closed to fluid mineral leasing (acres)	0	61,197	66,293	0
Areas open to mineral leasing with NSO stipulation (acres)	9,780	0	0	61,197
Acres of long-term surface disturbance	2,915 total (548 BLM minerals)	2,851 total (476 BLM minerals)	2,851 total (475 BLM minerals)	2,899 total (530 BLM minerals)
Well density – short term (wells/square mile)	0.84 planning area 2.5 BLM minerals	0.83 planning area 2.2 BLM minerals	0.83 planning area 2.2 BLM minerals	0.84 planning area 2.5 BLM minerals
Well density – long term (wells/square mile)	0.74 planning area 2.3 BLM minerals	0.72 planning area 2.0 BLM minerals	0.71 planning area 2.0 BLM minerals	0.73 planning area 2.2 BLM minerals
Leased Fluid Minerals				
Restrictions on surface disturbance for leased fluid minerals	Lowest level of protection for GRSG in GH and PH	High level of protection for GRSG in PH	Highest level of protection for GRSG in PH and GH	High level of protection for GRSG in PH
Summary of Impacts to GRSG from Oil and Gas Development	Alternative C closes PH and GH to leasing and Alternatives B closes PH to leasing. Since most of the high development potential has already been leased, and due to the small amount of BLM minerals in the planning area, the surface disturbance and well densities do not change significantly among the alternatives (even between the alternatives that have no lease vs. the no-action). The action alternatives are in agreement with the following conservation measures identified in the COT report specific to Energy Development: • Avoid energy development in PACs (Doherty et al. 2010). Identify areas where leasing is not acceptable, or not acceptable without stipulations for surface occupancy that maintains GRSG habitats. • If avoidance is not possible within PACs due to pre-existing valid rights, adjacent development or split estate issues, development should only occur in non-habitat areas, including all appurtenant			

Table 4-6
Comparison of Alleviated Threats to GRSG in North Dakota by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
	structures, with an adequate buffer that is sufficient to preclude impacts to GRSG habitat from noise and other human activities. By limiting disturbances within PH (Alternative B, C and D) and GH (Alternative C), the action alternatives would work towards the objective of reducing threats to intact shrubland. Alternative C would have more restrictions on fluid mineral development than Alternatives B and D, and Alternative A would have the fewest restrictions of all alternatives.			
		Mining		
Locatable minerals – recommended for withdrawal (acres)	0	46,397 Recommend a withdrawal from locatable mineral entry in PH	49,970 Recommend a withdrawal from locatable mineral entry in PH and GH	0 No new recommended withdrawal from locatable mineral entry
Salable minerals/mineral materials (acres)	0	46,397 PH would be closed to mineral material sales	49,970 PH and GH would be closed to mineral material sales	46,397 PH would be closed to mineral material sales
Coal mining - areas identified as unsuitable (acres)	0	87,443	166,207	87,443
Summary of Impacts to GRSG from Mining	Alternatives B and C would be more protective to GRSG and GRSG habitat than Alternatives A and D (Alternative D is the same as B except locatable minerals are not withdrawn due to the very low potential). However, all the action alternatives are in agreement with the following COT conservation options: • Avoid new mining activities and/or any associated facilities within occupied habitat, including seasonal habitats.			
		COT Report Threat – Infrastructure		
ROW avoidance areas (acres)	0 No ROW avoidance areas	80 GH would be an avoidance area	0 No new acres of avoidance since PH and GH would be an exclusion area	32,900 Specific criteria would have to be met in order to permit disturbances

Table 4-6
Comparison of Alleviated Threats to GRSG in North Dakota by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
ROW exclusion areas (acres)	0 No ROW exclusion areas	32,900 PH would be a ROW exclusion area	32,980 PH and GH would be a ROW exclusion area	0 No ROW exclusion areas
Travel management all limited areas (acres)	33,030	33,030	33,030	33,030
Summary of Impacts to GRSG from Infrastructure	Alternatives B, C and D restrict ROWs in PH, which responds to the need (identified in the COT report) to stop population decline and habitat loss by eliminating activities known to negatively impact GRSG and their habitats through reduction in the threat of habitat loss, degradation and fragmentation. The action alternatives are in agreement with the following conservation objectives/options identified in the COT report specific to infrastructure: • Avoid development of infrastructure within PACs (objective). • Avoid construction of these features in GRSG habitat, both within and outside of PACs. • Restrictions limiting use of roads should be enforced. Alternative A, in general, has the least protections for GRSG and GRSG habitat from development of infrastructure. All alternatives limit OHV use to existing roads and trails, but Alternative C also contains a 4-mile buffer from leks for route construction. All action alternatives have limitations on route construction and realignments to minimize impacts to GRSG.			
COT Report Threat - Fire				
Fire and Fuels				
Fire and fuels management	Treatments considered on a case-by-case basis, and not prioritized specific to GRSG habitat	No treatments would be allowed in known winter range in PH, unless treatment is designed to strategically reduce wildfire risk around or in winter range and would maintain winter habitat range quality	No treatments would be allowed in known winter range, unless treatment is designed to strategically reduce wildfire risk around or in winter range and would maintain winter habitat range quality	No treatments would be allowed in known winter range in PH, unless treatment is designed to strategically reduce wildfire risk around or in winter range and would maintain winter habitat range quality

Table 4-6
Comparison of Alleviated Threats to GRSG in North Dakota by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
		Wildfire		
Fire operations	Control wildfires on BLM-administered land – no specific RMP direction for GRSG	Prioritize suppression, immediately after life and property, to conserve the habitat (though Alternatives B and D apply this to PH, there are only 80 BLM surface acres in GH)		
Summary of Impacts to GRSG from Fire Management	The alternatives are in agreement with the following conservation options from the COT report: • Renew and implement the BLM IM 2011-138 (Sage-grouse Conservation Related to Wildland Fire and Fuels Management; BLM 2011b) until a decision is made on whether or not to incorporate the measure identified in the IM into RMPs. The measures in this IM are listed in **Appendix B** of this document (B.2.4 Required Design Features for Fire and Fuels).			
	COT Report Threats - Grazing and Range Management Structures			
Areas available for livestock grazing (acres)	32,945 BLM-managed surface lands within the planning area would be available for livestock grazing	32,945 BLM-managed surface lands within the planning area would be available for livestock grazing	32,945 BLM-managed surface lands within the planning area would be available for livestock grazing; however, the largest four allotments in PH would have a 50% reduction in AUMs	32,945 BLM-managed surface lands within the planning area would be available for livestock grazing
Available AUMs	5,780	5,780	3,739	5,780
Summary of Impacts to GRSG from Grazing	GRSG habitat considerations within livestock grazing allotments would be similar across all action alternatives. Range improvements are more restricted under Alternative B than under Alternative A. Under all alternatives, grazing would be managed to achieve the standards of rangeland health. Under Alternative A, this includes a biodiversity standard; however, under the action alternatives, specific GRSG habitat objectives would be developed (in cooperation with NDGFD and USFWS). Under the action alternatives, new range improvements would be approved if they conserve, enhance, or restore GRSG habitat.			

Table 4-6
Comparison of Alleviated Threats to GRSG in North Dakota by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
COT Report Threats - Sagebrush Elimination, Conifer Invasion[2], Invasive Species (Vegetation Management)				
Areas prioritized for vegetation treatments	No specific habitat restoration or vegetation management actions in the North Dakota RMP for GRSG	Across all action alternatives, treatments would be prioritized to consider GRSG habitat requirements		
Summary of Impacts to GRSG from Vegetation Management	The action alternatives are in agreement with the following conservation objective/conservation measures from the COT report: • Avoid sagebrush removal or manipulation in GRSG breeding or wintering habitats (objective). • Retain all remaining large intact sagebrush patches, particularly at low elevations.			
COT Report Threat - Recreation[3]				
Issuance of SRPs	All alternatives limit vehicle use to existing roads and trails (33,030 acres of BLM surface)			
Summary of Impacts to GRSG from Recreation	There are no areas open to off-road travel within the planning area in any alternative. All alternatives are in agreement with the following conservation option from the COT report: • Close important GRSG use areas to off-road vehicle use.			

[2] Conifers were listed as **Unknown** in the COT report threats list; however, the alternatives do contain an action to reduce juniper encroachment.
[3] Recreation was listed as **Not Known to be Present** in the COT report; however, the alternatives for NDFO do contain an action for SRPs. Travel Management is listed under Infrastructure section above.

4.3 LANDS AND REALTY

4.3.1 Methods and Assumptions

Indicators

Table 4-7, Comparison of Lands and Realty Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on lands and realty under each alternative.

Table 4-7
Comparison of Lands and Realty Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Acres of BLM surface ownership in the planning area	33,030	33,030	33,030	33,030
Number and type of land tenure adjustments (i.e., lands identified for disposal, withdrawal, or acquisition)	3,436 acres for disposal	80 acres available for disposal	0 acres available for disposal	80 acres available for disposal
Number, acres/miles, and types of surface-disturbing ROWs and leases, including communication sites	371 acres	Decrease of existing surface disturbance if buried or removed; decrease of new surface disturbance due to ROW avoidance and exclusions	Decrease of existing surface disturbance if buried or removed; decrease of new surface disturbance due to ROW exclusions	Decrease of existing surface disturbance if buried or removed; decrease of new surface disturbance due to ROW avoidance

Assumptions

The analysis includes the following assumptions:

- Existing ROWs would be managed to protect valid existing rights.
- On renewal, assignment, or amendment of existing ROWs, additional stipulations could be included in the land use authorization.
- ROW holders may continue their authorized use as long as they are in compliance with the terms and conditions of their grant.
- The BLM would continue to process land use authorizations and land tenure adjustments as workforce and workload allow.

- The demand for all types of ROWs (including communication sites, utilities, and renewable energy projects) would steadily increase over the life of this RMPA.
- Maintaining and upgrading utilities, communication sites, and other ROWs is preferred before the construction of new facilities in the decision area, but only if the upgrading can be accommodated in the existing ROW.
- Demand for small distribution facilities to extend and upgrade services, such as communication sites and utilities, would increase as rural development occurs on the dispersed private parcels within the planning area.
- Demand for both regional and interstate transmission lines would increase as population and urban areas grow.
- Demand for new ROWs is expected to increase as demand for new communication technology, such as fiber optic cable, grows.
- Retention areas include all decision-area lands (the BLM-administered lands within the planning area), with the exception of lands identified or under consideration for disposal.
- In accordance with the Omnibus Act, the BLM would continue to manage all previously withdrawn BLM-administered lands as withdrawn from entry, appropriation, or disposal under the public land laws.
- Withdrawals would be reviewed, as needed, and recommended for extensions, modifications, revocations, or terminations. All existing withdrawals initiated by other agencies, such as the US Bureau of Reclamation or the Department of Energy, would be continued through the term provided by the Public Land Order or other official document unless the initiating agency or the BLM requests that the withdrawal be revoked.

4.3.2 Nature and Type of Effects

Resources and resource uses affect the lands and realty program by prescribing ROW exclusion and avoidance areas and stipulations in order to protect resources. A ROW exclusion area is one that is not available for new ROW location under any conditions. In a ROW avoidance area, new ROW development would ideally be avoided; however, the area may be available for ROW development subject to additional requirements, such as resource surveys and reports, construction and reclamation engineering, long-term monitoring, special design features, special siting requirements, TLs, and rerouting. Such requirements could restrict project location, they could delay availability of energy supply (by delaying or restricting pipelines, transmission lines, or renewable energy projects), or they could delay or restrict communications service availability. As a result of special surveys and reports,

alternative routes may need to be identified and selected to protect sensitive resources, such as GRSG habitat. Designating ROW exclusion and avoidance areas and applying special stipulations would result in increased application processing time and costs due to the potential need to relocate facilities or due to greater design, mitigation, and siting requirements.

Collocating transmission and mineral development infrastructure in existing ROWs and existing disturbed areas reduces land use conflicts and additional land disturbance. Colocation policies also clarify the preferred locations for utilities and simplify processing on BLM-administered lands. However, collocating can limit options for mineral development and selection of more-preferable locations for ROWs.

Travel management actions can involve closing areas or specific routes to motorized or mechanized travel, thereby creating areas that are impractical for some types of land uses, such as transmission lines or communication sites.

Land tenure adjustments are intended to maintain or improve the efficiency of BLM management, including management of GRSG habitat. Land disposal can result in a more contiguous decision area, thus increasing efficient management of BLM-administered lands. However, while consolidation may be beneficial for certain resources and uses, it may not necessarily reduce effects on GRSG habitat.

The BLM does not require a ROW authorization in circumstances where actions are tied to leases that are part of a unit. For example, a fluid mineral leaseholder wanting to install a pipeline within a unitized area would be exempt from acquiring a ROW authorization as long as the pipeline is contained in the unit.

Implementing management for the following resources would have negligible or no impact on lands and realty and are therefore not discussed in detail: recreation, range management, mineral development, fire and fuels management, and habitat restoration/vegetation management.

4.3.3 Impacts Common to All Alternatives

Impacts from Travel and Transportation Management

Under all alternatives, the BLM would complete a travel and transportation management plan, designating certain routes as open, closed, or limited to motorized travel. While the BLM would not close access to valid existing rights, travel management decisions that make access to existing or desirable future ROW locations more difficult would discourage co-location in existing ROWs and new ROW development.

Impacts from Lands and Realty

Under all alternatives, the BLM would continue to manage 33,030 acres of BLM-administered land in the planning area, including 32,900 acres in PH and 80 acres in GH. Alternatives B, C, and D include objectives to acquire lands in PH. However, none of the alternatives propose a specific change in the amount of land currently administered by the BLM in the planning area. Therefore, under all alternatives, the distribution of surface ownership in the planning area would remain unchanged.

Table 4-8, ROW Avoidance and Exclusion Areas by Alternative, provides ROW exclusion and avoidance areas by alternative. For oil and gas activities, net exclusion and avoidance areas are those areas not within the boundaries of a unitized area.

Table 4-8
ROW Avoidance and Exclusion Areas by Alternative

	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
ROW exclusion area	0	32,900	32,980	32,900[1]
ROW avoidance area	0	80	0	32,900
Unitized areas	24,842	24,842	24,842	24,842
Net exclusion area for oil and gas activities	0	8,058	8,138	0
Net avoidance area for oil and gas activities	0	80	0	32,900

[1] PH would be exclusion areas for new ROW wind energy developments.

4.3.4 Alternative A

Impacts from Travel and Transportation Management

Under Alternative A, travel would continue to be allowed on all existing roads and trails until site-specific planning is completed. Existing transportation routes would continue to provide motorized access to ROW infrastructure and communication sites for construction and maintenance.

Impacts from Lands and Realty

Under Alternative A, approximately 368 acres of existing ROWs in the decision area would continue to provide opportunities for colocation of new infrastructure. The BLM would continue to allow ROW development on 33,090 acres in the decision area and no lands within the decision area would be specifically designated as ROW exclusion or avoidance. BLM-administered lands would continue to be available for multiple-use and single-use communication sites and road access ROW on a case-by-case basis pursuant to Title V of

FLPMA, and 43 CFR 2800 regulations. All ROW applications would be reviewed using the criteria of following existing corridors wherever practical and avoiding the proliferation of separate ROWs.

Renewable energy projects such as wind and solar facilities would be permitted through the ROW authorization process. Refer to **Section 4.19**, Renewable Energy, for impact analysis regarding solar and wind energy development. Additionally, under Alternative A, 3,436 acres of BLM-administered land in PH would be available for disposal. While land tenure adjustments, especially those that result in a more consolidated land ownership pattern, can improve BLM administration of public lands, a change in surface ownership from the BLM to another entity could impact GRSG habitat if the new ownership does not provide the same habitat protections as on BLM-administered land.

Impacts from ACECs

There are no designated ACECs in the planning area under Alternative A, and, as a result, no impacts from ACEC management actions on lands and realty.

4.3.5 Alternative B

Impacts from Travel and Transportation Management

The BLM would evaluate the need for permanent or seasonal road closures under Alternative B. Should the BLM determine during a future site-specific evaluation that there is a need to close certain routes, those closures could affect the convenience of access for ROW holders to existing ROW infrastructure as described above in *Nature and Type of Effects*.

Under Alternative B, the BLM would only allow new roads where access to valid existing rights is necessary and does not currently exist which would limit new ROW authorizations and new road construction as compared to Alternative A. Access would be accommodated via the 112 miles of existing roadways crossing PH. Road surfaces account for approximately three percent (1,120 acres) of the decision area in PH. Limitations on new road construction could make certain areas in the remaining 97 percent of the decision area where a roadway is not present impractical for new ROW authorizations.

Impacts from Lands and Realty

Under Alternative B, PH (32,900 acres) would be ROW exclusion area and GH (80 acres) would be a ROW avoidance area. The BLM would also take advantage of opportunities to remove, bury, or modify existing power lines within the 368 acres of existing ROWs in PH.

As noted above in *Nature and Types of Effects*, limitations on new ROWs and above-ground linear features, such as transmission lines and pipelines, could restrict the availability of energy or service availability and reliability for communication systems. ROW exclusion and avoidance designations could extend processing time for renewals of existing ROW authorizations, and make

siting of new linear or block ROWs more difficult than under Alternative A. New development related to oil and gas activities would continue to be allowed within the 24,842 acres of unitized lease areas.

The BLM would retain administration of PH except where land exchanges would result in more contiguous federal ownership patterns or where disposal accompanied by a habitat mitigation agreement or conservation easement would result in more effective management of GRSG habitat. In addition, the BLM would seek to acquire state and private lands to conserve, enhance, or restore GRSG habitat. If the BLM were to proceed with land tenure adjustments, those actions would enhance BLM management of GRSG habitat but could affect existing authorizations and leases as described in *Nature and Type of Effects*.

Impacts from ACECs
Impacts would be the same as under Alternative A.

4.3.6 Alternative C

Impacts from Travel and Transportation Management
Alternative C would prohibit new road construction within four miles of active leks. Because of the density of active lek sites, new road construction would be limited to 638 acres (two percent of the decision area), which is a reduction in areas available for new road construction and ROWs as compared to Alternative A. This reduction would increase those effects described in *Nature and Type of Effects*, including delays in application processing time and costs, increase siting limitations, and delay delivery of energy supplies as compared to Alternative A.

Impacts from Lands and Realty
Under Alternative C, PH and GH (32,980 acres) would be designated as exclusion area for new ROW authorizations Impacts on ROW authorizations from the exclusion designation would be similar Alternative B. Impacts to unitized areas from exclusions would be the same as Alternative B.

The BLM would retain public ownership in PH and GH with no exceptions and seek to acquire important private lands. The effects of land tenure adjustment decisions would be similar to Alternative B, but would include an additional 80 acres of GH retained.

Impacts from ACECs
Under Alternative C, the BLM would designate PH (32,900 acres) as a new ACEC with management tailored to protect the GRSG habitat. There would be no additional management actions related to the ACEC; therefore, the impacts on lands and realty would be the same as those described under sections above.

4.3.7 Alternative D

Impacts from Travel and Transportation Management
Impacts from travel and transportation management under Alternative D would be similar as under Alternative B.

Impacts from Lands and Realty
Under Alternative D, PH (32,900 acres) would be managed as ROW avoidance for new ROW authorizations. PH would be designated as wind energy ROW exclusion, while GH would be designated as wind energy ROW avoidance. Impacts to unitized areas from exclusions would be the same as Alternative B. The designation of PH as ROW exclusion and GH as avoidance would limit the placement of new above ground wind energy infrastructure, resulting in an increase of effects to the lands and realty actions as compared to Alternative A. The extent of the effects would be based on the location and type of any proposed new ROW as well as the wind energy resource available.

Impacts from land tenure adjustments would be the same as those described under Alternative B.

Impacts from ACECs
Impacts would be the same as under Alternative A.

4.4 VEGETATION (INCLUDING NOXIOUS WEEDS; RIPARIAN AND WETLANDS)

4.4.1 Methods and Assumptions

Impacts were determined by assessing which actions, if any, would change the upland vegetation, riparian and wetland vegetation, and weed indicators described below. Some impacts are direct, while others are indirect and affect vegetation through a change in another resource. Direct impacts on vegetation include disrupting, damaging, or removing vegetation, thereby reducing area, amount, or condition of native vegetation. Included among these are actions that reduce total numbers of plant species and actions that reduce or cause the loss of diversity, vigor, or structure of vegetation, or that degrade its function as habitat for GRSG or other wildlife.

Indirect impacts are those that may occur later in time, such as decreased plant vigor or health from dust or reduced water quality. Other indirect impacts include loss of habitat suitable for vegetation colonization due to surface disturbance; introduction of weeds that compete with desirable, native vegetation; conditions that enhance the spread of weeds; and general loss of potential habitat due to surface occupancy or soil compaction.

Indicators
Table 4-9, Comparison of Vegetation Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on vegetation under each alternative.

Table 4-9
Comparison of Vegetation Indicators by Alternative

Indicator	Alternative A	Alternative B	Alternative C	Alternative D
Acres meeting Rangeland Health standards	Current level	Stable	Possible increase from grazing limit	Stable
Acres of sagebrush (PH/GH)	9,711	Possible increase	Increase	Possible increase
Extent of fragmentation	Increasing	Stable or decreasing	Decreasing	Stable or decreasing
Percentage of riparian areas in PFC	Current level	Increase	Increase	Increase
Acres of riparian/wetland vegetation	1,463	Stable or increasing	Stable or increasing	Stable or increasing
Change in spread of noxious weeds	Stable	Stable or decreasing	Stable or decreasing	Stable

Assumptions

The analysis includes the following assumptions:

- All plant communities would be managed toward achieving a mix of species composition, cover, and age classes across the landscape, except in localized situations where plantings are used to defer livestock use on native pasture.
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location in the watershed; the type, time, and degree of disturbance; existing vegetation; precipitation; and mitigating actions applied to the disturbance.
- Noxious and invasive weeds would continue to be introduced and spread as a result of ongoing vehicle traffic in and out of the planning area, recreational activities, wildland fire, wildlife and livestock grazing and movements, and surface-disturbing activities.
- Activities that would disturb soils could cause erosion, loss of topsoil, and soil compaction, which could affect the ability of vegetation to regenerate. Further, surface-disturbing activities could increase dust, which could cover existing vegetation and impair plant photosynthesis and respiration. Resulting impacts could include lowered plant vigor and growth rate, altered or disrupted pollination, and increased susceptibility to disease.

- Ecological health and ecosystem functioning depend on a number of factors, including vegetative cover, species diversity, nutrient cycling and availability, water infiltration and availability, and percent cover of weeds.
- Climatic fluctuation would continue to influence the health and productivity of plant communities on an annual basis.
- Short-term effects would occur over a timeframe of two years or less and long-term effects would occur over longer than two years.

4.4.2 Nature and Type of Effects

GRSG rely on sagebrush ecosystems for all aspects of their life cycle. Typically, a range of sagebrush community composition within the landscape (including variations in sub-species composition, co-dominant vegetation, shrub cover, herbaceous cover, stand age) are needed to meet seasonal, and inter-seasonal, requirements for food, cover, nesting, and wintering habitats. The landscape required for GRSG may be up to 40 square miles. Thus, conserving and managing GRSG is as much about the ecology, management and conservation of large, intact sagebrush ecosystems as it is about the dynamics and behaviors of the populations themselves (Manier et al. 2013).

Historically, sagebrush-dominated vegetation was one of the most widespread habitats in the country, but its expanse has been fragmented, lost, or altered by invasive plants and anthropogenic disturbance (NTT 2011). Protection of GRSG habitat would involve restrictions and limitations on activities that contribute to the spread of invasive species, fire, and other surface disturbance, and management of vegetation to promote healthy sagebrush and understory vegetation to support GRSG.

Vegetation Management and Habitat Protection

In addition to landscapes with large, intact patches of sagebrush (i.e., limited habitat fragmentation), GRSG require high-quality habitat conditions including a diversity of herbaceous species, vegetative and reproductive health of native grasses, as well as an abundance of sagebrush, making management for high condition in seasonally important habitats important (Connelly et al. 2004). Given the limited acreage of suitable sagebrush habitats and the cost of habitat restoration, management plans that protect intact sagebrush and restore impacted areas strategically to enhance existing habitats (for example, connectivity of intact sagebrush) have the best chance of increasing the amount and quality sagebrush cover (Knick and Connelly 2011). Sagebrush-promoting vegetation treatments would enhance native vegetation and overall ecosystem productivity, while reducing the distribution of invasive species and some woody species.

Invasive plants can alter plant community structure and composition, productivity, nutrient cycling, and hydrology, and may competitively exclude native plant populations. In particular, invasive plants can reduce and eliminate

vegetation that GRSG use for food and cover, resulting in habitat loss and fragmentation, and may also increase the risk of wildfire. The spread of invasive plants such as cheatgrass (*Bromus tectorum*) has increased the frequency and intensity of fires (Balch et al. 2012). An assortment of nonnative annuals and perennials and native conifers are currently invading sagebrush ecosystems.

Although not a substantial threat in North Dakota, expansion of conifer woodlands, especially juniper (*Juniperus spp.*) present a threat to GRSG in other parts of the range, because the mature trees do not provide suitable habitat, and displace shrubs, grasses and forbs through direct competition for resources. Mature trees may offer perch sites for raptors; thus, woodland expansion may also represent expansion of predation threat, similarly to perches on power lines and other structures (Holloran 2005; Aldridge and Boyce 2007).

Current treatments and active vegetation management typically focus on vegetation composition and structure for fuels management, habitat management, and productivity manipulation for improving the habitat and forage conditions for ungulates and other grazers, using surface soil stabilization to manipulate vegetation composition or increase productivity, or by removing invasive plants. Locally and regionally, the distribution of these treatments can affect the distribution of GRSG and sagebrush habitats (Knick and Connelly 2011). Vegetation treatments would cause short-term disturbance to vegetation from vegetation removal, but would result in long-term improvements to habitat quality and rangeland health.

Management of vegetation resources to protect GRSG would alter vegetative communities by promoting increases in sagebrush height and herbaceous cover and vegetation productivity, in order to improve rangeland health and enhance sagebrush ecosystems. Treatments designed to prevent encroachment of shrubs, non-native species or woody vegetation would alter the condition of native vegetation communities by changing the density, composition, and frequency of species within plant communities (Connelly et al. 2004).

Vegetation manipulations in the riparian zone, such as weed treatments, native plantings, and erosion control in the channel, would improve the acreage of riparian vegetation and the condition of the riparian vegetation species, and the hydrologic functionality to attain PFC. Habitat connectivity for GRSG could be increased through vegetation manipulation designed to restore vegetation, or transition of an area to better match the surrounding vegetation.

Direct protection of sagebrush acreage to support GRSG would limit or modify uses in this habitat type. Such use restrictions would reduce damage to native vegetation communities and individual native plant species in areas that are important for regional vegetation diversity and quality. Likewise, use restrictions would minimize fragmentation and loss of connectivity and would be more likely to retain existing age class distribution within these specific areas. Use

restrictions could also minimize the spread of invasive species by limiting human activities that cause soil disturbance or seed introductions.

Wildland Fire

While wildfires likely played an important role historically in creating a mosaic of herbaceous dominated areas (recently disturbed), and mature sagebrush (less-frequently disturbed), current land-use patterns have restricted the system's ability to support natural wildfire regimes. Slow rates of re-growth and recovery of vegetation after disturbances (driven by low water availability and other constraints) coupled with high rates of disturbance and conversion to introduced plant cover are partly responsible for the loss of sagebrush acreage and the fragmentation of GRSG habitat (Beck and Mitchell 2000). Thus, preservation of sagebrush ecosystems against wildfire and limiting use of prescribed burning is important to preserving GRSG habitat.

Big sagebrush does not re-sprout after a fire, but is replenished by wind-dispersed seed from adjacent unburned stands or seeds in the soil. Depending on the species and the size of a burn, sagebrush can reestablish within five years of a burn, but a return to a full pre-burn community cover can take 13 to 100 years (Connelly et al. 2004). Fire suppression may be used to maintain habitat for GRSG (NTT 2011), but these policies alter the successional pattern of vegetation in the landscape. When management reduces wildland fire frequency by controlling natural ignitions, the indirect impact is that vegetation ages, and early successional vegetation communities are diminished. Fire suppression may preserve condition of some sagebrush communities, as well as habitat connectivity. This is particularly important in areas where fire frequency has increased as a result of weed invasion, or where landscapes are highly fragmented. Fire also increases opportunities for noxious weeds, such as cheatgrass, to expand (Balch et al. 2012), so fire suppression can indirectly limit this expansion. However, fire suppression can also lead to increased fuel loads, which can lead to more damaging or larger-scale fires in the long term.

Controlled burning may be prescribed to treat fuel buildup and can assist in the recovery of sagebrush habitat in some vegetation types. Re-seeding with native plants and long-term monitoring to ensure the production of GRSG cover and forage plants would assist vegetation recovery (NTT 2011).

Lands and Realty

Construction of utility ROWs involves vegetation removal, which in the short term would disturb native vegetation communities, including sagebrush, and individual native plant species, and, in the long term, may alter age class distribution, reduce connectivity, and encourage the spread of invasive weeds. ROWs may extend for many miles or acres, fragmenting habitat and increasing the potential for weeds to be introduced or spread (NTT 2011). ROW corridors would be managed to concentrate placement of large linear facilities

and other ROW development in less-sensitive areas and to minimize the loss of connectivity and total acreage of vegetation that would be disturbed.

ROW exclusion areas would prohibit all development of ROWs in PH, with the exceptions provided (including allowing ROW development within unitized areas), while ROW avoidance areas would consider on a case-by-case basis whether an ROW should be allowed. This flexibility may be advantageous where federal and private land-ownership areas are mixed and exclusion areas may result in more widespread development on private lands.

Land exchanges or acquisitions to reduce the fragmentation of GRSG habitat and could improve the BLM's ability to implement management actions that would improve the condition of native vegetation communities.

Mineral Resources

The basins where most sagebrush ecosystems reside are the also the center of major oil and gas reserves, which has created a long history of industrial use, particularly on eastern portions of the range, which include North Dakota. Energy development requires construction of roads, well pads, wells and other infrastructure, and associated noise, traffic and lights, that alter, degrade and/or entirely displace native ecosystems and disturb wildlife (Naugle et al. 2011). Surface disturbance associated with mineral development often removes vegetation, reduces the condition of native vegetation communities and the connectivity of habitat, and encourages the spread of invasive species (NTT 2011).

Despite significant closures of BLM-administered lands to oil and gas leasing within PH and GH, current leases are substantial across GRSG ranges (Connelly et al. 2004). If mineral development is shifted away from sagebrush habitat to other areas to protect GRSG, fragmentation and degradation of sagebrush habitat would be reduced for the areas protected, but impacts could still occur or increase in non-federal lands that remain open to mineral leasing and development.

Recreation

Recreation is not considered a substantial threat to GRSG in the planning area (USFWS 2013). Moderate recreational use of GRSG habitat is generally benign, but excessive recreational use may cause degradation of sagebrush vegetation from activities such as camping, bicycling, off-road vehicle use and hunting. Potential impacts from excessive recreational use include trampling of vegetation, soil compaction, erosion, spread of invasive plants, and generation of fugitive dust (NTT 2011). Recreational use can also increase the potential for wildfire caused by invasive plant spread or human error (Knick and Connelly 2011). Most impacts occur in easily accessible areas and in areas open to cross-country travel, particularly motorized use. Restrictions on recreational use of GRSG habitat would limit damage to the vegetation communities that comprise this habitat, by directly reducing disturbance to vegetation from trampling,

motorized vehicles, dust, and spread of invasive weeds. Such restrictions could involve seasonal area closures or other limitations, to be addressed in future site-specific travel planning..

Travel and Transportation

Road construction divides and fragments GRSG habitat, and causes erosion and nutrient leaching. The use of roads creates soil compaction, and allows the spread of human disturbance, including wildfire and invasive plant species (Connelly et al. 2004; Lyon and Anderson 2003). Invasive weeds can out-compete sagebrush and other vegetation essential for GRSG survival. Invasive species also increase wildfire frequencies, further contributing to loss of habitat (Balch et al. 2012).

For protection of GRSG, some roads may be seasonally or permanently closed, traffic may be restricted to designated routes, and new route construction avoided in PH to the maximum extent possible (NTT 2011). The more areas that are closed to motorized vehicle use, the less impact on vegetation from surface disturbance, such as vehicle and human trampling of vegetation, soil compaction, and spread of dust and weeds, would be expected.

Livestock Grazing

Livestock grazing is the most widespread land use across the sagebrush biome (Connelly et al. 2004). Livestock grazing is a "diffuse" form of biotic disturbance that exerts repeated pressure over many years on a system; unlike point-sources of disturbance (e.g., fires), livestock grazing exerts repeated pressure across the landscape. Thus, effects of grazing are not likely to be detected as disruptions, but as differences in the processes and functioning of the sagebrush system. Livestock grazing can affect soils, vegetation health, species composition, water, and nutrient availability by consuming vegetation, redistributing nutrients and seeds, trampling soils and vegetation, and disrupting microbial systems (Connelly et al. 2004; NTT 2011). Grazing may reduce herbaceous understory cover for nesting GRSG, but also may enhance rangeland health by limiting the growth of introduced annual plants. Grazing effects are not distributed evenly because historic practices, management plans and agreements, and animal behavior all lead to differential use of the range (Knick and Connelly 2011).

At unsustainable levels, grazing can lead to loss of vegetative cover, reduced water infiltration rates, reduced nutrient cycling, decreased water quality, increased soil erosion, and reduced habitat quality for wildlife, including GRSG (Knick and Connelly 2011). Land health evaluations are used to assess rangeland condition; if rangelands are meeting land health standards, then it is assumed that current livestock grazing intensity and duration are not degrading the landscape and are compatible with providing wildlife habitat and maintaining rangeland health. Conversely, in areas where land health standards are not being met, these assessments help to identify areas where changes in grazing management would be beneficial.

Livestock often use riparian and wetland areas for water and shade; if in excess, livestock use may reduce riparian acreage meeting PFC, by disrupting vegetation condition and hydrologic functionality. Grazing could also reduce litter and fine fuel loading, which could reduce fire size and severity. Grazing systems that provide for closer management of allotments in GRSG habitat and aim to protect sagebrush and riparian ecosystems would enhance sagebrush and understory vegetation by allowing more plant growth, and reducing trampling and introduction of noxious weeds.

Impacts from mineral split estate are covered under the discussions of impacts from fluid and solid minerals. As such, there will be no further discussion of mineral split estate in this section.

4.4.3 Impacts Common to All Alternatives

Under all alternatives, the same acreage of vegetation communities would be open to livestock grazing (**Table 4-10**, Acres Open to and Unallocated for Grazing under All Alternatives). As a result, the potential for impacts caused by livestock grazing would be greatest in prairie and sagebrush habitats, where the greatest acres would be open to grazing.

Table 4-10
Acres Open to and Unallocated for Grazing under All Alternatives

Resource Use	Sagebrush	Conifer Steppe	Prairie	Wetland/ Riparian	Other
Open to grazing	7,722	1,988	17,563	1,313	4,305
Unallocated for grazing	29	1	44	6	1

4.4.4 Alternative A

Impacts from Travel and Transportation Management

Under Alternative A, BLM-administered lands would continue to permit limited yearlong use for motorized wheeled vehicles, restricted to existing roads and trails. Continuation of this policy would allow the potential for introduction of invasive plants, potential for wildfire, compaction of soil, fragmentation, and other effects as discussed under *Nature and Type of Effects.*

Impacts from Recreation

Alternative A includes no specific recreation management related to GRSG or their habitat and thus current impacts from recreation on vegetation as described under *Nature and Type of Effects* would continue. Potential impacts include trampling of vegetation, soil compaction, erosion, spread of invasive plants, and generation of fugitive dust.

Impacts from Lands and Realty

Alternative A includes no specific lands and realty management related to GRSG or their habitat, although some measures to site ROWs in a way that minimizes surface disturbance and avoids environmentally sensitive areas would be applied. **Table 4-11**, ROW Exclusion and Avoidance Areas in GRSG Habitat under each Alternative, below, shows the acres of ROW exclusion and avoidance areas in GRSG habitat under each alternative. There would be no exclusion or avoidance areas within the planning area. In addition, allowing ROW development within unitized areas (24,842 acres) would potentially result in loss or disturbance of vegetation from these activities.

Table 4-11
ROW Exclusion and Avoidance Areas in GRSG Habitat under each Alternative

Resource Use	Acreage	Alternative A	Alternative B	Alternative C	Alternative D
ROW avoidance (acres)	Total	0	80	0	32,900
	Sagebrush	0	3	0	7,748
ROW exclusion (acres)	Total	0	32,900	32,980	32,900[1]
	Sagebrush	0	7,748	7,752	0

[1] PH would be exclusion areas for new ROW wind energy developments.

Land tenure adjustments would be subject to current disposal/exchange/acquisition criteria, which include retaining lands with threatened or endangered species, high quality riparian habitat, or plant and animal populations or natural communities of high interest. Retention of these areas would reduce the likelihood of habitat conversion to agriculture, urbanization, or other uses that would remove vegetation.

Impacts from Range Management

Under Alternative A, 32,945 acres of GRSG habitat in the planning area would continue to be open for livestock grazing, with 5,781 available AUMs, while 80 acres would be unallocated. Livestock grazing would continue to be managed through existing grazing plans, with methods and guidelines from the existing RMP followed to maintain ecological conditions according to Standards for Rangeland Health. The Montana/Dakotas Drought Policy (**Appendix H**) would be followed to prevent impacts on rangelands under drought conditions. Continuation of these policies could indirectly preserve existing sagebrush habitat.

Riparian habitats would be managed to achieve PFC, and livestock would be restricted from riparian areas. Together, these management actions would help to improve riparian vegetation health and reduce impacts caused by livestock, such as trampling and overuse of riparian areas.

Range improvements would be designed to meet both wildlife and range health objectives, and development of range improvements on erodible soils would be avoided in springs. These approaches would help protect sagebrush ecosystems by supporting rangeland health and reducing the likelihood of surface disturbance in sensitive areas.

Impacts from Fluid Minerals

Under Alternative A, NSO stipulations would be applied within 0.25 mile of active leks and no seismic exploration or other development would be allowed within two miles of leks during the breeding season. Currently, no acres in the planning area are closed to fluid mineral leasing, while 73,435 BLM-administered acres are open to leasing. Of these, 25,130 acres are under standard terms and conditions, while 9,780 acres are NSO, 21,235 acres are CSU, and 38,504 acres are under TL. As discussed above under *Nature and Type of Effects*, mineral exploration and extraction directly disturb vegetation. Therefore, restrictions on mineral leasing would protect vegetation in these areas. **Table 4-12**, Acres Leased for Minerals or Available for Leasing in Sagebrush Habitat under each Alternative, below, shows the acres of sagebrush habitat that would be open to leasing under each alternative.

As described in **Table 4-1**, there would be approximately 816 acres of short-term disturbance and 548 acres of long-term disturbance on BLM-administered lands related to existing and potential development. However, oil and gas development would have limited impacts on vegetation because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on vegetation related to removal or degradation of vegetation, and potential spread of invasive species.

Table 4-12
Acres Leased for Minerals or Available for Leasing in Sagebrush Habitat under each Alternative

Resource Use	Alternative A (surface/ subsurface)	Alternative B (surface/ subsurface)	Alternative C (surface/ subsurface)	Alternative D (surface/ subsurface)
Closed to fluid mineral leasing	0/0	6,679/7,098	6,682/7,117	0/0
Open to fluid mineral leasing	790/7,117	3/20	0/0	790/7,117
NSO	1,158/1,073	0/0	0/0	6,680/7,098
CSU	2,238/2,338	0/0	0/0	0/0
Open to locatable mineral exploration	6,640/3,008	3/18	0/0	6,640/3,008
Areas withdrawn or petitioned from locatable mineral entry	0/0	6,637/5,282	6,640/5,406	6,637/5,282

Impacts from Solid Minerals

Under Alternative A, 242,743 acres would be available for consideration for coal mining, although there are no existing coal leases and development of federal coal resources within GRSG habitat is not anticipated during the life of this plan. Therefore, no impacts on vegetation are expected from coal.

For locatable minerals, mineral materials, and non-energy leasable minerals, a total of 56,681 BLM-administered acres would continue to be open to exploration and development. Impacts on vegetation from surface disturbance, as described under *Nature and Type of Effects*, would continue.

Impacts from Fire and Fuels Management

Fire and fuels management under Alternative A would not specifically protect sagebrush vegetation, although prescribed burning may be used where appropriate in support of resource management objectives, including improving vegetation condition.

Impacts from Habitat Restoration and Vegetation Management

Under Alternative A, Integrated Vegetation Management Handbook policies would be followed and would provide guidance on which treatments and chemicals can be used. Application of these policies would improve vegetation management in sagebrush habitat thereby likely improving vegetation conditions in these areas.

Impacts from ACECs

No ACECs would be designated under Alternative A; therefore, there would be no impacts on vegetation from management for ACECs.

4.4.5 Alternative B

Impacts from Travel and Transportation Management

Travel and transportation management under Alternative B would likely reduce impacts on vegetation from roads and motorized vehicles by limiting motorized vehicles to existing roads and trails in PH and GH, evaluating the need to permanently or seasonally close roads or areas to traffic in PH, and restoring roads by re-seeding with appropriate seed mixes and considering the use of transplanted sagebrush. Restoration of sagebrush habitat and minimizing surface disturbances in sagebrush habitat would enhance vegetation and restore habitat to a greater extent than current policy under Alternative A.

Impacts from Recreation

Management proposed under Alternative B would reduce impacts on vegetation from recreation as described under *Nature and Type of Effects* by limiting issuance of SRPs in PH. Such management would restrict potentially damaging recreational uses of these areas associated with SRPs, although impacts from dispersed recreation, such as hiking, biking, or equestrian activities, would continue to disturb vegetation in areas where they occur.

Impacts from Lands and Realty

Establishing ROW exclusion and avoidance areas would protect vegetation in areas where they are applied as described above under *Nature and Type of Effects*. Under Alternative B, BLM would manage PH as ROW exclusion areas (32,900 acres), with limited exceptions. Similar to Alternative A, allowing ROW development within unitized areas (24,842 acres) would potentially result in loss or disturbance of vegetation from these activities. GH would be ROW avoidance areas (80 acres). Out-of-use ROWs would be reclaimed, which would increase the extent and connectivity of vegetation communities. These measures would increase the acres of vegetation that would be protected by lands and realty management compared to Alternative A (see **Table 4-11** above).

Retention of BLM-administered lands in PH with limited exceptions would reduce the likelihood of vegetation removal or fragmentation associated with agricultural or urban development that could occur on state or private lands.

Impacts from Range Management

There would be no change to the acreage open for grazing or available AUMs described under Alternative A. However, Alternative B includes a number of management actions in PH to incorporate GRSG habitat objectives and management considerations into livestock grazing management. Together, these efforts would reduce, but would not eliminate, impacts from grazing on vegetation communities described under *Nature and Type of Effects*, and would promote the health of GRSG habitats, including sagebrush steppe, riparian areas, and wet meadows.

Impacts from Fluid Minerals

Restrictions and RDFs on fluid mineral leasing and development proposed under Alternative B would reduce the impacts on vegetation compared to Alternative A. Under this alternative, 61,197 acres in the planning area would be closed to fluid mineral leasing, while 12,238 acres would remain open to leasing. All acres would be under standard terms and conditions. PH would be closed to fluid mineral leasing under Alternative B, and existing leases would not be renewed. Conservation measures would be applied as conditions of permit approvals. These restrictions on fluid mineral leasing and development would protect more acres of vegetation from associated activities compared to Alternative A, and would reduce the likelihood of impacts from fluid mineral exploration and development described under *Nature and Type of Effects*.

As described in **Table 4-1**, there would be approximately 624 acres of short-term disturbance and 476 acres of long-term disturbance on BLM-administered lands related to existing and potential development. Impacts to vegetation in these areas would be the same as Alternative A but would occur over a smaller area. Similar to Alternative A, oil and gas development would have limited impacts on vegetation because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or

closing areas to development would have minimal impacts related to removal or degradation of vegetation, and potential spread of invasive species. **Table 4-12** shows the acreage of sagebrush available for mineral leasing under each alternative. Within sagebrush vegetation, approximately 6,680 acres of surface and 7,100 acres of subsurface would be closed to fluid mineral leasing, compared to zero acres closed under Alternative A.

Impacts from Solid Minerals

The management actions, RDFs, and BMPs proposed under Alternative B would reduce impacts on vegetation associated with solid mineral exploration and extraction activities compared with Alternative A (see **Table 4-12**). Approximately three acres of surface and 18 acres of subsurface would be open to locatable mineral exploration in sagebrush habitat, compared to 6,640 acres of surface and 3,008 acres of subsurface under Alternative A. All mining of coal would be found to be unsuitable in PH (87,443 acres) and PH would be recommended for withdrawal from locatable mineral entry. For non-energy leasable minerals, PH would be closed to leasing and to mineral material sales. BMPs would be applied to existing leases and locatable mineral claims, and restoration would be required for existing salable mineral pits. These policies would decrease the number of acres of vegetation potentially impacted by solid mineral development compared to Alternative A, and a reduction in the likelihood of impacts on vegetation described under *Nature and Type of Effects*. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on vegetation but it would preclude any potential future development.

Impacts from Fire and Fuels Management

Fire and fuel management policies proposed under Alternative B would be designed to protect sagebrush ecosystems by maintaining sagebrush cover, applying seasonal restrictions, protecting winter range, and requiring use of native seeds. Post-fuels treatments and ES&R management would be designed to ensure long-term persistence of seeded areas and native plants. These proposed modifications to fire and fuel management would result in an increase in the protection of sagebrush vegetation compared to Alternative A, and a reduction in the likelihood of impacts from fire and fuels management described under *Nature and Type of Effects*.

Prioritizing fire suppression in PH and GH would protect vegetation from the destructive effects of wildfire, but could result in increased fuel load and spread of noxious weeds.

Impacts from Habitat Restoration and Vegetation Management

Habitat restoration and vegetation management actions under Alternative B would aim to improve vegetation conditions and prioritize restoration efforts to benefit sagebrush vegetation. As a result, the restoration and vegetation management actions would enhance vegetation extent and condition relative to

Alternative A by requiring the use of native seeds, designing post-restoration management to ensure the long-term persistence of the restoration efforts, considering changes in climate, and monitoring and controlling invasive species.

Impacts from ACECs
Impacts would be the same as Alternative A.

4.4.6 Alternative C

Impacts from Travel and Transportation Management
Impacts from travel and transportation management would be similar to Alternative B, although impacts on vegetation (as described under the *Nature and Type of Effects*) would be further reduced since protections would apply to both PH and GH, and the BLM would apply additional mitigation requirements. Prohibiting road construction within four miles of a lek would leave only approximately 600 acres in PH for future road construction and would help prevent fragmentation of vegetative communities.

Impacts from Recreation
Impacts on vegetation from recreation management under Alternative C would be the same as under Alternative B.

Impacts from Lands and Realty
Similar to Alternative B, the measures proposed under Alternative C would reduce the impacts of ROWs on vegetation. PH and GH would be ROW exclusion areas (32,980 acres), with limited exceptions (See **Table 4-11** above). Wind energy projects would not be sited in PH and GH. Management of ROW exclusion zones would decrease impacts (described under the *Nature and Type of Effects*) on sagebrush and vegetation. However, ROW exclusion areas could result in displacing ROW development onto adjacent private lands thereby negating their beneficial effects. Similar to Alternative A, allowing ROW development within unitized areas (24,842 acres) would potentially result in loss or disturbance of vegetation from these activities.

As under Alternative B, public ownership would be maintained in PH, but without the exceptions provided under that alternative. Private lands could be acquired in ACECs to enhance the GRSG conservation value of existing lands. Although it is uncertain how much private land would be acquired to enhance GRSG habitat under Alternative C, this policy would increase the acreage where vegetation condition would be improved compared Alternative A, as no such measures have been provided under Alternative A.

Impacts from Range Management
Under Alternative C, grazing would be reduced by 50 percent on all allotments within the Big Gumbo area. There would be 3,739 AUMs available in the long term, compared to 5,780 AUMS under Alternative A. By reducing AUMs, BLM would reduce trampling and removal of vegetation in these areas. New water

developments for diversion from seeps or springs would not be authorized, which would prevent impacts on wet meadows by maintaining the existing vegetation in these areas. Other impacts would be similar to those described for Alternative B, but would provide slightly greater protection to vegetation since they would be applied to both PH and GH.

Impacts from Fluid Minerals

Fluid minerals management under Alternative C would be similar to that described for Alternative B, but would include several more restrictive conservation measures, thereby enhancing vegetation protection. In addition, actions would be applied to both PH and GH, which would increase the area of vegetation that would be protected. For example, under Alternative C, 66,293 acres in the planning area would be closed to fluid mineral leasing, while 7,142 acres remain open to leasing. All acres would be under standard terms and conditions.

As described in **Table 4-1**, there would be approximately 621 acres of short-term disturbance and 475 acres of long-term disturbance on BLM-administered lands related to existing and potential development. Similar to Alternative A, oil and gas development would have limited impacts on vegetation because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts related to removal or degradation of vegetation, and potential spread of invasive species. **Table 4-12** shows the acreage of sagebrush available for mineral leasing under each alternative. Within sagebrush vegetation, approximately 6,682 acres of surface and 7,117 acres of subsurface would be closed to fluid mineral leasing, compared to zero acres closed under Alternative A.

Impacts from Solid Minerals

Impacts from solid minerals management would be similar as Alternative B, but would be applied to a larger area (PH and GH), and would thus provide greater protection for vegetation over the long term. Zero acres of surface and subsurface would be open to locatable mineral exploration in sagebrush habitat, compared to 6,640 acres of surface and 3,008 acres of subsurface under Alternative A. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on vegetation but it would preclude any potential future development.

Impacts from Fire and Fuels Management

Impacts from fire and fuels management would be largely similar to those described for Alternative B, but would be applied to a larger area (PH and GH), and would thus provide greater protection for vegetation over the long term.

Impacts from Habitat Restoration and Vegetation Management

Impacts from habitat restoration and vegetation management would be largely similar to those described for Alternative B, but would be applied to a slightly

larger area (PH and GH), and would thus provide greater protection for vegetation over the long term.

Impacts from ACECs

An ACEC to protect GRSG would be designated as sagebrush reserves on PH, covering 32,900 acres under this alternative. Vegetation within the ACEC would be protected by increased management focus and restrictions on surface-disturbing activities in these areas.

4.4.7 Alternative D

Impacts from Travel and Transportation Management

Measures proposed under Alternative D would reduce impacts on GRSG habitat compared to Alternative A. Many management actions would be similar to Alternative B, with increased management flexibility incorporated to improve management and target those areas that need most protection. Other measures would be as described under Alternative B, but would apply to both PH and GH. Overall, management under Alternative B would reduce impacts on vegetation from activities associated with travel and transportation in the planning area, including those described under *Nature and Type of Effects*, compared to Alternative A.

Impacts from Recreation

Impacts from recreation management under Alternative D would be the same as Alternative B.

Impacts from Lands and Realty

Lands and realty management proposed under Alternative D would provide increased protection of vegetation compared to Alternative A. PH would be managed as ROW avoidance areas (32,980 acres), although PH would be an exclusion area for wind energy ROW authorizations (**Table 4-11**). ROW avoidance areas would allow for management flexibility to avoid displacing ROWs onto private land. These measures would improve management and would reduce impacts from ROW development as described under *Nature and Type of Effects*, compared to Alternative A. ROWs would be allowed in GH with appropriate mitigation measures. Other measures and impacts would be as described under Alternative B.

Impacts from land tenure decisions would be the same as Alternative B.

Impacts from Range Management

Management under Alternative D would be similar to that described for Alternative B, with increased collaboration with stakeholders and increased tools available to improve flexibility in management. As such, impacts would likely be similar to Alternative B, though increased management flexibility may improve management by targeting those areas that need most protection.

Impacts from Fluid Minerals

Under Alternative D, all PH would be open to leasing subject to an NSO stipulation. Conservation measures would be different from those described for Alternative B, and would incorporate surface disturbance reduction and guidance for mitigation. Such management would reduce disturbance to vegetation associated with fluid mineral development relative to Alternative A.

As described in **Table 4-1**, there would be approximately 767 acres of short-term disturbance and 530 acres of long-term disturbance on BLM-administered lands related to existing and potential development. Similar to Alternative A, oil and gas development would have limited impacts on vegetation because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts related to removal or degradation of vegetation, and potential spread of invasive species. Like Alternative A, zero acres of sagebrush vegetation would be closed for mineral leasing (**Table 4-12**).

Impacts from Solid Minerals

Impacts under Alternative D would be similar to those described for Alternative B. Although 6,640 acres of surface and 3,008 acres of subsurface would be open to locatable mineral exploration in sagebrush habitat, proposed actions for locatable mineral development would be analyzed on a case-by-case basis in cooperation with the State of North Dakota and BMPs applied to avoid unnecessary degradation of GRSG habitat. These actions would reduce, but would not eliminate, impacts from locatable mineral development on vegetation compared to Alternative A, including those described under *Nature and Type of Effects*. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on vegetation but it would preclude any potential future development.

Impacts from Fire and Fuels Management

Fuels treatment policies and restrictions would be designed and implemented as described in Alternative B, except sagebrush canopy cover would not be reduced to less than eight percent. In addition, fuels management projects in PH would be designed to incorporate greater flexibility to maximize the acreage protected. These proposed modifications to fire and fuel management would result in an increase in the protection of sagebrush vegetation compared to Alternative A, and a reduction in the likelihood of impacts from fire and fuels management described under *Nature and Type of Effects*.

Impacts from Habitat Restoration and Vegetation Management

Impacts from habitat restoration and vegetation management under Alternative D would be similar to those described for Alternative B. However, this alternative includes consideration of other threatened, endangered, or sensitive species, which may change the proportions of vegetation communities that would be protected in certain instances.

Impacts from ACECs
Impacts would be the same as under Alternative A.

4.5 WILDLAND FIRE MANAGEMENT AND ECOLOGY

4.5.1 Methods and Assumptions

Indicators
Table 4-13, Comparison of Wildland Fire Management and Ecology Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on wildland fire management and ecology under each alternative.

Table 4-13
Comparison of Wildland Fire Management and Ecology Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Alteration of vegetative cover that is likely to result in a substantial shift in FRCC across the planning area	No change	Potential minor increase	Potential minor increase	Potential minor increase
A substantial change in the likelihood or severity of wildland fire (based on level of restrictions on uses that may introduce sources of ignition)	Fires more likely to occur, due to few restrictions	Fires less likely to occur, due to more restrictions	Fires less likely to occur, due to more restrictions	Fires less likely to occur, due to more restrictions
Management actions that substantially inhibit a response to wildland fire or appropriate treatments to prevent wildland fire	No change	No change	Increase	No change

Assumptions
The analysis includes the following assumptions:

- Fire is an important functional, natural disturbance in many of the ecological systems found in the planning area.
- A direct relationship exists between fuel loading and potential fire intensity and severity.
- Demand for fuels treatments would likely increase over the life of this plan.

4.5.2 Nature and Type of Effects
Impacts on wildland fire management result from changes in fire frequency and intensity, and the ability to employ fire-suppression methods, all of which would affect management of fire and related costs within the planning area. Actions which change FRCC from highly altered ecosystems could reduce the risk of

losing key ecosystems as well as decrease fire risk and management costs in the long term.

Many different resource uses may introduce additional ignition sources into the planning area, which increase the probability of wildfire occurrence and the need for fire-suppression activities. Fire intensity can be affected by activities that decrease fuel loading, such as vegetation treatments and harvesting of timber products, and activities that alter the composition and structure of vegetation communities. High-intensity fires generally result in a greater loss of vegetation cover, changes to soil chemistry, damage to root structures, and a greater ability for non-native species to become established (Verma and Jayakumar 2012).

Transportation and travel management can impact fire frequency by changing the level of risk of human caused ignitions. The risk of ignition is increased where travel is less restrictive, particularly where motorized vehicles travel cross-country. All forms of travel encourage the spread of invasive weeds (CEC 2012), particularly cheatgrass, which can shift fire regimes and increase fire behavior potential. Conversely, if management restricts access, wildfire risk may be decreased. In addition, transportation management may impact fire suppression efforts; when routes are closed and rehabilitated, they become unavailable for response to wildfires, limiting access opportunities.

Similarly, the level and type of recreation permitted can impact fire risk. Increased recreational use may increase the probability of unintentional fire starts from human-caused ignitions and the need for fire suppression.

Surface disturbance caused by development would generally contribute to the modification of the composition and structure of vegetation communities (including increases in noxious weed proliferation) in the vicinity of developed areas, which could then be more likely to fuel high-intensity fires. This could cause an increase in program costs because of the increased potential for fire.

Lands and realty actions may indirectly result in development and associate fire risk. For example, ROW authorizations can result in indirect impacts by increasing the risk of human-caused ignition should construction of transmission lines, renewable energy projects, or other development occur.

Likewise, the development of energy and minerals resources increases the risk of wildfires by introducing new ignition sources (Shlisky et al. 2007). Associated facilities, infrastructure and transmission lines can increase fire and fuels program costs while decreasing fire management flexibility with regards to suppression options. Energy development also poses hazards to firefighters, including unknown toxins, facility protection, evacuation of industry personnel, and dangerous overhead power lines. Fire programs could incur additional costs to train firefighting personnel for emergency situations associated with energy development. Additional limitations on mineral development would have an

indirect effect of decreased fire. This would be due to less development, fewer vehicles, and less construction equipment, all of which would serve to decrease the chance of human ignition. Development of federal minerals underlying non-federal surface ownership may impact fire management on BLM-administered lands, particularly when ownership is in a checkerboard pattern, as fires ignited on non-federal lands may quickly spread onto and impact BLM-administered lands.

The potential for invasive species establishment or increase may follow construction and could impact fire management actions through increased risk of fire and need for fire management.

Range grazing management can impact the ability to manage fire as a natural process through changes in fine fuels availability (e.g., grasses). Livestock grazing reduces fuel loads, so a reduction in grazing intensity or change in grazing location may lead to changes in fuel levels at site specific locations.

Vegetation and weed treatments that decrease standing vegetation could decrease the intensity of wildland fires and allow fires to be more easily controlled. For example, efforts to reduce incursion of nonnative annual grasses (primarily cheatgrass) and proliferation of other noxious and invasive weeds would promote healthy plant communities and lower risk of high-intensity wildfire (USGS 2006). Used appropriately, prescribed fire would be compatible with noxious weed control; however, the presence of noxious weeds and the potential of weeds to spread after a prescribed fire would need to be monitored on a site-specific basis. Conversely, management actions that retain shrub and cover may result in increased fuel loading and increase the likelihood and intensity of wildland fire.

Management actions that are intended to improve, create, or re-establish healthy ecological conditions in various vegetation types benefit the fire and fuels program in the long term by promoting the most efficient use of fire and fuels fire management program resources. In addition, allowing a range of fuel treatment options and providing the possibility to use unplanned wildfire for resource benefit where appropriate provides needed management flexibility to reduce large fire costs and achieve fire and fuels goals and objectives. Conversely, prioritizing fire suppression can limit management options and increase costs for fire management programs.

Special designations such as ACECs and the management of sensitive resources can restrict fuels treatments on a site-specific basis. For example, in areas where preservation of particular species or habitats is emphasized, management options and fuels treatments may be limited.

Implementing management for the following resources would have negligible or no impact on wildland fire management and ecology and are therefore not discussed in detail: mineral split estate.

4.5.3 Impacts Common to All Alternatives

Given the lack of wildfire in the planning area over the past two decades, the risk of wildfire is likely to remain relatively low under all alternatives. Changes in management actions for other resources and resource uses may however, impact the chance of ignition and intensity of fire should it occur. Similarly, the use of prescribed fire is likely to continue to have only a minor role in vegetation management in the planning area across all alternatives.

Impacts from Solid Minerals

Coal management is not expected to impact fire management because there is no coal activity in the planning area, nor is there expected to be any activity in the foreseeable future. In addition, there is no locatable mineral potential, nor any interest in developing locatable minerals within GRSG habitat. As a result, withdrawing an area or leaving an area open to locatable minerals is not expected to impact fire risk or fire management activities.

4.5.4 Alternative A

Impacts from Travel and Transportation Management

Management under Alternative A would limit motorized and mechanized travel to existing routes on 33,030 acres, and fire risk from human-caused ignitions would be minimized due to lack of off-road motorized travel. In addition, site-specific travel management would be implemented with designation of roads as well as seasonal and permanent closures, where appropriate. When plans are complete the likelihood of human caused ignition may decrease slightly due to site-specific restriction on access.

Administrative access would be maintained for fire suppression and fire management activity, except in the case of road closure and rehabilitation, therefore the impacts on access would be minimal.

Impacts from Recreation

Under Alternative A, management actions for recreation would be relatively flexible, which increases the risk of fire through increased exposure to sources of human-caused ignitions.

Impacts from Lands and Realty

Under Alternative A, no ROW exclusion or avoidance areas would be present in the decision area. In addition, oil and gas development on existing leases within unitized areas (24,842 acres) would be allowed. As discussed under *Nature and Type of Effects*, fire risk could be increased as a result of development from ROW authorizations; therefore, this alternative would have the highest potential for impacts from lands and realty on fire management. ROW authorizations are compared across alternatives in **Table 4-14**, Comparison of Lands and Realty Actions Across Alternatives.

Table 4-14
Comparison of Lands and Realty Actions Across Alternatives

Alternative	A	B	C	D
ROW exclusion areas (acres)	0	32,900	32,980	32,900[1]
ROW avoidance areas (acres)	0	80	0	32,980
Unitized areas (acres)	24,842	24,842	24,842	24,842

[1] PH would be exclusion areas for new ROW wind energy developments.

Impacts from Range Management

Under Alternative A, grazing would be allowed on all lands identified as suitable (approximately 32,9450 acres). Additionally, under Alternative A the BLM would allocate up to about 5,780 AUMs for livestock in the long term. Use of livestock grazing can result in site-specific reduction in fuels and the associated risk of wildland fire as described under *Nature and Type of Effects*.

Impacts from Fluid Minerals

Alternative A places some restrictions on surface occupancy and seismic exploration, construction, and development near strutting grounds. However, Alternative A would include the fewest restrictions on fluid minerals out of all the alternatives. Due to this, the chance of human ignition under this alternative would be greater than other the under alternatives and could indirectly effect fire management through increased fire risk. Under Alternative A, there are no areas closed to fluid mineral leasing, while 73,435 acres of BLM, private, and state lands are open to fluid mineral leasing.

Overall, oil and gas development would have limited impacts on fire management because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on fire risk or related fire management activity.

Impacts from Solid Minerals

Under Alternative A, no portions of the decision area would be withdrawn from salable-non energy mineral application or closed to mineral material development. As a result, there is potential for human ignition and increased fire risk from these types of solid mineral development.

Impacts from Fire and Fuels Management

Management actions under Alternative A would place minimal restrictions on fuels management and fire control methods, and therefore would have few impacts on fire management. Under Alternative A, the BLM would allow for the preparation of prescribed burn plans for vegetative manipulations where needed and would control wildfire on BLM-administered land, but otherwise does not specify management actions. Due to the flexibility in management of prescribed

and wildland fires, fire suppression costs are likely to be the lower in Alternative A as compared to all action alternatives. Potential fuels treatment and suppression costs are compared by alternative in **Table 4-15**, Relative Comparison of Fuels Treatment and Fire Suppression Costs Across Alternatives.

Table 4-15
Relative Comparison of Fuels Treatment and Fire Suppression Costs Across Alternatives

Alternative	A	B	C	D
Relative fuels treatment costs	$$	$$	$	$$
	Variable costs based on other resource needs	Restrictions on fuels treatments in PH	Restrictions on fuels treatments in PH and GH	Restrictions on fuels treatments in PH
Relative suppression costs	$	$$$	$$$$	$$$
	No specific suppression measures for GRSG habitat	Suppression of fire emphasized in PH	Suppression of fire emphasized in PH and GH	Suppression of fire emphasized in PH with local modification

Note: The $ symbol represents the relative costs of fuels treatment and suppression across alternatives with $ representing the lowest cost and $$$$ the highest cost, this information is for comparative purposes only and no specific dollar amount is forecasted here.

Impacts from Habitat Restoration and Vegetation Management

Under Alternative A, no specific direction is provided in the RMP for restoration and management. Vegetation could be managed to alter fuel loads and management activities could be conducted as appropriate. This could impact fire management options and costs.

Impacts from ACECs

Under Alternative A, no ACECs would be established. This enables fire and fuels treatments to continue to function with more flexibility because of the lack of restrictions placed on ACECs.

4.5.5 Alternative B

Impacts from Travel and Transportation Management

Under Alternative B, as in all alternatives, travel would be limited to existing routes. In PH, activity level travel plans would be completed within five years of the ROD. Additional restrictions would be in place on upgrades, route construction and realignment. This would further limit the risk of human-caused ignition in PH by reducing exposure to machinery, vehicles, and personnel that could cause ignitions. Road closure could, however, result in some impacts on ability to respond to fire due to reduced access.

Impacts from Recreation

Under Alternative B, SRPs would only be allowed in PH when the PH would benefit or experience no effects of the permits. Because issuance of permits may increase exposure of the area to human activity and, consequently, the likelihood of human-caused ignitions, wildfire risk from recreation activities may be decreased under this alternative as compared to Alternative A.

Impacts from Lands and Realty

Under Alternative B, management of PH as an exclusion area for new ROW authorizations would reduce the potential for development and the associated fire risk and suppression costs; therefore, impacts would be reduced as compared to Alternative A (see **Table 4-14**).

Impacts from Range Management

Under Alternative B, the BLM would have the same amount of acres open for grazing and would allot the same number of AUMs as Alternative A; however, other management actions may impact fire management. For example, retirement of permitted grazing use if approved by permittee, may lead to increased fuels in those site-specific locations and result in a slightly higher risk of fire as compared to Alternative A. However, Alternative B also has management focused on achieving ecological site potential, which would likely aim to reduce invasive species and increase habitat health and could decrease the risk of fire.

Assessment of land health and changes to grazing systems to achieve objectives would be prioritized in PH; therefore, any changes to fuels would be focused on these areas.

Impacts from Fluid Minerals

Under Alternative B, the BLM would place some limitations on fluid mineral exploration and extraction, which would indirectly effect fire management through a decreased risk of fire due to less development, fewer vehicles, and less construction equipment, resulting in less of a chance of human ignition. The BLM would also place greater restrictions on fluid mineral leasing in PH as compared with Alternative A, including some seasonal restrictions. In addition, this alternative prohibits new surface occupancy on federal leases within PH (with some exceptions allowed).

Under Alternative B, 61,197 acres would be closed to fluid mineral leasing (61,197 more acres than Alternative A), while 12,238 acres of BLM, private and state lands would be open to fluid mineral leasing (61,197 less than Alternative A), resulting in fewer impacts on fire management. Similar to Alternative A, overall oil and gas development would have limited impacts on fire management because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on fire risk or related fire management activity.

Impacts from Solid Minerals

Under Alternative B, additional restriction would be put in place on mineral development as compared to Alternative A. PH would be closed to mineral material development and non-energy leasable mineral leasing. As a result, fire risks would decrease from these types of mineral developments. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on fire risk but it would preclude any potential future development.

Impacts from Fire and Fuels Management

Under Alternative B, the BLM would place restrictions on fire and fuels management when it would be beneficial to PH. In PH, the BLM would design and implement fuels treatments and suppression with an emphasis on protecting sagebrush ecosystems. Sagebrush canopy cover would not be reduced less than 15 percent unless a fuels management objective requires additional reduction in sagebrush cover. Restrictions placed on fire and fuels management under this alternative such as seasonal closures, no treatments in known winter range, restrictions on the use of fire to treat sagebrush in low precipitation zones, could impact the ability to efficiently manage fuels and could increase costs of vegetation management and fire suppression.

Under Alternative B, the BLM would prioritize the suppression of fire in order to conserve both GH and PH. This could result in an increased need for fire management and additional costs for the fire management program.

Impacts of activities would vary based on the FRCC of the area impacted, as described in *Nature and Type of Impacts*. The majority of the lands for both PH and GH are in FRCC II, which means the fire regimes have been moderately altered from their historical range by either increased or decreased frequency. A moderate risk of losing key ecosystem components is identified for lands in this class; therefore, management actions restoring habitat to a more natural vegetation structure would improve fire regime under this and all action alternatives.

Impacts from Habitat Restoration and Vegetation Management

Under Alternative B, many of the management actions focus on the use of native plants in order to create landscapes that most benefit the GRSG. The emphasis of native plants under this alternative could contribute to healthy plant communities and an associated lower risk of high-intensity wildfire. However, habitat parameters could also limit the options for fuels treatment activities and could therefore increase costs of treatment compared to Alternative A.

Impacts from ACECs

Impacts would be the same as under Alternative A.

4.5.6 Alternative C

Impacts from Travel and Transportation Management
Travel management actions would be similar to those described in Alternative B but restrictions would also be applied to GH. Risk of human caused ignition would slightly decrease for both PH and GH as compared to Alternative A. Due to limitations on new roads in most PH, access for fire management may be reduced, resulting in increased time or cost for suppression compared with Alternative A.

Impacts from Recreation
Impacts under Alternative C are the same as those under Alternative B, but would apply to both GH and PH; therefore, the likelihood of human-caused ignition would be further reduced as compared to Alternative A.

Impacts from Lands and Realty
Under Alternative C, impacts would be similar as described for Alternative B but would be applied across PH and GH (see **Table 4-14**). Due to the restrictions on ROW development in PH and GH under this alternative, fire risks from lands and realty actions would be the least of any alternative.

Impacts from Range Management
Under Alternative C, there would continue to be 32,945 acres open to grazing; however, permitted AUMs in the planning area would be reduced to 3,739 due to the approximately 50 percent reduction of AUMs in the Big Gumbo area. This could result in a larger need for fire management actions than under Alternative A, particularly in the Big Gumbo region because the fuel load reduction would not be as great. However, as stated in *Nature and Type of Effects*, it is difficult to predict the impacts of grazing on wildfire and so the analysis of the impact of more AUMs on fire management is inconclusive.

Other impacts under Alternative C would be similar to those discussed under Alternative B, *Impacts from Range Management.* However, Alternative C management actions would apply to both PH and GH and impacts could be slightly intensified.

Impacts from Fluid Minerals
Impacts under Alternative C would be similar to those under Alternative B, but would apply to both PH and GH. Under Alternative C, 66,293 acres would be closed to fluid mineral leasing (compared to zero acres closed under Alternative A), while 7,142 acres of BLM, private and state lands would be open to fluid mineral leasing (66,293 less than Alternative A), resulting in fewer impacts on fire management. Overall, restrictions to fluid mineral development under Alternative C would be greater than under the other alternatives. This would have the potential to indirectly effect fire management through a decreased risk of fire due to less development, fewer vehicles, and less construction equipment, resulting in less chance of human ignition.

Similar to Alternative A, overall oil and gas development would have limited impacts on fire management because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on fire risk or related fire management activity.

Impacts from Solid Minerals

Under Alternative C, restriction on mineral development would be the broadest of all alternatives, with limitations on leasing and development as described in Alternative B, but expanded to GH as well as PH. Fire risks related to nonenergy leasables and mineral materials development would be minimal under this alternative due to the limitations placed on these types of minerals. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on fire risk but it would preclude any potential future development.

Impacts from Fire and Fuels Management

Management actions under Alternative C would also place more restrictions on fire and fuels management than Alternative A. Management and impacts under Alternative C would be similar to management under Alternative B, but would apply to both GH and PH, therefore suppression costs may be slightly increased.

Impacts from Habitat Restoration and Vegetation Management

Impacts under Alternative C would be similar to those under Alternative B except that management actions under Alternative C would apply to both GH and PH; therefore, the potential for long-term benefits to ecosystem health could be slightly increased but the costs for treatments also increased.

Impacts from ACECs

Under Alternative C, PH would be designated as an ACEC. The ACEC would cover 32,900 acres. There could be reduced flexibility for hazardous fuels treatments on the 32,900 acres managed as an ACEC, which could reduce the efficiency with which fires are suppressed and increase fire management costs.

4.5.7 Alternative D

Impacts from Travel and Transportation Management

Impacts would be similar to that described in Alternatives B and C.

Impacts from Recreation

Impacts under Alternative D are the same as those under Alternative B.

Impacts from Lands and Realty

Under Alternative D, PH would be managed as a ROW avoidance area and additionally, as an exclusion area for new wind energy ROW authorizations. ROWs would be allowed in GH with measures to minimize surface disturbing

and disruptive activities. Impacts on fire management from ROW development would therefore be decreased as compared to Alternative A (see **Table 4-14**).

Impacts from Range Management

Total acres available for grazing and permitted AUMs would be the same as described for Alternatives A and B. Other management actions would be the similar to Alternative B but would emphasize working with state and local agencies to develop standards. As a result, impacts on fire management would be similar to those described in Alternative B but may be more suited to site-specific conditions, including the habitat needs of other high priority species, resulting in improved ecological conditions and decreased fire risk.

Impacts from Fluid Minerals

Similar to Alternative A, Alternative D does not close any acres to fluid mineral leasing and has 73,435 acres open to fluid mineral leasing. Under Alternative D, however, NSO restrictions would apply in PH and there would be a minor decrease in forecasted wells, therefore development and related impacts on fire management would be reduced as compared to Alternative A. The chance of ignition from fluid mineral development would still be present.

Similar to Alternative A, overall oil and gas development would have limited impacts on fire management because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on fire risk or related fire management activity.

Impacts from Solid Minerals

Under Alternative D, impacts from solid mineral development would be similar to those described under Alternative A; however, PH would be closed to mineral material development, with reduction in surface disturbance and road use and related impacts on fire risk as compared with Alternative A. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on fire risk but it would preclude any potential future development.

Impacts from Fire and Fuels Management

Impacts from Alternative D would be similar to those under Alternative B except the minimum percent canopy cover permitted would be eight percent instead of 15 percent. This change is primarily based on regional habitat conditions and the likelihood that the NDFO could not meet the canopy cover requirements set for the NTT report. While the change may make achieving habitat objectives more likely, direct impacts of this change on fire management would be minimal, and impacts would be similar to described in Alternative B.

Impacts from Habitat Restoration and Vegetation Management
Impacts under Alternative D would be similar to those under Alternative B, as Alternative D also focuses on restoring native plant communities based on local site conditions and information, which could further reduce the risk of fires.

Impacts from ACECs
Impacts would be the same as Alternative A.

4.6 FLUID MINERALS

4.6.1 Methods and Assumptions

Analysis of impacts on fluid minerals from this RMPA focuses on the impacts of conservation measures to protect GRSG. These impacts may be direct or indirect. For example, a direct impact on fluid minerals would result from closure of an area to fluid mineral leasing. An indirect impact would result from removal of a road, which would change the economic feasibility of developing a site. Additional actions or conditions that might cause direct or indirect impacts on fluid minerals are described under *Indicators*, below.

Indicators
Indicators were developed and used to analyze impacts of the management actions under each alternative on fluid minerals. **Table 4-16**, Comparison of Fluid Minerals Indicators by Alternative, illustrates how the indicators vary under each alternative.

Where information is available, consideration is given to the potential for fluid mineral resources on lands closed to leasing. For example, an indicator of an impact on fluid minerals is if there were substantial reductions in federal leasing and development of fluid mineral resources in high potential areas.

Assumptions
The analysis includes the following assumptions:

- Existing fluid mineral leases would not be affected by the closures proposed under this RMPA.
- Oil and gas operations on existing federal leases, regardless of surface ownership, would be subject to COAs by the BLM Authorized Officer. The BLM can deny surface occupancy on portions of leases with COAs to avoid or minimize resource conflicts if this action does not eliminate reasonable opportunities to develop the lease.
- Valid existing leases would be managed under the stipulations in effect when the leases were issued. New stipulations proposed under this RMPA would apply only on new leases.

Table 4-16
Comparison of Fluid Minerals Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
The amount of unleased land identified as closed to mineral exploration and development (acres)	0	18,817	22,491	0
The amount of land subject to NSO stipulations (acres)	9,780	0	0	61,197
The amount of land subject to CSU stipulations (acres)	21,235	0	0	5,090
The amount of land subject to TLs (acres)	38,504	0	0	0
Application of COAs on fluid mineral development activities on leased parcels for the protection of GRSG (acres)	No change	Increase	Increase	Increase
Restrictions on geophysical exploration in GRSG habitat	No change	Increase	Increase	Increase
The amount of land managed as ROW avoidance areas (acres)	0	80	0	32,900
The amount of land managed as ROW exclusion areas (acres)	0	32,900	32,980	32,900[1]

[1] PH would be exclusion areas for new ROW wind energy developments.
Source: BLM 2012a

- New information may lead to changes in delineated GRSG habitat. New habitat areas, or areas that are no longer habitat, may be identified. This adjustment would typically result in small changes to areas requiring the stipulations or management actions stated in this plan. Modifications to GRSG habitat would be updated in the existing data inventory through plan maintenance.
- If an area is leased, it could be developed; however, not all leases would be developed within the life of this RMPA.

- As the demand for energy increases, so will the demand for extracting energy resources.
- Stipulations also apply to fluid mineral leasing on lands overlying federal mineral estate, which includes federal mineral estate underlying BLM-administered lands and non-BLM-administered lands. There are 396,053 acres of federal mineral estate within the planning area (30,574 acres of BLM-administered surface with federal minerals and 365,479 acres of split estate). The decisions in this plan amendment will not affect federal minerals underlying Forest Service or other federal agency-administered surface.
- As discussed in **Section 3.7**, Fluid Minerals, market circumstances will likely result in continued industry emphasis on increasing oil supplies and searching for additional natural gas supplies in the planning area. Much of the oil and gas supply growth within the planning area is expected to come from production in existing reservoirs, with new reservoir discoveries most likely to come from areas outside the planning area (BLM 2009a).

4.6.2 Nature and Type of Effects

Closing areas within GRSG habitat to fluid mineral leasing would directly impact the fluid minerals program by prohibiting the development of those resources on federal mineral estate. Fluid mineral operations would be limited in their choice of project locations and may be forced to develop in areas that are challenging to access or have less economic resources because more ideal areas could be closed to leasing.

Management actions that prohibit or restrict surface occupancy or disturbance (such as TLs, NSO, CSU, and limitations on the total amount of surface disturbance in areas) overlying federal fluid mineral resources would also directly impact the development of those resources by limiting the siting, design, and operations of fluid mineral development projects. This, in turn, could force operators to use more costly development methods than they otherwise might have used. Equipment shortages could result from application of TLs because a bottleneck may be created during the limited time period in which activity would be allowed.

In areas where NSO stipulations are applied, federal fluid minerals could be leased, but the leaseholder/operator would have to use offsite methods such as directional drilling to access the mineral resource. The area where directional drilling can be effectively used is limited, meaning some minerals may be inaccessible in areas where an NSO stipulation covers a large area or where no leasing is allowed on surrounding lands.

Application of CSU stipulations allows some use and occupancy of the surface. While less restrictive than an NSO, a CSU stipulation allows the BLM to require special operational constraints, to shift the surface-disturbing activity associated

with fluid mineral leasing more than the standard 200 meters (656 feet), or to require additional protective measures (e.g., restrictions on noise levels) to protect GRSG. While not prohibiting surface-disturbing activities, a CSU stipulation does influence the location and level of operations within the subject area.

TL stipulations may be necessary to protect GRSG from impacts of development. These stipulations are necessary if impacts cannot be mitigated within the standard 60-day suspension of operation period afforded by regulation. Areas where TL stipulations are applied would be temporarily closed to fluid mineral exploration and development, surface-disturbing activities, and intensive human activity during identified time frames based on seasons or GRSG breeding times. While some operational activities would be allowed at all times (e.g., vehicle travel and maintenance), construction, drilling, completions, and other operations considered to be intensive in nature would not be allowed during the restricted time frame. Most activities, however, can be initiated and completed outside of the restricted dates specified in the TL stipulation.

Applying COAs, which include RDFs (per **Appendix B**) and conservation measures outlined in **Chapter 2** (**Table 2-3**), to existing leases would directly impact fluid mineral operations. These RDFs and conservation measures would include standards such as noise restrictions, height limitations on structures, design requirements, water development standards, remote monitoring requirements, and reclamation standards. Application of these requirements through COAs would impact fluid mineral operations by increasing costs if it resulted in the application of additional requirements or use of more expensive technology (such as remote monitoring systems) than would otherwise have been used by operators. Impacts of these COAs would be mitigated where exceptions limit their application. This would occur where a COA was not applicable (e.g., a resource is not present on a given site) or where site-specific consideration merited slight variation. See **Section 2.4.3**, Elements Common to Alternatives B, C, and D, for more information on when these exceptions to RDFs would apply.

Placing limits on geophysical exploration could reduce the availability of data on fluid mineral resources and could increase costs of fluid mineral development if the limits required use of more expensive technology. TLs on geophysical exploration would delay development activities and could cause equipment shortages because all exploration would be occurring during the same time period.

Requiring master development plans and unitization could cause direct impacts on fluid minerals through increased costs of fluid mineral extraction by delaying the permit approval process until such additional site-specific planning efforts are completed. However, unitization typically has been initiated at the operator's discretion.

Requiring reclamation bonds in the amount necessary to cover full reclamation upon completion of the project could deter fluid mineral exploration and development by increasing up-front costs when these costs could have previously occurred after economic resources had already been recovered. This would be a direct impact on fluid minerals.

Identification of areas in which to acquire additional surface or mineral estate containing GRSG habitat would have no impacts on fluid minerals because it would not result in application of management actions to additional acres of surface or fluid mineral estate. If areas for acquisition were identified, acquisition would occur only in areas containing existing federal mineral leases, which are already subject to BLM management actions applicable to both the surface and the mineral estate through the fluid minerals program.

Management actions creating ROW exclusion or avoidance areas could indirectly increase the cost of fluid mineral extraction by limiting the available means for transporting fluid minerals to processing facilities and markets. For example, new natural gas pipelines could not be built in an ROW exclusion area. Impacts would be mitigated where exceptions were allowed for co-location of new ROWs within existing ROWs to satisfy valid existing rights.

Implementing management for the following resources would have negligible or no impact on fluid minerals and are therefore not discussed in detail: travel and transportation management, recreation, range management, solid minerals, fire and fuels management, habitat restoration/vegetation management, and ACECs.

4.6.3 Impacts Common to All Alternatives

Impacts from Fluid Minerals

Under all alternatives, the BLM would continue to require a bond in accordance with 43 CFR 3104. The amount of the bond would have to be at least the minimum amount described in the regulations to "ensure…reclamation of the lease area(s) and the restoration of any lands or surface waters adversely affected by lease operations after the abandonment or cessation of oil and gas operations on the lease(s)."

4.6.4 Alternative A

Impacts from Lands and Realty

Under Alternative A, the entire planning area would continue to be open to ROW location. No areas would be managed as exclusion or avoidance; therefore, there would be no impacts from lands and realty on fluid minerals under this alternative.

Impacts from Fluid Minerals

Under Alternative A, new oil and gas leases would continue to be subject to an NSO stipulation within 0.25 mile of active leks and to a TL stipulation within

two miles of leks. The overall breakdown of acreages of oil and gas potential in various leasing categories in the decision area is included in **Table 4-17**, Oil and Gas Leasing Categories, Alternative A[1].

As discussed in **Section 3.7**, approximately 26,024 acres (35 percent) of oil and gas federal mineral estate in the decision area is unleased. Of these unleased acres, 7,081 (27 percent) have high potential. All unleased acreage in the decision area is open to fluid mineral leasing; however, 1,373 unleased acres (five percent of unleased oil and gas federal mineral estate) are subject to NSO stipulations. In addition, 5,799 unleased acres (23 percent of unleased oil and gas federal mineral estate) are subject to CSU stipulations. The most widely applied stipulations are TLs, covering 10,898 unleased acres (15 percent of unleased oil and gas federal mineral estate) in the decision area. Under Alternative A, it is projected that 60 new exploratory and development wells would be drilled on federal oil and gas estate during the life of the current RMP (see **Table 4-1**). Of these new wells, 49 are expected to be producing oil and gas wells through 2029 (BLM 2013).

Under Alternative A, existing oil and gas leases would continue to be developed according to their lease terms, including a TL prohibiting exploration and development within two miles of leks between March 1 and June 15. COAs could be applied to mitigate or prevent impacts on BLM-administered lands or other resources. BMPs could be incorporated as a COA. If COAs were applied, impacts would be the same type as those described under *Nature and Type of Effects*.

Geophysical exploration would continue to be allowed within the decision area.

4.6.5 Alternative B

Impacts from Lands and Realty

Under Alternative B, all BLM-administered surface lands in PH (32,900 acres, or approximately 100 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all PH would be closed to fluid mineral leasing under Alternative B, managing areas as ROW exclusion in PH would have no impact on fluid minerals.

All BLM-administered surface lands in GH (totaling 80 acres, or less than one percent of BLM-administered surface in the decision area) would be managed as ROW avoidance under Alternative B. Fluid minerals beneath those 80 acres would be impacted by the ROW avoidance area as described under *Nature and Type of Effects*. Impacts would increase in comparison with Alternative A.

Table 4-17
Oil and Gas Leasing Categories, Alternative A[1]

Oil and Gas Potential	Closed to Leasing (acres)	Open Subject to NSO Stipulations (acres)	Open Subject to CSU Stipulations (acres)	Open Subject to TL stipulations (acres)	Open Subject to Standard Terms and Conditions (acres)
High Potential	**0**	**9,583**	**17,427**	**29,840**	**6,676**
Total unleased	0	1,176	2,787	4,764	1,140
Total leased	0	8,407	14,640	25,076	5,536
BLM surface/ federal minerals	*0*	*6,444*	*10,781*	*18,085*	*2,194*
Unleased	*0*	*296*	*794*	*1,523*	*489*
Leased	*0*	*6,148*	*9,987*	*16,562*	*1,705*
Private or state surface/federal minerals)	*0*	*3,139*	*6,646*	*11,755*	*4,482*
Unleased	*0*	*880*	*1,993*	*3,241*	*651*
Leased	*0*	*2,259*	*4,653*	*8,514*	*3,831*
Moderate Potential	**0**	**31**	**1,418**	**3,131**	**4,050**
Total unleased	0	31	728	1,495	2,689
Total leased	0	0	690	1,636	1,361
BLM surface/federal minerals	*0*	*0*	*442*	*1,165*	*836*
Unleased	*0*	*0*	*107*	*484*	*519*
Leased	*0*	*0*	*335*	*681*	*317*
Private or state surface/ federal minerals	*0*	*31*	*976*	*1,966*	*3,214*
Unleased	*0*	*31*	*621*	*1,011*	*2,170*
Leased	*0*	*0*	*355*	*955*	*1,044*
Low/No Known Potential	**0**	**166**	**2,390**	**5,533**	**14,404**
Total unleased	0	166	2,284	4,639	9,905
Total leased	0	0	106	894	4,499

Table 4-17
Oil and Gas Leasing Categories, Alternative A[1]

Oil and Gas Potential	Closed to Leasing (acres)	Open Subject to NSO Stipulations (acres)	Open Subject to CSU Stipulations (acres)	Open Subject to TL stipulations (acres)	Open Subject to Standard Terms and Conditions (acres)
BLM surface/federal minerals	*0*	*0*	*519*	*1,632*	*208*
Unleased	*0*	*0*	*413*	*1,158*	*169*
Leased	*0*	*0*	*106*	*474*	*39*
Private or state surface/federal minerals	*0*	*166*	*1,871*	*3,901*	*14,196*
Unleased	*0*	*166*	*1,871*	*3,481*	*9,736*
Leased	*0*	*0*	*0*	*420*	*4,460*
Total (All Potentials)	***0***	***9,780***	***21,235***	***38,504***	***25,130***
Total unleased	***0***	***1,373***	***5,799***	***10,898***	***13,734***
Total leased	***0***	***8,407***	***15,436***	***27,606***	***11,396***
BLM surface/federal minerals	***0***	***6,444***	***11,742***	***20,882***	***3,238***
Unleased	***0***	***296***	***1,314***	***3,165***	***1,177***
Leased	***0***	***6,148***	***10,428***	***17,717***	***2,061***
Private or state surface/federal minerals	***0***	***3,336***	***9,493***	***17,622***	***21,892***
Unleased	***0***	***1,077***	***4,485***	***7,733***	***12,557***
Leased	***0***	***2,259***	***5,008***	***9,889***	***9,335***

[1]Total acreage for stipulations is greater than the total acreage within the decision area because stipulations could overlap. Acreages do not include 118,858 acres of federal mineral estate within the decision area that do not contain GRSG habitat.
Source: BLM 2012a

Impacts from Fluid Minerals (Including Mineral Split Estate)

Under Alternative B, all federal oil and gas estate within PH (61,197 acres or 83 percent of the decision area) would be closed to fluid mineral leasing, which would increase impacts on fluid minerals in comparison with Alternative A. These closures would include 18,830 acres of unleased federal oil and gas estate, of which 7,056 acres (37 percent) have high potential. Impacts of these closures would be the same type as those described under *Nature and Type of Effects*. Existing leases would remain valid through their term but could not be renewed.

The 5,096 acres of federal oil and gas within GH (seven percent of the decision area) would be subject to the same stipulations as those under Alternative A (detailed in **Table 4-18**, Oil and Gas Leasing Categories in General Habitat, Alternative B, below); however, new leases in GH would be subject to RDFs, which would increase impacts on fluid minerals in comparison with Alternative A. The RDFs would require operators to limit their surface disturbance and noise levels, discourage raptor perching, reclaim disturbed areas to set standards, and take other measures to protect GRSG. Impacts of requiring these RDFs would be the same type as described under *Nature and Type of Effects*.

Under Alternative B, it is projected that 26 new exploratory and development wells would be drilled on federal oil and gas estate over 20 years. Of these new wells, 21 are expected to be producing oil and gas wells through 2029 (see **Table 4-1**). This represents a 57 percent decrease in projected producing wells on federal oil and gas estate compared with Alternative A (BLM 2013).

Conservation measures in addition to RDFs would be applied as COAs to 135 existing leases on 42,367 acres (70 percent) of PH overlying federal oil and gas estate. These actions would increase impacts on fluid minerals in comparison with Alternative A. In addition to limitations on surface disturbance and timing of exploratory drilling, the COAs would require unitization when necessary to minimize harm to GRSG and would call for completion of Master Development plans instead of processing individual APDs. Cost impacts of these required actions would be the same type as those described under *Nature and Type of Effects*. The BLM would not apply COAs that would eliminate reasonable opportunities to develop the lease.

Geophysical exploration would be allowed on the 61,197 acres of federal oil and gas estate within PH but would be subject to TLs and other restrictions. Impacts of these restrictions on geophysical exploration would be the same type as those described under *Nature and Type of Effects*.

Overall, as a result of increased restrictions and limitations as compared to Alternative A, Alternative B would result in an increase in the magnitude and duration of effects on fluid minerals development over time.

Table 4-18
Oil and Gas Leasing Categories in General Habitat, Alternative B

Oil and Gas Potential	Closed to Leasing	Open Subject to NSO Stipulations	Open Subject to CSU Stipulations	Open Subject to TL Stipulations	Open Subject to Standard Terms and Conditions
High Potential	**0**	**0**	**0**	**0**	**441**
Total unleased	0	0	0	0	16
Total leased	0	0	0	0	425
BLM surface/federal minerals	*0*	*0*	*0*	*0*	*0*
Unleased	*0*	*0*	*0*	*0*	*0*
Leased	*0*	*0*	*0*	*0*	*0*
Private or state surface/federal minerals	*0*	*0*	*0*	*0*	*441*
Unleased	*0*	*0*	*0*	*0*	*16*
Leased	*0*	*0*	*0*	*0*	*425*
Moderate Potential	**0**	**2**	**3**	**3**	**322**
Total unleased	*0*	*2*	*3*	*3*	*4*
Total leased	*0*	*0*	*0*	*0*	*318*
BLM surface/federal minerals	*0*	*0*	*0*	*0*	*0*
Unleased	*0*	*0*	*0*	*0*	*0*
Leased	*0*	*0*	*0*	*0*	*0*
Private or state surface/federal minerals	*0*	*2*	*3*	*3*	*322*
Unleased	*0*	*2*	*3*	*3*	*4*
Leased	*0*	*0*	*0*	*0*	*318*
Low/No Known Potential	**0**	**0**	**0**	**0**	**4,324**
Total unleased	*0*	*0*	*0*	*0*	*3,648*
Total leased	*0*	*0*	*0*	*0*	*676*
BLM surface/federal minerals	*0*	*0*	*0*	*0*	*78*
Unleased	*0*	*0*	*0*	*0*	*40*
Leased	*0*	*0*	*0*	*0*	*38*

Table 4-18
Oil and Gas Leasing Categories in General Habitat, Alternative B

Oil and Gas Potential	Closed to Leasing	Open Subject to NSO Stipulations	Open Subject to CSU Stipulations	Open Subject to TL Stipulations	Open Subject to Standard Terms and Conditions
Private or state surface/federal minerals	*0*	*0*	*0*	*0*	*4,246*
Unleased	*0*	*0*	*0*	*0*	*3,608*
Leased	*0*	*0*	*0*	*0*	*638*
Total (All Potentials)	***0***	***2***	***3***	***3***	***5,087***
Total unleased	***0***	***2***	***3***	***3***	***3,668***
Total leased	***0***	***0***	***0***	***0***	***1,419***
BLM surface/federal minerals	***0***	***0***	***0***	***0***	***78***
Unleased	***0***	***0***	***0***	***0***	***40***
Leased	***0***	***0***	***0***	***0***	***38***
Private or state surface/federal minerals	***0***	***2***	***3***	***3***	***5,009***
Unleased	***0***	***2***	***3***	***3***	***3,628***
Leased	***0***	***0***	***0***	***0***	***1,381***

Source: BLM 2012a

4.6.6 Alternative C

Impacts from Lands and Realty

Under Alternative C, all PH and GH (32,980 acres, or approximately 100 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas. However, because all PH and GH would be closed to fluid mineral leasing under Alternative C, managing areas as ROW exclusion in PH and GH would have no impact on fluid minerals.

Impacts from Fluid Minerals (Including Mineral Split Estate)

Under Alternative C, all federal oil and gas estate in PH and GH (66,293 acres, or 90 percent of the decision area) would be closed to fluid mineral leasing, which would increase impacts on fluid minerals in comparison with Alternative A. Approximately 22,501 acres (86 percent) of unleased federal oil and gas estate in the decision area would be closed, of which 7,056 acres (PH) and 16 acres (GH) have high potential. Closure of these 7,072 high potential acres would close approximately 100 percent of the unleased acres with high oil and gas potential in the decision area. Impacts would be the same type as those described under *Nature and Type of Effects*.

Under Alternative C, it is projected that 25 new exploratory and development wells would be drilled on federal oil and gas estate over 20 years. Of these new wells, 21 are expected to be producing oil and gas wells through 2029 (see **Table 4-1**). This represents a 57 percent decrease in projected producing wells on federal oil and gas estate compared with Alternative A (BLM 2013).

Management actions applicable to existing leases under Alternative C would be similar to those under Alternative B, but they would apply to 16 existing leases on 1,425 acres of federal oil and gas estate within GH in addition to 135 leases on 42,367 acres of federal oil and gas estate within PH. In addition to applying the restrictive management under Alternative B to more acres, Alternative C would call for COAs implementing seasonal restrictions on vehicle traffic and human presence associated with exploratory drilling. This alternative also would limit new surface disturbance on existing leases to three percent per section, with some exceptions. Impacts of these operating and siting restrictions would be the same type as those described under *Nature and Type of Effects*.

Overall, as a result of increased restrictions and limitations as compared to Alternative A, Alternative C would result in an increase in the magnitude and duration of effects on fluid minerals development over time.

4.6.7 Alternative D

Impacts from Lands and Realty

Under Alternative D, all BLM-administered surface in PH (32,900 acres, or approximately 100 percent of BLM-administered surface in the decision area) would be managed as ROW avoidance areas. However, because all fluid mineral

development in PH would be subject to NSO stipulations under Alternative D, managing ROW avoidance areas in PH would have no impact on fluid minerals.

All GH would be open to ROW location under Alternative D (except wind energy). However, identification of conservation measures to minimize surface disturbance and disrupting activities could increase the expense of developing facilities for oil and gas operations by limiting routing options and requiring the use of more expensive technology.

Impacts from Fluid Minerals (Including Mineral Split Estate)

Under Alternative D, all federal oil and gas estate in PH (61,197 acres or 83 percent of the decision area) would be open to fluid mineral leasing subject to NSO stipulations. The 18,830 acres of unleased federal oil and gas estate in PH (72 percent of unleased acres in the decision area) would be subject to these stipulations. Of these unleased acres that would be subject to NSO stipulations, 7,056 acres have high potential. These acres make up approximately 100 percent of all the unleased high potential federal oil and gas estate in the decision area.

All GH (5,096 acres of federal oil and gas estate, or seven percent of the decision area) would be subject to CSU stipulations under Alternative D. Impacts of these stipulations would be the same type as those described under *Nature and Type of Effects*.

Under Alternative D, it is projected that 51 new exploratory and development wells would be drilled on federal oil and gas estate in the short term. Of these new wells, 42 are expected to be producing oil and gas wells in the long term (see **Table 4-1**). This represents a 14 percent decrease in projected producing wells on federal oil and gas estate compared with Alternative A (BLM 2013).

For existing leases, the BLM would apply the same RDFs to the same acreage as under Alternative B. However, the conservation measures applied would differ. No quantitative percentage limit, surface occupancy buffers, or TL would apply to surface disturbance; rather, surface disturbance would prevent or minimize disturbance to GRSG and their habitat. Unitization would occur on a case-by-case basis.

In addition to RDFs and limitations on disturbance, noise limitations and structure height restrictions would apply under Alternative D. Cost impacts of these operating and siting constraints would be the same type as those described under *Nature and Type of Effects*.

Management of geophysical exploration under Alternative D would be the same as that under Alternative B.

Overall, as a result of increased restrictions and limitations as compared to Alternative A, Alternative D would result in an increase in the magnitude and duration of effects on fluid minerals development over time.

4.7 COAL

As discussed in **Section 3.8**, Coal, there has been no coal development within the planning area. While the Bowman-Gascoyne Known Recoverable Coal Resource Area intersects PH and GH, no development of this field is anticipated within the life of the North Dakota RMP. The Known Recoverable Coal Resource Area has low development potential, and no interest has been expressed in developing the area. Lignite mining is occurring in other parts of North Dakota, so demand is being satisfied from mining in these other areas. In addition, the 2010 Analysis of the Management Situation for North Dakota analyzed coal development potential in the state when designating new Coal Study Areas. Only areas with sufficient economic coal resources to make them likely to be developed within the next 15 to 20 years were designated as Coal Study Areas. The Known Recoverable Coal Resource Area within the planning area was not designated as a Coal Study Area because it was determined not to have sufficient economic coal resources (BLM 2010a). Because no coal development is foreseeable in the planning area, coal resources in the planning area are not expected to be impacted by management actions proposed in this RMPA. However, potential future development would be precluded in PH (87,443 acres) in Alternatives B and D, and in PH and GH (166,207 acres) in Alternative C.

4.8 LOCATABLE MINERALS

As discussed in **Section 3.9**, Locatable Minerals, no locatable mineral development is anticipated within GRSG habitat over the next 20 years. Although uranium deposits exist within GH in Bowman County, these deposits have low development potential and are not expected to be developed during the next 20 years. As a result, locatable minerals in the planning area are not expected to be impacted by management actions proposed in this RMPA. However, potential future development would be precluded in PH (46,397 acres) in Alternative B, and PH and GH (49,970 acres) in Alternative C.

4.9 MINERAL MATERIALS

4.9.1 Methods and Assumptions

Analysis of impacts on mineral materials from this RMPA focuses on the impacts of conservation measures to protect GRSG. These impacts may be direct or indirect. For example, a direct impact on mineral materials would result from closure of an area to mineral material sales disposal. An indirect impact would result from removal of a road, which would change the economic feasibility of developing a site. Additional actions or conditions that might cause direct or indirect impacts on mineral materials are described under *Indicators*, below.

Indicators

Table 4-19, Comparison of Mineral Materials Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on mineral materials under each alternative.

Table 4-19
Comparison of Mineral Materials Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
The amount of land closed to mineral material disposal (acres)	0	46,397	49,970	46,397
The amount of land managed as ROW avoidance areas (acres)	0	80	0	32,900
The amount of land managed as ROW exclusion areas (acres)	0	32,900	32,980	32,900[1]
Restrictions on mineral material pits no longer in use	No change	Increase	Increase	Increase

[1] PH would be exclusion areas for new ROW wind energy developments.

Where information is available, consideration is given to the potential for mineral materials on lands closed to mineral material disposal. For example, an indicator of an impact on mineral materials is if there were substantial closures to mineral material disposal in high potential areas.

In areas that are open to mineral material disposal, factors that affect mineral material development include permitting, regulatory policy, public perception and concerns, travel management, transportation, proximity to sensitive areas, low commodity prices, taxes, and housing and other necessities for workers.

The amount of area that would fall under restrictions outlined in **Chapter 2**, and the impact of those restrictions on mineral material development, are considered below in the analysis of each alternative.

Assumptions

The analysis includes the following assumptions:

- While mineral material potential exists within PH, there is no development on federal mineral material estate in this area.
- Management actions also apply to mineral material development on lands overlying federal mineral estate, which includes federal mineral estate underlying BLM-administered lands and non-BLM administered lands. There are 56,681 acres of federal mineral material estate within the planning area (30,408 acres of BLM-

administered surface with federal minerals and 26,273 acres of split estate).

4.9.2 Nature and Type of Effects

The predominant mining method for mineral materials is surface mining; therefore, any restrictions on surface-disturbing activities effectively close the subject areas to mineral material mining. Demand for mineral materials is generated primarily from road maintenance needs. Closure of areas to mineral material sales would result in pits relocating nearby.

Requiring reclamation of mineral material pits no longer in use could increase costs on developers if the BLM requires them to pay for the reclamation.

Managing areas as ROW avoidance or exclusion could result in impacts on mineral materials because construction of new roads in these areas would likely decrease. As a result, demand for mineral materials needed for construction and maintenance would also decrease.

Implementing management for the following resources would have negligible or no impact on mineral materials and are therefore not discussed in detail: travel and transportation management, recreation, range management, fluid minerals, fire and fuels management, habitat restoration/vegetation management, and ACECs.

4.9.3 Impacts Common to All Alternatives

There are no impacts which are common to all alternatives.

4.9.4 Alternative A

Impacts from Lands and Realty

Under Alternative A, all BLM-administered surface within the decision area would continue to be open to ROW authorization, allowing the most flexibility for development. The effects would be the same as described above in *Nature and Type of Effects*.

Impacts from Mineral Materials

All federal mineral estate in the decision area would remain open to mineral material disposal under Alternative A, allowing the greatest development potential. Effects would be similar to those described in the *Nature and Type of Effects* above.

4.9.5 Alternative B

Impacts from Lands and Realty

Approximately 32,900 acres in PH (100 percent of BLM-administered surface in the decision area) would be managed as an ROW exclusion area under Alternative B. However, because all PH would also be closed to mineral

material disposal under this alternative, the ROW exclusion area would not impact the mineral materials program.

Under Alternative B, approximately 80 acres in GH (less than one percent of the decision area) would be managed as an ROW avoidance area. Impacts of this management would be the same type as those described under *Nature and Type of Effects*, but with a slight increase in areas affected over Alternative A.

Impacts from Mineral Materials

Under Alternative B, all of the federal mineral material estate in PH (totaling 46,397 acres, or 82 percent of the locatable federal mineral estate in the decision area) would be closed to mineral material disposal. The types of impacts from these closures would be the same as those discussed under *Nature and Type of Effects*, and represents an increase in the area affected as compared to Alternative A.

In PH, mineral material pits no longer in use would be restored to meet GRSG habitat conservation objectives. The types of impacts from restoring pits no longer in use would be the same as those described under *Nature and Type of Effects*.

Overall, as a result of increased restrictions as compared to Alternative A, Alternative B would result in an increase in the area of effects on mineral materials development over time.

4.9.6 Alternative C

Impacts from Lands and Realty

Approximately 32,980 acres in PH and GH (100 percent of BLM-administered surface in the decision area) would be managed as ROW exclusion areas under Alternative C. However, because all PH and GH would be closed to mineral materials disposal under this alternative, the ROW exclusion areas would not impact the mineral materials program.

Impacts from Mineral Materials

Under Alternative C, approximately 49,970 acres of federal mineral material estate in PH and GH (88 percent of federal mineral estate in the decision area) would be closed to mineral materials disposal. This would include (46,397 acres of PH and 3,573 acres of GH), the most acres of any alternative. The types of impacts from these closures would be the same as those discussed under *Nature and Type of Effects*, and occur over a large area.

Similar to Alternative B, mineral material pits no longer in use would be restored to meet GRSG habitat conservation objectives; however under this alternative, this measure would apply to both PH and GH, thereby increasing the area of impact. The types of impacts from restoring pits no longer in use are

the same as those described under *Nature and Type of Effects*, but occur over a much larger area than under Alternative A.

Overall, as a result of increased restrictions as compared to Alternative A, Alternative C would result in an increase in the area of effects on mineral materials development over time.

4.9.7 Alternative D

Impacts from Lands and Realty

Under Alternative D, 32,900 acres in PH (100 percent of BLM-administered surface in the decision area) would be managed as an ROW avoidance area. However, because all PH would be closed to mineral materials disposal, the ROW avoidance area would have no impact on the mineral materials program.

Impacts from Mineral Materials

Management and impacts under Alternative D would be the same as those under Alternative B.

Overall, as a result of increased restrictions as compared to Alternative A, Alternative D would result in an increase in the area of effects on mineral materials development over time.

4.10 COMPREHENSIVE TRAVEL AND TRANSPORTATION MANAGEMENT

Comprehensive Travel and Transportation Management typically supports and creates impacts on other resources and uses. Impacts on travel and transportation from other resource areas include management prescriptions that alter the existing transportation system, for instance, through the physical removal of routes (i.e. reclaiming and revegetating the ROW) or by way of limiting or closing routes to certain modes of travel (such as designating routes as closed to motorized travel).

In the RMPA/EIS planning area, motorized travel, including OHV travel, is limited to existing routes. Since motorized travel can impact GRSG populations and habitat, management prescriptions associated with the proposed action alternatives (Alternatives B, C, and D) would result in the closure of routes to motorized travel and in some cases reclaiming of road surfaces.

4.10.1 Methods and Assumptions

Indicators

Table 4-20, Comparison of Comprehensive Travel and Transportation Management Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on Comprehensive Travel and Transportation Management under each alternative.

Table 4-20
Comparison of Comprehensive Travel and Transportation Management Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Acres where new road development would not be allowed	0	0, with mitigation	32,342	0, with mitigation

Assumptions

The analysis includes the following assumptions:

- The demand to increase and maintain travel routes on BLM-administered lands would continue to increase over 20 years, especially near communities and in areas of high-density oil and gas development.
- The BLM is not responsible for the maintenance of federal, state, or county roads on BLM-administered lands.
- The travel designations would not affect ROW holders, permitted uses, county or state roads, or other valid existing rights. Travel closures/limitations apply primarily to public access.
- The incidence of resource damage would increase with the increasing use of BLM-administered lands.
- Administrative use authorizations are granted on a case-by-case basis with approval from the BLM.
- Implementation of a travel management plan during a future site-specific travel planning process would include increased public education, signing, enforcement, and resource monitoring in regard to travel management.

4.10.2 Nature and Type of Effects

Impacts on Comprehensive Travel and Transportation Management are those that restrict travel (e.g., managing areas as closed or limited to motorized travel and seasonal travel limitations). Current BLM management limits motorized travel to existing roads and trails. New travel and transportation management actions in response to GRSG habitat protection strategies could impact the number of acres where motorized travel is allowed on existing roads and trails. Seasonal travel restrictions to prevent disruption of GRSG breeding and brood rearing activities would allow motorized and mechanized travel in defined areas only at specific times of the year. Full closure of certain areas would direct travelers elsewhere in the transportation network, potentially resulting in impacts on those areas from the added activity. Additionally, management actions that restrict future route construction would limit the ability of the

travel network to accommodate increased travel demands over time. Conflicts among route users could increase if the existing network becomes congested.

Management for all other resources and uses would have negligible or no impact on Comprehensive Travel and Transportation Management and are therefore not discussed in detail.

4.10.3 Impacts Common to All Alternatives

Under all alternatives, travel would be limited to existing roads and trails with no areas designated as entirely open to motorized cross-country travel, and no routes or areas specifically closed to motorized or mechanized travel. Under Alternatives B, C, and D, the BLM would complete activity-level travel management plans within five years, while Alternative A, does not contain a specified timeframe.

Table 4-21, Areas Open/Closed to New Road Construction by Alternative, provides a comparison of areas open and closed to new road construction by alternative. Closed areas are based on the total area covered by 4-mile buffers placed around active lek sites.

Table 4-21
Areas Open/Closed to New Road Construction by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Area open to new construction (acres)	32,980	32,980	638	32,980
Area closed to new construction (acres)	0	0	32,342	0

4.10.4 Alternative A

Impacts from Travel and Transportation Management

Under Alternative A, existing travel opportunities would be maintained. The BLM would continue to manage for a total of 114 miles of roads and trails throughout the decision area. Motorized wheeled travel would continue to be limited yearlong to existing roads and trails and no areas would be entirely open to cross-country motorized wheeled travel or entirely closed. While the BLM would develop a transportation management plan, it would not be required to do so within a specified timeframe, continuing existing impacts, as described above in the *Nature and Types of Effects*, into the foreseeable future.

4.10.5 Alternative B

Impacts from Travel and Transportation Management

BLM management prescriptions under Alternative B to protect GRSG habitat would result in the potential for more access limitations when compared to

Alternative A. The BLM would develop a travel and transportation management plan within five years of the RMP ROD. Also under Alternative B, the BLM would only allow new roads where access to valid existing rights is necessary and does not currently exist, therefore restricting new roads and/or ROWs and access through PH. This would extend effects as described above in *Nature and Type of Effects* across more of the decision area than under Alternative A.

During travel and transportation management planning, should the BLM determine there is a need to close certain routes, those closures would impact the existing travel and transportation network, including the types of travel allowed on routes, as described above in *Nature and Type of Effects*.

4.10.6 Alternative C

Impacts from Travel and Transportation Management

BLM management prescriptions under Alternative C to protect GRSG habitat would result in the potential for more impacts on travel and transportation management when compared to Alternative A.

BLM management actions under Alternative C for GRSG habitat protection and subsequent impacts on travel and transportation management would be the same as those described under Alternative B, with the exception that no new road construction would be allowed within four miles of active GRSG leks. The 4-mile lek buffers cover 32,342 acres (98 percent of the decision area). As a result, new road construction would be limited to 638 acres in the decision area. This prohibition on new road construction would preclude the construction of new roads where they might otherwise be needed to improve access or the functionality of the network.

4.10.7 Alternative D

Impacts from Travel and Transportation Management

BLM management prescriptions under Alternative D to protect GRSG habitat would result in the potential for more impacts on travel and transportation management when compared to Alternative A and would be similar to those described under Alternative B.

4.11 RECREATION

4.11.1 Methods and Assumptions

Impacts on recreation can be direct or indirect. Management actions that alter or prohibit users' opportunities to access recreation areas or participate in recreation activities would result in a direct impact. Indirect impacts are those that change the physical, social, or administrative setting within which recreation activities take place.

Indicators

Table 4-22, Comparison of Recreation Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on recreation under each alternative.

Table 4-22
Comparison of Recreation Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Change in recreation activities and participation rates in the planning and PH areas	No change	Opportunity for increase due to restrictions on surface disturbance	Greatest opportunity for increase due to restrictions on surface disturbance	Opportunity for increase due to restrictions on surface disturbance
Change in the number and type of SRPs issued on an annual basis within the planning area and PH	No change	Potential limit on the number and type of new SRPs in PH	Potential limit on the number and type of new SRPs in PH	Potential limit on the number and type of new SRPs in PH

Assumptions

The analysis includes the following assumptions:

- Traditional recreational uses in the planning area, such as hunting and fishing, would continue as people seek outdoor family-oriented activities; an active retired population spends its disposable time and income on recreation; and as other areas of the country become more urbanized.
- Recreation would continue to be an important component of the local economy.
- Substantial increases in recreation could negatively impact GRSG habitat.
- The potential for resource impacts and conflicts between all types of users would increase with increasing use.
- There would continue to be no or little demand for SRPs.
- The BLM would issue SRPs on a discretionary basis.

4.11.2 Nature and Type of Effects

Impacts on recreation are frequently the result of management actions related to other resources and resource uses (for example, special status species habitat protection) and stipulations placed on resource uses. New management actions to preserve GRSG habitat would affect a variety of resources and uses, which would in turn affect recreation.

BLM management of areas as unsuitable for public utilities (i.e., ROW exclusion areas) protects recreation opportunities. Depending on the location, development in utility corridors impacts recreation opportunities during construction and operation. Managing areas as ROW avoidance can limit development that would be incompatible with recreation in these areas.

On lands open to fluid mineral leasing, oil and gas facilities, equipment, noise, dust, vehicles, night lighting, pipelines, and human activity affect the recreation setting during construction and operation. Fluid mineral development that requires surface occupancy generally impacts recreation management objectives, opportunities, and activities. Even with CSU stipulations, oil and gas development can impact recreation opportunities if the development conflicts with existing recreation activities. However, applying NSO stipulations preserves the natural character of landscapes and protects GRSG habitat. Stipulations maintain current recreation settings and preserve recreation opportunities in those areas in the long term.

Minerals development and disposal result in short- and long-term impacts during construction and operations by displacing recreation opportunities. Closure of certain areas to mineral development decreases the likelihood for conflict with recreation users and maintains desired recreation settings.

Comprehensive Travel and Transportation Management affects recreation opportunities and the overall recreation experience by managing for access to areas where recreation activities take place. Closure of routes to motorized travel can decrease access to recreation uses, while at the same time reducing conflicts between motorized and non-motorized recreation activities. Travel and transportation management policies that close routes to OHV use directly affect recreation opportunities in the closed area and can increase OHV impacts outside the closure boundary. Additionally, management actions that restrict future route construction limit the ability of the travel network to accommodate increased travel demands, such as increased OHV use, over time. Conflicts among route users could increase if the existing network becomes congested; however, limitations on new road construction and route upgrading would maintain dispersed recreational experiences associated with activities such as hunting, especially in areas where few to no routes exist.

Where lands are open to livestock grazing, impacts on recreation can result. The intensity of the impact varies based on recreation activity and visitor expectation. Range improvements help to reduce conflicts by keeping grazing animals away from recreation areas. Structural range improvements may also hinder cross-country movement by hunters, bird watchers, hikers, and other recreationalists.

Development of renewable energy projects, such as wind farms and associated transmission infrastructure, could result in the loss of recreation opportunities.

Management of certain areas as ROW avoidance areas would minimize impacts from renewable energy projects.

Impacts on recreation from ACECs would vary depending on the relevant and important values for which the ACEC was established to protect. Often times, BLM management for ACECs include restrictions on surface-disturbing activities within the ACEC boundary, which could directly or indirectly affect recreation opportunities within an ACEC. At the same time, management prescriptions for ACECs can help maintain the existing physical setting by preserving natural landscapes.

Implementing management for certain resources would have negligible or no impact on recreation and will therefore not be discussed in detail. Resources not likely to have an effect on recreation include: fire and fuels management and habitat restoration/vegetation management. In addition, although there is one existing gravel mine in Bowman County, no mineral materials mining operations currently exist on BLM-administered land in the planning area. Nor is there any foreseeable coal or locatable mineral potential in the decision area. Therefore management decisions for these resources would not affect recreation opportunities in the planning area and are not included in the following analysis.

4.11.3 Impacts Common to All Alternatives

Impacts from Lands and Realty

Under all alternatives, impacts on recreation opportunities from existing ROWs would continue. The restoration of discontinued or abandoned ROWs pursuant to FLPMA guidelines would reduce the potential for long-term impacts. Particularly in situations where the ROW includes a linear obstruction such as a wall or fence, removal of the feature could improve recreation user experiences. Removal of roads, however, could negatively impact recreation opportunities if the routes are used for recreational activities, such as OHV use or for access to hunting areas.

4.11.4 Alternative A

Impacts from Travel and Transportation Management

Under Alternative A, existing travel opportunities would be maintained. The BLM would continue to manage for a total of 114 miles of roads and trails throughout the decision area. Motorized and non-motorized road and trail based recreation opportunities, and the overall recreation experience would be maintained into the foreseeable future.

Impacts from Recreation

Under Alternative A, the BLM would continue to manage for dispersed recreation activities, particularly big game hunting. Existing impacts on recreation from other resources and uses would be as described above in

Nature and Type of Effects, and continue with little or no change over existing conditions.

Impacts from Lands and Realty

Under Alternative A, 371 total acres of existing ROW authorizations would continue to impact recreation opportunities. No lands within the planning area would be designated as ROW avoidance or exclusion areas; therefore, there would be potential impacts on recreation during construction and operation of facilities throughout the planning area as described in *Nature and Type of Effects*.

Impacts from Range Management

Under Alternative A, 32,945 acres of suitable grazing lands would continue to be open with a long-term allocation of 5,781 AUMs. Impacts on recreation users from conflicts with grazing animals and infrastructure would be consistent with the *Nature and Types of Effects* described above, especially where cattle grazing areas overlap prime big-game hunting areas. Impacts of grazing to new SRPs would be evaluated on a case-by-case basis through the SRP issuance process.

Impacts from Fluid Minerals

Conventional oil and gas development under Alternative A would continue at high production rates, particularly in Bowman County where there are 577 production wells. However, oil and gas development peaked in 2008 and is consistently declining (North Dakota Industrial Commission 2012a), therefore limiting the expected amount of new oil and gas development. Under Alternative A, oil and gas production would continue to impact recreational opportunities throughout the planning area as described in *Nature and Types of Effects* above, but would likely decline as the trend for new oil and gas developments continues to decline. Impacts on recreation users would include activities and disturbance related to exploration, development, and operations.

Impacts from ACECs

There would be no designated ACECs in the planning area under Alternative A; therefore, there would be no impacts from ACEC management actions on recreation activities.

4.11.5 Alternative B

Impacts from Travel and Transportation Management

Under Alternative B, the BLM would allow motorized travel on existing roads and trails while at the same time evaluate the need for permanent or seasonal road closures. Should the BLM determine there is a need to close certain routes those closures could impact recreation opportunities. Areas where routes would be closed could include areas where recreation activities take place. Additional impacts would be consistent with the *Nature and Types of Effects*.

Dispersed recreation activities, which primarily include big game hunting, would be less susceptible to impacts from route designations. However, permanent or

seasonal closure of travel routes and limitations on new road development could impact recreation by limiting motorized travel on routes used for access to hunting, fishing, and other popular recreation activities.

Under Alternative B, the BLM would only allow new roads where access to valid existing rights is necessary and does not currently exist. While new roads could improve certain recreation experiences such as OHV operation, actions proposed under Alternative B would reduce the potential for new conflicts between motorized travel and existing recreation uses that do not require motorized vehicle operation as compared to Alternative A.

Impacts from Recreation

Under Alternative B, the BLM would only issue SRPs that have a neutral or beneficial effect on PH, which could limit future opportunities for SRPs in PH as compared to Alternative A.

Impacts from Lands and Realty

Under Alternative B, PH would be designated as exclusion areas for new ROW authorizations and GH would be designated ROW avoidance areas. Additionally, under Alternative B, the BLM would take advantage of opportunities to remove, bury, or modify existing power lines within PH. A long-term reduction in the amount of acres dedicated to ROWs and above-ground linear features, such as transmission lines and pipelines, would improve recreation opportunities. Dispersed recreation activities, which primarily include big game hunting, would be less susceptible to impacts from ROW development. However, permanent or seasonal closure of travel routes and limitations on new ROW development could impact recreation by limiting motorized travel on routes used for hunting, fishing, and other popular recreation activities.

Impacts from Range Management

Under Alternative B, the BLM would conduct land health assessments in PH to assess whether GRSG habitat objectives are being met. Based on these assessments, in cases where GRSG objectives are not being met, the BLM would evaluate and implement grazing decisions, conservation plans, or other agreements to meet those objectives. Management actions related to grazing systems could reduce the timing, distribution, type, intensity, and/or number of livestock allowed in PH. A reduction in total livestock number or seasonal grazing restrictions would reduce range management conflicts with recreation users, particularly big game hunters. Impacts on recreation users would be consistent with the *Nature and Types of Effects*, especially where cattle grazing areas overlap prime big-game hunting areas. Dispersed recreation activities, which primarily include big game hunting, would be less susceptible to impacts from grazing actions.

Impacts from Fluid Minerals

The closure of PH to fluid mineral development under Alternative B would eliminate the potential for new oil and gas development conflicting with recreation users. The benefits of reduced surface disturbance and no new construction activity associated with oil and gas development would be consistent with the *Nature and Types of Effects*. Restriction of geophysical exploration to helicopter-portable drilling methods could impact certain recreation activities, such as hunting, if helicopter operations are in proximity to key big game or bird hunting areas. Dispersed recreation activities, which primarily include big game hunting, would be less susceptible to impacts from mineral development.

Impacts from ACECs

Impacts would be the same as Alternative A.

4.11.6 Alternative C

Impacts from Travel and Transportation Management

The types of impacts on recreation under Alternative C would the same as those described above under Alternative B, with the exception that the BLM would use a 4-mile buffer around leks to determine where limitations on new road construction would be necessary to minimize disturbance to GRSG habitat. In total, the 4-mile buffers account for 98 percent (32,342 acres) of the decision area in PH, including all BLM-administered land in the Big Gumbo Management Area. Prohibition of new road construction would limit motorized recreational use to the existing network of roads and trails. There would be no opportunity to accommodate any increase in recreational use or mitigate user conflicts by adding additional routes.

Impacts from Recreation

Impacts from recreation would be similar as Alternative B. Management actions would apply to both PH and GH, impacting a larger area resulting in a wider area where certain type of SRPs and the recreational opportunities they afford would be limited.

Impacts from Lands and Realty

Under Alternative C, PH and GH areas would be designated as ROW exclusion areas for new ROW authorizations. Any new development would be allowed only if it could be contained within an existing ROW. The type of impacts on recreation opportunities would be similar as under Alternative B; however, the impacts would be experienced over a larger area.

Impacts from Range Management

Under Alternative C, BLM range management would reduce the number of grazing allotments in the Big Gumbo Management Area by 50 percent to 2,041 AUMs. In the long-term, the BLM would allocate up to 3,739 AUMs. A

reduction in the allotted number of livestock would reduce the potential for livestock conflicts with big-game hunters and other recreation users.

Impacts from Fluid Minerals

Impacts under Alternative C from fluid minerals would be similar as Alternative B, with exception that GH would also be closed to fluid mineral leasing, resulting in improved opportunities for quiet and dispersed recreation over a greater area.

Impacts from ACECs

Under Alternative C, the BLM would designate PH (32,900 acres) of GRSG habitat as a new ACEC. Management for the ACEC would be tailored to protect the relevant and important values (i.e. GRSG habitat) for which the ACEC would be designated. Designation of the ACEC could affect recreation opportunities by limiting new surface disturbing activities within the ACEC boundaries. Motorized access for hunting and other recreation activities could be impacted by the designation. The ACEC designation could limit the issuance of new SRPs if the requested activity is proposed within the ACEC boundary.

4.11.7 Alternative D

Impacts from Travel and Transportation Management

Impacts on recreation under Alternative D would be similar as those described above under Alternative B.

Impacts from Recreation

Impacts from recreation management would be similar as Alternative B.

Impacts from Lands and Realty

Under Alternative D, PH would be managed as ROW avoidance areas for new ROW authorizations and exclusion areas for new wind energy projects. ROWs would continue to be allowed in GH areas with the exception of wind energy ROWs. GH would be designated as wind energy ROW avoidance areas. Any new development would be allowed only if it could be contained within an existing ROW. Consistent with the *Nature and Types of Effects,* managing areas as ROW avoidance could limit development that would be incompatible with recreation in these areas.

Impacts from Range Management

Impacts on recreation from BLM range management actions proposed under Alternative D would be the same as those described above under Alternative B.

Impacts from Fluid Minerals

Under Alternative D, PH areas would be open to oil and gas development; however, surface occupancy would be prohibited. Within three miles of active leks, BLM management would prohibit geophysical exploration and development during mating season (March 1 through June 15). The BLM would prohibit all

exploration and development within 0.6 miles of a lek. Reduced surface oil and gas development would minimize potential impacts on recreation by reducing disturbance related to these activities, as described in *Nature and Types of Effects* compared to Alternative A.

Impacts from ACECs
Impacts would be the same as Alternative A.

4.12 RANGE MANAGEMENT

4.12.1 Methods and Assumptions

Indicators
Table 4-23, Comparison of Range Management Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on range management under each alternative.

Table 4-23
Comparison of Range Management Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Permitted AUMs in PH and GH	5,772	5,772	3,731	5,772
Prohibitions to the ability to construct or maintain range improvements and conduct treatments (infrastructure and vegetation)	No change	Increase	Increase	Increase
Acres closed to livestock grazing in PH and GH	0	0	0	0
Acres open to livestock grazing in PH and GH	32,900	32,900	32,900	32,900
Changes to timing, duration or frequency of permitted use	No change	Potential increase	Potential increase	Potential increase

Assumptions
The analysis includes the following assumptions:

- All new and existing leases and permits would be subject to terms and conditions determined by the BLM Authorized Officer to achieve the management and resource condition objectives for BLM-administered lands and to meet land health standards.
- Range improvements (e.g., fences, pipeline, water wells, troughs, and reservoirs) could result in a localized loss of vegetation cover throughout the improvements' useful life. Vegetation would be reestablished through reclamation practices along water pipelines

within five years to the extent possible, whereas areas with fences, water wells, troughs, and reservoirs could contain a portion of the area disturbed during their useful life and would be revegetated when abandoned.

- The construction and maintenance of range improvements would continue in the decision area as needed. New range improvements could be subject to limitations, as defined in the plan. Range improvements lead to better livestock distribution and management, which would maintain or improve rangeland health and could benefit the forage base.
- Livestock grazing is a "diffuse" form of biotic disturbance that exerts repeated pressure over many years on a system; unlike point sources of disturbance (e.g., fires), livestock grazing exerts repeated pressure across the landscape.
- Vegetation could be treated to allow the current level of AUMs to be maintained or increased in the project area or specific allotments.

4.12.2 Nature and Type of Effects

Impacts on livestock grazing are generally the result of activities that affect forage levels, areas open to grazing, the class of livestock, the season of use and timing, the ability to construct range improvements, and human disturbance or harassment of livestock in grazing allotments. Key types of impacts are detailed below.

Protecting GRSG habitat may directly affect livestock grazing if management requires limitations to areas open to grazing or available AUMs, modification of grazing strategies, or changes to season of use, which could result in increased time and cost to permittees/lessees or impact the ability of permittees/lessees to fully utilize permitted AUMs. For example, management actions to enhance habitat for GRSG could affect livestock grazing by restricting grazing intensity, retiring permitted grazing use in some areas, or changing livestock rotation patterns, in order to maintain residual herbaceous cover in sagebrush habitat (NTT 2011). Grazing allotments containing sagebrush habitat would be managed to maximize cover and forage for GRSG, not to maximize livestock forage, which could necessitate change in livestock management.

Management of vegetation resources to benefit GRSG may, however, indirectly benefit livestock grazing by increasing vegetation productivity and improving forage in the long term, especially in cases where current conditions are not meeting or exceeding land health standards. For example, in allotments with a history of intensive grazing, transitions in the composition of sagebrush communities may have occurred that have reduced cover or forage for GRSG (Cagney et al. 2010) and grazing livestock. However, when grazing management is put into place to promote health and vigor of the herbaceous community for

livestock, this would generally result in sufficient herbaceous cover to meet habitat requirements for breeding GRSG, such as those specified by Connelly et al. (2000).

Similarly, vegetation management designed to curb incursion of non-native annual grasses such as cheatgrass, encroachment of shrubs or woody vegetation, could remove forage in the short-term. However, these treatments generally enhance rangeland conditions in the longer term (NTT 2011).

Unregimented livestock grazing can have adverse impacts on riparian ecosystems (Armour et al. 1991); therefore, managing riparian habitat can directly impact livestock grazing through excluding livestock at specific sites, increasing herding, adding range improvements (such as cross fences and water gaps), and adjusting season of use and livestock numbers. Managing riparian habitat to maintain PFC would benefit grazing livestock by indirectly providing cleaner and more reliable water sources and more dependable forage availability.

Protecting water quality and watershed health could require changes in livestock management, such as deferring or shortening grazing periods, adding range improvements, excluding grazing from riparian areas, establishing riparian pastures, and increasing livestock herding. In areas requiring exclusion of grazers or other restriction on livestock management, these limitations could result in increased costs to permittees/lessees if changes resulted in AUM reduction or increased livestock management costs.

Recreation can affect livestock grazing directly through human disturbance and indirectly through rangeland degradation. Direct disturbance can include undesired animal dispersing or trespassing due to gates left open by recreational users; animal displacement, harassment, or injury from collisions or shooting; or damage to range improvements, particularly from the use of recreational vehicles or from recreational shooting. Disturbance could occur during the hunting season due to increased presence of people, vehicles, and noise and livestock shooting. In addition, OHV use results in indirect impacts, such as increased dust on forage in high use areas, leading to lower forage palatability. Limitations on recreational use in GRSG habitat could indirectly benefit livestock by reducing direct disturbances.

Other direct long-term recreation impacts include disturbance caused by increased levels of human activities. The degree of impacts would vary with the intensity of recreation (that is, large numbers of people for SRP use would likely have a higher level of disturbance, as compared to frequent use by a small number of visitors), the timing of recreation activities (livestock could be more susceptible to disturbance during the spring when young are present), and location of recreation in the allotment (a higher level of disturbance could occur near areas frequented by livestock, such as water sources or salt licks). As

stated above, limitations on recreational use in GRSG habitat could indirectly benefit livestock by reducing direct disturbances.

Limits on construction or use of transportation routes may affect livestock grazing practices. Road construction may cause loss of forage, harassment, and displacement; thus, reduction of these activities may benefit livestock by reducing disturbances. Closing roads or trails not leading to range improvements would also increase forage availability when the area is rehabilitated or when natural rehabilitation occurs. However, limitations on cross-country travel may impact permittees/lessees ability to effectively manage livestock if exemptions are not granted for access to allotments. Travel management actions for GRSG protection generally involve increased limitations or restrictions on travel management.

Wildland fire alters sagebrush habitat due to the long time required for sagebrush to regenerate, which allows for spread of cheatgrass and other invasive species (NTT 2011). Wildland fire would remove vegetation and forage over the short term. Additional impacts on livestock operations could occur when BLM guidelines require a rest period following rehabilitation before grazing is reestablished. Changes in wildland fire suppression and fuels management to protect GRSG habitat would have varying effects on livestock grazing. Measures to protect sagebrush habitat might reduce the spread of wildland fire and the associated disruption to livestock. The management of habitat for GRSG using natural disturbance regimes, such as fire and using vegetative treatments to accomplish biodiversity objectives to improve plant community resilience, could also benefit livestock grazing in the long term by maintaining a balance of seral stages. In general, selectively thinning woodland species benefits livestock grazing by creating a healthier grass, forb, and shrub community.

Restrictions on ROWs or land transfers may indirectly impact grazing by reducing construction impacts from development of these ROWs (such as dust, displacement, and introduction of noxious weeds). Lands and realty actions taken to protect GRSG habitat would involve avoiding or excluding ROWs (e.g., for power lines, pipelines, and other structures) or land transfers in PH or GH. However, the areas outside of GRSG habitat to which ROWs are relocated may see an increase in construction-related effects.

Energy and mineral development could impact grazing as follows: During the exploration and testing phase of mineral development, the footprint of disturbance is usually small and localized; therefore, minimal acres available for grazing would be directly impacted. However, during the exploration phase impacts on livestock dispersal and trespass could occur, increasing time and cost to permittees/lessees. Outside of the exploration and testing phase, surface-disturbing mineral development directly affects areas of grazing in the short term during construction of well pads, roads, pipelines, and other facilities.

Potential impacts include changes in available forage, reduced forage palatability because of dust on vegetation, limits on livestock movement, harassment, temporary displacement of livestock, and an increased potential for the introduction and proliferation of noxious weeds that lack the nutritional value needed for productive grazing practices. In the long term, a smaller amount of grazing acreage is permanently lost from mining operations following rehabilitation. Improving roads associated with mineral development could facilitate livestock management operations by maintaining or improving access to remote locations within allotments. Properly implemented BMPs and reclamation mitigation measures would likely improve rangeland health and forage levels for livestock. Reduction in mineral development in GRSG habitat could reduce potential impacts on grazing, described above.

Management for energy and mineral development on split estate lands would not impact permittees/lessees with BLM public land leases; however, impacts could occur to livestock grazing on private, state, or lands of other ownership as stated above.

Changes in livestock grazing management could impact grazing opportunities in a variety of ways. For example, implementing particular livestock grazing management requirements to benefit GRSG could affect livestock grazing by increasing operators' costs or changing required management actions. Short-term and long-term costs to permittees/lessees could increase, or AUMs could decrease for some permittees/lessees due to the following:

- Implementation of a grazing strategy
- Change in season-of-use or livestock class
- Modification to grazing systems
- Construction or modification of range improvements

These management requirements could result in economic impacts on individuals and the community at large, both direct and indirect. For example, if a ranch is dependent seasonally on federal forage, a reduction or eliminations of federal AUMS may create forage imbalances that produce a greater reduction in grazing capacity than just the loss of federal AUMs (Torell et al. 2002).

Some management changes may require a short-term output of cost for permittees/lessees, but would result in long-term benefits. For example, construction of range improvements to improve livestock distribution and allow use of a larger portion of the rangeland would generally enhance rangeland health in the long term; however, it could impact the livestock permittees/lessees economically in the short term. Constructing off-site water sources and fencing riparian and spring sources could keep livestock away from sensitive riparian areas and provide a cleaner more reliable source of water for livestock but would similarly represent an increased cost for permittees/lessees.

Retirement of privileges would likely result in a reduction in conflicts between grazing and other land uses and may improve range health and forage conditions for remaining permitted use in the area.

ACECs may be designated to protect sensitive habitat for the benefit of GRSG. Grazing availability would depend on the designated ACEC management objectives. Restrictions could include reduction in grazing in the ACEC, limitations on the class of livestock animal, or the season, duration, or location that livestock are allowed to graze.

4.12.3 Impacts Common to All Alternatives

Impacts from Travel and Transportation Management

Under all alternatives, motorized vehicles would be designated as limited to existing roads and trails, thereby limiting the impacts on livestock grazing from dispersed travel as discussed under *Nature and Type of Effects*. Access to authorized BLM uses, such as grazing allotments, would not be impacted in any alternatives. Site-specific travel management planning could, when completed, reduce the potential for conflicts between range management and travel management.

Impacts from Solid Minerals

Due to the lack of current coal leasing in the project area and lack of coal development potential in the planning area, there is low potential for management of coal resources to have impacts on range management in any alternatives. In addition, there is no locatable mineral potential, nor any interest in developing locatable minerals within GRSG habitat. As a result, withdrawing an area or leaving an area open to locatable minerals is not expected to impact range management.

4.12.4 Alternative A

Impacts from Travel and Transportation Management

Under Alternative A, as under all alternatives, motorized travel would be limited to designated routes, and site-specific travel management planning would be developed, limiting disturbance to livestock. Effects would be the same as those described above in *Nature and Type of Effects*.

Impacts from Recreation

Under this alternative, there would be no restrictions to SRPs in the decision area; therefore, livestock could be disturbed by recreational activities or groups in the planning area. However, due to the current lack of SRPs and limited interest in future SRPs in the planning area, impacts would likely be minimal. Human disturbance and rangeland degradation from general recreational activities would be as described under *Nature and Type of Effects*.

Impacts from Lands and Realty

Under Alternative A, no new ROW exclusion or avoidance areas would be present in the decision area. Disturbance of livestock could result from development of ROWs; therefore, this alternative would have the highest potential for impacts from lands and realty on range management, and impacts would be as described under *Nature and Type of Effects*, including dust, displacement, and noxious weeds.

Impacts from Range Management

Under Alternative A, livestock grazing would be allowed on all BLM-administered lands identified as authorized (approximately 32,945 acres in the planning area, including 32,900 acres in PH) for a total 28 allotments with 5,780 AUMs in the planning area, including 27 allotments with 5,772 AUMs in GRSG habitat (see **Table 4-23**). All permits/leases under Alternative A would be required to meet or make progress towards meeting standards defined in the North and South Dakota Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997). Lands would be maintained and restored to maintain healthy native plant and animal species, and efforts to manage public rangeland under drought conditions would be directed first to allotments with resource concerns, therefore impacts on grazing management options or permitted AUMs would most likely change in these areas (approximately 1,309 acres) found to be not meeting land health standards as a result of livestock grazing at last assessment).

Similarly, the focus in riparian areas and wetlands would be to improve functioning-at-risk and non-functioning riparian areas and wetlands towards PFC. As described under *Nature and Type of Effects*, managing riparian habitat can directly impact livestock grazing through excluding livestock at specific sites, increasing herding, adding range improvements (such as cross fences and water gaps), and adjusting season of use and livestock numbers. Such changes in grazing management options may result in an increase in costs and time required for permittees/lessees in these areas.

Range improvements, including fences and vegetation treatments as well as water developments, would be allowed in the decision area when needed to support grazing systems or improve livestock distribution, allowing for options for management for permittees/lessees. Fences would be constructed to protect and benefit livestock and wildlife, but no specific provision are included for GRSG so additional costs could be limited.

Impacts from Fluid Minerals

Under Alternative A, no lands in the planning area would be closed to leasing. The largest number of BLM-administered lands would be open to fluid mineral leasing with standard terms and conditions; approximately 30,450 acres would also be open to livestock grazing; therefore, conflicts between grazing and mineral development would be more likely to occur in this area.

Table 4-24, Fluid Mineral Impacts on Range Management by Alternative (PH and GH), provides information on areas open to grazing and mineral development and areas open with stipulations by alternative.

Table 4-24
Fluid Mineral Impacts on Range Management by Alternative (PH and GH)

Management Action	Alternative A	Alternative B	Alternative C	Alternative D
Acres open to grazing and open to fluid mineral development (BLM surface and federal minerals)	30,450	80	0	30,450
Acres open to grazing and closed to fluid mineral development (BLM surface and federal minerals)	0	30,370	30,450	0
Acres open to grazing with NSO/CSU/TL restrictions for fluid mineral development (BLM surface and federal minerals)	27,267	0	0	30,370

Protection for GRSG would be provided from CSU, TL, and NSO stipulations. Restrictions would also be applied through site-specific conditions on approval for leases. While some decrease in disturbance to range management could occur as a result of surface use restrictions, there is the potential for disturbance in the majority of the decision area as discussed under *Nature and Type of Effects*. Of the area open for mineral development, approximately 27,267 acres open to grazing would be available for leasing with stipulations under Alternative A (see **Table 4-24**).

Overall, oil and gas management would have limited impacts on range management under Alternative A because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on disturbance to livestock or impact range management activities.

Impacts from Solid Minerals

Under Alternative A, no portions of the decision area would be withdrawn from mineral entry, salable-non energy mineral application or closed to mineral material development. As a result there is potential for impacts on range management from mineral development as described under *Nature and Type of Effects.*

Impacts from Mineral Split Estate

Across all alternatives, federal permittees would not be impacted by split estate lands; however, there is the potential for impacts on range management on other lands. Under Alternative A, standard regulations are in place for mineral

development on non-federal surface lands, including permitting and reclamation requirements.

Impacts from Fire and Fuels Management

Under Alternative A, fire could be utilized as a resource for vegetation manipulation for range management as needed, allowing for options for management for permittees/lessees. Impacts would vary based on site-specific management actions, but fire could be utilized to maintain optimal forage for livestock in the long term.

Impacts from Habitat Restoration and Vegetation Management

Under Alternative A, no specific direction for GRSG is provided in the RMP for restoration and management actions. Vegetation could be managed to improve forage and impacts on range management from vegetation would be minimal.

Impacts from ACECs

No new ACECs would be designated under Alternative A; therefore, there would be no impacts on range management.

4.12.5 Alternative B

Impacts from Travel and Transportation Management

In PH and GH, motorized travel would be limited to existing roads as described under Alternative A. Travel plans to be completed would analyze PH for the need for road closures, and limitations would be implemented during development of new roads. Some reduction in routes and limitations on new routes as well as upgrades to existing routes would be added compared to Alternative A, which could result in indirect reduction in disturbance to livestock in PH.

Impacts from Recreation

SRPs in PH would be limited when they were found to have negative impacts on GRSG; potentially limiting disturbance to grazing from recreational use. Due to the current lack of SRPs and limited interest in future SRPs in the planning area, impacts would likely be minimal.

Impacts from Lands and Realty

Under Alternative B, management of PH as an exclusion area for new ROWs authorizations could slightly reduce the potential for disturbance of livestock in this area, which covers the majority of the allotments in the planning area (and 26 out of 27 allotments in GRSG habitat).

Impacts from Range Management

Under Alternative B, as in all alternatives, approximately 32,945 acres in the planning area (including 32,900 acres in PH) would be open to grazing. A total of 28 allotments with 5,780 AUMs would be authorized (including 27 allotments with 5,772 AUMs in PH or GH), the same as Alternative A (see **Table 4-23**).

Under Alternative B, all GRSG habitat objectives and management would be incorporated into AMP and permit renewals; therefore, impacts would occur at a site-specific level during the permit renewal process. Completion of land health assessments and permits would be prioritized within PH, particularly those with the best opportunity to conserve, enhance or restore habitat for GRSG. As a result, impacts on range management would be most likely to occur in these areas.

Under Alternative B, management actions (grazing decisions, AMP/Conservation Plan development, or other agreements) to modify grazing management would be made to meet seasonal GRSG habitat requirements (Connelly et al. 2011a). As described under *Nature and Type of Effects*, this could require changes to management of a given allotment such as in class of livestock permitted, changes to livestock rotation or season of grazing permitted. Such changes would have the potential to decrease management options and, therefore, result in increased time and costs required for permittees/lessees.

Work would be done with area ranchers so that operations within GRSG habitat could be planned as single units; therefore, the time and cost required to implement these changes could be reduced, although they would still be higher than under current conditions where no change would be required.

In addition, retirement of permitted grazing use from willing permittees would be an option in PH. As described under *Nature and Type of Effects*, conflicts with other land uses would be reduced and land health and forage could be improved.

Vegetation treatments that benefit livestock forage could only be completed if these treatments would also conserve, enhance or improve GRSG habitat; therefore, the management options in PH could be reduced when treatments would not benefit GRSG, and the ability to fully utilize permitted AUMs could be impacted in such cases. Land health assessment utilizing ESDs would be required to determine if standards of rangeland health as well as GRSG habitat objectives were being met. In many cases, treatments may improve both rangeland health and GRSG habitat; therefore, impacts on rangeland management would be minimized.

Under Alternative B, riparian areas and wet meadows would be managed for PFC within PH, with potential limitations on grazing within these areas or increased use of fencing/herding to manage distribution of livestock so that pressure on these systems is limited this could result in increased costs or time by permittees.

Specific objectives to conserve, enhance, or restore PH based on ESDs would be developed and land health assessment to measure progress towards these objectives would be conducted. If it was found that allotments were not meeting

standards, changes to grazing systems or AUM levels could be required and may result in increased costs or time for permittees.

Under Alternative B, structural range improvements such as fences and exclosures would be allowed in PH, but must be developed to conserve or enhance GRSG habitat. In addition, fences would require flagging to lessen risk for GRSG impacts. The cost of building or maintaining these structures may be increased as compared with Alternative A. Similarly, new water developments from diversion from spring or seep sources would only be permitted when GRSG habitat would also benefit. The ability to construct these developments would be strictly limited.

Impacts from Fluid Minerals

Under Alternative B, PH would be closed to fluid mineral leasing, with no new nominations accepted upon termination of existing leases. BLM-administered lands open to fluid mineral leasing with standard terms and conditions would cover 80 acres, more than 99 percent less than Alternative A (see **Table 4-24**). For existing leases, conservation measures would prohibit surface occupancy on federal leases within PH during certain time periods in order to preserve GRSG habitat. As a result, disturbance and impacts on range management would be reduced.

In addition, similar to Alternative A, the limited reasonably foreseeable development of oil and gas would result in minimal impacts on range management from fluid mineral development.

Impacts from Solid Minerals

Under Alternative B, additional restriction would be put in place on mineral development as compared to Alternative A. PH would be closed to mineral material development, non-energy leasable mineral leasing and recommended for withdrawal from mineral leasing. As a result, disturbance from mineral development and impacts on range management would decrease as all but one allotment in the GRSG habitat in the planning area is located within PH. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on range management but it would preclude any potential future development.

Impacts from Mineral Split Estate

As described under Alternative A, there would be no impact on BLM permittees from mineral development of these lands. Impacts on private range management would likely decrease in PH due to the application of the same conservation measures as applied on BLM-administered lands.

Impacts from Fire and Fuels Management

Under Alternative B, fuel treatments would be designed and implemented in PH to protect existing GRSG ecosystems, including the potential for livestock utilization to strategically reduce fine fuels. As a result, there is the potential for

the need for grazing system modification to meet GRSG objectives, with increased costs or time for permittees. Suppression of wildland fires could reduce disruption of grazing in the short term but may not provide optimal livestock forage conditions in the long term.

Impacts from Habitat Restoration and Vegetation Management
Under Alternative B, restoration projects would be designed and prioritized to benefit GRSG. In PH, implementation of projects to remove non-native species and improve habitat could improve livestock forage but may also result in the need to adjust grazing management with potential for increased costs or time for permittees.

Impacts from ACECs
Impacts would be the same as under Alternative A.

4.12.6 Alternative C

Impacts from Travel and Transportation Management
Under Alternative C, additional restriction on road construction would be implemented, new road construction within four miles of active GRSG leks would be prohibited, and new road construction in PH and GH would be avoided. As a result, new disturbance in allotments within PH and GH would be limited. Furthermore, due to the reduction of grazing in PH, impacts from travel management would be limited.

Impacts from Recreation
Impacts from recreation on grazing would be limited due to reduction of grazing in PH under Alternative C.

Impacts from Lands and Realty
Under Alternative C, impacts would be similar as described for Alternative B but would be applied across PH and GH. Due to the restrictions on ROW development and the reduction of grazing in PH under Alternative C, disruption of grazing from lands and realty actions would be limited.

Impacts from Range Management
Under Alternative C, as in all alternatives, approximately 32,945 acres in the planning area (including 32,900 acres in PH) would be available for livestock grazing. However, permitted AUMs in the Big Gumbo area would be reduced by 50 percent (3,739 total AUMS, including 3,731 AUMs on four allotments in PH or GH, a total reduction of 36 percent of AUMs in the planning area).

The reduction in AUMs in PH would result in a potential for economic impacts on permittees/lessees both in the short and long term. As discussed under *Nature and Type of Effects*, permittees/lessees would be faced with reducing AUMs for their operations or locating replacement forage, often at higher costs than that currently obtained from BLM-administered lands, with potential

impacts on individual leases/permits as well as the local community. Reduction in permitted AUMs would also impact ability of permittees/lessees to utilize seasonal rotations or other management strategies that utilize both public and private lands. Permittees/lessees who currently rotate pastures between private and public lands may need to construct additional water developments or other structural range improvements on private pastures, resulting in increased time and costs.

In the long term, there is potential for indirect impacts in the Big Gumbo area as a result of changes to vegetation communities due to the reduction in grazing. Should the vegetation class represent non-optimal conditions for livestock, adjustments to management could be required.

As a result of reduction in grazing, there is also the potential for increased conflicts between grazing and other resources and resource uses on lands of other surface ownership should livestock grazing increase in this area.

Management actions for range management, including those for incorporation of GRSG standards and objectives, land health assessments, and changes to grazing systems to meet GRSG objectives, would be similar to those described for Alternative B, but would be applied to GH as well as PH in many instances. The practical application of this difference on range management, however, would be limited due to the presence of the majority of the area open to grazing and active allotments in PH (32,820 out of 32,900 acres in PH or 99.8 percent).

Similarly, management of riparian areas and wet meadows would be as described for Alternative B, but apply to all PH and GH acreages instead of just at riparian and wetland meadow sites. Alternative C also includes a provision that at least six inches of stubble height must remain on all riparian/meadow area herbaceous species at all times. As a result, further restrictions could be placed on permittees, impacting their ability to distribute livestock and fully utilize allotted AUMs.

The ability to conduct vegetation treatments for the purpose of enhancing livestock forage as well as structural range improvements would be the most limited under this alternative for both PH and GH. As a result, the ability of permittees to effectively distribute livestock could be impacted, resulting in increases in cost or time for management.

Impacts from Fluid Minerals

Under Alternative C, both PH and GH would be closed to fluid mineral leasing. Restrictions as discussed under Alternative B would be applied but would be extended to GH as well as PH. There would be no overlap of areas open to grazing and also open to fluid mineral development under this alternative (see **Table 4-24**). As a result, impacts from fluid minerals on range management would be the lowest under this alternative.

In addition, similar to Alternative A, the limited reasonably foreseeable development of oil and gas would result in minimal impacts on range management from fluid mineral development.

Impacts from Solid Minerals

Under Alternative C, restriction on mineral development would be the broadest of all alternatives, with limitations on leasing and development as described in Alternative B, but expanded to GH as well as PH. Impacts from solid minerals on range management would be minimal under this alternative due to the limitations on nonenergy leasables and mineral materials, and the reduction of livestock grazing from in PH.

Impacts from Mineral Split Estate

As in Alternative A, there is no impact of split estate mineral development on BLM permittees. It is likely that mineral development on split estate PH and GH under this alternative would result in the least disturbance to private range management due to the application of conservation measures to these areas.

Impacts from Fire and Fuels Management

Under Alternative C, management actions would be similar to that described for Alternative B, but applied to PH and GH and with additional restrictions on the use of fuels as vegetation treatment. Impacts on range management, however, would be reduced under this alternative, compared to Alternative A, due to the reduction in grazing in Alternative C.

Impacts from Habitat Restoration and Vegetation Management

Under Alternative C, impacts from habitat and vegetation management would be similar to that described under Alternative B, but applied to both PH and GH. Due to the reduction in grazing in this alternative, however, impacts would be reduced in scale.

Impacts from ACECs

Under Alternative C, the 32,900 acres of PH on BLM-administered lands would be designated as an ACEC to protect GRSG. Potential impacts in this area would be as described under *Nature and Type of Effects*; however, due to the reduction of grazing in PH, impacts would be limited.

4.12.7 Alternative D

Impacts from Travel and Transportation Management

Under Alternative D, impacts would be similar to those described under Alternative B but would apply both to PH and GH. As a result, disturbance from travel management on livestock grazing would be limited.

Impacts from Recreation

Impacts from recreation would be the same as Alternative B.

Impacts from Lands and Realty

Under Alternative D, PH would be managed as a ROW avoidance area and additionally, as an exclusion area for new wind energy ROW authorizations. ROWs would be allowed in GH with measures to minimize surface disturbing and disruptive activities. Impacts on livestock grazing from ROW development would therefore be decreased as compared to Alternative A.

Impacts from Range Management

In Alternative D, as in all alternatives 32,945 acres (including 32,900 acres in PH) would be open to grazing. A total of 28 allotments with 5,780 AUMs would be authorized (including 27 allotments with 5,772 AUMs in PH or GH), the same as Alternative A (see **Table 4-23**).

GRSG habitat objectives and management considerations would be incorporated into BLM grazing allotments through AMPs or permit renewals, although under Alternative D, standards would be developed with the state and local objectives would be developed at the field office level in partnership with NDGFD and USFWS. As a result, impacts on grazing systems could occur upon lease renewal as discussed in Alternative B, but coordination with the NDGFD and the USFWS should decrease conflicts in standards and provide a location appropriate framework, assisting permittees ability to adopt these standards and reducing impacts.

Land health assessments would be required as discussed under Alternative B, with additional requirements to prioritize assessments for other priority species and riparian habitat in addition to GRSG with potential for broader impacts in the near-term in the planning area as more allotments would be prioritized for assessment.

Riparian and wetland habitat would be managed to more towards or maintain PFC and strive towards GRSG habitat objectives; however, under Alterative D, objectives would be set with reference to the state vegetation relative to the ESD. Therefore, ability of permittees to meet these standards may be improved and the need to adjust management reduced.

Rangeland improvements under Alternative D would be permitted with limitations, with impacts as described in Alternative B. Overall, impacts would vary on a site-specific basis.

Impacts from Fluid Minerals

Under Alternative D, areas open and closed to leasing would be the same as described under Alternative A (see **Table 4-24**). However, prohibitions of surface occupancy and use within PH and CSU stipulations for GH would limit the impacts on range management as compared to Alternative A.

In addition, similar to Alternative A, the limited reasonably foreseeable development of oil and gas would result in minimal impacts on range management from fluid mineral development.

Impacts from Solid Minerals

Under Alternative D, impacts from solid mineral development would be similar to those described under Alternative A; however, PH would be closed to mineral material development, with reduction in surface disturbance and road use and related impacts on livestock. Some additional site-specific restrictions could occur in the form of RDFs. Impacts on livestock grazing from mineral development would therefore be reduced as compared with Alternative A. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on range management but it would preclude any potential future development.

Impacts from Mineral Split Estate

Under Alternative D, as described in Alternative A, there would be no impact on BLM-permittees. Conservation measures would be applied when federal action (mineral exploration or development) occurs, resulting in some potential reduction in disturbance for livestock on non-federal lands.

Impacts from Fire and Fuels Management

Under Alternative D, impacts would be similar to those described under Alternative B.

Impacts from Habitat Restoration and Vegetation Management

Under Alternative D, projects to reduce conifer encroachment would also benefit range management by improving forage conditions in the long term. As described under Alternative B, changes to livestock grazing systems could be required for post restoration management with potential impacts on costs or time for management by permittees.

Impacts from ACECs

Impacts would be the same as under Alternative A.

4.13 AREAS OF CRITICAL ENVIRONMENTAL CONCERN

4.13.1 Methods and Assumptions

Direct impacts on ACECs are considered to be those that either impair or enhance the relevant and important values for which the ACEC was proposed for designation. In this case, there are no existing ACECs, and the proposed GRSG ACEC would be designated to protect relevant and important values associated with PH. As such, this analysis focuses on the impacts on relevant and important PH from either the special management derived from ACEC designation or, under alternatives where the ACEC is not proposed for designation, the management actions and allocations for other resources and

resource uses. All impacts discussed are direct impacts, though some may not occur immediately after implementation of management actions.

Indicators

Table 4-25, Comparison of ACEC Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on ACECs under each alternative.

Table 4-25
Comparison of ACEC Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Total acreage within an ACEC boundary	0	0	32,900	0
Specific management provisions designed to protect the relevant and important values for which the ACEC was designated	No change	No change	50% reduction in grazing	No change

Assumptions

The analysis includes the following assumptions:

- Permitted activities would not be allowed to impair the relevant and important values for which the ACEC is designated. The exception is locatable minerals; until withdrawn from mineral entry, a mining claim can be filed, and subsequent mining activities could have an impact. However, measures would have to be identified in a mine plan to mitigate unnecessary and undue degradation.

4.13.2 Nature and Type of Effects

Special status species management objectives would prevent degradation of, and could improve, relevant and important values where an ACEC is designated to protect such values. BLM management could protect the relevant and important values in the GRSG ACEC independent of an ACEC designation. Refer to **Section 4.2** for a discussion of impacts on GRSG habitat.

Implementing management for the following resources would have negligible or no impact on ACECs and are therefore not discussed in detail: recreation, lands and realty, range management, fluid minerals, solid minerals, mineral split estate, fire and fuels management, and habitat restoration/vegetation management.

4.13.3 Impacts Common to All Alternatives

Alternative C is the only alternative under which the BLM proposes an ACEC. Therefore, there are no impacts on ACECs that would be common to all alternatives.

Table 4-26, ACECs by Alternative, provides a comparison of ACEC acreages by alternative.

Table 4-26
ACECs by Alternative

ACEC Name	Alternative A	Alternative B	Alternative C	Alternative D
GRSG Conservation Area (acres)	0	0	32,900	0

4.13.4 Alternative A

Impacts from ACECs

There would be no impact on ACECs under Alternative A. The BLM would continue to manage BLM-administered lands in accordance with existing management policies. Refer to **Section 4.2** for a discussion of impacts on habitat.

4.13.5 Alternative B

Impacts from ACECs

There would be no impact on ACECs under Alternative B. The BLM would implement new management strategies for the protection of PH, but without establishing an ACEC. Refer to **Section 4.2** for a discussion of impacts on GRSG habitat.

4.13.6 Alternative C

Impacts from ACECs

The designation and management of a new ACEC under Alternative C (**Table 4-25**) could be used as a way to protect GRSG habitat. Management prescriptions to protect habitat areas would be similar to Alternatives B and D, but would include a 32,900-acre (includes all PH) ACEC administrative boundary designation, a restriction on new road construction within four miles of a lek, and a 50-percent reduction in grazing on the largest piece of BLM-administered lands in the ACEC (four allotments). Refer to **Section 4.2** for a discussion of impacts on GRSG habitat. In addition, ACEC designation can heighten awareness of the resource and help prioritize BLM management. Acquisition of lands within a designated ACEC could help protect relevant and important values by bringing additional acres under BLM control and managing those acres according to special protection of GRSG habitats.

4.13.7 Alternative D

Impacts would be the same as those described for Alternative A.

4.14 AIR RESOURCES

4.14.1 Methods and Assumptions

Indicators

Table 4-27, Comparison of Air Resource Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on air resources under each alternative.

Table 4-27
Comparison of Air Resource Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Acres closed to fluid minerals	0	61,197 (7,056 in high potential areas)	66,293 (7,072 in high potential areas)	0
Acres closed to new road construction	0	0	32,342	0

Assumptions

The analysis includes the following assumptions:

- Air resource impacts can be localized or regional.
- Weather-related events and wildfires may cause or contribute to local or regional air resource impacts.

4.14.2 Nature and Type of Effects

Actions that reduce emissions of air pollutants improve air resources. Actions that initiate or increase emissions of air pollutants can degrade air resources, including increased concentrations of air pollutants, decreased visibility, increased atmospheric nitrogen and sulfur deposition on soils and vegetation, and acidification of sensitive water bodies. Emissions of hazardous air pollutants could potentially result in localized increased risk of impacts on human health. Criteria and hazardous air pollutants can negatively impact human health in a variety of ways. Exposure to air pollution most often affects the respiratory system, and is often also associated with pulmonary, cardiac, vascular, and neurological impairments (EPA 2013). Children and other high-risk groups, such as the elderly, pregnant women, and individuals with chronic heart and lung diseases, are especially susceptible to impacts from air pollution (EPA 2013).

Actions that increase emissions of air pollutants can result in negative effects on AQRVs, including visibility and atmospheric deposition. An increase in SO_2, NO_x, PM_{10}, and $PM_{2.5}$ emissions can result in decreased visibility, increased atmospheric nitrogen and sulfur deposition on soils and vegetation, and

acidification of sensitive water bodies. Fugitive dust could potentially result in increases in ambient concentrations of PM_{10} and $PM_{2.5}$ resulting in localized impacts on vegetation and increases in atmospheric deposition. Particulate matter also contributes to haze and limits visibility (EPA 2012e). Ozone, which is formed by a chemical reaction between volatile organic compounds and NO_x, contributes to smog, which limits visibility (EPA 2012f).

Particulate matter emissions (fugitive dust) are caused by agriculture, earth-moving activities, wind erosion, and vehicular traffic on unpaved roads and surfaces associated with development and operation.

Implementing management for the following resources would have negligible or no impact on air resources and are therefore not discussed in detail: recreation, lands and realty, range management, solid minerals, mineral split estate, habitat restoration/vegetation management, and ACECs.

4.14.3 Impacts Common to All Alternatives

There are no impacts that are common to all alternatives.

4.14.4 Alternative A

Air resource impacts under Alternative A are identical to impacts associated with current management as described above in *Nature and Type of Effects*. No changes to criteria air pollutant or hazardous air pollutant emissions would occur.

4.14.5 Alternative B

Impacts from Travel and Transportation Management

Under Alternative B, BLM management prescriptions to protect GRSG habitat would result in the potential for more access limitations when compared to Alternative A. The BLM would develop a travel and transportation management plan within five years of the RMP ROD, should the BLM determine there is a need to close certain routes. Also under Alternative B, the BLM would only allow new roads where access to valid existing rights is necessary and does not currently exist, restricting new roads and/or ROWs and access through PH.

Construction of new roads has short-term effects associated with construction of the roads, including fugitive dust emissions from surface disturbance and exhaust emissions associated with road construction equipment, worker vehicles, and material deliveries, and long-term effects associated with road use and maintenance. Limiting new road construction and closing roads would reduce the potential for short and long-term effects on air resources.

Impacts from Fluid Minerals

Under Alternative B, 61,197 acres would be closed to fluid mineral development, including 7,056 acres of high oil and gas potential. Under Alternative B, it is projected that 26 new exploratory and development wells

would be drilled on federal oil and gas estate over 20 years. Of these new wells, 21 are expected to be producing oil and gas wells through 2029 (see **Table 4-1**). This represents a 57 percent decrease in projected producing wells on federal oil and gas estate compared with Alternative A (BLM 2013).

Oil and gas development results in short-term and long-term emissions of criteria and hazardous air pollutants from vehicle use, drill rigs, construction equipment use, flaring or venting of natural gas, and disturbance of soils (EPA 2012g). Closing areas of high potential development would have the potential to result in fewer impacts on air resources, as compared to Alternative A, due to decreased emissions associated with exploration and development of fluid minerals.

Impacts from Fire and Fuels Management

Fires, particularly uncontrolled fires, can significantly affect air quality by introducing large amounts of particulate, carbon monoxide, atmospheric mercury, ozone precursors, and volatile organic compounds into the air, affecting both visibility and human health (BC Air Quality 2013). Under Alternative B, fuels treatment would be focused on protecting existing sagebrush in PH, and efforts would be made to ensure sagebrush canopy cover was not reduced to less than 15 percent. This management action restricts the amount of vegetation that can be burned in a prescribed burn, or that can be allowed to burn in an unplanned natural ignition. This would result in less likelihood of human-caused fires occurring compared with Alternative A. This would result in fewer fire-related impacts on air resources.

Habitat reconstruction or vegetation treatments used in fire and fuels management would cause negligible increases in exhaust and fugitive dust, while prescribed burning would cause increased emissions and temporarily degrade air resources.

4.14.6 Alternative C

Impacts from Travel and Transportation Management

Under Alternative C, the BLM would close 32,342 acres of the planning area to new road construction compared with Alternative A. Prohibiting new road construction would likely result in fewer impacts on air resources, due to decreased emissions associated with road construction and use.

Impacts from Fluid Minerals

Under Alternative C, 66,293 acres would be closed to fluid mineral development, including 7,072 acres of high oil and gas potential. Under Alternative C, it is projected that 25 new exploratory and development wells would be drilled on federal oil and gas estate over 20 years. Of these new wells, 21 are expected to be producing oil and gas wells through 2029 (see **Table 4-1**). This represents a 57 percent decrease in projected producing wells on federal oil and gas estate compared with Alternative A (BLM 2013).

As described under Alternative B, closing areas of high potential development would likely result in fewer impacts on air resources due to decreased emissions associated with exploration and development of fluid minerals.

Impacts from Fire and Fuels Management

Impacts from fire and fuels management would be the same as described for Alternative B.

4.14.7 Alternative D

Impacts from Travel and Transportation Management

Under Alternative D, BLM management prescriptions to protect GRSG habitat would result in the potential for more impacts on travel and transportation management compared to Alternative A and would be similar to those described under Alternative B. Prohibiting new road construction would likely result in fewer impacts on air resources, due to decreased emissions associated with road construction and use.

Impacts from Fluid Minerals

Similar to Alternative A, under Alternative D, the BLM would not close any acres to fluid mineral leasing. Under Alternative D, it is projected that 51 new exploratory and development wells would be drilled on federal oil and gas estate in the short term. Of these new wells, 42 are expected to be producing oil and gas wells in the long term (see **Table 4-1**). This represents a 14 percent decrease in projected producing wells on federal oil and gas estate compared with Alternative A (BLM 2013). Impacts on air resources would be similar to those discussed under Alternative A.

Impacts from Fire and Fuels Management

Under Alternative D, fuels treatment would be focused on protecting existing sagebrush in PH, and efforts would be made to ensure sagebrush canopy cover was not reduced to less than eight percent. Similar to Alternative B, management actions would result in less likelihood of human-caused fires occurring. Overall, fires may be less likely to occur compared with Alternative A, which would result in fewer fire-related impacts on air resources.

4.15 CLIMATE

4.15.1 Methods and Assumptions

Indicators

Table 4-28, Comparison of Climate Change Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects related to climate change under each alternative.

Table 4-28
Comparison of Climate Change Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Acres closed to fluid minerals	0	61,197 (7,056 in high potential areas)	66,293 (7,072 in high potential areas)	0
Acres closed to new road construction	0	0	32,342	0
Climate change projections for the planning area	No change	Less likely to contribute to GHG emissions	Less likely to contribute to GHG emissions	Less likely to contribute to GHG emissions

Assumptions

The analysis includes the following assumptions:

- There is a correlation between global concentrations of GHGs and climate change.

4.15.2 Nature and Type of Effects

Management actions that could affect climate change would include actions that increase GHG emissions, actions that reduce GHG emissions, actions that create carbon sinks, and actions that eliminate or damage carbon sinks.

While GHG emissions or GHG sequestration may result from many of the proposed management actions, these changes would be quite small relative to state, national, or global GHG emissions. Relative to state and national GHG emissions, emission changes due to management actions associated with this RMPA would be negligible.

Implementing management for the following resources would have negligible or no impact on climate and are therefore not discussed in detail: recreation, lands and realty, range management, solid minerals, mineral split estate, habitat restoration/vegetation management, and ACECs.

4.15.3 Impacts Common to All Alternatives

There are no impacts that are common to all alternatives.

4.15.4 Alternative A

Climate impacts under Alternative A are identical to impacts resulting from current management as described above in *Nature and Type of Effects*. No changes to GHG emissions would occur.

4.15.5 Alternative B

Impacts from Travel and Transportation Management

Under Alternative B, BLM management prescriptions to protect GRSG habitat would result in the potential for more access limitations when compared to Alternative A. The BLM would develop a travel and transportation management plan within five years of the RMP ROD, should the BLM determine there is a need to close certain routes. Also under Alternative B, the BLM would only allow new roads where access to valid existing rights is necessary and does not currently exist, restricting new roads and/or ROWs and access through PH.

Road construction and use emits GHGs through the combustion of fuel in vehicles and construction equipment. Prohibiting new road construction and closing roads would have the potential to reduce GHG emissions associated with road construction and use.

Impacts from Fluid Minerals

Under Alternative B, 61,197 acres would be closed to fluid mineral development, including 7,056 acres of high oil and gas potential. Under Alternative B, it is projected that 26 new exploratory and development wells would be drilled on federal oil and gas estate over 20 years. Of these new wells, 21 are expected to be producing oil and gas wells through 2029 (see **Table 4-1**). This represents a 57 percent decrease in projected producing wells on federal oil and gas estate compared with Alternative A (BLM 2013).

Oil and gas development results in short-term and long-term emissions of GHGs during fuel combustion in vehicles, drill rigs, and construction equipment, as well as GHG leaks from equipment (EPA 2012g). Oil and gas activities also remove vegetation and releases sequestered carbon. Closing areas of high potential to development would have the potential to result in fewer releases of GHGs in the planning area as compared to Alternative A.

Impacts from Fire and Fuels Management

Fires, particularly uncontrolled fires, can emit large quantities of GHGs into the atmosphere, including carbon dioxide, methane, and nitrous oxide (EPA 2012h, page 7-21 to 7-22). Fires also remove vegetation that acts as a carbon sink. Under Alternative B, fuels treatment would be focused on protecting existing sagebrush in PH, and efforts would be made to ensure sagebrush canopy cover was not reduced to less than 15 percent. This management action restricts the amount of vegetation that can be burned in a prescribed burn or that can be allowed to burn in an unplanned natural ignition. Human-caused fires would be less likely to occur compared with Alternative A, which would result in lower GHG emissions and smaller contributions to climate change than under Alternative A.

4.15.6 Alternative C

Impacts from Travel and Transportation Management
Under Alternative C, the BLM would close 32,342 acres of the planning area to new road construction compared with Alternative A. Prohibiting new road construction would have the potential to reduce GHG emissions associated with road construction and use.

Impacts from Fluid Minerals
Under Alternative C, 66,293 acres would be closed to fluid mineral development, including 7,072 acres of high oil and gas potential. Under Alternative C, it is projected that 25 new exploratory and development wells would be drilled on federal oil and gas estate over 20 years. Of these new wells, 21 are expected to be producing oil and gas wells through 2029 (see **Table 4-1**). This represents a 57 percent decrease in projected producing wells on federal oil and gas estate compared with Alternative A (BLM 2013).

As described under Alternative B, closing areas of high potential to development would have the potential to reduce GHG emissions and lessen climate change impacts.

Impacts from Fire and Fuels Management
Impacts from fire and fuels management would be the same as described under Alternative B.

4.15.7 Alternative D

Impacts from Travel and Transportation Management
Under Alternative D, BLM management prescriptions to protect GRSG habitat would result in the potential for more impacts on travel and transportation management compared to Alternative A and would be similar to those described under Alternative B. Prohibiting new road construction would likely have the potential to reduce GHG emissions associated with road construction and use.

Impacts from Fluid Minerals
Similar to Alternative A, under Alternative D, the BLM would not close any acres to fluid mineral leasing, though a slight decrease in the number of wells is projected. Under Alternative D, it is projected that 51 new exploratory and development wells would be drilled on federal oil and gas estate in the short term. Of these new wells, 42 are expected to be producing oil and gas wells in the long term (see **Table 4-1**). This represents a 14 percent decrease in projected producing wells on federal oil and gas estate compared with Alternative A (BLM 2013). Climate change impacts would be similar to those discussed under Alternative A.

Impacts from Fire and Fuels Management

Under Alternative D, fuels treatment would be focused on protecting existing sagebrush in PH, and efforts would be made to ensure sagebrush canopy cover was not reduced to less than eight percent. Fires may be less likely to occur compared with Alternative A, which would result in fewer fire-related GHG emissions and reduce climate change impacts.

4.16 SOIL RESOURCES

4.16.1 Methods and Assumptions

Indicators

Table 4-29, Comparison of Soils Resources Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on soils resources under each alternative. Conservation measures for GRSG would have only beneficial impacts on soils; therefore, indicators are worded in a way that measures to what degree soils would receive protections.

Table 4-29
Comparison of Soils Resources Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Livestock grazing AUMs	5,780	5,780	3,739	5,780
Acres in ROW exclusion	0	32,900	32,980	32,900[1]
Acres closed to fluid mineral leasing	0	61,197	66,293	0
Acres found unsuitable for surface coal mining	0	87,443	166,207	87,443

[1] PH would be exclusion areas for new ROW wind energy developments.

Assumptions

The analysis includes the following assumptions:

- Soils of the BLM-administered lands will be managed to maintain productivity and promote sustained yields while keeping erosion at minimal/acceptable levels and preventing physical or chemical degradation.
- Proposed surface-disturbing projects will be analyzed to determine suitability of soils to support or sustain such projects and designed to minimize soil loss.
- Management actions and objectives will be consistent with soil resource capabilities.

- Fuels projects, as well as planned and un-planned fire that contribute towards establishment of a more "natural" fire regime, would have long term benefits to soil health.

4.16.2 Nature and Type of Effects

Activities that disturb, compact, contaminate or remove vegetation from soils are generally considered to negatively affect soil health. Impacts on soil resources can result from a number of causes, including livestock grazing, recreation, mineral resource activities, renewable energy development, and road construction. The intensity and extent of impacts on soil resources are determined in part by the type and location of the surface-disturbing activities and surface occupancy. Impacts on soil resources can also be affected by any applicable stipulations and Plans of Operations that address site-specific environmental concerns and require mitigation to stabilize soil, to prevent unnecessary erosion, and to revegetate disturbed surfaces.

Grazing activities are known to alter vegetative and biological soil crust communities. Livestock grazing can cause adverse impacts on soils, particularly during high-intensity low-duration grazing systems in small pastures. Modified grazing management practices can be necessary to maintain soil health where soils are found to be sensitive to livestock disturbances (for example, soil on steep slopes and fragile soils). Properly managed grazing can protect soils and help provide healthy plant communities.

Direct and indirect impacts from resource programs on soil resources are generally mitigated by avoiding or minimizing the impact using designations such as ROW exclusion and avoidance areas, and stipulations such as NSO and CSU. Impacts that cannot be avoided are generally minimized by the application of COAs, RDFs, BMPs, and standard operating procedures.

Surface-disturbing activities and surface occupancy can impact soil resources by compacting soil. In some cases, soil compaction aids in plant establishment and growth. However, too much compaction decreases water infiltration rates and gas exchange rates. Decreased gas exchange rates can cause aeration problems, induce nitrogen and potassium deficiency, and negatively impact root development, which is a key component of soil stabilization. As soil compaction increases, the soil's ability to support vegetation diminishes because the resulting increase in soil strength and change in soil structure (loss of porosity) inhibit root system growth and reduce water infiltration. As vegetative cover, water infiltration, and soil stabilizing crusts are diminished or disrupted, the surface water runoff rates increase, further accelerating rates of soil erosion.

Implementing management for the following resources would have negligible or no impact on soil resources and are therefore not discussed in detail: mineral split estate; fire and fuels management; habitat restoration/vegetation management; and ACECs.

4.16.3 Impacts Common to All Alternatives

Table 4-30, Quantitative Impact Summary by Alternative for Soils, provides a comparison of the quantifiable aspects of each alternative with respect to soils.

Table 4-30
Quantitative Impact Summary by Alternative for Soils

Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
ROW exclusion area (acres)	0	32,900	32,980	32,900[1]
ROW avoidance area (acres)	0	80	0	32,900
Acres closed to fluid mineral leasing	0	61,197	66,293	0
Acres unsuitable for coal mining	0	87,443	166,207	87,443
Livestock grazing AUMs over 32,945 acres	5,780	5,780	3,739	5,780

[1] PH would be exclusion areas for new ROW wind energy developments.

Impacts from Recreation

Most recreation on BLM-administered lands results in vegetation loss, soil compaction, and soil erosion. Management approaches that direct recreation to specific areas and avoid dispersed recreation can result in more predictable, localized and manageable impacts.

Impacts from Mineral Materials and Non-Energy Leasable Minerals

Mineral development generally requires roads and large areas of soil excavation. Local soil health and characteristics within project footprints are typically severely impacted. Restoration and revegetation efforts can restore soil health over the long term once mineral extraction activities are complete, but landscapes are often scarred and areas of prior soil cover are often permanently altered through open pits, mineshafts, and other features. Eliminating or reducing surface-disturbing activities related to these types of mineral development in GRSG habitat would reduce impacts on soil resources.

4.16.4 Alternative A

Impacts from Travel and Transportation Management

Travel across land by foot, bicycle, horse, or OHV results in vegetation loss, soil compaction, and soil erosion. Management approaches that designate travel to specified routes can result in more predictable, localized, and manageable impacts. Selectively locating travel routes away from areas of fragile soil conditions can minimize the extent of these effects, ideally limiting them to the footprint of the trail.

Under Alternative A, BLM-administered lands would continue to permit limited yearlong use for motorized wheeled vehicles, restricted to existing roads and trails. Continuation of this policy would allow the potential for disturbance and compaction of soils, fragmentation, and other effects as discussed under *Nature and Type of Effects.*

Impacts from Lands and Realty

Lands and realty management decisions affect where ground disturbing activities can and cannot occur. The use of ROW exclusion and ROW avoidance areas protect certain areas from intense compaction and erosion. As shown in **Table 4-30**, Alternative A has no ROW exclusion or avoidance areas.

Adjustments to land tenure and withdrawal of certain lands can determine where ground-disturbing activities could occur. Under Alternative A, lands could be considered for disposal, exchange, or withdrawal.

Impacts from Range Management

Under Alternative A, 5,780 AUMs would be available over 32,945 acres open for grazing (see **Table 4-30**). Compaction and erosion of soils could occur as a result of this grazing; however, implementing and meeting the Standards for Rangeland Health and Guidelines would minimize these impacts.

Impacts from Fluid Minerals

No areas are closed to fluid mineral leasing and development under Alternative A, however, stipulations are in place and these protections would continue (see **Table 4-30**). As described in **Table 4-1**, there would be approximately 816 acres of short-term disturbance and 548 acres of long-term disturbance on BLM-administered lands related to existing and potential development. However, oil and gas development would have limited impacts on soils because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on soils related to surface disturbance and occupancy.

Impacts from Solid Minerals

Alternative A does not allow for withdrawing any areas from mineral entry and does not identify any areas as unsuitable or unacceptable for surface mining of coal (see **Table 4-30**). Impact on soils related to surface disturbance and occupancy, as described above in *Nature and Type of Effects*, from these activities could occur.

4.16.5 Alternative B

Impacts from Travel and Transportation Management

Travel and transportation management under Alternative B would likely reduce impacts on soils from roads and motorized vehicles by limiting motorized vehicles to existing roads and trails in PH and GH, evaluating the need to

permanently or seasonally close roads or areas to traffic in PH, and restoring roads by re-seeding with appropriate seed mixes and considering the use of transplanted sagebrush. Restoration of sagebrush habitat and minimizing surface disturbances in sagebrush habitat would enhance soil conditions to a greater extent than current policy under Alternative A.

Impacts from Lands and Realty

Under Alternative B, PH (32,900 acres) would be managed as ROW exclusion and GH (80 acres) as ROW avoidance area. This would be more protective of soil resources than Alternative A, which has no acreage of either designation (see **Table 4-30**).

Under Alternative B, the BLM would seek to acquire lands in PH that have intact subsurface mineral estate and whose surface is owned by the State of North Dakota or private entities. The acquisition would be to conserve, enhance or restore sage-grouse habitat. As such, Alternative B includes measures that would increase the potential to maintain soils in a healthy state, free from human uses that may otherwise cause compaction, erosion, or contamination.

Impacts from Range Management

Management under Alternative B would be the same as Alternative A with respect to the number of AUMs available and the acreage open for grazing (see **Table 4-30**); therefore, impacts would be the same as described under Alternative A.

Impacts from Fluid Minerals

Under Alternative B, the BLM would close PH (61,197 acres) to fluid mineral leasing and development, compared with no closures under Alternative A, which would protect these areas from the soil impacts of compaction, erosion and contamination associated with oil, gas exploration, development and production (see **Table 4-30**). As described in **Table 4-1**, there would be approximately 624 acres of short-term disturbance and 476 acres of long-term disturbance on BLM-administered lands related to existing and potential development. Impacts to soils in these areas would be the same as Alternative A, but would occur over a smaller area. Similar to Alternative A, oil and gas development would have limited impacts on soils.

Impacts from Solid Minerals

Under Alternative B, the BLM would manage all PH (87,443 federal mineral acres) as unsuitable for surface mining of coal, compared with 0 acres under Alternative A, and would allow for withdrawing areas from mineral entry within PH, reducing the potential for soil impacts of compaction, erosion, and contamination in these areas (see **Table 4-30**). Solid minerals management would be more protective of soils resources under Alternative B than under Alternative A. Because mineral potential is low for coal and mineral materials,

these restrictions may have little practical impact on soil resources but it would preclude any potential future development.

4.16.6 Alternative C

Impacts from Travel and Transportation Management
Impacts from travel and transportation management would be similar to those under Alternative B, but protections would apply to both PH and GH and the BLM would apply additional mitigation requirements so impacts on soils (as described under the *Nature and Type of Effects*) would be further reduced. Prohibiting road construction within four miles of a lek would leave only approximately 600 acres in PH for future road construction and would help prevent disturbance and degradation of soils.

Impacts from Lands and Realty
Under Alternative C, the BLM would manage 32,980 acres as ROW exclusion and 0 acres as ROW avoidance area. This would be more protective of soil resources than Alternative A, which has no acreage of either designation (see **Table 4-30**). The ROW exclusion and avoidance areas would protect and partially protect soils, respectively, from the typical impacts associated with developments in ROWs of erosion, compaction, and sometimes contamination.

Alternative C allows for the acquisition of lands with suitable habitat and calls for the withdrawal of lands within PH from mineral activity. These acquisitions and withdrawals in GRSG habitat would protect soil resources in these areas from the impacts of erosion, compaction, and sometimes contamination that are typically associated with surface-disturbing activities.

Impacts from Range Management
Under Alternative C, 36 percent fewer AUMs would be available over the same number of acres open for grazing as under Alternative A (see **Table 4-30**). This lower intensity of grazing would likely be more similar to natural grazing scenarios, reducing erosion and compaction in heavy use areas and allowing for the establishment of more diverse vegetative populations. Lower grazing intensity could provide the potential for changes in nutrient cycling and may lead to excess litter buildup which would affect plant growth and succession and could add more organic matter to developing topsoils. Improvements in soil health would be expected in some areas currently not meeting Rangeland Health Standards. Alternative C is expected to result in improved soil health in some areas when compared with Alternative A.

Impacts from Fluid Minerals
Under Alternative C, the BLM would close GH and PH (66,293 acres) to fluid mineral leasing and development that would otherwise not be closed under Alternative A (see **Table 4-30**). This closure would protect these areas from the soil impacts of erosion, compaction and sometimes contamination that are

typically associated with oil, gas, and geothermal exploration, development, and production.

As described in **Table 4-1**, there would be approximately 621 acres of short-term disturbance and 475 acres of long-term disturbance on BLM-administered lands related to existing and potential development. Similar to Alternative A, oil and gas development would have limited impacts on soil.

Impacts from Solid Minerals

Under Alternative C, the BLM would manage all PH and GH (166,207 acres) as unsuitable for surface mining of coal, compared with 0 acres under Alternative A (see **Table 4-30**). The BLM would also allow for withdrawing areas from mineral entry within PH. The closures and the allowance for withdrawals would reduce the potential for soil impacts typically associated with solid mineral extraction of erosion, compaction and sometimes contamination from occurring in these areas. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on soil resources but it would preclude any potential future development.

4.16.7 Alternative D

Impacts from Travel and Transportation Management

Measures proposed under Alternative D would reduce impacts on GRSG habitat compared to Alternative A. Many management actions and resulting impacts would be similar to Alternative B, with increased management flexibility incorporated to improve management and target those areas that need most protection. Other measures would be as described under Alternative B, but would apply to both PH and GH. Overall, management under Alternative D would reduce impacts on soils from activities associated with travel and transportation in the planning area, including those described under *Nature and Type of Effects*, compared to Alternative A.

Impacts from Lands and Realty

Alternative D has zero acres of ROW exclusion area and 32,900 acres of ROW avoidance area (includes all PH) compared with no such areas under Alternative A (see **Table 4-30**). The ROW avoidance area would protect and partially protect soils, respectively, from the typical impacts associated with developments in ROWs of erosion, compaction, and sometimes contamination.

Impacts from Range Management

Impacts from Alternative D would be the same as Alternative A with respect to the number of AUMs available and the acreage open for grazing, resulting in the same impacts on soils (see **Table 4-30**).

Impacts from Fluid Minerals

Under Alternative D, as under Alternative A, the BLM would not close any areas to fluid mineral leasing and development, resulting in similar impacts on

soil resources (see **Table 4-30**). As described in **Table 4-1**, there would be approximately 767 acres of short-term disturbance and 530 acres of long-term disturbance on BLM-administered lands related to existing and potential development. Similar to Alternative A, oil and gas development would have limited impacts on soils.

Impacts from Solid Minerals

As with Alternative A, under Alternative D, lands would be open to mineral entry. The BLM would manage all PH (87,443 acres) as unacceptable for coal mining, which would be more protective of soil resources than management under Alternative A since the impacts typically associated with coal mining of erosion, compaction and sometimes contamination would not be able to occur on these lands (see **Table 4-30**). Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on soil resources but it would preclude any potential future development.

4.17 WATER RESOURCES

4.17.1 Methods and Assumptions

Indicators

Table 4-31, Comparison of Water Resources Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on water resources under each alternative. It is acknowledged that conservation measures for GRSG would have only beneficial impacts on water resources and so indicators are worded in a way that measures to what degree water resources would receive protections.

Table 4-31
Comparison of Water Resources Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Livestock grazing AUMs over 32,945 acres	5,780	5,780	3,739	5,780
Acres in ROW exclusion	0	32,900	32,980	32,900[1]
Acres closed to fluid mineral leasing	0	61,197	66,293	0
Acres found unsuitable for surface coal mining	0	87,443	166,207	87,443
Opportunity to restore or improve water sources for GRSG and their habitat	No change	Increase	Variable – see analysis	Increase
Opportunity for elimination of mosquito breeding water conditions	No change	Increase	Increase	Increase

[1] PH would be exclusion areas for new ROW wind energy developments.

Assumptions

The analysis includes the assumption that projects that help restore watersheds, desirable vegetation communities, or wildlife habitats (including surface disturbance associated with these efforts) would benefit water resources over the long term.

4.17.2 Nature and Type of Effects

Management actions could change the quality and accessibility of water features that serve as GRSG drinking sources. Drinking water accessibility and quality in turn affect the health and survival of the GRSG. Actions could also increase or decrease the ability of water sources to serve as mosquito breeding habitat, which could in turn increase or decrease, respectively, the risk of West Nile virus transmission to GRSG.

Surface water quality is influenced by both natural and human factors. Aside from the natural factors of weather-related erosion of soils into waterways, surface water quality can be affected by the transport of eroded soils into streams due to improperly managed livestock grazing, introduction of waste matter such as fecal coliforms into streams from domestic livestock, and "low-water" crossing points of roads, routes, and ways used by motorized vehicles.

Surface-disturbing activities can remove or disturb essential soil-stabilizing agents, such as vegetation diversity, soil crusts, litter, and woody debris. These soil features function as living mulch by retaining soil moisture and discouraging annual weed growth (Belnap et al. 2001). Loss of one or more of these agents increases potential erosion and sediment transport to surface water bodies, leading to surface water quality degradation. Surface-disturbing activities under certain circumstances can also lead to soil compaction, which decreases infiltration rates and elevates potential for overland flow. Overland flow can increase erosion and sediment delivery potential to area surface water bodies, leading to surface water quality degradation.

In areas with NSO stipulations and managed as ROW exclusion, water quality would be protected since ground disturbance would be prohibited and soil erosion limited to natural processes. In areas managed as ROW avoidance, water quality would receive some protection since ground disturbance would often be limited. ROW avoidance areas would generally result in lower impacts on water quality, compared with areas not managed as ROW avoidance.

Surface-disturbing activities within stream channels, floodplains, and riparian habitats are more likely to alter natural morphologic stability and floodplain function. Morphologic destabilization and loss of floodplain function accelerate stream channel and bank erosion, increase sediment supply, dewater near-stream alluvium, cause the loss of riparian and fish habitat, and deteriorate water quality (Rosgen 1996). Altering or removing riparian habitats can reduce the hydraulic roughness of the bank and increase flow velocities near the bank

(National Research Council 2002). Increased flow velocities near the bank can accelerate erosion, decreasing water quality.

When surface-disturbing impacts are allowed to alter natural drainage patterns, the runoff critical to recharging and sustaining locally important aquifers, springs/seeps/fens, wetlands, and associated riparian habitats is redirected elsewhere. As a result, these sensitive areas can be dewatered, compromising vegetative health and vigor, while degrading proper function and condition of the watershed.

Subsurface disturbances can alter natural aquifer properties (e.g., enhance hydraulic conductivity of existing fractures, breach confining units, and change hydraulic pressure gradients), which can increase potential for contamination of surface and groundwater resources. Furthermore, altering natural aquifer properties can dewater locally important freshwater sources (e.g., groundwater, springs, seeps, fens, and streams).

Under dry conditions, surface-disturbing activities release dust into the air. During winter, wind-blown dust can settle on top of snow and affect the rate of snowmelt. Dust-covered snow versus clean snow can have albedo (reflectivity) values as low as 0.35, doubling the amount of absorbed solar radiation. Research and simulations based on observations in the Senator Beck Basin Study Area near Silverton, Colorado, indicate that excess dust on snow (versus pre-1800 conditions) increased the rate of snowmelt and advanced the timing of melting by about three to four weeks (Painter et al. 2007). Furthermore, results of studies conducted by Painter and others (2007) indicate that annual runoff is reduced by five percent under current dust conditions. Primary contributing factors for decreased runoff follow.

Greater absorption of energy during snowmelt causes more of the snow to sublimate directly into the atmosphere.

Earlier melting exposes the ground surface to sunlight and warmth, which both allow more water to evaporate directly from the soil and extend the growing season for plants that then can transpire additional water. It is this combined increase in evapotranspiration that appears to have the most impact on stream flow.

Surface water runoff depends on both natural factors and land management. Natural factors include climate, geology and soils, slope, channel conditions, and vegetation type and density. Land use or management actions that alter these natural factors play a role in altering surface water runoff. Such actions include grading or compacting soils for new roads or well pads and calling for management prescriptions that alter the type or density of vegetation.

Reducing water flow can have adverse impacts on the ecology of a watershed, its recreational potential, the availability of drinking water and water for other

uses, and groundwater quality and quantity. Water quality impacts from reduced water supplies include increased water temperatures, pH levels, and alkaline levels. Reductions in water supply could result from consumptive uses of surface water or tributary groundwater sources that do not return water to the basin. Examples are evaporative loss from new surface water features, evapotranspiration from irrigation of vegetation, injection into deep wells, or use in drilling fluids that are later disposed of outside of the basin.

Mineral development is generally associated with the risk of impairments to local surface waters and groundwater. Mineral development disturbs soils and can result in increased erosion and contamination of waterways via runoff. Mineral development increases the presence of petroleum-using vehicles and equipment on the land and increases the likelihood of chemical spills that can sink into the earth and contaminate groundwater. Mineral development can result in pools of standing water that can serve as mosquito breeding habitat, increasing the ability for West Nile virus to spread into a landscape otherwise not at risk to the pathogen.

Lands that are open for fluid minerals leasing have the potential for future health and safety risks related to oil, gas exploration, development, operation, and decommissioning. The number of acres open for leasing is proportional to the potential for long-term direct health and safety impacts. Use, storage, and transportation of fluids, such as produced water, hydraulic fracturing fluids, and condensate, have the possibility of spills that could migrate to surface or groundwater, causing human health impacts.

Potential impacts from coal, locatable mineral, mineral material, and nonenergy leasable mineral activities and development include the release of pollutants capable of contaminating surface water during stormwater runoff or contaminating aquifers during groundwater recharge. Mineral activities and developments could also alter drainage patterns, which would affect stream hydrographs and water supplies. Discharge of mine water can alter water chemistry and impair natural stream morphologic conditions.

Activities beneficial to water resources are primarily defined as improving conditions by enhancing or restoring degraded water quality or by reducing ongoing groundwater depletion. Changing grazing patterns in riparian areas further benefits the water quality and geomorphic function of streams. Management actions regarding closure or avoidance of specific areas, or restrictions of disturbance, protect environmental conditions and, thus, are beneficial. Mitigation measures also reduce the impacts on water resources from ongoing or future activities.

Implementing management for the following resources would have negligible or no impact on water resources and are therefore not discussed in detail: travel and transportation management; recreation; mineral split estate; fire and fuels management; habitat restoration/vegetation management; and ACECs.

4.17.3 Impacts Common to All Alternatives

There are no impacts that are common to all alternatives.

Table 4-32, Quantitative Impact Summary by Alternative for Water Resources, provides a comparison of the quantifiable aspects of each alternative with respect to Water Resources.

Table 4-32
Quantitative Impact Summary by Alternative for Water Resources

Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
ROW exclusion area (acres)	0	32,900	32,980	32,900[1]
ROW avoidance area (acres)	0	80	0	32,900
Acres closed to fluid mineral leasing	0	61,197	66,293	0
Acres unsuitable for coal mining	0	87,443	166,207	87,443
Livestock Grazing AUMs over 32,945 acres	5,780	5,780	3,739	5,780

[1] PH would be exclusion areas for new ROW wind energy developments.

4.17.4 Alternative A

Impacts from Lands and Realty

Lands and realty management decisions affect where ground disturbing activities can and cannot occur. The use of ROW exclusion and ROW avoidance areas limit the amount of man-made runoff of soils and chemicals into waterways within those areas and are generally considered to be protective of water quality. ROW exclusion and avoidance areas are also seen to reduce the likelihood of chemical spills onto the ground, which can then sink into the earth and contaminate groundwater. Alternative A has no ROW exclusion or avoidance areas (see **Table 4-32**).

Impacts from Range Management

Livestock generally cause decreases in water quality through the heavy trampling of soils and vegetation along and within natural water features that are also used by GRSG as drinking water sources. At the same time, water supply structures throughout the landscape that have been established for the benefit of livestock also often provide drinking water sources for GRSG.

Under Alternative A, BLM would maintain PFC riparian and wetland areas. Water sources would be developed where needed (as indicated by monitoring) to improve GRSG habitat and waters used by GRSG and adversely affected by uncontrolled livestock use would be fenced. These actions would have a beneficial effect on water sources over time.

Under Alternative A, 5,780 AUMs would be available over 32,945 acres open for grazing (see **Table 4-32**). The level of grazing itself does not necessarily have an impact on water sources. More important is the way in which the livestock and the water sources are managed, which is addressed in the previous paragraph.

Impacts from Fluid Minerals

Alternative A does not close any areas to fluid mineral leasing and development (see **Table 4-32**), nor does it not include any fluid minerals management actions that would protect GRSG against West Nile virus. Impacts on soils related to surface disturbance and occupancy from these activities, as described above in *Nature and Type of Effects*, could occur. Disturbance of soils from mineral development would continue to result in the potential for increased erosion and contamination. Disturbance of soils from mineral development would continue to result in the potential for increased erosion and contamination.

As described in **Table 4-1**, there would be approximately 816 acres of short-term disturbance and 548 acres of long-term disturbance on BLM-administered lands related to existing and potential development. However, oil and gas development would have limited impacts on soils because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on soils related to surface disturbance and occupancy.

Impacts from Solid Minerals

Alternative A does not include any solid minerals management actions that would protect GRSG against West Nile virus meaning that water sources could be created that foster mosquito breeding. Management under Alternative A does not allow for withdrawing any areas from mineral entry and does not identify any areas as unsuitable or unacceptable for surface mining of coal (see **Table 4-32**). There would be no impact on water resources over existing conditions. Impact on soils related to surface disturbance and occupancy, as described above in *Nature and Type of Effects*, from these activities could occur.

4.17.5 Alternative B

Impacts from Lands and Realty

Under Alternative B, the BLM would manage PH (32,900 acres) as ROW exclusion area and PH (80 acres) as ROW avoidance area. This would be more protective of water resources than Alternative A, which has no acreage of either designation (see **Table 4-32**), therefore creating fewer impacts of the type and nature described above in *Nature and Type of Effects*.

Impacts from Range Management

Management under Alternative B would be the same as Alternative A with respect to the number of AUMs available and the acreage open for grazing (see

Table 4-32). However, Alternative B includes measures that would provide greater potential for improvement of water quality sources for GRSG in riparian areas and wet meadows for PFC than Alternative A through striving to attain reference state vegetation relative to the ESD. Alternative B would be of greater benefit to water resources than Alternative A through the analysis of existing water sources and the implementation of appropriate modifications to maintain the continuity of the predevelopment riparian area within PH. Alternative B includes more management options for structural range improvements that specifically benefit PH than Alternative A. The BLM would provide GRSG with greater protection against West Nile virus than under Alternative A through implementing RDFs when developing or modifying water developments in PH. Water sources are more likely to be maintained in conditions that would not be conducive to mosquito breeding.

Impacts from Fluid Minerals

Under Alternative B, the BLM would close PH (61,197 acres) to fluid mineral leasing and development. This closure would decrease the chance for the contamination of surface water and groundwater and would decrease the likelihood for the creation of new mosquito breeding habitat and the risk of infection of GRSG with West Nile virus (see **Table 4-32**).

As described in **Table 4-1**, there would be approximately 624 acres of short-term disturbance and 476 acres of long-term disturbance on BLM-administered lands related to existing and potential development. Impacts on soils in these areas would be the same as Alternative A, but would occur over a smaller area. Similar to Alternative A, oil and gas development would have limited impacts on water resources.

Impacts from Solid Minerals

Under Alternative B, the BLM would find all PH (87,443 acres) as unsuitable for surface mining of coal and would allow for withdrawing areas from mineral entry within PH (see **Table 4-32**); however, little-to-no coal extraction is expected in the planning area, so protective effects of this closure would be limited. This would reduce the chance for the contamination of water resources within PH and would reduce the chance for forming mosquito breeding habitat and furthering the potential transmission of West Nile virus to GRSG. The BLM would also apply West Nile virus prevention RDFs on solid mineral projects (BMPs would be proposed for locatable minerals). Overall, management under Alternative B could result in higher quality water sources, and could decrease the occurrence of mosquito breeding habitat and the potential for West Nile virus transmission than Alternative A. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on water resources but it would preclude any potential future development.

4.17.6 Alternative C

Impacts from Lands and Realty

Under Alternative C, the BLM would manage 32,980 acres as ROW exclusion area and zero acres as ROW avoidance area. The ROW exclusion and avoidance areas would protect and partially protect water resources, respectively, from the typical impacts associated with developments in ROWs of erosion and sometimes contamination. This would be more protective of water resources than Alternative A, which has no acreage of either designation (see **Table 4-32**), resulting in fewer impacts on water resources of the type and nature described above in *Nature and Type of Effects*.

Impacts from Range Management

Under Alternative C, 36 percent fewer AUMs would be available over the same acreage of acres open for grazing as under Alternative A (see **Table 4-32**). This lower intensity of grazing would provide the potential for improved soil and vegetative health, would reduce the potential for soil eroding and transporting suspended solids into waterways, would result in thicker vegetative cover and organic litter that would better filter suspended solids out of surface runoff, and would reduce the amount of fecal coliforms being generated on the landscape that could then flow into waterways. Management actions under Alternative C would improve surface water quality over existing conditions. The lower level of grazing could also make some existing water sources more available to GRSG through there being less livestock to temporarily displace the birds during livestock drinking events.

Under Alternative C, the BLM would provide greater protections of water quality than Alternative A for water sources in PH through managing riparian areas and wet meadows for PFC. Compared with Alternative A, Alternative C may limit the BLM in its ability to improve water availability through banning the authorization of new water developments through diversions from seeps or springs in GRSG habitat. Impacts from Alternative C would be of greater benefit to GRSG than Alternative A through the analysis of existing water sources and the implementation of appropriate modifications to maintain the continuity of the predevelopment riparian area within GRSG habitats. Management under Alternative C would provide greater potential for new beneficial water sources to be installed in PH and GH than Alternative A through avoiding all new structural range developments except for those independently shown to benefit GRSG. Management actions under Alternative C would provide GRSG with greater protection against West Nile virus than Alternative A through implementing RDFs when developing or modifying water developments in PH.

Impacts from Fluid Minerals

Under Alternative C, the BLM would close GH and PH (66,293 acres) to fluid mineral leasing and development, which would decrease the chance for the contamination of surface water and groundwater and would decrease the

likelihood for the creation of new mosquito breeding habitat and the risk of infection of GRSG with West Nile virus (see **Table 4-32**). This management would make Alternative C more protective of GRSG than Alternative A.

As described in **Table 4-1**, there would be approximately 621 acres of short-term disturbance and 475 acres of long-term disturbance on BLM-administered lands related to existing and potential development. Similar to Alternative A, oil and gas development would have limited impacts on water resources.

Impacts from Solid Minerals

Under Alternative C, the BLM would manage all PH (166,207 acres) as unsuitable for surface mining of coal and would allow for withdrawing areas from mineral entry within PH (see **Table 4-32**); however, little-to-no coal extraction is expected in the planning area so protective effects of this closure would be limited. This would reduce the chance for the contamination of water resources within PH, and would reduce the chance for forming mosquito breeding habitat and furthering the potential transmission of West Nile virus to GRSG. The BLM would also apply West Nile virus prevention RDFs (BMPs would be proposed for locatable minerals) on solid mineral projects. Overall, management actions under Alternative C could be more protective of GRSG with respect to West Nile virus transmission than Alternative A. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on water resources but it would preclude any potential future development.

4.17.7 Alternative D

Impacts from Lands and Realty

Under Alternative D, the BLM would manage PH (32,900 acres) as ROW avoidance area; however, PH would be a ROW exclusion area for wind energy development. This would be more protective of water resources than Alternative A, which has no acreage of either designation (see **Table 4-32**).

Impacts from Range Management

Management under Alternative D would be the same as Alternative A with respect to the number of AUMs available and the acreage open for grazing (see **Table 4-32**).

Under Alternative D, management actions would provide greater potential for improvement of water quality sources for GRSG in riparian areas and wet meadows that meet PFC than Alternative A by striving to move towards GRSG habitat objectives within capabilities of the reference state vegetation relative to the ESD. Unlike Alternative A, management under Alternative D would provide the opportunity for improving PH through new water diversions from springs and seeps. Impacts from Alternative D would be similar to Alternative B and would be of greater benefit to GRSG than Alternative A through the analysis of existing water sources and the implementation of appropriate modifications to

maintain the continuity of the predevelopment riparian area within PH. Alternative D provides more options than Alternative A for structural range improvements that specifically benefit PH. Management actions under Alternative D would provide more opportunities to improve water resources and greater protection against West Nile virus than Alternative A through implementing RDFs when developing or modifying water developments in PH.

Impacts from Fluid Minerals

Under Alternative D, as with Alternative A, the BLM would not close any areas to fluid mineral leasing and development (see **Table 4-32**). Management under Alternative D would provide greater protection of GRSG from West Nile virus than Alternative A through managing water developments to reduce the spread of the virus within GRSG habitat areas and through imposing NSO within PH.

As described in **Table 4-1**, there would be approximately 767 acres of short-term disturbance and 530 acres of long-term disturbance on BLM-administered lands related to existing and potential development (less than Alternative A). Similar to Alternative A, oil and gas development would have limited impacts on water resources.

Impacts from Solid Minerals

Implementation of Alternative D could potentially find all PH (87,443 acres) as unsuitable for surface mining of coal (see **Table 4-32**). Under Alternative D, the BLM would apply West Nile virus prevention RDFs (BMPs would be proposed for locatable minerals) on solid mineral projects to prevent unnecessary and undue degradation. Overall, management actions under Alternative D could be more protective of GRSG with respect to West Nile virus transmission than Alternative A. Because mineral potential is low for coal and mineral materials, these restrictions may have little practical impact on water resources but it would preclude any potential future development.

4.18 SPECIAL STATUS SPECIES – OTHER SPECIES OF ISSUE

4.18.1 Methods and Assumptions

Although data on known locations within the planning area are available, the data are neither complete nor comprehensive concerning all special status species or potential habitat that might exist. Known Sprague's pipit distribution area was considered for quantitative analysis; however, the potential presence of other species was also considered, and, as a result, some impacts are discussed in more general terms. Additionally, transient gray wolf and migrating whooping crane have the potential to occupy the planning area.

Indicators

Table 4-33, Comparison of Special Status Species-Other Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on special status species under each alternative.

Table 4-33
Comparison of Special Status Species-Other Indicators by Alternative

Indicator	Alternative			
	A	B	C	D
Acres in ROW exclusion	0	32,900	32,980	32,900[1]
Livestock grazing AUMs	5,780	5,780	3,739	5,780
Acres closed to fluid mineral leasing	0	61,197	66,293	0
Acres found unsuitable for coal mining	0	87,443	166,207	87,443

[1] PH would be exclusion areas for new ROW wind energy developments.

Assumptions

The analysis includes the following assumptions:

- In general, special status species would be more sensitive to habitat fragmentation than common species, development, or changes in habitat conditions, as populations are often already highly fragmented, require specific microhabitats, and are especially sensitive to disturbance and human presence.
- The analysis presented is largely qualitative due to the lack of data or uncertainty in existing data on certain special status species' occurrences, for example, many of the BLM sensitive plant species. Furthermore, since many special status species may potentially use habitats that are currently unoccupied and populations fluctuate, any quantitative analysis of occupied habitat would change over time as knowledge of where species exist increases. Where appropriate, acreages from **Chapter 2** are included to show a comparison between alternatives.
- Impacts on special status species would be more significant than impacts on common species because population viability is already uncertain for special status species and certain species, such as special status plants, tend to be poor competitors.
- Short-term effects are defined as those that would occur over a timeframe of two years or less, and long-term effects would occur over longer than two years.

4.18.2 Nature and Type of Effects

Fish and Wildlife

Special status fish and wildlife habitats on BLM-administered lands within the decision area would be affected under all alternatives, and the condition of habitats is directly linked to vegetation conditions, water quality and quantity,

and progression towards land health standards (**Section 4.4** and **Section 4.17**).

Changes to special status fish and wildlife habitats would be caused by the following: 1) disturbance from casual use; 2) disturbance from permitted activities; and 3) changes to habitat conditions.

Disturbance from Casual Use

Substantial analysis and planning is used to determine the locations and types of casual use activities that would occur, such as recreation, motorized vehicle use, and use of authorized and unauthorized routes. Examples of impacts on special status fish and wildlife from casual use include habitat loss, fragmentation, or degradation; mortality or injury of animals; sedimentation of waterways; increased turbidity; decreased water quality; disturbance to species during sensitive or critical periods in their life cycle such as spawning, nesting, or denning; short-term displacement; and long-term habitat avoidance by species such as raptors that are sensitive to noise or human presence. Some species may adapt to disturbances over time and could recolonize disturbed habitats. While no lands within the decision area are designated open to motorized travel, impacts would still occur in areas limited to designated routes due to noise disturbance, human presence, potential for weed spread and habitat degradation, and the potential for injury or mortality to wildlife from vehicle collisions.

Both short-term, loud noise (such as from vehicles or construction) and long-term, low-level noise (such as from oil and gas development) have been documented to cause physiological effects on wildlife species, including increased heart rate, altered metabolism, and a change in hormone balance (Radle 2007, pg. 5). Determining the effect of noise is complicated because different species and individuals have varying responses, and certain species rely more heavily on acoustical cues than others (Radle 2007, pg. 5). Impacts would be both short and long term, depending on the type and source of noise.

On-site management of recreation and motorized activity, and designation and closure of travel routes could prevent or reduce impacts. Seasonal closure of routes would prevent impacts on species during sensitive or critical times of the year, such as during winter or birthing.

Disturbance from Permitted Activities

Permitted, surface-disturbing activities (e.g., mineral exploration and development, and ROWs) would result in short-term direct impacts through mortality, injury, displacement, and noise or human disturbance caused by increased vehicle traffic and use of heavy machinery. Displacement of species could increase competition for resources in adjacent habitats. Over the long term, these activities would remove and fragment habitats due to road development and use, facility construction and placement, creation of well pads and pipelines, and construction within ROWs. Species could avoid developed

areas over the long-term, or may adapt and recolonize sites after construction. ROW avoidance and exclusion areas would reduce or avoid habitat impacts and could reduce the total acreage of habitat disturbance and fragmentation.

Bird mortality or injury could occur from collision or electrocution with transmission lines and other ROW structures. Development in areas where there are existing ROWs would reduce impacts, since resident birds may have adapted to the existing ROWs. COAs, such as requiring flight diverters or following Avian Power Line Interaction Committee guidelines, would be applied to new ROW applications to reduce impacts. Wind energy may also cause direct impacts on birds and bats, including blade strikes, barotrauma (injury or mortality caused by rapid or excessive pressure changes), habitat loss, and displacement. Indirect impacts may include introduction of invasive vegetation that results in alteration of fire cycles; increase in predators or predation pressure; decreased survival or reproduction of the species; and decreased habitat effectiveness. Areas managed under NSO, CSU, and TL stipulations would limit surface disturbance and associated impacts in certain areas.

Changes to Habitat Conditions

Changes to habitat conditions could occur from vegetation and weed treatments; livestock grazing; GRSG habitat enhancements; fire; fuels treatments; and range improvements. Overall, the BLM would aim to achieve or trend toward achieving Rangeland Health Standard 5: Biodiversity, which would maintain and/or restore habitat values for fish and wildlife. Over the short term, vegetation, fire, and weed treatments would remove habitat, and impacts would occur until the desired habitat was established. Over the long term, vegetation and habitat treatments would increase habitat structural and compositional diversity, increase cover and nesting habitat, prevent sedimentation of waterways, and retain riparian and wetland habitats. Depending on the extent and severity, fire can improve habitat for some species in the long term.

If managed improperly, overutilization of forage by livestock could occur, leading to increased competition with wildlife for forage, and potentially reduced cover and nesting habitat for other species. Livestock could also spread weeds, which would degrade habitats. Special status wildlife could be displaced from their habitats, which could increase competition for resources in adjacent habitats. Impacts would vary depending on the extent of vegetation removal, type of habitat impacted, and length of the grazing period. In general, the more acres that are open to grazing and AUMs available under a given alternative, the greater the risk for impacts. Livestock may degrade riparian areas, which could impact riparian-dependent, aquatic, and fish species.

Natural disturbances such as unplanned fire ignitions could cause short- or long-term damage to habitats depending on the seral type affected, extent, and severity of the fire. In the short term, fire removes nesting and cover habitat and leaves bare areas that provide little habitat value and could erode to cause

sedimentation of waterways. Fire could displace species from suitable habitat, which could increase competition for resources in adjacent habitats. In the long term, wildland and prescribed fires, as well as fuels treatments, improve habitat by increasing structural diversity. Often, fire and fuels treatments lower the risk for an uncharacteristically large or severe wildfire that would destroy a large acreage of wildlife habitats.

Management actions and special designated areas (e.g., ACECs) that restrict surface-disturbing activities would reduce impacts such as habitat removal, fragmentation, and human disturbance. Such management actions include stipulations to protect GRSG; closure of areas to mineral leasing and development; ROW avoidance and exclusion areas; areas recommended for withdrawal from mineral entry; restrictions within ACECs; and route closures or restrictions.

Criteria would be used to guide land exchanges, disposals, and acquisitions, which could reduce the fragmentation of BLM-administered land in the planning area. This could improve the BLM's ability to implement management actions that would result in improved habitats, undisturbed fish and wildlife populations, and attainment of land health standards. However, lands identified for disposal could cause fragmentation and habitat loss if the disposed land is converted to other uses, such as agriculture or residential or industrial development.

4.18.3 Impacts Common to All Alternatives

There are no impacts that are common to all alternatives.

4.18.4 Alternative A

Impacts from Travel and Transportation Management

BLM-administered lands would continue to permit limited yearlong use for motorized wheeled vehicles, restricted to existing roads and trails on 33,030 acres. Through site-specific planning, the BLM would inventory, map, and designate roads and trails as open, seasonally open, or closed. Through this process, important wildlife habitat areas could be protected. Ecological impacts of roads and motorized trails include mortality due to collisions, behavior modifications due to noise, activity and/or habitat loss, alteration of physical environment, leaching of nutrients, erosion, spread of invasive plants, increased use, and alteration by humans due to accessibility would likely continue.

Impacts from Recreation

Under Alternative A, use authorizations would be considered as requested by the public. Recreational use may result in human disturbance, degradation of habitat, or mortality, as described in *Nature and Type of Effects*.

Impacts from Lands and Realty

No ROW avoidance or exclusion areas would be designated under Alternative A and 3,436 acres would be identified for disposal. As a result, human

disturbance- and infrastructure-related impacts described above in *Nature and Type of Effects* would continue. However, BLM would co-locate facilities where possible, which would reduce impacts on some special status species by reducing the extent of new disturbance.

Land tenure adjustments would be subject to current disposal/exchange/ acquisition criteria, which include retaining lands with threatened or endangered species, high quality riparian habitat, or plant and animal populations or natural communities of high interest. This would reduce the likelihood of habitat conversion to agriculture, urbanization, or other uses that would remove habitat.

Impacts from Range Management

The most current assessment of acres meeting land health standards in the planning area are described in **Table 3-39**. Nearly 33,000 acres were assessed in PPH and 80 acres in PGH. These assessments indicate that most of the PPH provides diverse and productive plant and animal habitat. Under Alternative A, the BLM would make 5,780 AUMs available, develop water sources, and allow land treatments. Changes to habitat conditions would be as described under *Nature and Type of Effects*. The BLM would incorporate management to reduce impacts during drought, and fences would be erected to protect and benefit wildlife. In addition, riparian and wetland habitats would be improved. Overall, while impacts from grazing would continue to occur, the BLM would take actions to reduce these impacts, which would reduce damage to habitat for some special status species.

Impacts from Fluid Minerals

Impacts could occur on 73,435 acres where BLM-administered surface lands and split estate would be open to fluid mineral leasing. All acres of Sprague's pipit distribution would be open to fluid mineral leasing. Human disturbance and changes to habitat as described under *Nature and Type of Effects* would be reduced on BLM-administered and split estate lands where NSO (9,780 acres), CSU (21,235 acres), or TL (38,504 acres) constraints would be applied for GRSG. NSO or CSU would be applied on 31,015 acres of Sprague's pipit distribution reducing the nature and types of the described impacts. However, oil and gas development would have limited differences among the alternatives because,, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on other special status species related to surface disturbance and occupancy.

Impacts from Solid Minerals

In Sprague's pipit distribution, 242,743 federal mineral acres would be acceptable for coal leasing and open to solid mineral entry. However, there are no existing coal leases and development of federal coal resources is not

anticipated during the life of this plan. Therefore, no impacts are expected from coal.

For locatable minerals, mineral materials, and non-energy leasable minerals, a total of 56,681 BLM-administered acres would continue to be managed as open to exploration and development. Impacts from surface disturbance and changes in habitat, as described under *Nature and Type of Effects*, would continue.

Impacts from Fire and Fuels Management

Management under Alternative A does not provide much guidance on fire and fuels management, so it is likely that changes in habitat from fire and fuels management, as described under *Nature and Type of Effects*, would continue. In some instances, habitat for some special status species would be lost to fire while other habitats would be protected from fuels management activities. However, the risk of wildfire is very low overall as there have been no fires on BLM-administered lands in the area in the past 10 years.

Impacts from Habitat Restoration and Vegetation Management

Management under Alternative A does not provide much guidance on habitat restoration and vegetation management, so it is likely that impacts from these activities as described above would continue. In some instances, habitat for other special status species would be improved from habitat restoration and vegetation management activities.

Impacts from ACECs

There are no designated ACECs in the planning area under Alternative A, and, as a result, no impacts from ACEC management actions on other special status species.

4.18.5 Alternative B

Impacts from Travel and Transportation Management

Similar to Alternative A, motorized wheeled vehicles would be limited to existing roads and trails on 30,030 acres. Under Alternative B, the BLM would evaluate the need for road closures in PH. If closures were applied, the impacts from roads would be reduced in these areas. The BLM would also impose limitations on new route construction and upgrading of existing routes in PH, which would reduce impacts from disturbance, changes to habitat, and mortality on other special status species in these areas. The BLM would use appropriate seed mixes when reseeding roads, primitive roads, and trails in PH and would transplant sagebrush to facilitate restoration, which would improve habitat connectivity for some special status species over the long term as compared to Alternative A.

Impacts from Recreation

The BLM would limit issuance of SRPs in PH to those that would have neutral or beneficial effects on GRSG. This action would potentially reduce impacts for those special status species that occur in PH as compared to Alternative A.

Impacts from Lands and Realty

The BLM would designate PH as ROW exclusion (32,900 acres) and GH as ROW avoidance (80 acres) areas, all of which includes Sprague's pipit distribution, thereby reducing impacts on GRSG. Such designations would also reduce impacts from human disturbance and changes to habitat for those other special status species that occur in these areas. Impacts from co-location of facilities would be similar to those described for Alternative A, though they would occur in GH only, which is a reduction of impacts as compared to Alternative A.

Impacts from Range Management

The BLM would make the same number of AUMs available as under Alternative A. However, under Alternative B, the BLM would implement a number of additional management actions to incorporate GRSG habitat objectives and management considerations into livestock grazing management. These include, but are not limited to, consideration of grazing methods and systems to reduce impacts on GRSG habitat, improved management of riparian areas and wet meadows, evaluation of existing introduced perennial grass seedings, water developments, and structural range improvements, RDFs for West Nile virus, and fence marking. Such management actions would largely affect those special status species that use the same habitats as GRSG, and would reduce, but would not eliminate, impacts from grazing on special status species in these areas as compared to Alternative A.

Impacts from Fluid Minerals

Under Alternative B, 61,197 acres of BLM-administered and split estate lands would be closed to fluid mineral leasing and conservation measures would be applied on leased fluid mineral estate and split estate lands. These actions would reduce the likelihood and extent of impacts on the distribution of Sprague's pipit caused by fluid mineral development as compared to Alternative A.

However, oil and gas development would have limited differences among the alternatives because, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on other special status species related to surface disturbance and occupancy.

Impacts from Solid Minerals

Under Alternative B, 87,443 acres of PH and of Sprague's pipit distribution would be unsuitable for coal mining and minimization measures would be applied in GH. However, there are no existing coal leases and development of

federal coal resources is not anticipated during the life of this plan. Therefore, no impacts are expected from coal.

Fewer acres (46,397 acres of BLM mineral estate and Sprague's pipit distribution) would be open to solid mineral exploration or development compared to Alternative A, and PH (46,397 acres) would be closed to mineral materials disposal and non-energy solid leasable mineral exploration and development. BMPs would be applied on existing leases, and RDFs would be applied to future leases (BMPs for locatable minerals). Together, these actions would reduce impacts on other special status species from solid minerals compared to Alternative A. Because mineral potential is low for mineral materials, these restrictions may have little practical impact on special status species but it would preclude any potential future development.

Impacts from Fire and Fuels Management

Fuels treatments under Alternative B would be designed to protect sagebrush ecosystems and would thereby protect habitat for those other special status species that rely on these habitats. The BLM would maintain sagebrush cover, apply seasonal restrictions, protect winter range, and require use of native seeds. The BLM would prioritize suppression in PH and in GH where fires would threaten PH. Together these actions would reduce the effects from wildland fire. However, suppression over large areas could allow for fuels to build up and could lead to a large-scale fire over the long term.

Impacts from Habitat Restoration and Vegetation Management

Habitat restoration and vegetation management actions would aim to improve GRSG habitat and prioritize restoration efforts to benefit GRSG habitats, including reducing invasive plants. This would improve habitat for other special status species that use the same habitat as GRSG.

Impacts from ACECs

Impacts would be the same as under Alternative A.

4.18.6 Alternative C

Impacts from Travel and Transportation Management

Similar to Alternative A, motorized wheeled vehicles would be limited to existing roads and trails on 30,030 acres. Disturbance, changes in habitat, and mortality from travel and transportation management would be similar to Alternative B; however, management under Alternative C would not allow roads to be built within four miles of a lek in PH or GH. This buffer would cover nearly all PH. Impacts would be further reduced from the Alternative A baseline, since protections would apply to both PH and GH, and the BLM would apply additional mitigation requirements. In PH and GH, no upgrading of existing routes or capacity would be allowed unless it is necessary for motorist safety, or eliminates the need to construct a new road. Any impacts shall be mitigated

with methods that have been demonstrated to be effective to offset the loss of GRSG habitat.

Impacts from Recreation

Impacts from recreation under Alternative C would be similar to those described for Alternative B. However, impacts would be reduced compared to Alternative A (and reduced below Alternative B levels) since restrictions would apply to both PH and GH. These measures would further reduce disturbance from recreational activities in potential habitat.

Impacts from Lands and Realty

Under Alternative C, PH and GH would be designated as a ROW exclusion area and no wind energy development would be allowed. No areas would be identified for disposal. Together, these management actions would reduce impacts from human disturbance and changes to habitat.

Impacts from Range Management

Impacts from range management under Alternative C would be similar to those described for Alternative B, although impacts would be reduced due to increased restrictions that would be applied to both PH and GH. For example, the BLM would make fewer AUMs available (3,740 AUMs), would not allow new water developments, and would avoid all new structural range improvements and location of supplements in PH and GH. Together, these management actions would reduce impacts from changes to habitat as a result of grazing as compared to Alternative A.

Impacts from Fluid Minerals

Under Alternative C, 66,293 acres, of which all acres would be Sprague's pipit distribution, would be closed to fluid mineral leasing and conservation measures would be applied on leased fluid mineral estate and split estate lands. Conservation measures would be more restrictive compared to Alternative B. These actions would reduce the likelihood and extent of impacts caused by fluid mineral development.

However, oil and gas development would have limited differences among the alternatives because,, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on other special status species related to surface disturbance and occupancy.

Impacts from Solid Minerals

Impacts from solid minerals under Alternative C would be similar to those described for Alternative B. No impacts are expected from coal. Impacts would be reduced compared to Alternative B since closures and restrictions would apply to both PH and GH. Together, these actions would reduce impacts on other special status species from solid minerals compared to Alternative A. Because mineral potential is low for coal and mineral materials, these

restrictions may have little practical impact on special status species but it would preclude any potential future development.

Impacts from Fire and Fuels Management

Impacts from fire and fuels management under Alternative C would be similar to those described under Alternative B, although the BLM would not consider the use of livestock to reduce fine fuels. While this would reduce the likelihood of impacts from livestock on habitat and species, it could also allow for fuels to build up and could increase the likelihood of a large fire that would destroy special status species habitat.

Impacts from Habitat Restoration and Vegetation Management

Impacts from habitat restoration and vegetation management would be similar to Alternative B but habitat improvements would be applied to both PH and GH under Alternative C. As a result, a greater area of habitat would be improved for some special status species.

Impacts from ACECs

Under Alternative C, all PH (32,900 acres) would be designated as an ACEC. This would afford protections to other special status species that occur in the GRSG ACEC.

4.18.7 Alternative D

Impacts from Travel and Transportation Management

Similar to Alternative A, motorized wheeled vehicles would be limited to existing roads and trails on 30,030 acres. Under Alternative D, closures would be evaluated when OHV use is found to cause adverse habitat impacts. Management actions that address disturbance, changes in habitat, and mortality from travel and transportation management similar to Alternative B, though many would apply to both PH and GH and would thus encompass a larger area where impacts would be reduced.

Impacts from Recreation

Impacts from recreation on other special status species under Alternative D would be the same as those described under Alternative B.

Impacts from Lands and Realty

All lands within the decision area would be designated as ROW avoidance areas, although PH would be an exclusion area for wind energy. Impacts from co-location of facilities and lands disposal would be the same as those described for Alternative B. Overall, management actions would reduce impacts from disturbance and changes in habitat compared to Alternative A.

Impacts from Range Management

Impacts from range management would be similar to those described for Alternative B, although the BLM would have more tools available to complete

their Land Health Assessments and would thus be more likely to complete these assessments in a timely manner. In addition, the BLM would consider other priority species when conducting vegetation treatments, which could benefit some special status species in the long term. Together, these actions would reduce impacts on other special status species from range management compared to Alternative A.

Impacts from Fluid Minerals

Under Alternative D, no lands would be closed to fluid mineral leasing, but 61,197 acres of Sprague's pipit distribution would be open to leasing subject to an NSO stipulation. The BLM would apply CSU stipulations on GH. In addition, a number of operational constraints would be applied to existing leases as COAs in PH, which would reduce impacts from disturbance and changes to habitat on other special status species in these areas.

However, oil and gas development would have limited differences among the alternatives because,, although there is high potential in GRSG habitat, most of the resources have already been developed; therefore, opening or closing areas to development would have minimal impacts on other special status species related to surface disturbance and occupancy.

Impacts from Solid Minerals

Under Alternative D, restrictions on coal mining would be the same as described for Alternative B. However, there are no existing coal leases and development of federal coal resources is not anticipated during the life of this plan. Therefore, no impacts are expected from coal.

Acres open to solid mineral exploration or development would be the same as under Alternative A, although under Alternative D, the BLM would apply RDFs (BMPs for locatable minerals) as needed to reduce impacts. Impacts from mineral materials disposal and non-energy solid leasable mineral exploration and development would be the same as described for Alternative B. Together, these actions would reduce impacts from disturbance and changes in habitat on other special status species compared to Alternative A. Because mineral potential is low for mineral materials, these restrictions may have little practical impact on special status species but it would preclude any potential future development.

Impacts from Fire and Fuels Management

Impacts from fire and fuels management would be similar to those described for Alternative B, although requirements and restrictions under Alternative D would be less stringent and could allow for increased impacts on special status species habitat in comparison.

Impacts from Habitat Restoration and Vegetation Management

Impacts from habitat restoration and vegetation management would be similar to those described for Alternative B, but BLM would consider other priority species habitat when prioritizing restoration projects and creating landscape

patterns. This could improve habitat for other special status species over the long term.

Impacts from ACECs
Impacts would be the same as under Alternative A.

4.19 RENEWABLE ENERGY

4.19.1 Methods and Assumptions

Indicators
Indicators of impacts on renewable energy are as follows:

- Acres of lands with "Good" or better solar potential within ROW exclusion and avoidance areas within PH/GH
- Acres of lands with "Good" or better wind potential within ROW exclusion and avoidance areas within PH/GH

Assumptions
The analysis includes the following assumptions:

- "Good" or better wind potential is classified as wind speeds of 7.0 meters/second at 50 meter height or at wind power density of above 400 watts/meter (NREL 2012a).
- "Good" or better solar potential is classified as having average annual solar energy above 6.0 kilowatt-hour/square meter/day or a solar power density above 400 watts/square meter (NREL 2012b).
- Existing ROWs may be modified on their renewal, assignment, or amendment if the requested actions meet the objectives of the amended RMP.
- ROW holders may continue their authorized use as long as they are in compliance with the terms and conditions of their grant.
- The demand for ROWs would increase over the life of the amended RMP.
- Renewable energy resources include solar, wind, and biomass facilities. Biomass projects are authorized under the timber regulations, unless a new facility is being authorized for biomass production. Based on recent trends (see **Chapter 3**), the development of biomass facilities within the planning area is unlikely; therefore, impacts from biomass production facilities are not analyzed.

Alternatives were evaluated for acres of ROW avoidance, acres of ROW exclusion, areas where new road construction is prohibited or to be avoided.

All of these factors are considered to be impediments to solar and wind development. Alternatives with greater acreages of such restrictions are considered to have a greater impact on solar and wind development potential then alternatives with fewer acres of such restrictions.

4.19.2 Nature and Type of Effects

Impacts on solar and wind developments are generally related to where ROW authorizations are allowed to occur, the mitigation measures required for specific project siting, and special stipulations required for resource protection.

ROWs can only occur on lands that are not ROW exclusion areas. Alternatives with greater ROW exclusion areas would have long-term direct impacts on the ability for solar and wind projects to be developed.

As discussed in **Section 4.3**, Lands and Realty, ROW applications may be filed within ROW avoidance areas; however, projects proposed in such areas may be subject to restrictions that would add application processing time and increased project costs. Alternatives with greater ROW avoidance areas are considered to have short-term direct impacts (e.g., special surveys, reports, and construction and reclamation BMPs) and long-term direct impacts (e.g., potential operation and maintenance requirements) on the development of renewable energy resources.

Implementing management for the following resources would have negligible or no impact on renewable energy and are therefore not discussed in detail: travel and transportation management, recreation, range management, fluid minerals, solid minerals, mineral split estate, fire and fuels management, habitat restoration/vegetation management, and ACECs.

4.19.3 Impacts Common to All Alternatives

The acreages of ROW exclusion and avoidance areas vary across alternatives and are provided in **Table 4-34**, BLM-Administered Lands Managed as ROW Exclusion and Avoidance Areas.

Table 4-34
BLM-Administered Lands Managed as ROW Exclusion and Avoidance Areas

	Alternative A	Alternative B	Alternative C	Alternative D
ROW exclusion area (acres)	0	32,900	32,980	32,900
ROW avoidance area (acres)	0	80	0	32,900
Open area (acres)	33,030	50	50	130[1]

[1] PH would be exclusion areas for new ROW wind energy developments.

There is no "Good" (6.0 kilowatt-hour/square meter/day) or better solar potential within the planning area. As such, none the alternatives would result in impacts on solar energy development potential.

Table 4-35, "Good" or Better Wind Potential That Would Be Managed as ROW Exclusion and Avoidance Areas, provides an overview of impacts across alternatives on wind development potential through showing the number of acres of "Good" or better (Class 4 or higher) wind potential within ROW exclusion and avoidance areas.

Table 4-35
"Good" or Better Wind Potential That Would Be Managed as ROW Exclusion and Avoidance Areas

	Alternative A	Alternative B	Alternative C	Alternative D
ROW exclusion area (acres)	0	3,606	3,686	32,900[1]
ROW avoidance area (acres)	0	80	0	3,686

[1] PH would be exclusion areas for new ROW wind energy developments.

4.19.4 Alternative A

Impacts from Lands and Realty

Under Alternative A, zero acres of lands with "Good" or better wind potential would be affected by ROW exclusion or avoidance areas. All lands with such potential would continue to be open for ROW applications on a case-by-case basis.

4.19.5 Alternative B

Impacts from Lands and Realty

Under Alternative B, PH (32,900 acres) would be managed as ROW exclusion areas and would not be open for ROW authorizations. Within this ROW exclusion area there are 3,606 acres considered to have "Good" or better wind potential. This represents 3,606 fewer acres open to wind energy development than under Alternative A. Therefore 97 percent of lands with "Good" or better wind potential that are open for ROW applications under Alternative A would become ROW exclusion areas under Alternative B.

Under Alternative B, an additional 80 acres would be managed as ROW avoidance areas. Within this ROW avoidance area all 80 acres are considered to have "Good" or better wind potential. This represents 80 fewer acres available for wind development without substantial restrictions. Therefore, under Alternative B, two percent of lands with "Good" or better wind potential

available for ROW authorizations would be subject to substantial development and operation restrictions when compare with Alternative A.

In total, 99 percent of the lands with "Good" or better wind potential within the decision area would be affected under Alternative B. Ninety seven percent of these lands would be completely unavailable for wind development while the other remaining would be substantially restricted as compared to Alternative A.

Table 4-36, Wind Potential Affected by Alternative B, provides a detailed overview of how these ROW restrictions relate to individual wind classes.

Table 4-36
Wind Potential Affected by Alternative B

Wind Potential (m/s at 50m)	Total Acres on BLM-Administered Land	Acres of ROW Exclusion (percent of total)	Acres of ROW Avoidance (percent of total)
Class 1 "Poor" 0.0-5.6	0	0	0
Class 2 "Marginal" 5.6-6.4	11,074	11,074	0
Class 3 "Fair" 6.4-7.0"	16,198	16,198	0
Class 4 "Good" 7.0-7.5	3,730	3,606 (97%)	80 (0.3%)
Class 5 "Excellent" 7.5-8.0	0	0	0
Class 6 "Outstanding" 8.0-8.8	0	0	0
Class 7 "Superb" 8.8 & above	0	0	0
Total Classes 1-7	**31,002**	**30,878 (99.6%)**	**80 (0.3%)**

NREL 2012a; BLM 2012a

Collocating new utilities within existing ROWs could reduce land use conflicts by grouping similar facilities and activities in specific areas and away from conflicting developments and activities. However, developing in existing ROWs could limit options for facility design and selection of more-preferable locations.

4.19.6 Alternative C

Impacts from Lands and Realty

Under Alternative C, 32,980 acres would be managed as ROW exclusion areas and would not be open for ROW applications. Within this ROW exclusion area, 3,686 of these acres are considered to have "Good" or better wind potential. Across the entire decision area, there are 3,730 acres of land considered to have "Good" or better wind potential; therefore, the ROW exclusion areas applied under Alternative C represent 99 percent of those lands. Under Alternative C, 3,686 fewer acres would be open to wind energy development than under Alternative A. In summary, 99 percent of lands with

"Good" or better wind potential that are open for ROW applications under Alternative A would become ROW exclusion areas under Alternative C and would not be available for wind development.

Under Alternative C, zero acres would be managed as ROW avoidance areas.

Table 4-37, Wind Potential Affected By Alternative C, provides a detailed overview of how these ROW restrictions relate to individual wind classes.

Table 4-37
Wind Potential Affected By Alternative C

Wind Potential (m/s at 50m)	Total Acres on BLM-Administered Land	Acres of ROW Exclusion (percent of total)	Acres of ROW Avoidance (percent of total)
Class 1 "Poor" 0.0-5.6	0	0	0
Class 2 "Marginal" 5.6-6.4	11,074	11,074	0
Class 3 "Fair" 6.4-7.0"	16,198	16,198	0
Class 4 "Good" 7.0-7.5	3,730	3,686 (99%)	0
Class 5 "Excellent" 7.5-8.0	0	0	0
Class 6 "Outstanding" 8.0-8.8	0	0	0
Class 7 "Superb" 8.8 & above	0	0	0
Total Classes 1-7	**31,002**	**30,958(99.9%)**	**0(0%)**

Source: NREL 2012a; BLM 2012a

4.19.7 Alternative D

Impacts from Lands and Realty

Under Alternative D, PH (32,900 acres) would be managed as ROW exclusion areas for wind energy ROW applications Therefore the same acreage would be closed to wind development as Alternative B.

Under Alternative B, an additional 80 acres would be managed as ROW avoidance areas. Impacts from avoidance areas would be the same as Alternative B.

Table 4-38, Wind Potential Affected By Alternative D, provides a detailed overview of how these ROW restrictions relate to individual wind classes.

Table 4-38
Wind Potential Affected By Alternative D

Wind Potential (m/s at 50m)	Total Acres on BLM-Administered Land	Acres of ROW Exclusion (percent of total)	Acres of ROW Avoidance (percent of total)
Class 1 "Poor" 0.0-5.6	0	0	0
Class 2 "Marginal" 5.6-6.4	11,074	0	11,074
Class 3 "Fair" 6.4-7.0"	16,198	0	16,198
Class 4 "Good" 7.0-7.5	3,730	0	3,606 (97%)
Class 5 "Excellent" 7.5-8.0	0	0	0
Class 6 "Outstanding" 8.0-8.8	0	0	0
Class 7 "Superb" 8.8 & above	0	0	0
Total Classes 1-7	**31,002**	**0(0%)**	**30,878(99.6%)**

Source: NREL 2012a; BLM 2012a

4.20 SOCIAL AND ECONOMIC CONDITIONS

4.20.1 Methods and Assumptions

The analysis of economic effects considers job and labor income in an economic impact analysis. Economic impact analysis is used to evaluate potential direct, indirect, and induced effects on the economy. The analytical technique used by the BLM to estimate employment and income impacts is "input-output" analysis using the IMPLAN Pro software system. Input-output analysis is a means of examining relationships within an economy both between businesses and between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. The resulting mathematical representation allows one to examine the effect of a change in one or several economic activities on an entire economy with all else constant. This examination is called economic impact analysis. IMPLAN translates changes in final demand for goods and services into economic effects, such as labor income and employment of the affected area's economy. The IMPLAN modeling system requires one to build regional economic models of one or more counties for a particular year. The model for this analysis uses 2010 IMPLAN data and the impact area for this analysis includes Bowman, Golden Valley and Slope counties.

The economic impacts on the local economy from the RMPA are measured by estimating the employment (full- and part-time jobs) and labor income generated by grazing on allotments potentially affected under the alternatives. The direct employment and labor income benefit employees and their families and therefore directly affect the local economy. Additional indirect and induced multiplier effects (ripple effects) are generated by the direct activities. Together

the direct and multiplier effects comprise the total economic impacts on the local economy (**Table 4-39**, Employment and Labor Income Generated from Grazing on Allotments Covered under the RMPA). The multiplier effects tied to grazing were estimated using IMPLAN. Potential limitations of these estimates are the time lag in IMPLAN data and the data intensive nature of the input-output model.

4.20.2 Alternative A

A summary of impacts on employment and labor income across alternatives is provided in **Table 4-39**. Details of analysis are provided below by resource and resource use.

Table 4-39
Employment and Labor Income Generated from Grazing on Allotments Covered under the RMPA

	Employment (full and part time jobs)				Labor Income (thousands of 2013 dollars)			
	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D
Direct	7	7	4	7	$13,693	$13,693	$8,859	$13,693
Indirect & Induced	3	3	2	3	$99,350	$99,350	$64,274	$99,350
Total	10	10	6	10	$113,043	$113,043	$73,133	$113,043

Source: IMPLAN 2010

Impacts from Range Management

Livestock grazing would continue to be managed under the existing RMP and Standards for Rangeland Health. Consequently current economic contributions from allocated grazing on allotments covered under this RMPA would continue. Use of allocated forage on these allotments generates 10 total jobs (direct, indirect and induced) and $113,000 in labor income (direct, indirect and induced) on an average annual basis within the impact area economy (**Table 4-39**). As noted in the discussion of employment specialization above, the three-county impact area can be considered specialized with respect to the grazing sector. Direct employment generated as a result of grazing under this alternative would provide seven jobs, which would comprise about 5.6 percent of employment in this sector.

Forage provided by the BLM is not the entire source of forage used by permittees: it provides an important source of forage that complements additional sources on other public or private land that may be used for unique purposes or during other parts of the year. Estimating the contribution of livestock grazing on the impact area using only BLM AUMs may underestimate the actual importance of BLM-administered lands as a forage resource if BLM AUMs are part of an overall grazing system; where a change in BLM grazing

affects the optimal use of the rest of forage resources. For example, reductions in allocated forage on BLM-administered lands could reduce use on private land given this interdependency in use. Consequently the employment and income estimates from allocated use (10 jobs and $113,000 in labor income) are likely an underestimate of employment and income estimates with additional use of other sources of forage attributable to BLM. Estimates of this additional use are not available for allocated use in the decision area but are acknowledged and discussed qualitatively for each alternative.

Impacts from Energy Development

Under Alternative A, existing contributions from oil and gas development on federal mineral estate in the decision area would continue. Approximately 9,860 acres of PH is found on unleased federal mineral estate and has high potential. Existing oil and gas leases would continue to be developed according to existing lease terms. Consequently future potential development of high potential federal mineral estate could occur in the decision area. Estimates of potential exploration and development under this alternative indicate that approximately four wells could be drilled on an average annual basis between 2013 and 2029 (DOI 2011). If this exploration and development occurred, levels of employment and income could be slightly greater than currently supported in the three county area. Effects from levels of production and anticipated levels of exploration and development under this alternative are depicted in **Table 4-40**, Employment and Labor Income Generated from Oil and Gas Exploration and Development on BLM in the Decision Area. Actual future production and market price cannot be projected; therefore, estimates of effects under this alternative may not be an accurate portrayal of actual impacts under future market conditions.

Table 4-40
Employment and Labor Income Generated from Oil and Gas Exploration and Development on BLM in the Decision Area

	Employment (full and part time jobs)				Labor Income (thousands of 2013 dollars)			
	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D
Direct	16.0	15.8	15.8	15.9	$639,234	$632,858	$628,128	$628,116
Indirect & Induced	5.4	5.1	5.1	5.3	$42	$30	$30	$39
Total	21.4	20.9	20.9	21.3	$639,276	$632,888	$628,157	$628,155

Source: IMPLAN 2010

Under Alternative A annual payments to local governments in the analysis area would be approximately $6.5 million which includes a portion of oil and gas royalties from existing production and anticipated production under this alternative. These payments would support about 116 jobs and $4 million in

labor income (direct, indirect and induced effects) on an average annual basis. Payments to counties and their impacts under this alternative are slightly higher than the other alternatives since anticipated well drilling is higher. As discussed above, this estimate is based on current prices and potential production. Actual production and market price cannot be projected thus, these estimates may not be an accurate portrayal of actual impacts. Regardless contributions from these payments would remain an important portion of general government revenue (approximately 30 percent of allocated revenue from all sources).

Impacts from Habitat Restoration and Vegetation Management and ACECs

Management under this alternative would not specifically protect GRSG habitat. In addition, no ACECs to protect GRSG habitat would be included in this alternative. As a result well-being and non-market values associated with GRSG habitat would not be protected.

4.20.3 Alternative B

Impacts from Range Management

Under Alternative B, there would be no change to the acreage open for grazing or available AUMs. AMPs and permit renewals would be used to incorporate GRSG management objectives into grazing allotments. Consequently, it is anticipated that current economic contributions from allocated grazing on allotments covered under this RMPA would continue. Use of allocated forage on these allotments generates 10 total jobs (direct, indirect and induced) and $113,000 in labor income (direct, indirect and induced) on an average annual basis within the impact area economy (**Table 4-39**). As noted in the discussion of employment specialization above, the three-county impact area can be considered specialized with respect to the grazing sector. Direct employment generated as a result of grazing under this alternative would provide seven jobs which would comprise about 5.6 percent of employment in this sector. Use on BLM-administered lands that complements additional sources of forage on other public or private land would continue under this alternative.

Impacts from Energy Development

Under Alternative B, prior existing rights on developed oil and gas leases would enable current contributions to continue from oil and gas development on federal mineral estate in the decision area. However, future development within PH found on unleased federal mineral estate with high potential would not occur since all federal mineral estate within PH would be closed to fluid mineral leasing. Regardless, some anticipated development is expected on other lands in the decision area; estimates of potential exploration and development under this alternative indicate that approximately two wells could be drilled on an average annual basis between 2013 and 2029 (DOI 2011). If this exploration and development occurred, levels of employment and income could be slightly greater than currently supported, but less than estimated under Alternative A.

Effects from levels of production and anticipated levels of exploration and development under this alternative are depicted in **Table 4-40**. Actual future production and market price cannot be projected; therefore, estimates of effects under this alternative may not be an accurate portrayal of actual impacts under future market conditions.

Under Alternative B, annual payments to local governments in the analysis area would be approximately $6.4 million which includes a portion of oil and gas royalties from existing production and anticipated production under this alternative. These payments would support about 114 jobs and $4 million in labor income (direct, indirect and induced effects) on an average annual basis. Payments to counties and their impacts under this alternative are slightly lower than the other alternatives since anticipated well drilling is lower. Regardless, current contributions from oil and gas production in the decision area (as presented **Section 3.21**, Social and Economic Conditions) could be accommodated under this alternative. As discussed above, this estimate is based on current prices and potential production. Actual production and market price cannot be projected; therefore, these estimates may not be an accurate portrayal of actual impacts. Contributions from these payments would remain an important portion of general government revenue (approximately 30 percent of allocated revenue from all sources).

Impacts from Habitat Restoration and Vegetation Management and ACECs

Under this alternative restoration projects would be prioritized based on benefit to GRSG; however, no ACECs to protect GRSG habitat would be included in this alternative. As a result well-being non-market values associated with GRSG habitat would be protected to a greater degree than Alternative A and D but less than Alternative C.

4.20.4 Alternative C

Impacts from Range Management

Under Alternative C, grazing would be reduced by 50 percent on all allotments within the Big Gumbo area. Consequently, it is anticipated that economic contributions from allocated grazing on allotments covered under this RMPA would be less than currently contributed. As a result of the reductions in the Big Gumbo area employment would decrease from 10 to six total jobs (direct, indirect and induced), and labor income would decrease from $113,000 to $73,000 (direct, indirect, and induced) on an average annual basis within the impact area economy (**Table 4-39**). As noted in the discussion of employment specialization, the three-county impact area can be considered specialized with respect to the grazing sector. Direct employment generated as a result of grazing under this alternative would decrease from seven jobs to four jobs which would correspond to a decrease from 5.6 percent to 3.4 percent of employment in this sector. Use on BLM-administered lands that complements

additional sources of forage on other public or private land would decrease under this alternative.

Impacts from Energy Development

Under Alternative C, prior existing rights on developed oil and gas leases would enable current contributions to continue from oil and gas development on federal mineral estate in the decision area. However, future development within GH and PH found on unleased federal mineral estate with high potential would not occur since all federal mineral estate within PH and GH would be closed to fluid mineral leasing. Regardless some anticipated development is expected on other lands in the decision area; estimates of potential exploration and development indicate that approximately two wells could be drilled on an average annual basis between 2013 and 2029 (DOI 2011). If this exploration and development occurred, levels of employment and income could be slightly greater than currently supported, but less than estimated under Alternative A. Effects from levels of production and anticipated levels of exploration and development under this alternative are depicted in **Table 4-40**. Actual future production and market price cannot be projected; therefore, estimates of effects under this alternative may not be an accurate portrayal of actual impacts under future market conditions.

Under Alternative C, annual payments to local governments in the analysis area would be approximately $6.4 million, which includes a portion of oil and gas royalties from existing production and anticipated production under this alternative. These payments would support about 114 jobs and $4 million in labor income (direct, indirect and induced effects) on an average annual basis. Payments to counties and their impacts under this alternative are slightly lower than the other alternatives since anticipated well drilling is lower. Regardless, current contributions from oil and gas production in the decision area (as presented **Section 3.21**, Social and Economic Conditions) could be accommodated under this alternative. As discussed above, this estimate is based on current prices and potential production. Actual production and market price cannot be projected; therefore, these estimates may not be an accurate portrayal of actual impacts. Contributions from these payments would remain an important portion of general government revenue (approximately 30 percent of allocated revenue from all sources).

Impacts from Habitat Restoration and Vegetation Management and ACECs

Under this alternative, additional actions would promote expansion of GRSG habitat at levels greater than the other alternatives. In addition, an ACEC to protect GRSG habitat would be designated under in this alternative. As a result well-being and non-market values associated with GRSG habitat would be protected to a greater degree than the other alternatives.

4.20.5 Alternative D

Impacts from Range Management

Under Alternative D, there would be no change to the acreage open for grazing or available AUMs. GRSG habitat objectives would be considered when evaluating land health standards. Consequently, it is anticipated that current economic contributions from allocated grazing on allotments covered under this RMPA would continue. Use of allocated forage on these allotments generates 10 total jobs (direct, indirect and induced) and $113,000 in labor income (direct, indirect and induced) on an average annual basis within the impact area economy (**Table 4-39**). As noted in the discussion of employment specialization above, the three-county impact area can be considered specialized with respect to the grazing sector. Direct employment generated as a result of grazing under this alternative would provide seven jobs, which would comprise about 5.6 percent of employment in this sector. Use on BLM-administered lands that complements additional sources of forage on other public or private land would continue under this alternative.

Impacts from Energy Development

Under Alternative D, prior existing rights on developed oil and gas leases would enable current contributions to continue from oil and gas development on federal mineral estate in the decision area. However, future development within PH found on unleased federal mineral estate with high potential could occur since PH would be subject to NSO stipulations. In addition, anticipated development is expected on other lands with lower potential in the decision area; estimates of potential exploration and development under this alternative indicate that approximately three wells could be drilled on an average annual basis between 2013 and 2029 (DOI 2011). If this exploration and development occurred, levels of employment and income could be slightly greater than Alternatives B and C but less than estimated under Alternative A. Effects from levels of production and anticipated levels of exploration and development under this alternative are depicted in **Table 4-40**. Actual future production and market price cannot be projected; therefore, estimates of effects under this alternative may not be an accurate portrayal of actual impacts under future market conditions.

Under Alternative D, annual payments to local governments in the analysis area would be approximately $6.5 million which includes a portion of oil and gas royalties from existing production and anticipated production under this alternative. These payments would support about 115 jobs and $4 million in labor income (direct, indirect and induced effects) on an average annual basis. Payments to counties and their impacts under this alternative are slightly higher than Alternatives B and C since anticipated well drilling is higher. Regardless, current contributions from oil and gas production in the decision area (as presented **Section 3.21**, Social and Economic Conditions) could be accommodated under this alternative. As discussed above, this estimate is based

on current prices and potential production. Actual production and market price cannot be projected; therefore, these estimates may not be an accurate portrayal of actual impacts. Contributions from these payments would remain an important portion of general government revenue (approximately 30 percent of allocated revenue from all sources).

Impacts from Habitat Restoration and Vegetation Management and ACECs

Under this alternative, consideration for other threatened, endangered, or sensitive species would be evaluated in addition to GRSG, when prioritizing restoration projects. In addition, no ACECs to protect GRSG habitat would be included in this alternative. As a result, well-being and non-market values associated with GRSG habitat would be protected to a greater degree than Alternative A, but less than the other alternatives.

4.21 ENVIRONMENTAL JUSTICE

While minority and low-income populations exist in the area, the alternatives are not expected to have a disproportionately high and adverse human health or environmental effects on these communities. Impacts to local communities are expected to be negligible, and there is no reason to suspect that any impacts would disproportionately affect minority and low income populations. For example, decreases in employment and income anticipated under Alternative C would be distributed amongst all segments of the population regardless of minority or poverty status.

4.22 UNAVOIDABLE ADVERSE IMPACTS

Section 102(C) of NEPA requires disclosure of any adverse environmental effects that cannot be avoided should the proposal be implemented. Unavoidable adverse impacts are those that remain following the implementation of mitigation measures or impacts for which there are no mitigation measures. Some unavoidable adverse impacts occur as a result of implementing the North Dakota Greater GRSG RMPA. Others are a result of public use of the decision area lands. This section summarizes major unavoidable impacts; discussions of the impacts of each management action (in the discussion of impacts by alternatives for each resource topic) provide greater information on specific unavoidable impacts.

Surface-disturbing activities would result in unavoidable adverse impacts under current BLM policy to foster multiple uses. Although these impacts would be mitigated to the extent possible, unavoidable damage would be inevitable. Long-term conversion of areas to other uses such as mineral and energy development would increase erosion and change the relative abundance of species within plant communities, the relative distribution of plant communities, and the relative occurrence of seral stages of those communities. Where habitat areas are not protected by specific wildlife stipulations, oil and gas development would result in unavoidable long-term wildlife habitat loss where developed. However,

oil and gas development would have limited impacts on disturbance because, although there is high potential in GRSG habitat, most of the high potential resources have already been developed; therefore, opening or closing areas to development would have minimal changes among the alternatives from converting areas to oil and gas development.

Wildlife and livestock would contribute to soil erosion, compaction, and vegetation loss, which could be extensive during drought cycles and dormancy periods. Conversely, unavoidable losses or damage to forage from resource development in the planning area would affect livestock and wildlife. Some level of competition for forage between these species, although mitigated to the extent possible, would be unavoidable. Instances of displacement, harassment, and injury could also occur.

Recreational activities, mineral resource development, and general use of the planning area would introduce additional ignition sources into the planning area, which would increase the probability of wildland fire occurrence and the need for suppression activities. These activities, combined with continued fire suppression, would also affect the overall composition and structure of vegetation communities, which could increase the potential for high-intensity wildland fires.

As recreation demand increases, recreation use would disperse, creating unavoidable conflicts as more users compete for a limited amount of space. In areas where development activities would be greater, the potential for displaced users would increase.

Numerous land use restrictions imposed throughout the planning area to protect sensitive resources and other important values, by their nature, affect the ability of operators, individuals, and groups who use BLM-administered lands to do so freely without limitations. These restrictions could also require closing roads or trails, or limiting certain modes or seasons of travel. Although attempts would be made to minimize these impacts by limiting them to the level of protection necessary to accomplish management objectives, and providing alternative use areas for affected activities, unavoidable adverse impacts would occur under all alternatives.

4.23 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Section 102(C) of NEPA requires a discussion of any irreversible or irretrievable commitments of resources that are involved in the proposal should it be implemented. An irretrievable commitment of a resource is one in which the resource or its use is lost for a period of time (e.g., extraction of any solid mineral ore or oil and gas). An irreversible commitment of a resource is one that cannot be reversed (e.g., the extinction of a species).

Implementing the North Dakota Greater Sage-Grouse RMPA management actions would result in surface-disturbing activities, including permitted recreation activities, mineral and energy development, and development in

ROWs, which result in a commitment to the loss of irreversible or irretrievable resources. Mineral extraction or sale eliminates a nonrenewable resource, thereby resulting in irreversible and irretrievable commitment of the resource. Surface disturbance associated with energy development is reclaimed after the resource is removed. However, surface disturbances from gas storage, road ROWs, and wind and solar development are a long-term encumbrance of the land. Soil erosion or the loss of productivity and soil structure may be considered irreversible commitments to resources. Surface-disturbing activities, therefore, would remove vegetation and accelerate erosion that would contribute to irreversible soil loss; however, management actions, RDFs, and BMPs are intended to reduce the magnitude of these impacts and restore some of the soil and vegetation lost. Primarily because of the number of acres available for energy and mineral development, and development in ROWs, such disturbances would occur to the greatest degree under Alternative A; management actions under Alternative D would be similar but with more stipulations for surface-disturbing activities. Alternative B, and to a greater extent Alternative C, contains additional conservation measures, mitigation measures, RDFs, and stipulations to protect planning area resources.

Across all alternatives, an irreversible commitment of nonrenewable fossil fuels (e.g., oil, gas, and coal), solid minerals, and mineral materials would occur from development over the life of the North Dakota RMP.

4.24 Relationship Between Local Short-term Uses and Long-term Productivity

Section 102(C) of NEPA requires discussion of the relationship between local, short-term uses of the human environment, and the maintenance and enhancement of long-term productivity of resources. As described in the introduction to this chapter, "short term" is defined as anticipated to occur within one to five years of the activity's implementation. "Long term" is defined as following the first five years of implementation, but within the life of the North Dakota RMP.

Short-term use of air resources would not affect long-term productivity, except that air quality emissions in high enough concentrations could reduce vegetation and plant vigor. Across all alternatives, management actions would result in various short-term effects, such as increased localized soil erosion, fugitive dust emission, vegetation loss or damage, and wildlife disturbance. Surface-disturbing activities, including utility construction and mineral resource development would result in the greatest potential for impacts on long-term productivity. Management prescriptions, RDFs, and BMPs are intended to minimize the effect of short-term commitments and reverse change over the long term. These prescriptions and the associated reduction of impacts would be greatest under Alternative C and are present to a lesser extent under Alternative B for resources such as vegetation and wildlife habitat. However, BLM-administered

lands are managed to foster multiple uses, and some impacts on long-term productivity could occur.

Short-term use of an area to foster energy and minerals, and development in ROWs would result in long-term loss of soil productivity and vegetation diversity. Impacts would persist as long as surface disturbance and vegetation loss continue. In general, the loss of soil productivity would be directly at the point of disturbance, although long-term vegetation diversity and habitat value could be reduced due to fragmentation and the increased potential for invasive species to spread from the developments or disturbances. Alternatives A would have the greatest potential for short-term loss of productivity and diversity due to less stringent mitigation and reclamation standards contained under Alternatives B and C and D. Management actions under Alternative C would provide the greatest long-term productivity by deferring development in many areas through closures or application of major restrictions on development activities.

The short-term use of potential habitat for energy and minerals, and development in ROWs could also affect the long-term sustainability of some special status species. Sprague's pipit, as well as other terrestrial special status species, could be affected by habitat fragmentation associated with short-term resource uses and road construction and use.

Chapter 5
Cumulative Impacts

CHAPTER 5
CUMULATIVE IMPACTS

5.1 INTRODUCTION

This chapter presents the likely cumulative impacts on the human and natural environment that could occur from implementing the alternatives presented in **Chapter 2**, Alternatives. This chapter is organized by topic, similar to **Chapter 3**, Affected Environment, and **Chapter 4**, Environmental Consequences.

Cumulative impacts are effects on the environment that result from the impact of implementing any one of the North Dakota Greater Sage-Grouse RMPA/EIS alternatives in combination with other actions outside the scope of this plan, either within the planning area or adjacent to it. Cumulative impact analysis is required by CEQ regulations because environmental conditions result from many different factors that act together. The total effect of any single action cannot be determined by considering it in isolation, but must be determined by considering the likely result of that action in conjunction with many others. Evaluation of potential impacts considers incremental impacts that could occur from the proposed project, as well as impacts from past, present, and reasonably foreseeable future actions. Management actions could be influenced by activities and conditions on adjacent public and non-public lands beyond the planning area boundary; therefore, assessment data and information could span multiple scales, land ownerships, and jurisdictions. These assessments involve determinations that often are complex and, to some degree, subjective.

5.1.1 Cumulative Analysis Methodology

The cumulative impacts discussion that follows considers the alternatives in the context of the broader human environment – specifically, actions that occur outside the scope and geographic area covered by the planning area. Cumulative impact analysis is limited to important issues of national, regional, or local significance.

Because of the programmatic nature of the RMPA and cumulative assessment, the analysis tends to be broad and generalized to address potential impacts that could occur from a reasonably foreseeable management scenario combined with other reasonably foreseeable activities or projects. Consequently, this assessment is primarily qualitative for most resources because of a lack of detailed information that would result from project-level decisions and other activities or projects. Quantitative information is used whenever available and as appropriate to portray the magnitude of an impact. The analysis assesses the magnitude of cumulative impacts by comparing the environment in its baseline condition with the expected impacts of the alternatives and other actions in the same geographic area. The magnitude of an impact is determined through a comparison of anticipated conditions against the naturally occurring baseline as depicted in the affected environment (see **Chapter 3**) or the long-term sustainability of a resource or social system.

The following factors were considered in this cumulative impact assessment:

- Federal, nonfederal, and private actions.
- Potential for synergistic effects or synergistic interaction among or between effects.
- Potential for effects across political and administrative boundaries.
- Other spatial and temporal characteristics of each affected resource.
- Comparative scale of cumulative impacts across alternatives.

The geographic scope for the cumulative impact analysis extends to the planning area boundary. For **Section 5.1.3**, Special Status Species – Greater Sage-Grouse, the cumulative impact analysis includes an analysis at the WAFWA Management Zone I level, in addition to the planning area analysis. WAFWA management zones are biologically based delineations that were determined by GRSG populations and sub-populations identified within seven floristic provinces. Analysis at this level enables the decision maker to understand the impacts on GRSG at a biologically meaningful scale.

5.1.2 Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and reasonably foreseeable future actions are considered in the analysis to identify whether and to what extent the environment has been degraded or enhanced, whether ongoing activities are causing impacts, and trends for activities in and impacts on the area. Projects and activities are evaluated on the basis of proximity, connection to the same environmental systems, potential for subsequent impacts or activity, similar impacts, the likelihood a project would occur, and whether the project is reasonably foreseeable.

Projects and activities considered in the cumulative analysis were identified through meetings held with cooperators and BLM employees with local knowledge of the area. Each was asked to provide information on the most influential past, present, or reasonably foreseeable future actions. Additional information was obtained through discussions with agency officials and review of publicly available materials and websites.

Effects of past actions and activities are manifested in the current condition of the resources, as described in the affected environment (see **Chapter 3**) and in **Table 5-1**, Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the Cumulative Impact Scenario. Reasonably foreseeable future actions are actions that have been committed to or known proposals that would take place within a 20-year planning period. **Table 5-1** provides a list of future actions considered in the cumulative effects analysis.

Reasonably foreseeable future action scenarios are projections made to predict future impacts – they are not actual planning decisions or resource commitments. Projections, which have been developed for analytical purposes only, are based on current conditions and trends and represent a best professional estimate. Unforeseen changes in factors such as economics, demand, and federal, state, and local laws and policies could result in different outcomes than those projected in this analysis.

Other potential future actions have been considered and eliminated from further analysis because there is a small likelihood these actions would be pursued and implemented within the life of the plan or because so little is known about the potential action that formulating an analysis of impacts is premature and/or speculative. In addition, potential future actions protective of the environment (such as new regulations related to fugitive dust emissions) have less likelihood of creating major environmental consequences alone, or in combination with this planning effort. Federal actions such as species listing would require BLM to reconsider decisions created from this action because the consultations and relative impacts might no longer be appropriate. These potential future actions may have greater capacity to affect resource uses within the planning area; however, until more information is developed, no reasonable estimation of impacts could be developed.

Data on the precise locations and overall extent of resources within the planning area are considerable, although the information varies according to resource type and locale. Furthermore, understanding of the impacts on and the interplay among these resources is evolving. As knowledge improves, management measures (adaptive or otherwise) would be considered to reduce potential cumulative impacts in accordance with law, regulations, and North Dakota RMP.

Table 5-1
Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the Cumulative Impact Scenario

Human Actions	
Energy and minerals development	See **Table 4-1** for short-term and long-term estimates of the number of oil and gas wells and their acres of disturbance across the planning area. Acres of long-term disturbance from oil and gas wells in the planning area would be approximately 2,900 acres from new and existing wells and pads; this would be the same amongst all the alternatives. The number of new and existing wells would range from 475 to 548, depending on the alternative. No locatable minerals or coal projects are anticipated to occur in the next 20 years due to low potential.
Vegetation management	Vegetation treatments – potential conifer encroachment reduction project on BLM-administered lands within the southern portion of the PH core area. Project would not include prescribed fire. On private lands within Bowman and Slope Counties, through the NRCS SGI, the following has been accomplished since 2010: • 41 contracts that cover 73,993 acres have been written to improve GRSG habitat (13 contracts have been completed in the three years of the initiative and 28 are currently active). • 2,308 acres of cover crops have been planted to provide brood habitat for GRSG chicks. • 1,305 acres have been planted to permanent vegetation to increase nesting habitat and cover or improve brood rearing habitat. • 4,909 acres of native sagebrush habitat have been improved through prescribed grazing management for wildlife habitat management. • Many supporting practices have been installed such as fence and water developments to facilitate range management.
Lands and realty	Wind and Solar applications – no applications on BLM-administered lands in the past and none are expected.
	Built wind projects – one wind farm (13 turbines) located five miles west of Rhame, North Dakota on private lands.
	Proposed transmission lines greater than 230 kV – one potential proposal, totaling approximately 15 acres.
	Existing transmission line at 230 kV – one current 230 kV line, totaling approximately 13 acres.
	Existing transmission lines greater than 230 kV – none.
Recreation and visitor use	Site-specific travel plan to be completed within five years of ROD. Recreation use to remain according to past trends.
Livestock grazing	Rangeland health evaluations will continue. One range improvement planned - seven mile pipeline on BLM-administered lands in Big Gumbo area.
Roadway development	Current roads are filling the needs of the oil and gas companies. However, any new oil and gas wells may include a new road to the location. New well numbers in the planning area are anticipated to be low due to planning area being outside the Bakken field.

Table 5-1
Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the Cumulative Impact Scenario

Natural Processes	
Wildland fires	Historically there has been wildfire in the planning area on Forest Service, state, and private lands (not on BLM-administered lands) in the past 10 years. Fires have occurred on approximately 9,900 acres of National Forest System lands, 1,700 acres of state lands, and 9,500 acres of private lands (Forest Service 2013a).
Climate change	GHGs will continue to be emitted locally, regionally, and globally and continue to contribute to climate change.

Projects and activities identified as having the greatest likelihood to generate potential cumulative impacts when added to the North Dakota Greater Sage-Grouse RMPA/EIS alternatives are displayed in **Table 5-1**.

5.2 SPECIAL STATUS SPECIES – GREATER SAGE-GROUSE

5.2.1 Introduction

The cumulative effects analysis study area for GRSG extends beyond the planning area boundary and consists of WAFWA Sage-Grouse MZ I, which includes North Dakota. This Draft EIS contains a quantitative cumulative effects analysis for GRSG habitat within the planning area boundary. At the larger WAFWA Management Zone level, the analysis is primarily qualitative in nature. Data and information to enable a more comprehensive quantitative analysis may become available between the Draft EIS and the Final EIS, and may include the following: ongoing land use plan amendments and revisions, state plans that may not yet be completed, coordination with states and agencies during consistency reviews, and data from non-BLM-administered lands. Those data that become available will be compiled and included in the quantitative cumulative effects analysis for sage-grouse in the Final EIS.

The timeframe for this analysis is ten years. The assumptions and indicators follow those established for the analysis of direct and indirect effects in **Chapter 4**.

5.2.2 WAFWA Management Zone I Analysis

According to the COT report (USFWS 2013), the four most substantial threats to GRSG habitats and populations occurring across populations in MZ I include energy development, infrastructure, disease, and conversion of habitat to agricultural use. MZ I consists of four GRSG populations in relatively large regions: the Dakotas, northern Montana, the Powder River Basin and the Yellowstone Watershed (Garton et al. 2011). Privately-owned lands make up 66 percent of sagebrush in the Great Plains, with BLM-administered land making up 17 percent (Knick 2011). This management zone contains some of the highest-connected network of sage-grouse leks in the range (Knick and Hanser 2011),

but also contains less productive sagebrush similar to areas where sage-grouse have been extirpated (Wisdom et al. 2011). Sagebrush cover is naturally limited due to the preponderance of grassland ecosystems, and, with agricultural pressure and energy production, results in substantial habitat limitations for GRSG populations.

Regional assessments estimated that 7.2 percent of PPH and PGH in MZ I are directly influenced by agricultural development, and over 99 percent of these habitats are within approximately four miles of agricultural land. Less than one percent of GRSG habitats are directly influenced by a natural gas or oil well, but nearly 100 percent lie within 12 miles of a well (Johnson et al. 2011; Taylor et al. 2012). Currently, 6.3 million acres (14 percent) of GRSG habitat is leased for the development of federal fluid minerals. Most GRSG habitats within MZ I have the potential to be influenced by coal mining and geothermal energy development, although coal and mineral developments directly influence less than one percent of the lands in the region.

Livestock grazing, wildfire, spread of noxious weeds, especially cheatgrass, and other factors also threaten GRSG in this region, but are of less concern than the four major factors listed above, and are not discussed in detail in this section.

Table 5-1 lists past, present, and reasonably foreseeable actions that would affect the planning area and vicinity. The most numerous expected projects are the development of oil and gas wells. According to **Table 4-1**, over 1,200 new wells in the Planning Area are anticipated under each of the alternatives, with over 4,000 acres impacted for short-term disturbance, 600 to 800 of which are BLM-administered lands. One additional transmission line is proposed in addition to an existing 230-kV transmission line. For vegetation management, the BLM is planning one conifer encroachment reduction project in PH on BLM-administered lands, and several other projects are planned under the NRCS SGI, including habitat improvements, cover crop planting, sagebrush improvements, and other supporting range improvements, described in **Table 5-1**. The vegetation management projects are intended to benefit GRSG populations. No major projects are planned in recreation, roadways, or grazing.

WAFWA is implementing its Sage-Grouse Strategy across management zones and includes monitoring, research, outreach, and funding of conservation projects for GRSG. A basic premise of the WAFWA Sage-Grouse Strategy is that additional conservation capacity must be developed at all levels (local, state and agency, and range-wide) for both the short term (first three to five years) and for the long term to ensure GRSG conservation.

Energy Development

Impacts from energy development can result in direct habitat loss; fragmentation of important habitats by roads, pipelines, and power lines; noise; and direct human disturbance. The effects of energy development often add to the impacts

from other human development and result in GRSG population declines. Population declines associated with energy development result from the abandonment of leks, decreased attendance at leks that persist, lower nest initiation, poorer nest success, decreased yearling survival, and avoidance of energy infrastructure in important wintering habitat areas (Holloran 2005; Aldridge and Boyce 2007).

As discussed in **Chapter 4**, oil and gas development impacts GRSG and sagebrush habitats through direct disturbance and habitat loss from well pads, access construction, seismic surveys, roads, power lines, and pipeline corridors; indirectly from noise, gaseous emissions, changes in water availability and quality, and human presence. The interaction and intensity of effects could cumulatively or individually lead to habitat fragmentation in the long term (Connelly et al. 2004; Holloran 2005). Declines in GRSG population growth (21 percent) between pre- and post-mine development were attributable to decreased nest success and adult female survival; the treatment effect was more noticeable closer to gas field infrastructure. Annual survival of individuals reared near gas field infrastructure (yearling females and males) was significantly lower than control individuals that were not reared near infrastructure (Holloran 2005).

Despite significant closures of public lands to oil and gas leasing within GRSG habitat, current leases are substantial across GRSG ranges with potential for development based on locations of geologic fields for traditional oil and gas distributed extensively across eastern portions of GRSG range (Manier et al. 2013). The Dakotas population is heavily influenced by oil and gas development, and oil and gas developments are scattered throughout the Yellowstone watershed area (USFWS 2013). The Powder River Basin contains substantial energy resources, including oil, natural gas and coal bed natural gas (USFWS 2013), while the northern Montana population has little energy development. Mining of various federal mineral resources currently directly affects approximately 3.5 percent of potential GRSG habitat with indirect effects potentially affecting larger portions in some areas.

No locatable or coal projects are anticipated in the next 20 years, so there would be no impact on GRSG even though there are differences among the alternatives. However, potential future development would be precluded in PH (87,443 acres) in Alternatives B and D, and in PH and GH (166,207 acres) in Alternative C.

As discussed in **Table 4-1**, new well development is anticipated in the cumulative analysis area, with over 4,000 acres of short-term habitat disturbance anticipated, 600 to 800 acres on BLM-administered land. These numbers vary little under the different alternatives, indicating that the planned operations will occur beyond the scope of BLM decision-making and only be minimally affected under the restrictions envisioned in Alternatives B, C, or D. However, the projections from the BLM in **Table 4-1** suggest that the management in

Alternatives B, C, or D would have a measurable, but limited impact on the acreage of GRSG habitat lost to energy development as it would apply to only a small portion of the overall development area. As described in **Chapter 4**, oil and gas development would also have limited contributions to cumulative impacts because, although there is high potential in GRSG habitat, most of the resources have already been developed. Cumulatively, energy development remains a substantial threat to GRSG under any of the alternatives.

Infrastructure

Developments, such as power lines, communication towers, fences, roads, and railroads, contribute to habitat loss and fragmentation, with power lines and roads having the largest effects (Connelly et al. 2004; Naugle et al. 2011). Human disturbance is increased over the short term during infrastructure construction. In the long term, increased threats from predators perching on infrastructure may cause declines in lek attendance or nest success. GRSG population declines have resulted from avoidance of infrastructure, reduced productivity, and/or reduced survival in the vicinity of infrastructure (Naugle et al. 2011).

As discussed in **Chapter 4**, power lines can directly affect GRSG by posing a collision and electrocution hazard, and can indirectly decrease lek attendance and recruitment by providing perches and nesting habitat for potential avian predators, such as golden eagles and ravens (Connelly et al. 2004). In addition, power lines are linear and often extend for many miles. Thus, ground disturbance associated with construction, as well as vehicle and human presence during maintenance activities, may introduce or spread invasive weeds over large areas, thereby degrading habitat.

Impacts from roads may include direct habitat loss from road construction and direct mortality from collisions with vehicles. Roads may also present barriers to migration corridors or seasonal habitats, facilitate predator movements, spread invasive plants, and increase human disturbance from noise and traffic (Forman and Alexander 1998). Research suggests that road traffic within 4.7 miles of leks negatively influence male lek attendance (Connelly et al. 2004). Railroads presumably have the same potential impacts to GRSG as do roads because they create linear corridors within sagebrush habitats, promoting habitat fragmentation and other disturbance.

Impact analysis details for each alternative are presented in **Chapter 4**. Considering that infrastructure development would occur beyond the scope of BLM decision-making and not affected by the restrictions envisioned in Alternatives B, C, or D, impacts from infrastructure development such as those described above would continue on GRSG and its habitat.

According to **Table 5-1**, one ROW project is planned, a transmission line approximately 15 acres in size. By designating ROW avoidance and exclusion areas, the BLM would reduce or minimize impacts from infrastructure, as new

ROWs would be prohibited (ROW exclusion) or would be sited to avoid sensitive areas (ROW avoidance), or designed to otherwise reduce or minimize direct and indirect effects to GRSG. Renewals or upgrades of existing facilities could incorporate additional conservation actions. Co-location or clustering of facilities would reduce impacts and would prevent disturbance in new areas. The restrictions in Alternatives B and C would block this near transmission line from being located in PH, while Alternative D would avoid siting it in PH. Alternative A would not restrict the siting of the transmission line, though existing policy does recommend co-locating ROWs when possible. Management under Alternatives B, C, or D would benefit GRSG more than Alternative A, by locating the infrastructure in a way that minimizes loss and fragmentation of habitat.

Habitat connectivity is threatened by existing roadways in the Yellowstone watershed, and Powder River Basin areas; the Dakotas populations are isolated but may have east-west connectivity to populations in Montana (USFWS 2013). No new roadway projects are envisioned in the planning area in **Table 5-1**, though the planned new oil and gas wells may require access roads. Given the numbers of wells anticipated under the alternatives, it is likely that a number of new access roads would be constructed in the short- and long-term. The alternatives do not vary the acreage of habitat restricted to existing roads; however, the restrictions on locating fluid mineral development in PH under Alternatives B and C may limit development of well access roads in GRSG habitat. Thus, these alternatives may be more protective of GRSG populations from impacts associated with roads. In addition, as described in **Chapter 4**, oil and gas development would have limited impacts because, although there is high potential in GRSG habitat, most of the resources have already been developed. Any of the action alternatives (B, C, or D) would site the planned transmission line such that impacts on GRSG habitat are minimized, thereby reducing impacts.

Disease

West Nile virus represents the only active disease which threatens GRSG populations with heavy mortality (USFWS 2010). GRSG are highly susceptible to West Nile virus, with resultant high levels of rapid mortality, typically in mid-summer (Clark et al. 2006). Data indicate that populations exposed to West Nile virus experience substantial drops in annual survival, and suggest that the virus could contribute to local population extirpation (Walker et al. 2004). Small, isolated populations, such as the Dakotas or the Powder River Basin, are more susceptible to stressors like disease because of their low numbers and lower ability to sustain numbers by recruitment from other populations.

West Nile virus is thought to have caused millions of wild bird deaths since its introduction in 1999. The disease has been detected in at least 326 species of dead birds in the US (Centers for Disease Control 2012). The dominant vector for the virus is *Culex tarsalis*, a common, widely distributed mosquito species

found in sagebrush habitats. Individuals may disperse more than 10 miles to colonize surface water and prefer sites with warm standing water and submerged vegetation on which to deposit eggs. Since mosquitoes require water to breed, impacts are more likely near anthropogenic water sources such as stock ponds and coal-bed methane ponds (Walker and Naugle 2011).

The BLM may require certain management of or changes to the design of stock ponds, coal-bed methane ponds, and other anthropogenic water sources associated with uses of public lands to reduce the likelihood for mosquito breeding and disease transmission. Alternative A does not contain any provisions for restricting the spread of West Nile virus. Alternatives B, C and D would design new water features for livestock such that they do not contribute to the spread of West Nile virus. Although the specific design and extent of deployment of these protective features is unclear, the provision makes Alternatives B, C and D more likely to reduce the threat of disease to GRSG populations. In practical terms, the large number of anthropogenic water sources, particularly for grazing, would make mitigation of this threat difficult. Climate change is expected to worsen the threat of disease by reducing naturally mesic areas and causing GRSG to congregate near anthropogenic water sources during the summer (Manier et al. 2013). While the BLM can require management actions to reduce the effects of West Nile virus on GRSG, these actions would not apply on non-BLM-administered lands or projects; therefore, the types of impacts described above would continue to affect the birds across the cumulative analysis area.

Conversion to Agriculture

Conversion of sagebrush habitat to agricultural use, or sodbusting, results in the loss of habitat available for GRSG use. In addition, habitat loss decreases the connectivity between seasonal habitats, increasing population isolation and fragmentation. Fragmentation then increases the probability for loss of the population, reduced genetic diversity and extirpation from stochastic events (Knick and Hanser 2011). In addition to reducing the land area available to support GRSG, habitat loss and fragmentation also increases the likelihood of other disturbances, such as human traffic, wildfire, and spread of invasive plants. Threats posed by conversion to agriculture as well as isolation, infrastructure, and energy development, all stem from the loss, fragmentation and degradation of habitat.

While habitat conversion for agriculture is not directly tied to BLM management, land tenure decisions, such as acquisitions and disposals, can indirectly affect the acreage available for agriculture and urbanization. For example, if the BLM disposes of a land parcel characterized as sagebrush-steppe, it could potentially be converted to farmland or sub-divided into home sites at the third party's discretion. It is assumed that lands retained in BLM management would not be converted for agriculture or urbanization.

Special designations, such as ACECs, provide protection to GRSG and their habitats, as they include special management prescriptions which provide broad protection from habitat fragmentation, loss and human disturbance. In general, the greater the acreage managed as ACECs, the greater the protection from surface disturbance that would be provided to GRSG and the more likely population stability and recruitment would be maintained.

The only alternative which establishes an ACEC is Alternative C, which designates all PH as an ACEC. Thus, this alternative provides the highest degree of protection from conversion to agriculture, though no disposals of BLM-administered land are planned, as indicated in **Table 5-1**. Alternatives B, C, and D all provide for protection of GRSG habitat from disposal, and recommend acquisition of private lands where possible to increase GRSG habitat and improve connectivity. Alternative A does not make a specific recommendation for acquisitions, but does evaluate wildlife habitat value in considering disposals. The three action alternatives are more protective of GRSG habitat than current policy under Alternative A, but BLM land management would have limited cumulative contributions on conversion of private lands to agricultural use, regardless of alternative.

Conclusion

While implementation of the action alternatives would reduce threats faced by GRSG in MZ I, overall cumulative trends toward habitat loss and fragmentation are likely to continue, primarily due to energy and infrastructure development pressures in GRSG habitat, notably in the Dakotas and Powder River Basin. The isolation and small size of these populations increases the risk posed by disease as well. The Yellowstone watershed faces habitat loss pressure from energy and infrastructure development, and fragmentation risk due to the low percentage of land in public management. The northern Montana population, on a large, relatively intact area of sagebrush mainly used for grazing, is largely resistant to these trends, and is at low risk of decline.

5.3 LANDS AND REALTY

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely to continue to affect the lands and realty program are lands and realty actions, energy and minerals development, travel management, and climate change.

Land use authorizations in the planning area place the largest demand on the BLM lands and realty program. Past lands use authorizations include 79 linear ROW features such as transmission lines, roads, and water pipelines, as well as 33 site-specific authorizations for oil and gas. Under all alternatives, there is expected to be a steadily increasing demand for ROWs to accommodate new power, water, and telecommunication lines; roadways; and other similar development. Any BLM management prescriptions such as ROW exclusion and

avoidance areas that limit the BLM's ability to accommodate ROW development would influence the level of cumulative impacts on lands and realty.

Under Alternative A, BLM management would continue to allow land use authorizations throughout the planning area. As a result, impacts on lands and realty as described in **Chapter 4** would continue to occur and accumulate as new ROWs are proposed.

Under Alternatives B, C, and D, BLM management would include varying levels of ROW restrictions. Designations of areas as avoidance or exclusion would neither impact existing ROW authorizations, such as an existing 230-kV electrical transmission line, nor ROW applications already being processed, such as a proposed 230-kV transmission line (see **Table 5-1**). The restrictions would, however, impact the BLM's ability to accommodate future development in ROWs. New ROW development in the cumulative impacts study area would be reduced or directed to non-BLM-administered lands. Cumulative impacts on lands and realty under Alternative C would include a reduction in the number of future ROW authorizations because PH and GH would be designated ROW exclusion. The closure of PH to mineral development combined with the prohibition of new road construction in PH within four miles of a lek would limit the BLM's ability to authorize new road ROWs and accommodate any increase in demand for access on BLM-administered lands. At the same time, the management prescriptions under the action alternatives, particularly Alternative C, would affect the BLM's ability to carry out certain goals of its lands and realty program.

National policies to mitigate climate change through the expansion of renewable energy production could also contribute long-term cumulative impacts on the lands and realty program in the planning area. According to the National Renewable Energy Laboratory, there are approximately 3,700-acres of viable wind resource areas (i.e., areas where the wind energy potential is greater than or equal to 400 watts per square meter) on BLM-administered lands in the planning area (see **Section 4.19**). There are no "Good" (6.0 kilowatt-hour/square meter/day) or better solar potential within the planning area. As such, none the alternatives would result in cumulative impacts on solar energy development potential.

As demand for renewable energy sources increases at the same time as wind energy technology, requests for ROWs, including transmission line ROWs through the planning area from adjacent wind generation facilities, could impact the lands and realty program. The potential for cumulative impacts would result under all alternatives. ROW development prohibitions under Alternative C and wind energy ROW development restrictions Alternative D would reduce the potential for new wind energy development in the planning area. Because comparable or higher wind resource potential, along with established electrical transmission infrastructure, exists elsewhere in North Dakota (US Department

of Energy 2012), the greatest potential for cumulative impacts from renewable energy development is likely to be from transmission line development within the planning area.

5.4 VEGETATION (INCLUDING NOXIOUS WEEDS; RIPARIAN AND WETLANDS)

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely to continue to affect vegetation are; energy and mineral development, vegetation management, and infrastructure development, primarily in support of oil and gas well development.

Oil and gas energy development impacts sagebrush habitats through direct disturbance and habitat loss from well pads, seismic surveys, roads, power lines, and pipeline corridors; indirectly from gaseous emissions, changes in water availability and quality, and human disturbance. The interaction and intensity of effects could cumulatively or individually lead to habitat fragmentation in the long term (Connelly et al. 2004, pg. 7-41, Holloran 2005, pg. 57-60).

Conversion of sagebrush habitat to agricultural use, or sodbusting, results in the loss of habitat available for GRSG use. In addition, habitat loss decreases the connectivity between seasonal habitats, increasing population isolation and fragmentation (Knick and Hanser 2011). In addition to reducing the land area available to support GRSG, habitat loss and fragmentation also increases the likelihood of other disturbances, such as human traffic, wildfire, and spread of invasive plants.

5.4.1 Alternative A

Under Alternative A, current management would continue on BLM-administered lands in the planning area. There would be no ROW avoidance or exclusion areas established, and no areas closed or restricted to fluid mineral leasing. Current management does consider wildlife habitat value in decision-making which could indirectly effect vegetation cumulatively. A planned transmission line could increase fragmentation of vegetation, and a substantial number of new wells and pad are planned on BLM-administered land, which would increase loss of sagebrush vegetation and degradation of vegetation conditions. The well activity would be particularly harmful to vegetation in the Powder River Basin and the Dakotas, where energy resources are plentiful in sagebrush habitat (USFWS 2013).

Energy development impacts sagebrush habitats through direct disturbance of vegetation and habitat loss from well pads and associated infrastructure, including access roads, power lines, and pipeline corridors; and vehicle use. Surface mining also results in direct loss of habitat, subsurface mining a lesser impact. Overburden storage, staging areas, roads, and other infrastructure also disturb vegetation and contribute to the risk of wildfire and introduction of noxious weeds. These trends would likely continue and increase given the energy development pressure in many areas of the planning area, and the lack of

specific management tools to mitigate them under Alternative A. As described in **Chapter 4**, oil and gas development on BLM-administered lands would have limited contributions to cumulative impacts because, although there is high potential in GRSG habitat, most of the resources have already been developed.

A planned conifer encroachment reduction project on BLM-administered lands (see **Table 5-1**) would benefit vegetation health and diversity under all the alternatives, and planned NRCS projects on private lands would improve rangeland health, increase herbaceous cover and create beneficial range improvements. These projects combined with the management actions under Alternative A would improve vegetation condition in discrete areas, but would not impact the larger trend toward habitat loss.

5.4.2 Alternative B

Under Alternative B, ROW exclusion and avoidance areas would be established. Habitat areas would be restricted or closed to fluid mineral leasing. No ACECs would be established, but land disposals and acquisitions would focus on maintaining sagebrush acreage and connectivity. Alternative B would slightly reduce the number of planned wells and anticipated acres of sagebrush habitat disturbed, compared to Alternative A (see **Table 4-1**), but over 600 acres of BLM-administered land are anticipated to be disturbed under this alternative. Additional habitat may be lost to access roads and associated infrastructure. As described in **Chapter 4**, oil and gas development would have limited contributions to cumulative impacts because, although there is high potential in GRSG habitat, most of the resources have already been developed.

The vegetation management and restoration projects mentioned above would benefit the planning area in discrete locations, as described above. Overall, the trend toward loss of sagebrush habitat would continue from energy development pressure, but development restrictions on lands retained as PH and improvements on private ranchlands in the planning area would improve habitat quality on remaining sagebrush acreage.

5.4.3 Alternative C

Alternative C would establish an ACEC on PH administered by the BLM, and PH and GH would be closed to fluid mineral leasing. Alternative C would designate both PH and GH as ROW exclusion areas. These provisions would protect vegetation from loss, fragmentation, and disturbance. As shown in **Table 4-1**, approximately 200 fewer acres of BLM-administered land would be disturbed by energy development under this alternative, but a number of wells would still be constructed. As described in **Chapter 4**, oil and gas development on BLM-administered lands would have limited contributions to cumulative impacts because, although there is high potential in GRSG habitat, most of the resources have already been developed.

As under the other alternatives, the vegetation management and restoration projects conducted by BLM and NRCS would benefit vegetation. Alternative C

would impose the most stringent restrictions on development of GRSG habitat. Overall, the trend toward loss of vegetation would continue from energy development, but development restrictions on habitat areas on public lands and improvements on private ranchlands would improve habitat quality on remaining sagebrush acreage.

5.4.4 Alternative D

Alternative D would improve vegetation protection compared to current management, but with more limited actions than Alternatives B or C. Alternative D would not close habitat to fluid mineral leasing but would place it under NSO stipulation. It would establish ROW avoidance areas but not exclusion areas for transmission lines (ROW exclusion areas would be established for wind energy.) These provisions would maintain flexibility for land managers in areas with mixed public and private ownership, where exclusion areas may result in more widespread development on private lands, and not reduce overall impacts on sagebrush habitat. Alternative D anticipates a minor reduction in well construction and acres impacted compared to Alternative A (see **Table 4-1**). As described in **Chapter 4**, oil and gas development would have limited contributions to cumulative impacts because, although there is high potential in GRSG habitat, most of the resources have already been developed.

As under the other alternatives, the vegetation management and restoration projects conducted by BLM and NRCS would benefit vegetation. Development restrictions on PH and GH, and improvements on private ranchlands would improve vegetation quality on sagebrush acreage, though overall, the trend toward loss of sagebrush would continue from energy and infrastructure development.

5.5 WILDLAND FIRE MANAGEMENT AND ECOLOGY

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect wildland fire management and ecology are; vegetation management projects, projects that impact ability to respond to wildland fire, projects that would increase ROWs and energy and mineral development, and projects that would increase access to land and consequently increase the risk of human-caused ignitions.

Although past, present, and future actions may increase the likelihood of wildfire as described below, wildland fire in the cumulative impact analysis area in the past has been rare, and the risk of wildfire is likely to remain relatively low in the future, regardless of alternative.

Vegetation management that could change FRCC could affect wildland fire management in the future. Projects on private lands through the NRCS SGI have focused on creating additional GRSG habitat. If any of these projects change fuel loads or result in a change in FRCC on private lands adjacent to the planning area, those lands may be more susceptible to fire and fire could spread from

those lands to the near-by planning area. Under Alternatives B, C, and D, there is a slightly larger possibility of alteration of vegetative cover resulting in a shift in FRCC than under Alternative A due to increased restrictions on vegetation management on public lands under the action alternatives.

Past energy development projects, such as the wind farm west of Rhame and existing transmission lines described in **Table 5-1** increase the risk of human-caused ignitions due to the construction, maintenance, and operation of those facilities as well as related transportation increases. Additionally, there is one potential transmission line proposal, which could increase the risk of fire. Well exploration and associated development, including access roads in the future would also increase the risk of human-caused ignition, which could impact wildland fire management. Alternatives B, C, and D place more restrictions on energy and mineral development and have more acres closed to ROWs than do Alternative A. Consequently, the cumulative risk of fire would be lower under Alternatives B, C, and D than under Alternative A.

As the global effects of climate change continue into the future, the likelihood of natural, unplanned ignition within the planning area may increase due to the irregular weather patterns, increased likelihood of storms, and drought. As climate change is a global process, impacts on climate change from management actions related to this project would be negligible and would be similar across all alternatives.

5.6 FLUID MINERALS

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely to continue to affect fluid minerals are development of and exploration for fluid minerals on oil and gas estate that is not owned by the federal government. This exploration and development must be considered in combination with exploration and development on federal oil and gas estate to assess the cumulative impacts of this RMPA/EIS. Under Alternative A, 384 new exploratory and development wells are projected to be drilled on all mineral ownerships in the planning area in the short term (the life of the RMP) (see **Table 4-1**). Sixty of these new wells are projected to be on federal oil and gas estate. In the long term (between now and 2029), 314 of these new wells are expected to become producing wells, 49 of which are projected to be on federal oil and gas estate.

The management actions proposed under this RMPA/EIS would cumulatively impact fluid mineral development through surface use restrictions (e.g., closures, and NSO, CSU, and TL stipulations) that ultimately would decrease the number of oil and gas wells drilled in the planning area during the planning period. Surface use restrictions, such as NSO restrictions, could also cause an operator to move to nearby areas with no such restrictions. While the management actions under Alternatives B and C would reduce new producing wells on federal oil and gas estate in the planning area by approximately 57 percent, as

shown in **Table 4-1**, new producing wells throughout the planning area would be expected to decrease from 314 wells under Alternative A to 289 wells under Alternatives B and C, an eight percent decrease. Under Alternative D, new producing wells on federal oil and gas estate would be expected to decrease by 14 percent compared with Alternative A. However, new producing wells throughout the planning area would be expected to decrease from 314 wells to 308 wells, a two percent decrease.

As the analysis above shows, the management actions proposed under this RMPA/EIS would likely have a much greater impact on oil and gas activity on federal oil and gas estate than on oil and gas activity throughout the planning area. Under all alternatives, the projected reduction in new producing wells throughout the planning area is less than 10 percent. However, the reduction in producing wells on federal oil and gas estate may be as high as 57 percent. As described in **Chapter 4**, oil and gas development would have limited contributions to cumulative impacts because, although there is high potential in GRSG habitat, most of the resources have already been developed.

5.7 COAL

The BLM has not identified any past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that are likely to affect coal (see **Table 5-1**). Therefore, cumulative impacts on coal are not anticipated. Refer to **Section 4.7** for the direct and indirect impacts.

5.8 LOCATABLE MINERALS

The BLM has not identified any past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that are likely to affect locatable minerals (see **Table 5-1**). Therefore, cumulative impacts on locatable minerals are not anticipated. Refer to **Section 4.8** for the direct and indirect impacts.

5.9 MINERAL MATERIALS

The BLM has not identified any past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that are likely to affect mineral materials (see **Table 5-1**). Therefore, cumulative impacts on mineral materials are not anticipated. Refer to **Section 4.9** for the direct and indirect impacts.

5.10 COMPREHENSIVE TRAVEL AND TRANSPORTATION MANAGEMENT

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect Comprehensive Travel and Transportation Management include the BLM OHV Final EIS and Proposed Plan Amendment ROD (BLM 2003c), which limits year-round motorized wheeled travel to existing roads and trails. BLM management would continue to limit motorized wheeled travel to existing roads and trails under all alternatives. There would be no additional cumulative impacts from closures of existing routes.

For all alternatives, cumulative impacts on Comprehensive Travel and Transportation Management would occur primarily from actions that facilitate, limit, or preclude motorized access, including the closure of areas to certain types of travel or through the designation of routes as part of a future travel management planning process. Beyond the OHV ROD and any future implementation-level transportation planning processes, the BLM has not identified any past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that are likely to affect Comprehensive Travel and Transportation Management.

In addition to the cumulative impacts applicable to all alternatives, the BLM would prohibit new road construction in PH within four miles of a lek under Alternative C. Cumulative impacts on Comprehensive Travel and Transportation Management as a result of this limitation could include congestion on the existing travel route network within and adjacent to the planning area, particularly where routes provide access to multiple resource uses. Congestion would prevent access and require more active management (i.e. enforcement, signage, education) by the BLM.

5.11 RECREATION

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect recreation are activities that conflict with recreation opportunities, particularly big game hunting. Past and present activities include ROW development, grazing and range improvements, and mineral development. Recreation in the planning area is expected to generally increase over time.

Fluid mineral development is and would continue to be the primary impact on recreation in the planning area. For all alternatives, long-term disturbance in the planning area from oil and gas activity would be approximately 2,900 acres (see **Table 4-1**) resulting in a contribution to cumulative impacts on popular recreation activities such as big game hunting, wildlife viewing, and hiking. The nature of cumulative impacts on recreation from oil and gas activity includes noise, dust, vehicle traffic, night lighting, increased safety hazards on roads due to traffic, loss of solitude, decreased tourism revenue, and increased conflict between recreation users and oil and gas activities.

Cumulative impacts from existing ROWs in the planning area would also continue to impact recreation activities and opportunities. An existing 230-kV electrical transmission line covering approximately 13 acres, combined with a proposed 230-kV electrical transmission line covering 15 acres would impact recreation opportunities in the vicinity of those ROWs. ROW development conflicts with recreation activities, particularly big game hunting, by creating linear obstructions for game and hunters. Cumulative impacts from existing and ongoing ROW development also reduce the quality of the rural outdoor experience sought by recreation users in planning area.

Under Alternative A, the BLM would continue to allow ROW development, mineral development, and grazing throughout the planning area resulting in a contribution to cumulative impacts on recreation activities and opportunities. Management under Alternatives B, C, and D would include limitations on surface disturbing activities, such as ROW development, grazing, and mineral development; therefore, reducing the potential to contribute to long-term cumulative impacts on recreation. Management under Alternative C, which would include the designation of PH as ROW exclusion area, a reduction in livestock grazing allotments by 50 percent, the designation of a new ACEC, and the closure of PH and GH to mineral development, would overall result in the least contribution to cumulative impacts on recreation compared to the other alternatives. Limitations on new road development within four miles of leks under Alternative C would impact certain recreation opportunities by decreasing the potential for new access, while at the same time, maintaining primitive dispersed recreation experiences such as hunting, especially in areas where few roads current exist.

5.12 RANGE MANAGEMENT

Past, present, and future actions within the cumulative impact analysis area that have affected and would likely to continue to affect livestock grazing are mainly those that reduce available grazing acreage, the level of forage production in those areas, or inhibit livestock improvements, such as water development or fences. Generally, livestock use has decreased over the past 100 years in the region.

Past and present actions that have affected livestock grazing include human-caused surface disturbances such as those associated with mineral development, recreation, and historic grazing practices. Vegetation treatments and range improvements on private lands in Bowman and Slope counties through the NRCS SGI may have resulted in some required changes to grazing management on private lands, but is likely to improve forage in the long term.

Future factors affecting livestock grazing are similar to present actions, and include any restriction on grazing management associated with future species listings under the ESA and additional changes to forage condition due to continued drought or climate change. Cumulative projects that increase human disturbance in grazing areas could also indirectly impact grazing by increasing weeds and invasive species, and by disturbing or displacing livestock.

The contribution of the management actions under any of the alternatives to cumulative impacts would parallel the impacts of the alternatives as described in **Chapter 4**; the greatest contribution to cumulative effects on livestock grazing would be seen in Alternative C, due to the reduction on grazing in the planning area. The reduction in grazing on public lands could impact area lessees/permittees economically and may put additional pressure on forage resources on private lands in the area.

5.13 AREAS OF CRITICAL ENVIRONMENTAL CONCERN

There are currently no ACECs in the planning area. Under Alternative C, the BLM would designate a new 32,900-acre GRSG ACEC as a way to prioritize BLM management of GRSG PH. Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that would affect the proposed new ACEC would include any action or condition that would impact the GRSG habitat health for which the ACEC would be established. Such actions or conditions include oil and gas production, ROW development, livestock grazing and range improvements, travel routes, and climate change. Although management under Alternative C would restrict activities such as ROW development, grazing, mineral entry, and new road construction within the ACEC, existing and future ROWs, oil and gas development, and travel routes would result in cumulative impacts on the ACEC. Examples of long-term impacts on the ACEC from these activities include noise, heavy vehicle traffic, and dust.

A proposed 230-kV transmission line would create long-term surface disturbance on 15 acres in the ACEC, as would a proposed 7-mile pipeline to supply water to livestock. The BLM also anticipates valid existing oil and gas leases in the planning area to result in the long-term disturbance of approximately 2,900 acres (see **Table 4-1**). Together, these actions would result in long-term cumulative impacts of the nature and type described in **Chapter 4** on the ACEC proposed under Alternative C.

Climate change would also pose a long-term threat of cumulative impacts on the relevant and important values of the ACEC proposed under Alternative C. Cumulative impacts on GRSG habitat and, consequently, on the ACEC from climate change could include vegetation regime changes (e.g., from sagebrush to grasslands) and increased wildfire potential due to drought (Connelly et al. 2004).

5.14 AIR QUALITY

The management actions proposed in this RMPA/EIS would reduce the number of oil and gas wells developed on the federal mineral estate in the planning area compared with current management actions (see **Table 4-1**), thereby reducing air emissions associated with these actions on BLM-administered lands. While air emissions would likely be reduced and proposed BLM management actions would have no incremental cumulative air quality impact, restricting oil and gas development on federally-administered lands could shift development to non-federal lands. Compared with Alternative A, cumulative air quality impacts would be slightly reduced under Alternatives B, C, and D, with the most reductions under Alternatives B and C. The cumulative actions identified in **Table 5-1** are not expected to result in a violation of the NAAQS under any alternative.

5.15 CLIMATE

Oil and gas development has occurred, is occurring, and would continue to occur on both federal and non-federal oil and gas estate within the planning area. The management actions proposed in this RMPA/EIS would reduce the number of oil and gas wells developed on the federal mineral estate in the planning area compared with current management actions (see **Table 4-1**), thereby reducing GHG emissions associated with these actions on BLM-administered lands. While GHG emissions would likely be reduced, restricting oil and gas development on federally-administered lands could shift development to non-federal lands.

Fires, particularly uncontrolled fires, can emit large quantities of GHGs into the atmosphere, including carbon dioxide, methane, and nitrous oxide (EPA 2012h, page 7-21 to 7-22); fires also remove vegetation that acts as a carbon sink. Proposed management actions would restrict the amount of vegetation that can be burned in a prescribed burn, or that can be allowed to burn in an unplanned natural ignition, to maintain sagebrush canopy cover, potentially resulting in fewer fire-related emissions in the short term.

Compared with Alternative A, climate change impacts would be slightly reduced under Alternatives B, C, and D, with the most reductions under Alternatives B and C. The cumulative actions identified in **Table 5-1** are not expected to result in a change in GHG emissions that would be large enough to alter climate change impacts in the region.

Overall, federal and nonfederal actions within the planning area would not have a significant cumulative impact on climate change. Actions in the planning area contribute a very small percentage of state and national GHG; CO_2 emissions for all of North Dakota were 1.3 percent of total US CO_2 emissions (2010 numbers) (US Energy Information Administration 2013c).

5.16 SOIL RESOURCES

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely to continue to affect soil resources are energy and mineral development, vegetation management, lands and realty actions, livestock grazing and range improvements, wildland fires, drought, and climate change.

Fluid mineral development would continue to impact soil resources in the planning area. For all alternatives, long-term disturbance in the planning area from oil and gas activity would be approximately 2,900 acres (see **Table 4-1**). This disturbance would impact soil resources through the removal of topsoil and the compaction, denuding, and eroding of soils within and alongside temporary roads, wells, and associated well pads. As described in **Chapter 4**, oil and gas development would have limited contributions to cumulative impacts because, although there is high potential in GRSG habitat, most of the resources have already been developed.

Vegetation management is important for soil stability as vegetation anchors soils in place and prevents excessive erosion and runoff into waterways. Vegetation management includes hazardous fuels reduction through prescribed fires, chemical and mechanical treatments, and seeding. Active vegetation management should contribute to the stabilization and protection of soils in these areas from erosion and compaction. Existing, proposed, and foreseeable ROW development in the planning area would also result in cumulative impacts on soil resources through vegetation loss, compaction, and erosion.

Livestock grazing would continue to have a range of effects on soils, with degradation of soils expected to continue in heavy use areas particularly around stock ponds and other water sources. The proposed installation of a seven-mile pipeline could cumulatively impact soils through compaction during construction and through the rearrangement of cattle movement in the planning area.

Fire can impact soils in the short term through the removal of vegetation resulting in instability and increased erosion and sediment runoff. Long-term effects of fire are considered beneficial as the landscape can be returned to a healthier state with proper seeding and management, which would indirectly reduce the risk of fire and provide for more established vegetation communities, resulting in more stable soils.

Drought and water availability impacts vegetation in the planning area, which impacts soil resources. Drought affects the health of rangeland, riparian areas, and forests, making them more susceptible to the invasion of weeds and fire. Past drought, along with associated wildland fire that has occurred in the planning areas since 2002, has contributed to current ecological conditions by impacting vegetation communities, which keep soils stabilized and reduce erosion and runoff into waterways.

Climate change would also pose a long-term threat of cumulative impacts soil resources. Cumulative impacts on soil resources from climate change could include vegetation regime changes (e.g., from sagebrush to grasslands), increased wildfire potential due to drought, and increased sedimentation and erosion (Connelly et al. 2004).

Under Alternative A, the BLM would continue to allow ROWs and mineral development throughout the planning area with the result of continued cumulative impacts on soil resources. Management under Alternatives B, C, and D would include limitations on surface disturbing activities, such as ROW development and mineral development; therefore, reducing the potential for contributing to long-term cumulative impacts on soil resources. When considered in conjunction with other non-BLM actions and compared to the other alternatives, management under Alternative C would result in the least amount of contribution to cumulative impacts on soil resources due to proposed management prescriptions that include the designation of PH and GH as ROW exclusion area, restrictions on road construction, removal of livestock

grazing in GRSG habitat, and closure or application of lease stipulations to mineral development in PH and GH.

5.17 WATER RESOURCES

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely to continue to affect water resources are fluid mineral development, lands and realty actions, livestock grazing and range improvements, vegetation management, drought and climate change.

For all alternatives, long-term disturbance in the planning area from oil and gas activity would be approximately 2,900 acres (see **Table 4-1**). These activities could impact water resources through an increase in the presence of petroleum-using vehicles and equipment which increases the likelihood of chemical spills, erosion, and contamination of waterways. Fluid mineral development can increase the likelihood of the creation of pools of standing water, which can serve as mosquito breeding habitat, increasing the ability for West Nile virus to spread into a landscape otherwise not at risk to the pathogen. As described in **Chapter 4**, oil and gas development would have limited contributions to cumulative impacts because, although there is high potential in GRSG habitat, most of the resources have already been developed.

Vegetation management is important for soil stability as vegetation anchors soils in place and prevents excessive erosion and runoff into waterways. Vegetation management includes hazardous fuels reduction through prescribed fires, chemical and mechanical treatments, and seeding. Active vegetation management should contribute to the stabilization and protection of soils in these areas from erosion and subsequent runoff contributing to higher pollutant loads in waterways.

Existing, proposed, and foreseeable ROW development in the planning area would also result in cumulative impacts on water resources through human-made runoff of soils and chemicals into waterways. The development allowed under these authorizations would result in surface-disturbance, which would generally contribute to a decrease in water quality through compaction, erosion, and sediment runoff into waterways as well as an increase in the potential for chemical contamination.

Livestock grazing can affect water resources through the trampling of soils and vegetation along and within natural water features, and through the formation of fecal coliforms in waterways. Livestock grazing is associated with range management, which involves constructing infrastructure in order to support livestock grazing. Proposed rangeland improvement projects are limited to a single seven-mile long stock water pipeline. This action and other unforeseen actions could cumulatively impact waters through compaction and erosion of soils during construction and subsequent runoff into waterways.

Drought affects the health of rangeland, riparian areas, and forests which make them more susceptible to the invasion of weeds and fire. Fire can impact water resources in the short term through the removal of vegetation resulting in instability of soils and increased erosion and sediment into waterways. Long-term effects of fire are considered beneficial as the landscape can be returned to a healthier state with proper seeding and management, which would indirectly reduce the risk of fire which would reduce erosion of soils into waterways.

Climate change would also pose a long-term threat of cumulative impacts water resources. Cumulative impacts from climate change on water resources could include vegetation regime changes (e.g., from sagebrush to grasslands), increased wildfire potential due to drought, and increased sedimentation and erosion into waterways (Connelly et al. 2004).

Under Alternative A, the BLM would continue to allow ROW development, mineral development, and grazing throughout the planning area with the result of contributing to cumulative impacts on water resources. Alternatives B, C, and D would include limitations on surface disturbing activities, such as ROW development, grazing, and mineral development; therefore, reducing the potential for long-term cumulative impacts on water resources. When considered in conjunction with other non-BLM actions and compared to the other alternatives, Alternative C would result in the least amount of contribution to cumulative impacts on waters due to proposed management prescriptions that include the designation of PH and GH as ROW exclusion area, reduction of livestock grazing in GRSG habitat, and closure or application of lease stipulations to mineral development in PH and GH.

5.18 SPECIAL STATUS SPECIES – OTHER SPECIES OF ISSUE

Many past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect special status species other than GRSG are described in **Table 5-1**. The most significant impacts likely to affect special status species, including Sprague's pipit distributions, include energy development, livestock grazing, and roadway development. Some special status species are in decline within and adjacent to the planning area as a result of increased habitat fragmentation, spread of noxious weeds, lack of fire on the landscape or fire suppression, and infrastructure development (BLM 2010a, pg. 227). Other actions that may contribute to cumulative impacts include vegetation management, recreation (OHV use), and climate change.

Cumulative impacts from future management actions proposed in **Table 5-1** would increase the number of surface acres disturbed by oil and gas well development up to approximately 2,900 acres in the planning area over the long term (see **Table 4-1**). However, contracts with private landowners are expected to improve 73,993 acres of GRSG habitat through the SGI program (**Table 5-1**). Additional vegetation management actions have occurred on

private lands in the planning area that collectively have increased GRSG habitat well beyond the projected potential increase in disturbed surface acres from future oil and gas well development. These planned improvements would also increase available habitat within and adjacent to the planning area for Sprague's pipit and other special status species that use similar habitat as GRSG.

Four indicators were identified to analyze the effects on special status species under each alternative in **Section 4.18**. These indicators include acres in ROW exclusion, livestock grazing AUMs, acres closed to fluid mineral leasing, and acres found unsuitable for surface coal mining. Management under Alternative A would have the greatest negative contribution to cumulative impacts on Sprague's pipit distribution and other special status species because it provides the fewest considerations of ecological impacts in management decisions. Management under Alternative D would result in slightly fewer contributions to cumulative impacts on Sprague's pipit distribution and other special status species due to an increase in the number of acres unsuitable for coal mining compared to Alternative A. Management under Alternatives B and C would reduce cumulative impacts on special status species, compared with Alternative A, due to the proposed increases in ROW exclusion areas and acres closed to fluid mineral leasing. Management under Alternative C would result in the least cumulative impacts among the proposed alternatives as livestock grazing AUMs would be decreased compared to no proposed changes in AUMs under Alternatives A, B, and D.

5.19 RENEWABLE ENERGY

Past, present and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely to continue to affect renewable energy are the construction of existing and proposed roads and transmission lines. They would have a minor cumulative effect by increasing the routing options and possibly reducing project construction or implementation costs. There would be no cumulative impacts for any of the alternatives on solar energy because there are no "Good" or better solar potential in the planning area.

Across all alternatives the primary indicator of impacts on wind energy is acres of BLM lands with "Good" or better wind potential within ROW exclusion and ROW avoidance areas. The minor cumulative impacts of increased routing options, and decreased project costs caused by construction of existing and proposed roads and transmission lines could encourage wind energy development on the small percentage of BLM-administered lands that would not be subject to these ROW restrictions. However, under Alternatives B, C, and D, development of wind energy resources on BLM lands are still unlikely due to the fact that 99 percent of "Good" or better wind potential land within the planning area would be designated as either ROW avoidance or exclusion areas.

Under Alternative A, wind energy development applications would continue to be processed on a case-by-case basis, with no additional acres designated as ROW exclusion or ROW avoidance area. Therefore the cumulative impacts of increased routing options and decreased project costs caused by the construction of existing and proposed roads and transmission lines would encourage wind energy development the most of any Alternative. However, this cumulative effect would still be considered minor.

Under Alternative B, 3,606 acres or 97 percent of lands with "Good" or better wind potential that are open for ROW applications under Alternative A would become exclusion areas. Another 80 acres or two percent of lands would become ROW avoidance area. This would leave 44 acres or one percent of lands with "Good" or better wind potential available for wind power development. Therefore, regardless of the cumulative impacts of increased routing options and decreased project costs caused by the construction of existing and proposed roads and transmission lines, this area is too small for a commercial-scale wind power plant.

Under Alternative C, 3,686 acres or 99 percent of lands with "Good" or better wind potential that are open for ROW applications under Alternative A would become exclusion areas and would not be available for wind development. This would leave 44 acres or one percent of lands with "Good" or better wind potential available for wind power development. Therefore, regardless of the cumulative impacts of increased routing options and decreased project costs caused by the construction of existing and proposed roads and transmission lines, this area is too for a commercial-scale wind power plant.

Under Alternative D, 3,606 acres or 97 percent of lands with "Good" or better wind potential that are open for ROW applications under Alternative A would become exclusion areas and thus would be subject to substantial restrictions. This would leave 44 acres or one percent of lands with "Good" or better wind potential available for wind power development without substantial restriction. Additionally, 80 acres of GH would be managed as ROW avoidance area. This would further restrict wind development in this area. Therefore, the cumulative impacts of increased routing options and decreased project costs caused by the construction of existing and proposed roads and transmission lines would be negated by these substantial restrictions to wind energy development.

Alternative A is the only Alternative that does not limit current available acreage for wind energy development. Therefore the minor cumulative effect of increased routing options and decreased project costs caused construction of existing and proposed roads and transmission lines could act to encourage wind energy development on BLM-administered lands

5.20 SOCIAL AND ECONOMIC CONDITIONS

Past, present, and reasonably foreseeable future actions and conditions have affected and would likely to continue to affect social and economic conditions.

Indicators used to examine effects to social and economic conditions (i.e. employment, income, effects to quality of life and related non-market values) are likely to be affected by past, present and reasonably foreseeable future actions. These activities include mineral exploration and development, unauthorized travel, livestock grazing, recreation, ROW development, weed invasion and spread, prescribed and wildland fires, land planning efforts, vegetation treatments and habitat improvement projects, insects and disease, and drought.

Actions proposed in this project would contribute to the cumulative impacts on employment and labor income directly as a result of labor required, and indirectly as purchases are made between industry sectors and households spend resulting income. These contributions would accrue to the three-county impact area alongside impacts from other projects occurring on public and private land in the area notably, ongoing oil and gas development as well as the existing wind farm and proposed transmission line (see **Table 5-1**).

The economy can be also be affected by a variety of factors including population growth, changes in interest rates, recession, growth of new sectors, tax policy, State economic policy, etc. When compared to these factors, the RMPA alternatives are likely to have a negligible cumulative impact on the area economy. For example, in 2010 total employment in the three-county impact area was 4,309 and labor income was $214,000,000. Employment decreases under Alternative C (the most restrictive alternative on resource uses) would comprise 0.08 and 0.02 percent of total employment and labor income. Because any changes in economic activity from the proposed action would be minimal at these levels, there would be no cumulative economic effects for the entire economy.

However, as noted above the three-county impact area can be considered specialized with respect to the grazing sector. Decreases in employment and labor income under Alternative C resulting from the reduction of AUMs on public lands would reduce contributions to the grazing sector from seven to four jobs which could result in a 2.6 percent decrease in employment in this sector. Decreases portrayed here could be lessened if alternative sources of forage are found for willing lessees/permittees. Regardless, an impact could occur to the grazing sector if changes occur for ranching and grazing on private and other public lands outside the scope of this RMPA, such as an increase in price of factors of production, drought, market conditions, etc.

5.21 ENVIRONMENTAL JUSTICE

Actions in the proposed plan are not anticipated to have a disproportionate impact on those in low income or minority populations in any alternative. As a result, the project would not contribute to cumulative impacts for environmental justice.

This page intentionally left blank.

Chapter 6
Consultation and Coordination

CHAPTER 6
CONSULTATION AND COORDINATION

This chapter describes the public outreach and participation opportunities made available through the development of this RMPA/EIS, and consultation and coordination efforts with tribes, government agencies, and other stakeholders. This chapter also lists the interdisciplinary team of staff who prepared the draft RMPA/EIS.

The BLM land use planning activities are conducted in accordance with requirements of NEPA, CEQ regulations, and BLM policies and procedures implementing NEPA. The NEPA and associated laws, regulations, and policies require the BLM to seek public involvement early in and throughout the planning process to develop a reasonable range of alternatives to proposed actions and to prepare environmental documents that disclose the potential impacts of proposed actions and alternatives. Public involvement and agency consultation and coordination, which have been at the heart of the planning process leading to this draft RMPA/EIS, were achieved through *Federal Register* notices, public and informal meetings, individual contacts, media releases, and the Rocky Mountain Region – National Greater Sage-Grouse Planning Strategy website (http://www.blm.gov/wo/st/en/prog/more/sagegrouse/eastern.html).

6.1 PUBLIC INVOLVEMENT

Public involvement is a vital and legal component of both the RMPA and EIS processes. Public involvement vests the public in the decision making process and allows for full environmental disclosure. Guidance for implementing public involvement under NEPA is codified in 40 CFR, Part 1506.6, thereby ensuring that federal agencies make a diligent effort to involve the public in the NEPA process. Section 202 of FLPMA directs the Secretary of the Interior to establish procedures for public involvement during land use planning actions on BLM-administered lands. These procedures can be found in the BLM's *Land Use Planning Handbook* (H-1601-1; BLM 2005). Public involvement for the North Dakota Greater Sage-Grouse RMPA/EIS includes the following four phases:

1. Public scoping before beginning NEPA analysis to determine the scope of issues and alternatives to be addressed in the RMPA/EIS
2. Public outreach via news releases
3. Collaboration with federal, state, local, and tribal governments, and cooperating agencies
4. Public review of and comment on the draft RMPA/EIS, which analyzes likely environmental effects and identifies the BLM's preferred alternative

The public scoping phase (phase 1) of the process has been completed and is described in **Section 6.1.1**, Scoping Process. The public outreach and collaboration phases (2 and 3) are ongoing throughout the RMPA/EIS process and are described in **Section 6.2**, Consultation and Coordination, and **Section 6.3**, Cooperating Agencies. Phase 4 started with the 90-day public comment period on the draft RMPA/EIS.

6.1.1 Scoping Process

The formal public scoping process for the North Dakota Greater Sage-Grouse RMPA/EIS began on December 9, 2011, with the publication of the notice of intent in the *Federal Register* (76 *Federal Register* 77008-77011). The notice of intent notified the public of the BLM's intent to prepare EISs and supplemental EISs to incorporate GRSG conservation measures into land use plans; it also initiated the public scoping period. A notice of correction to the notice of intent was released on February 10, 2012 (77 *Federal Register* 7178-7179). The notice of correction extended the scoping period until March 29, 2012.

Project Website

The BLM launched a national GRSG conservation website as part of its efforts to maintain and restore GRSG habitat on BLM-administered lands. The national website is available on the Internet at http://www.blm.gov/wo/st/en/prog/more/sagegrouse.html. The BLM has also launched a Rocky Mountain regional website: http://www.blm.gov/wo/st/en/prog/more/sagegrouse/eastern.html. These sites are regularly updated to provide the public with the latest information about the planning process. The Rocky Mountain website provides background information about the project, a public involvement timeline, maps of the planning areas, and copies of public information documents and notice of intent. The dates and locations of scoping open houses were also announced on the Rocky Mountain website.

Press Release

A press release was made available on the national and Rocky Mountain Region websites on December 8, 2011, announcing the scoping period for the EIS process. The NDFO also distributed a press release on December 22, 2012, announcing the scoping period for the EIS process. The press releases provided information on the scoping open houses being held and described the various

methods for submitting comments. A second press release was posted on the national and Rocky Mountain websites on February 7, 2012, announcing the extension of the public scoping period to March 23, 2012.

Public Scoping Open House

The BLM hosted an open house in Bowman, North Dakota, on January 17, 2012, to provide the public with an opportunity to become involved, learn about the project and the planning process, meet the planning team members, and offer comments. The open house was advertised via a press release and the Rocky Mountain website. The scoping meeting was held in an open house format to encourage participants to discuss concerns and questions with the BLM and other agency staff representatives.

Scoping Comments Received

Detailed information about the comments received can be found in the *National Greater Sage-Grouse Planning Strategy Scoping Summary Report*, finalized in May 2012 (BLM 2012b). A total of 272 unique written submissions for the Rocky Mountain Region, which includes North Dakota, were received during the public scoping period. In the *Greater Sage-Grouse Scoping Summary Report*, North Dakota and South Dakota are combined for analysis purposes. There were only 14 unique comments specific to North Dakota and South Dakota. The issues identified during public scoping and outreach helped refine the list of planning issues, included in **Section 1.6.3**, which guided the development of alternative management strategies for the RMPA.

6.2 CONSULTATION AND COORDINATION

Federal laws require the BLM to consult with certain federal and state agencies and entities and Native American tribes (40 CFR, Part 1502.25) during the NEPA decision making process. The BLM is also directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 CFR, Part 1500.4-5).

In addition to formal scoping (**Section 6.1.1**), as summarized below, the BLM has implemented an extensive collaborative outreach and public involvement process that has included coordinating with cooperating agencies. The BLM will continue to meet with interested agencies and organizations throughout the planning process, as appropriate, and will continue coordinating closely with cooperating agencies.

The NDFO initiated consultation with tribes that are identified as having interests or aboriginal territories in the RMPA planning area. Letters were mailed to the tribes listed below in December 2011, with follow-up letters mailed in August 2012 (both letters offering to meet with the tribes and inviting them to be cooperating agencies). Consultation with American Indian's and federally recognized tribes is required under a variety of laws, regulations, Executive Orders, and BLM policies. Federally recognized tribes with interests in the planning area include Three Affiliated Tribes: Mandan, Hidatsa, and

Arikara; Spirit Lake Sioux Tribe; Standing Rock Sioux Tribe; Turtle Mountain Band of Chippewa; and the Lower Sioux Indian Community.

No written comments were received from tribal agencies during the scoping period. Government-to-government consultation will continue throughout the RMPA process to ensure that the concerns of tribal groups are considered in development of the RMPA. This EIS does not impact any tribal lands or any tribal oil and gas interests (there are none within this planning area), nor does it restrict any access to sacred sites.

Consultation with State Historic Preservation Office (SHPO) will occur along with SHPO's review of the DEIS.

To comply with Section 7(c) of the ESA, the BLM coordinated with the USFWS early in the planning process. The USFWS provided input on planning issues, data collection and review, and alternatives development. The USFWS is also a cooperating agency in this process and has participated throughout the development of this DRMPA/DEIS.

6.3 COOPERATING AGENCIES

A cooperating agency is any federal, state, or local government agency or Indian tribe that enters into a formal agreement with the lead federal agency to help develop an environmental analysis. More specifically, cooperating agencies "work with the BLM, sharing knowledge and resources, to achieve desired outcomes for public lands and communities within statutory and regulatory frameworks" (*BLM Land Use Planning Handbook* H-1601-1; BLM 2005). The primary role of cooperating agencies during the planning process is to provide input on issues for which they have a special expertise or jurisdiction.

On December 7, 2012, the BLM wrote to 23 local, state, federal, and tribal representatives, inviting them to participate as cooperating agencies for the North Dakota Greater Sage-Grouse RMPA/EIS. Four agencies agreed to participate in the RMPA as designated cooperating agencies, all of which have signed memoranda of understanding with the BLM (**Table 6-1**, Cooperating Agencies).

Table 6-1
Cooperating Agencies

Agencies and Tribes Invited to be Cooperators	Agencies that Signed MOUs
DOI, Fish and Wildlife Service	✓
North Dakota Game and Fish Department	✓
Bowman County Commissioners	✓
Bowman-Slope Conservation District	✓
Slope County Commissioners	
Theodore Roosevelt National Park	
US Forest Service – Bismark	

Table 6-1
Cooperating Agencies

Agencies and Tribes Invited to be Cooperators	Agencies that Signed MOUs
US Forest Service – Dickinson	
North Dakota Department of Health	
North Dakota Industrial Commission	
North Dakota State Historical Society	
North Dakota State Land Department	
North DakotaState Water Commission	
North Dakota Geological Survey	
USDA NRCS	
North Dakota Department of Agriculture	
State of North Dakota	
North Dakota Public Service Commission	
Golden Valley County Commissioners	
North Dakota State Historical Preservation Office	
Bureau of Indian Affairs	
Bureau of Reclamation	
US EPA – Region 8	
Three Affiliated Tribes: Mandan, Hidatsa, Arikara Nation	
Standing Rock Sioux Tribe	
Turtle Mountain Chippewa Tribe	
Lower Sioux Indian Community	

These agencies have been engaged throughout the planning process, including during alternatives development. Two cooperating agency meetings were held in Bowman, North Dakota, on July 25, 2012, and September 5, 2012, to help develop alternatives. A third meeting was held with cooperators during the Draft EIS local/state/federal review on March 18, 2013. Cooperating agencies were also encouraged to attend the scoping open house and provide comments during the scoping period (**Section 6.1.1**).

6.4 LIST OF PREPARERS

This RMPA/EIS was prepared by an interdisciplinary team of staff from the BLM and Environmental Management and Planning Solutions, Inc. The following is a list of people that prepared or contributed to the development of the RMPA/EIS.

Name	Role/Responsibility
BLM	
Susan Bassett	Air Resources, Climate
Carmen Drieling	Range Management, Soil, Water, Vegetation
Shelly Gerhardt	Recreation, Comprehensive Travel Management
Linda Gisvold	Lands and Realty
Eric Lepisto	Wildland Fire Management and Ecology

Name	Role/Responsibility
Ruth Miller	Project Lead
Jessica Montag	Socioeconomics
Allen Ollila	Fluid Minerals
Phil Perlewitz	Solid Minerals
Randy Schardt	GIS
Tim Zachmeier	Wildlife, Vegetation
EMPSi: Environmental Management and Planning Solutions, Inc.	
Angie Adams	ACECs
David Batts	Program Manager
Amy Cordle	Air Resources, Climate
Annie Daly	Air Resources, Climate, Wildland Fire Management and Ecology
Andrew Gentile	Soil Resources, Water Resources, Renewable Energy
Zoe Ghali	Wildland Fire Management and Ecology; Range Management, Socioeconomics
Peter Gower	Recreation, Comprehensive Travel and Transportation Management, Lands and Realty, ACECs
Brandon Jensen	Special Status Species
Matt Kluvo	Renewable Energy
Laura Long	Technical Editor
Katie Patterson	Fluid and Solid Minerals
Holly Prohaska	Range Management
Chad Ricklefs	Project Manager, Lands and Realty
Jennifer Whitaker	Fluid and Solid Minerals
Liza Wozniak	Vegetation; Special Status Species
Drew Vankat	Recreation, Comprehensive Travel and Transportation Management
Randy Varney	Technical Editor
Meredith Zaccherio	Vegetation, Special-Status Species
US Forest Service TEAMS Planning Enterprise Unit	
Jennifer Dobb	Socioeconomics
Henry Eichman	Socioeconomics

Chapter 7
References

CHAPTER 7
REFERENCES

Aldridge, C. L. and M. S. Boyce. 2007. Linking occurrence and fitness to persistence: a habitat-based approach for endangered greater sage-grouse. Ecological Applications 17:508-526.

Aldridge, C. L., S. E. Nielsen, H. L. Beyer, M. S. Boyce, J. W. Connelly, S. T. Knick, and M. A. Schroeder. 2008. Range-wide patterns of Greater Sage-Grouse persistence. Diversity and Distributions 17:983-994.

Armour, C. L., D. A. Duff and W. Elmore. 1991. The effects of livestock grazing on riparian and stream ecosystems. Fisheries 16(1): 7 – 11.

Balch, J. K., B. A. Bradley, C. M. D'Antonio, and J. Gomez-Dans. 2012. Introduced annual grass increases regional fire activity across the arid western USA (1980–2009). Global Change Biology vol. 19 (1) p. 173-183.

Bangsund and Leistritz. 2010. Agribusiness and Applied Economics Report. Petroleum Industry's Economic Contribution to North Dakota in 2009. http://ageconsearch.umn.edu/bitstream/99252/2/AAE676.pdf.

BC Air Quality (British Columbia Air Quality). 2013. How Forest Fires Affect Air Quality. Internet Web site: http://www.bcairquality.ca/topics/forest-fires-air-quality.html. Accessed on February 1, 2013.

Beck, J. L. and D. L. Mitchell. 2000. Influences of livestock grazing on sage grouse habitat. Wildlife Society Bulletin 28:993-1002.

Beck, J. L., K. P. Reese, J. W. Connelly, and M. B. Lucia. 2006. Movements and survival of juvenile greater sage-grouse in southeastern Idaho. Wildlife Society Bulletin 34:1070-1078.

Beck, J. L., J. W. Connelly, and K. P. Reese. 2009. Recovery of greater sage-grouse habitat features in Wyoming big sagebrush following prescribed fire. Restoration Ecology 17:393-403.

Belnap, J., R. Prasse, and K. T. Harper. 2001. Influences of Biological Soil Crusts on Soil Environments and Vascular Plants. Biological Studies, Vol 150: 281-300.

Belnap, J., J. H. Kaltenecker, R. Rosentreter, J. Williams, S. Leonard, and D. Eldridge. 2001. Biological soil 13 crusts: ecology and management. Technical Reference 1730-2. BLM, Denver, CO. 118 pp.

BLM (US Department of the Interior, Bureau of Land Management). 1986. North Dakota Draft Resource Management Plan and Environmental Impact Statement.

_____. 1987. North Dakota Resource Management Plan and Environmental Impact Statement. Billings, Montana. July 1987.

_____. 1988a. North Dakota Resource Management Plan and Environmental Impact Statement, Record of Decision. Billings, Montana. 1988.

_____. 1988b. Bureau of Land Management, Policy Manual 1613 – Areas of Critical Environmental Concern. Washington, DC. September 29, 1988.

_____. 1990. Handbook H-1624-1—*Planning for Fluid Mineral Resources*. Washington, DC. May 1990.

_____. 1991. *Final Environmental Impact Statement Vegetation Treatment on BLM Lands in Thirteen Western States*. Washington, DC. May 1991.

_____. 1997. *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management for Montana and the Dakotas*. Billings, Montana. August 1997.

_____. 1998. Riparian Area Management: Process for Assessing Proper Functioning Condition. Technical Reference 1737-9. Revised 1998.

_____. 2003a. *Fire/Fuels Management Plan Environmental Assessment/Plan Amendment for Montana and the Dakotas*. Billings, Montana. July 2003.

_____. 2003b. Dakota Prairie Grasslands Oil and Gas Leasing Record of Decision. Billings, Montana. June 2003.

_____. 2003c. *Off-Highway Vehicle Record of Decision and Proposed Plan Amendment for Montana, North Dakota, and Portions of South Dakota*. Billings, Montana. June 2003.

_____. 2004a. Policy for Administering Public Land Grazing in Montana, North and South Dakota During Periods of Drought.

_____. 2004b. North Dakota Field Office Fire Management Plan. US Department of the Interior, US BLM, North Dakota Field Office. 2004.

_____. 2004c. Instruction Memorandum 2004-227, Bureau of Land Management's Biomass Utilization Strategy. Washington, DC. August 16, 2004.

_____. 2005. Handbook H-1601-1—*Land Use Planning Handbook*. Washington, DC. March 2005.

_____. 2007. *Final Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement and Associated Record of Decision*. Washington, DC. September 2007.

_____. 2008a. Handbook H-1790-1—*National Environmental Policy Act*. Washington, DC. January 2008.

_____. 2008b. Bureau of Land Management, Policy Manual 6840 – Special Status Species Management. Washington, DC. December 12, 2008.

_____. 2008c. Bureau of Land Management, Policy Manual Handbook H-1740-01 – Renewable Resource Improvement and Treatment Guidelines and Procedures. Washington, DC. February 29, 2008.

_____. 2008d. Instruction Memorandum 2009-018, Process for Setting Priorities for Issuing Grazing Permits and Leases. October 31, 2008.

_____. 2008e. Instruction Memorandum 2009-043, Wind Energy Development Policy. Washington, DC. December 19, 2008.

_____. 2009a. *Reasonable Foreseeable Development Scenario for Oil and Gas Activities on Bureau Managed Lands in the North Dakota Study Area*. US BLM, North Dakota. 94 pp.

_____. 2009b. Instruction Memorandum 2009-120, Updated Contract Clause for Utilization of Woody Biomass. Washington, DC. May 7, 2009.

_____. 2010a. Analysis of the Management Situation. North Dakota. April 2010.

_____. 2010b. Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management. October 2010.

_____. 2011a. Instructional Memorandum 2011-138, Sage-grouse Conservation Related to Wildland Fire and Fuels Management. Washington, DC. June 13, 2011.

_____. 2011b. Instruction Memorandum 2012-044, BLM National. Greater Sage-Grouse Land Use Planning Strategy. Washington, DC. December 27, 2011.

_____. 2011c. Instructional Memorandum 2011-003, Solar Energy Development 1 Policy. Washington, DC. October 7, 2010.

_____. 2011d. Instructional Memorandum 2011-061, Solar and Wind Energy Applications – Pre-Application and Screening. Washington, DC. February 7, 2011.

_____. 2012a. BLM GIS data.

_____. 2012b. *National Greater Sage-Grouse Planning Strategy, Land Use Plan Amendments and Environmental Impact Statements; Scoping Summary Report*. Washington, DC. May 2012.

_____. 2012c. Instruction Memorandum 2012-169—*RMP Alternative Development for Livestock Grazing*. Washington, DC. August 16, 2012.

_____. 2012d. Instruction Memorandum MT-2012-042—*Guidance to Address Alternative Development in Livestock Grazing Permit Renewals*. Billings, MT. February 14, 2012.

_____. 2012e. Instruction Memorandum 2012-043— *Greater Sage-Grouse Interim Management Policies and Procedures*. Washington, DC. December 22, 2011.

_____. 2013. GIS data calculated by Reservoir Management Group.

Bowman County. 2012. *Bowman County Comprehensive Plan Update: 2012*. Adopted April 3, 2012.

Bureau of Labor Statistics. 2011. Local Area Unemployment Statistics. http://www.bls.gov/lau/#tables Unemployment Rates for States http://www.bls.gov/lau/lastrk10.htm.

Braun, C. E. 1998. Sage grouse declines in western North America: What are the problems? Proceedings of the Western Association of State Fish and Wildlife Agencies 78:139–56.

Brown, J. K. 1982. Fuel and fire behavior prediction in big sagebrush. US Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. Research Paper INT-290. Ogden, UT.

Cagney et al. 2010. Grazing Influence, Objective Development, and Management in Wyoming's Greater Sage-Grouse Habitat with Emphasis on Nesting and Early Brood Rearing.

CEC (Commission for Environmental Cooperation). 2012. Invasive Species. The Northern American Mosaic: An Overview of Key Environmental Issues. Commission for Environmental Cooperation document. p. 1-4.

Centers for Disease Control. 2012. West Nile Virus. Internet Web site: http://www.cdc.gov/ncidod/dvbid/westnile/birds&mammals.htm.

Center for Integrative Environmental Research. 2008. Economic Impacts of Climate Change on North Dakota. September 2008.

CEQ (Council on Environmental Quality). 1981. *Forty Most Asked Questions Concerning CEQ's NEPA Regulations*. March 23, 1981.

_____. 1997. Environmental Justice, Guidance Under the National Environmental Policy Act. Washington, D.C. December 10, 1997. Internet Web site: http://ceq.hss.doe.gov/nepa/regs/ej/ej.pdf.

Clark, L. J. Hall, R. McLean, M. Dunbar, K. Klenk, R. Bowen C. A. Smeraski. 2006. Susceptibility of Greater Sage-Grouse to Experimental Infection with West Nile Virus. Journal of Wildlife Diseases 42: 14-22.

Coates, P. S. 2007. Greater Sage-Grouse (Centrocercus urophasianus) nest predation and incubation behavior. Idaho State University, Boise, ID.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines to manage Sage Grouse populations and their habitats. Wildlife Society Bulletin 28:967-985.

Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. *Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies*. Unpublished report. Cheyenne, Wyoming.

Connelly, J. W., C. A. Hagen, and M. A. Schroeder. 2011a. Characteristics and dynamics of Greater Sage-Grouse populations. Pp. 53-67 in S.T. Knick and J.W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Connelly, J. W., E. T. Rinkes, and C. E. Braun. 2011b. Characteristics of Greater Sage-Grouse habitats: a landscape species at micro- and macroscales. Pp. 69-83 in S.T. Knick and J.W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Cronk, Q. and J. Fuller. 1995. Plant Invaders: The threat to natural ecosystems. Chapman & Hall. New York.

DOI (US Department of the Interior). 2004. Bureau of Land Management National Sage-Grouse Habitat Conservation Strategy.

_____. 2011. Elser, A.M, Stilwell, D.P, Davis-Lawrence. Revised Activity and Surface Disturbance Projections for the Reasonable Foreseeable Development Scenario for Oil and Gas Activities on Bureau Managed Lands in the North Dakota Study Area.

DOI and USDA (US Department of the Interior and US 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.

DOI, USDA, DOE, DOD, DOC, EPA, FEMA, and NASF (US Department of the Interior. US Department of Agriculture, Department of Energy, Department of Defense, Department of Commerce, US Environmental Protection Agency, Federal Emergency Management Agency and National Association of State Foresters). 2001. Review and Update of the 1995 Federal Wildland Fire Management Policy, January, 2001.

Doherty, K .E., D. E. Naugle, and B. L. Walker. 2010. Greater sage-grouse nesting habitat: The importance of managing at multiple scales. Journal of Wildlife Management 74:1544-1553.

Eiswerth, M. E. and J. S. Shonkwiler. 2006. Examining post-wildfire reseeding on arid arid rangeland: a multivariate tobit modeling approach. Ecological Modeling 192:286-298.

Ellis, K. L. 1984. Behavior of lekking sage-grouse in response to a perched golden eagle. Western Birds 15:37–38.

_____. 1985. Effects of a new transmission line on distribution and aerial predation of breeding male sage grouse. 28 pp. Final Report.

Enz, John W. 2003. North Dakota Topographic, Climatic, and Agricultural Overview. January 2003.

EPA (US Environmental Protection Agency). 2004-2010. CASTNET Annual Reports. Internet Web site: http://java.epa.gov/castnet/documents.do. Accessed on January 31, 2013.

_____. 2010a. Primary Distinguishing Characteristics of Level III Ecoregions of the Continental United States, revised July 2010. Internet Web site: http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm. Accessed on August 22, 2011, p. 7.

_____. 2010b. EPA GHGData. 2010 Greenhouse Gas Emissions from Large Facilities. Internet Web site: http://ghgdata.epa.gov/ghgp/main.do#/facility/?q=Facility%20or%20Location&st=ND&fc=&fid=&lowE=0&highE=23000000&&g1=1&g2=1&g3=1&g4=1&g5=1&g6=1&g7=1&s1=1&s2=1&s3=1&s4=1&s5=1&s6=1&s7=1&s8=1&s9=1&s301=1&s302=1&s303=1&s304=1&s305=1&s306=1&s401=1&s402=1&s403=1&s404=1&s601=1&s602=1&s701=1&s702=1&s703=1&s704=1&s705=1&s706=1&s707=1&s708=1&s709=1&s710=1&s711=1&s801=1&s802=1&s803=1&s804=1&s805=1&s901=1&s902=1&s903=1&s904=1&s905=1&ss=&so=0&ds=E&yr=2010. Accessed on January 17, 2013.

_____. 2011a. Level III Ecoregions of the Continental United States. Revised December 2011.

_____. 2011b. Climate Change, Basic Information. Internet Web site: http://www.epa.gov/climatechange/basicinfo.html. Accessed on October 18, 2011.

_____. 2012a. EPA Green Book. Internet Web site: http://www.epa.gov/airquality/greenbook/ancl3.html. Accessed on September 5, 2012.

_____. 2012b. Air Quality Statistics Report. Internet Web site: http://www.epa.gov/airquality/airdata/ad_rep_con.html. Accessed on January 16, 2013.

_____. 2012c. Air Quality Index Report. Internet Web site: http://www.epa.gov/airdata/ad_rep_aqi.html. Accessed on September 4, 2012.

_____. 2012d. Glossary of Climate Change Terms. Internet Web site: http://www.epa.gov/climatechange/glossary.html. Accessed January 20, 2013.

_____. 2012e. Visibility, Basic Information. Internet Web site: http://www.epa.gov/visibility/what.html. Accessed January 21, 2013.

_____. 2012f. Ground Level Ozone, Basic Information. Internet Web site: http://www.epa.gov/airquality/ozonepollution/basic.html. Accessed January 21, 2013.

_____. 2012g. Emissions from the Oil and Natural Gas Industry. Last updated October 10, 2012. Internet Web site: http://www.epa.gov/airquality/oilandgas/basic.html. Accessed on February 1, 2013.

_____. 2012h. Inventory of US Greenhouse Gas Emissions and Sink: 1990-2010. Chapter 3, Land Use, Land-Use Change, and Forestry. April 15, 2012. Internet Web site: http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html. Accessed on February 1, 2013.

_____. 2013. Health Effects of Air Pollution. Internet Web site: http://www.epa.gov/region07/air/quality/health.htm. Accessed March 20, 2013.

Forest Service (US Department of Agriculture, Forest Service). 1998. Economic and Social Conditions of Communities: Economic and Social Characteristics of Interior Columbia Basin Communities and an Estimation of Effects on Communities from the Alternatives of the Eastside and Upper Columbia River basin DEIs.

_____. 2001. *Final Environmental Impact Statement for the Northern Great Plains Management Plans Revision.* Chadron, Nebraska. May 2001.

_____. 2013a. Personal communication from Arden Warm, wildlife biologist, Medora Ranger District, Dakota Prairie Grasslands. April 17, 2013.

_____. 2013b. North Dakota Greater Sage-Grouse EIS/RMPA, Social and Economic Conditions and Analysis Report. TEAMS Planning Enterprise Unit. January 17, 2013.

Forman R. T. T. and L. E. Alexander. 1998. Roads and Their Major Ecological Effects. Annual Review of Ecology and Systematics 29, pp. 207-231.

Fuhlendorf, S. D. and D. M. Engle. 2001. Restoring Heterogeneity on Rangelands: Ecosystem Management Based on Evolutionary Grazing Patterns. *BioScience,* 51(8): 625–632.

Garton, E. O., J. W. Connelly, J. S. Horne, C. A. Hagen, A. Moser, M. Schroder. 2011. Greater sage-grouse population dynamics and probability of persistence. pp. 293-382 *in* S.T. Knick and J.W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology vol. 38). University of California Press, Berkeley, CA.

Golden Valley County. 2012. *Golden Valley County Comprehensive Plan Update: 2012*.

Hagen, C. A., J. W. Connelly, and M. A. Schroeder. 2007. A meta-analysis for greater sage-grouse nesting and brood rearing habitats. Wildlife Biology 13 (Supplement 1):42-50.

Hagen, C. A. 2010. Impacts of energy development on prairie grouse ecology: a research synthesis. Transactions of North American Wildlife and Natural Resource Conference 75:96-103.

Hann, W. J. and D. L. Bunnell. 2001. *Fire and land management planning and implementation across multiple scales*. Int. J. Wildland Fire. 10:389-403.

Hann, W., A. Shlisky, D. Havlina, K. Schon, S. Barrett, T. DeMeo, K. Pohl, J. Menakis, D. Hamilton,J. Jones, and M. Levesque. 2008. Interagency Fire Regime Condition Class Guidebook. Version 1.3.0 [Online]. Available: www.frcc.gov.

Herman-Brunson K. 2007. Nesting and Brood Rearing Habitat Selection of Greater Sage-Grouse and Associated Survival of Hens and Broods at the Edge of their Historic Distribution. Masters thesis, South Dakota State University. http://pubstorage.sdstate.edu/wfs/thesis/Herman-Brunson-Katie-M-M-S-2007.pdf.

Holloran, M. J. 2005. Greater Sage-Grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. Dissertation, Department of Zoology and Physiology, University of Wyoming, Laramie, Wyoming.

IMPLAN. 2010. Minnesota IMPLAN Group 2010. Data for purchase and additional information can be found at www.implan.com.

IMPROVE. 2011. Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States: Report V. Interagency Monitoring of Protected Visual Environments (IMPROVE). June 2011.

IPCC (Intergovernmental Panel on Climate Change). 2007. Climate Change 2007: The Physical Science Basis: Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Avery, M. Tignor, and H. L. Miller, eds.]. New York, NY: Cambridge University Press. 996 p. Available at: http://www.ipcc.ch/.

Johnson, D. H., M. J. Holloran, J. W. Connelly, S. E. Hanser, C. L. Amundson, and S. T. Knick. 2011. Influences of environmental and anthropogenic features on Greater Sage-Grouse populations, 1997-2007. Pp. 407-450 in S. T. Knick and J. W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Kazcor, N. 2008. Nesting and Brood-rearing Success and Resource Selection of Greater Sage-grouse in Northwestern South Dakota. Master's thesis, South Dakota State University. http://pubstorage.sdstate.edu/wfs/thesis/Kaczor-Nicholas-W-M-S-2008.pdf.

Knapp, A. K., J. M. Blair, J. M. Briggs, S.C. Collins, D. C. Hartnett, L.C. Johnson, and E. G. Towne. 1999. The keystone role of bison in North American tallgrass prairie. Bison increase habitat heterogeneity and alter a broad array of plant, community, and ecosystem processes. *BioScience*, 49(1):39–50.

Knick S. T. 2011. Historical development, principal federal legislation and current management of sagebrush habitats: implications for conservation. Pp. 13-31 *in* S.T. Knick and J.W. Connelly, editors. Greater Sage-Grouse: ecology of a landscape species and its habitats. Cooper Ornithological Union, University of California Press, Berkeley, California.

Knick, S. T. and J. W. Connelly. 2011. Greater Sage-Grouse and sagebrush: an introduction to the landscape. Pp. 1-9 in S.T. Knick and J.W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Knick, S. T. and S. E. Hanser. 2011. Connecting pattern and process in Greater Sage-Grouse populations and sagebrush landscapes. Pp. 383-405 in S.T. Knick and J.W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

LeBeau 2012. Evaluation of greater sage-grouse reproductive habitat and response to wind energy development in south-central Wyoming. Master's Thesis. University of Wyoming, Laramie, WY.

Lyon, L. A. and S. H. Anderson. 2003. Potential gas development impacts on sage grouse nest initiation and movement. Wildlife Society Bulletin 31:486-491.

Manier, D. J., D. J. A. Wood, Z. H. Bowen, R. M. Donovan, M. J. Holloran, L. M. Juliusson, K. S. Mayne,, S. J. Oyler-McCance, F. R. Quamen, D. J. Saher, and A. J. Titolo. 2013. Summary of Science, Activities, Programs and Policies that Influence the Rangewide Conservation of Greater Sage-Grouse (*Centrocercus urophasianus*). U.S. Geological Survey Open-File Report 2013-1098, Fort Collins, Colorado.

MDU (Montana-Dakotas Utilities). 2013. Internet Web site: http://www.mdu.com/OurBusiness/UtilityResources/Pages/MontanaDakotaUtilities.aspx. Accessed May 29, 2013.

Meinke, C. W., S. T. Knick, and D. A. Pyke. 2009. A spatial model to prioritize sagebrush landscapes in the intermountain west (USA) for restoration. Restoration Ecology 17:652-659.

Milchunas, D. G., O. E. Sala, and W. K. Lauenroth. 1988. A Generalized Model of the Effects of Grazing by Large Herbivores on Grassland Community Structure. *The American Naturalist*, 132(1):87-106.

Miller, R. F. and L. L. Eddleman. 2001. Spatial and Temporal Changes of Sage Grouse Habitat in the Sagebrush Biome. Oregon State University Agricultural Experiment Station. Technical Bulletin 151. Corvallis, OR. 39 pp. Available at Internet Web site: http://greatbasin.wr.usgs.gov/LWG/Floristic_Provinces.asp.

NADP/NTN (National Atmospheric Deposition Program/National Trends Network). 2012. NTN Site ND00 interactive trend plots. Internet Web site: http://nadp.sws.uiuc.edu/sites/ntn/NTNtrends.html?siteID=ND00. Accessed January 16, 2013.

National Renewable Energy Laboratory. 2011. Estimates of Windy Land Area and Wind Energy Potential, by State, for Areas >=30% Capacity at 80m. Updated April 13, 2011. Internet Web site: http://www.windpoweringamerica.gov/filter_detail.asp?itemid=2542. Accessed May 3, 2013.

_____. 2012a. "Classes of Wind Power Density at 10m and 50m". Internet Web site: http: //rredc.nrel.gov/wind/pubs/atlas/tables/1-1T.html. Accessed December 2012.

_____. 2012b. "Fuel from the Sky: Solar Power's Potential for Western Energy Supply". Internet Web site: http://www.nrel.gov/csp/pdfs/32160.pdf. Accessed December 2012.

National Research Council. 2002. Riparian areas: functions and strategies for management. National Academy of Science. Washington, DC.

_____. 2010. *Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia*. NRC of the National Academies. Prepublication version released July 16. http://www.nap.edu/catalog.php?record_id=12877. Page 180.

Naugle D. E., K. E. Doherty, B. L. Walker, M. J. Holloran, and H. E. Copeland. 2011. Energy development and greater sage-grouse. Pages 489-504 in S.T. Knick and C.J.W., editors. Greater Sage-Grouse: ecology of a landscape species and its habitats. Cooper Ornithological Union, University of California Press, Berkeley, CA.

National Conference of State Legislatures. 2008. North Dakota- Assessing the Costs of Climate Change. Climate Change and the Economy. Internet Web site: http://www.ncsl.org/print/environ/ClimateChangeND.pdf. Accessed on August 31, 2012.

NDDoH (North Dakota Department of Health). 2011. North Dakota Air Quality Monitoring Data Summary 2010. Internet Web site: http://www.ndhealth.gov/aq/ambient/Annual%20Reports/ANN_10.pdf. Accessed on August 31, 2012.

_____. 2012. Annual Report. North Dakota Ambient Monitoring Network Plan. Internet Web site: http://www.ndhealth.gov/aq/ambient/nwrev_12.pdf. Accessed on February 1, 2013.

NDGFD (North Dakota Game and Fish Department). 2005. Management Plan and Conservation Strategies for Greater Sage-Grouse in North Dakota. July 2005.

_____. 2012a. Sage-grouse spring census data, North Dakota, 1951-2012.

_____. 2012b. 2012 Small Game and Furbearer Regulations Set. Internet Web site: http://www.gf.nd.gov/news/2012-small-game-and-furbearer-regulations-set. Accessed September 9, 2012.

North Dakota Geological Survey. 2013. "Mineral Resources of North Dakota: Uranium." Internet Web site: https://www.dmr.nd.gov/ndgs/Mineral/nd_uraniumnew.asp. Accessed February 25, 2013.

North Dakota Industrial Commission. 2012a. *2012 North Dakota Gas Production by Formation*. North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division. Internet Web site: https://www.dmr.nd.gov/oilgas/stats/2012Formation.pdf. Accessed on August 28, 2012.

_____. 2011b. *2011 North Dakota Oil Production by Formation*. North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division. Internet Web site: https://www.dmr.nd.gov/oilgas/stats/2011Formation.pdf. Accessed on August 28, 2012.

_____. 2013a. *ND Historical Barrels of Oil Produced by County*. North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division. Internet Web site: https://www.dmr.nd.gov/oilgas/stats/countymot.pdf. Accessed on August 21, 2013.

_____. 2013b. *ND Historical MCF Gas Produced by County*. North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division. Internet Web site: https://www.dmr.nd.gov/oilgas/stats/countymgt.pdf. Accessed on August 21, 2013.

_____. 2013c. *ND State Industrial Commission June 2013 Oil and Gas Production Report*. June 2013. 201 pp.

North Dakota State Soil Conservation Committee. 2011. *2011 Surface Mining Report for Minerals Other Than Coal*. Bismarck, North Dakota. 14 pp.

NPS (National Park Service). 2009. Air Resources Division. Air quality in national parks: 2008 annual performance and progress report. Natural Resource Report NPS/NRPC/ARD/NRR—2009/151. National Park Service, Denver, Colorado.

NTT (Sage-Grouse National Technical Team). 2011. *A Report on National Greater Sage-Grouse Conservation Measures*. December 2011.

Painter, T. H., A. P. Barrett, C. C. Landry, J. C. Neff, M. P. Cassidy, C. R. Lawrence, K. E. McBride, and G. L. Farmer. 2007. Impact of disturbed desert soils on duration of mountain snow cover. Geophysical Research Letters, Vol. 34, L12502, doi:10.1029/2007GL030284, 2007.

Parks Canada. 2002. Grasslands National Park of Canada Management Plan. 2002. Parks Canada, The National Parks and National Historic Sites of Canada. Quebec, Canada.

Radle, A. L. 2007. The effect of noise on wildlife: a literature review. Accessed online at the World Forum for Acoustic Ecology Online Reader. Internet Web site: http://interact.uoregon.edu/MediaLit/wfae/library/articles/radle_effect_noise_wildlife.pdf.

Rosgen, D. L. 1996. A Geomorphological Approach to Restoration of Incised Rivers. Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision, 1997.

Schroeder, M. A., C. L. Aldridge, A. D. Apa, J. R. Bohne, C. E. Braun, S. D. Bunnell, J. W. Connelly, P. Diebert, S. C. Gardner, M. A. Hilliard, G. D. Kobriger, S. M. McAdam, C. W. McCarthy, J. J. McCarthy, D. L. Mitchell, E. V. Rickerson, and S. J. Stiver. 2004. Distribution of sage-grouse in North American. Condor 106:363-376.

Shlisky, A., J. Waugh, P. Gonzalez, M. Gonzalez, M. Manta, H. Santoso, E. Alvarado, A. Ainuddin Nuruddin, D. Arturo Rodríguez-Trejo, R. Swaty, D. Schmidt, M. Kaufmann, R. Myers, A. Alencar, F. Kearns, D. Johnson, J. Smith, and D. Zollner. 2007. Fire, ecosystems and people: Threats and strategies for global biodiversity conservation. The Nature Conservancy Global Fire Initiative Technical Report 2007-2.

Slope County. 2010. *Slope County Comprehensive Plan*.

State Department (US Department of State) 2010. Fifth US climate action report. Washington, DC: Global Publishing Services. 180 p. Available at: http://www.state.gov/e/oes/rls/rpts/car/index.htm.

State of North Dakota 2013a. Department of Mineral Resources. Oil and Gas Division. Chart of daily oil production with price per barrel. https://www.dmr.nd.gov/oilgas/stats/DailyProdPrice.pdf

_____. 2013b. Department of Mineral Resources. Oil and Gas Division. ND Historical Barrels of Oil Produced by County. https://www.dmr.nd.gov/oilgas/stats/countymot.pdf.

Steenhof, K., M. N. Kochert, and J. A. Roppe. 1993. Nesting by raptors and common ravens on electrical transmission line towers. Journal of Wildlife Management 57:271-281.

Stiver, S. J., A. D. Apa, J. R. Bohne, S. D. Bunnell, P. A. Deibert, S. C. Gardner, M. A. Hilliard, C. W. McCarthy, and M. A. Schroeder. 2006. *Greater Sage-Grouse Comprehensive Conservation Strategy. Western Association of Fish and Wildlife Agencies*. Unpublished report. Cheyenne, Wyoming.

Swanson, C. 2009. Ecology of Greater Sage-Grouse in the Dakotas. PhD dissertation. Wildlife and Fisheries Science, South Dakota State University. http://pubstorage.sdstate.edu/wfs/thesis/Swanson-Christopher-C-Ph-D-2009.pdf.

Taylor R. L., B. L. Walker, D. E. Naugle, L. S. Mills. 2012. Managing multiple vital rates to maximize greater sage-grouse population growth. Journal of Wildlife Management 76: 336-347.

Torell, L. A., J. A. Tanaka, N. Rimbey, T. Darden, L. Van Tassell and A. Harp. 2002. Ranch- level impacts of changing grazing policies on BLM land to protect the Greater Sage-Grouse: Evidence from Idaho, Nevada and Oregon. Policy Analysis Center for Western Public Lands, policy paper SG-01-02, Caldwell, ID.

US Climate Change Science Program. 2008. The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States. May 2008.

USDA (US Department of Agriculture). 2000. Coarse-scale Potential Natural Vegetation Groups, v2000. USDA, US Forest Service. Internet Web site: http://www.firelab.org/science-applications/fire-fuel/181-pnvg. Accessed August 28, 2012.

_____. 2012. National Agricultural Statistical Service. Statistics by State. http://www.nass.usda.gov/Statistics_by_State/North_Dakota/Publications/County_Estimates/index.asp.

USDA and DOI (US Department of Agriculture and US Department of the Interior). February 2009. Guidance for Implementation of Federal Wildland Fire Management Policy. Wildland Fire Leadership Council.

US Department of Commerce. 2000, 2005 and 2010. Decennial census data Historic data http://www.census.gov/population/cencounts/nd190090.

_____. 2007. Census of Governments Survey of State and Local Government Finances, Washington, D.C. Obtained from EPS-HDT Federal Payments report page 4.

_____. 2012a. Census Bureau, American Community Survey Office, Washington, D.C.

_____. 2012b. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C. Table CA30.

US Department of Energy. 2012. Wind Powering America: North Dakota 80-Meter Wind Map and Wind Resource Potential. Available at: http://www.windpoweringamerica.gov/wind_resource_maps.asp?stateab=nd.

US Energy Information Administration. 2013a. State Energy Profiles. Internet Web site: http://www.eia.gov/state/state_energy_profiles.cfm?sid=ND. Accessed on March, 19 2013.

_____. 2013b. State Energy Reserves and Supply. Internet Web site: http://www.eia.gov/state/data.cfm?sid=ND#ReservesSupply. Accessed on March, 19 2013.

_____. 2013c. US States, Rankings: Carbon Dioxide Emissions, 2010. Internet Web site: http://www.eia.gov/beta/state/rankings/?sid=US#/series/98. Accessed on February 15, 2013.

USFWS (US Fish and Wildlife Service). 2010. "12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered: Notice of 12-month Petition Findings." *Federal Register* 75 p. 13910. March 23, 2010.

_____. 2012. Endangered, Threatened, Proposed and Candidate Species North Dakota. Ecological Services North Dakota Field Office. Internet Web site: http://www.fws.gov/northdakotafieldoffice/endspecies/endangered_species.htm. Accessed September 11, 2012.

_____. 2013. Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report. U.S. Fish and Wildlife Service, Denver, CO. February 2013.

US Global Change Research Program. 2009. Global Climate Change Impacts in the United States. Cambridge University Press. Downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf.

USGS (United States Geological Survey). 2006. Effects of Fire in the Northern Great Plains; Effects of Fire on Some Undesirable Species. Internet Web site: http://www.npwrc.usgs.gov/resource/habitat/fire/undesire.htm. Accessed January 29, 2013.

_____. 2010. GAP Land Cover Data Set, version 2.

_____. 2012. National Hydrography Dataset.

Verma, S. and S. Jayakumar. 2012. Impact of forest fire on physical, chemical and biological properties of soil: A review. Proceedings of the International Academy of Ecology and Environmental Sciences, 2(3): 168-176.

Walker, B. L., D. E. Naugle, K. E. Doherty, T. E. Cornish. 2004. Outbreak of West Nile virus in greater sag-grouse and guidelines for monitoring, handling and submitting dead birds. Wildlife Society Bulletin 32: 1-7.

Walker, B. L., D. E. Naugle, and K. E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654.

Walker B. L. and D. E. Naugle. 2011. West Nile virus ecology in sagebrush habitat and impacts on greater sage-grouse populations. Pp. 127-143 in S. Knick, editor. Greater Sage-Gouse: ecology of a landscape species and its habitat. Cooper Ornithological Union, University of California Press, Berkeley.

Westbrooks, R. 1998. Invasive plants, changing the landscape of America: Fact book. Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW). Washington, DC.

Wildland Fire Leadership Council. 2009. Guidance for Implementation of Federal Wildland Fire Management Policy. US Department of the Interior, WFLC. February, 2009.

Wisdom, M. J., C. W. Meinke, S. T. Knick, and M. A. Schroeder. 2011. Factors associated with extirpation of Sage-Grouse. Pp. 451-472 in S.T. Knick and J.W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Glossary

GLOSSARY

2008 WAFWA Sage-grouse MOU. A memorandum of understanding (MOU) among Western Association of Fish and Wildlife Agencies, US Department of Agriculture, Forest Service, US Department of the Interior, Bureau of Land Management, US Department of the Interior, Fish and Wildlife Service, US Department of the Interior, Geological Survey, US Department of Agriculture, Natural Resources Conservation Service, and the US Department of Agriculture, Farm Service Agency. The purpose of the MOU is to provide for cooperation among the participating state and federal land, wildlife management and science agencies in the conservation and management of sage-grouse (*Centrocercus urophasianus*) sagebrush (*Artemisia* spp.) habitats and other sagebrush-dependent wildlife throughout the western United States and Canada and a commitment of all agencies to implement the 2006 WAFWA Conservation Strategy.

2011 Partnership MOU. A partnership agreement among the US Department of Agriculture, Natural Resources Conservation Service, Forest Service, US Department of the Interior, Bureau of Land Management, and Fish and Wildlife Service in 2011. This MOU is for range management – to implement NRCS practices on adjacent federal properties.

Acquisition. Acquisition of lands can be pursued to facilitate various resource management objectives. Acquisitions, including easements, can be completed through exchange, Land and Water Conservation Fund purchases, donations, or receipts from the Federal Land Transaction Facilitation Act sales or exchanges.

Activity plan. A type of implementation plan (see *Implementation plan*); an activity plan usually describes multiple projects and applies best management practices to meet land use plan objectives. Examples of activity plans include interdisciplinary management plans, habitat management plans, recreation area management plans, and grazing plans.

Actual use. The amount of animal unit months consumed by livestock based on the numbers of livestock and grazing dates submitted by the livestock operator and confirmed by periodic field checks by the BLM.

Adaptive management. A type of natural resource management in which decisions are made as part of an ongoing science-based process. Adaptive management involves testing, monitoring, and evaluating applied strategies, and incorporating new knowledge into management approaches that are based on scientific findings and the needs of society. Results are used to modify management policy, strategies, and practices.

Administrative access. A term used to describe access for resource management and administrative purposes such as fire suppression, cadastral surveys, permit compliance, law enforcement and military in the performance of their official duty, or other access needed to administer BLM-managed lands or uses.

Air basin. A land area with generally similar meteorological and geographic conditions throughout. To the extent possible, air basin boundaries are defined along political boundary lines and include both the source and receptor areas.

Air pollution. The addition to the atmosphere of any material that may have a deleterious effect to life on our planet.

Allotment. An area of land in which one or more livestock operators graze their livestock. Allotments generally consist of BLM-administered lands but may include other federally managed, state-owned, and private lands. An allotment may include one or more separate pastures. Livestock numbers and periods of use are specified for each allotment.

Allotment management plan (AMP). A concisely written program of livestock grazing management, including supportive measures if required, designed to attain specific, multiple-use management goals in a grazing allotment. An AMP is prepared in consultation with the permittee(s), lessee(s), and other affected interests. Livestock grazing is considered in relation to other uses of the range and to renewable resources, such as watershed, vegetation, and wildlife. An AMP establishes seasons of use, the number of livestock to be permitted, the range improvements needed, and the grazing system.

Alluvial soil. A soil developing from recently deposited alluvium and exhibiting essentially no horizon development or modification of the recently deposited materials.

Alluvium. Clay, silt, sand, gravel, or other rock materials transported by moving water. Deposited in comparatively recent geologic time as sorted or semi-sorted sediment in rivers, floodplains, lakes, and shores, and in fans at the base of mountain slopes.

Ambient air quality. The state of the atmosphere at ground level as defined by the range of measured and/or predicted ambient concentrations of all significant pollutants for all averaging periods of interest.

Amendment. The process for considering or making changes in the terms, conditions, and decisions of approved Resource Management Plans or management framework plans. Usually only one or two issues are considered that involve only a portion of the planning area.

Animal unit month (AUM). The amount of forage necessary for the sustenance of one cow or its equivalent for a period of one month.

Anthropogenic disturbances. Features include but are not limited to paved highways, graded gravel roads, transmission lines, substations, wind turbines, oil and gas wells, geothermal wells and associated facilities, pipelines, landfills, agricultural conversion, homes, and mines.

Aquatic. Living or growing in or on the water.

Area of Critical Environmental Concern (ACEC). Special area designation established through the BLM's land use planning process (43 CFR 1610.7-2) where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The level of allowable use within an ACEC is established through the collaborative planning process. Designation of an ACEC allows for resource use limitations in order to protect identified resources or values.

Atmospheric deposition. Air pollution produced when acid chemicals are incorporated into rain, snow, fog, or mist and fall to the earth. Sometimes referred to as "acid rain" and comes from sulfur oxides and nitrogen oxides, products of burning coal and other fuels and from certain industrial processes. If the acid chemicals in the air are blown into the area where the weather is wet, the acids can fall to earth in the rain, snow, fog, or mist. In areas where the weather is dry, the acid chemicals may become incorporated into dust or smoke.

Attainment area. A geographic area in which levels of a criteria air pollutant meet the health-based National Ambient Air Quality Standard for that specific pollutant.

Authorized/authorized use. This is an activity (i.e., resource use) occurring on the public lands that is either explicitly or implicitly recognized and legalized by law or regulation. This term may refer to those activities occurring on the public lands for which the BLM, Forest Service, or other appropriate authority (e.g., Congress for RS 2477 rights-of-way, Federal Energy Regulatory Commission (FERC) for major, interstate rights-of-way), has issued a formal authorization document (e.g., livestock grazing lease/permit; right-of-way grant; coal lease; oil and gas permit to drill; etc.). Formally authorized uses typically involve some type of commercial activity, facility placement, or event. These formally authorized uses are often spatially or temporally limited. Unless constrained or bounded by statute, regulation, or an approved land use plan decision, legal activities involving public enjoyment and use of the public lands (e.g., hiking, camping, hunting, etc.) require no formal BLM or Forest Service authorization.

Avoidance/avoidance area. These terms usually address mitigation of some activity (i.e., resource use). Paraphrasing the CEQ regulations (40 CFR 1508.20), avoidance means to circumvent, or bypass, an impact altogether by not taking a certain action, or parts of an action. Therefore, the term "avoidance" does not necessarily prohibit a proposed activity, but it may require the relocation of an action, or the total redesign of an action to eliminate any potential impacts resulting from it. Also see *"right-of-way avoidance area"* definition.

Best Management Practices (BMPs). A suite of techniques that guide or may be applied to management actions to aide in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a planning decision unless the plans specify that they are mandatory.

Big game. Indigenous, ungulate (hoofed) wildlife species that are hunted, such as elk, deer, bison, bighorn sheep, and pronghorn antelope.

Biodiversity (biological diversity). The variety of life and its processes, and the interrelationships within and among various levels of ecological organization. Conservation, protection, and restoration of biological species and genetic diversity are needed to sustain the health of existing biological systems. Federal resource management agencies must examine the implications of management actions and development decisions on regional and local biodiversity.

Biological soil crust. A complex association between soil particles and cyanobacteria, algae, microfungi, lichens, and bryophytes that live within or atop the uppermost millimeters of soil.

BLM Sensitive Species. Those species that are not federally listed as endangered, threatened, or proposed under the Endangered Species Act, but that are designated by the BLM State Director under 16 USC 1536(a)(2) for special management consideration. By national policy, federally listed candidate species are automatically included as sensitive species. Sensitive species are managed so they will not need to be listed as proposed, threatened, or endangered under the Endangered Species Act.

Candidate species. Taxa for which the US Fish and Wildlife Service has sufficient information on their status and threats to propose the species for listing as endangered or threatened under the Endangered Species Act, but for which issuance of a proposed rule is currently precluded by higher priority listing actions. Separate lists for plants, vertebrate animals, and invertebrate animals are published periodically in the Federal Register (BLM Manual 6840, Special Status Species Manual).

Casual use. Casual use means activities ordinarily resulting in no or negligible disturbance of the public lands, resources, or improvements. For examples for rights of ways see 43 CFR 2801.5. For examples for locatable minerals see 43 CFR 3809.5.

Categorical exclusion. A category of actions (identified in agency guidance) that do not individually or cumulatively have a significant effect on the human environment, and for which neither an environmental assessment nor an environmental impact statement is required (40 CFR 1508.4), but a limited form of NEPA analysis is performed.

Checkerboard. This term refers to a land ownership pattern of alternating sections of Federal owned lands with private or State owned lands for 20 miles on either side of a land grant railroad (e.g. Union Pacific, Northern Pacific, etc.). On land status maps this alternating ownership is either delineated by color coding or alphabetic code resulting in a "checkerboard" visual pattern.

Chemical vegetation treatment. Application of herbicides to control invasive species/noxious weeds and/or unwanted vegetation. To meet resource objectives the preponderance of chemical treatments would be used in areas where cheatgrass or noxious weeds have invaded sagebrush steppe.

Clean Air Act of 1963 (as amended). Federal legislation governing air pollution control.

Clean Water Act of 1972 (as amended). Federal legislation governing water pollution control.

Climate change. Any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from:

- natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;
- natural processes within the climate system (e.g., changes in ocean circulation); and
- human activities that change the atmosphere's composition (e.g., driving automobiles) and the land surface (e.g., deforestation, reforestation, urbanization, desertification, etc.).

Closed area. An area where one or more uses are prohibited either temporarily or over the long term. Areas may be closed to uses such as, but not limited to, off-road vehicles, mineral leasing, mineral or vegetative material collection, or target shooting. In off-road vehicle use closed areas, motorized and mechanized off-road vehicle use is prohibited. Use of motorized and mechanized off-road vehicles in closed areas may be allowed for certain reasons; however, such use shall be made only with the approval of the authorized officer (43 CFR 8340.0-5).

Collaboration. A cooperative process in which interested parties, often with widely varied interests, work together to seek solutions with broad support for managing public and other lands. Collaboration may take place with any interested parties, whether or not they are a cooperating agency.

Comprehensive trails and travel management. The proactive interdisciplinary planning; on-the-ground management and administration of travel networks (both motorized and non-motorized) to ensure public access, natural resources, and regulatory needs are considered. It consists of inventory, planning, designation, implementation, education, enforcement, monitoring, easement acquisition, mapping and signing, and other measures necessary to provide access to public lands for a wide variety of uses (including uses for recreational, traditional, casual, agricultural, commercial, educational, landing strips, and other purposes).

Condition class (fire regimes). Fire regime condition classes are a measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components, such as species composition, structural stage, stand age, canopy closure, and fuel loadings. One or more of the following activities may have caused this departure: fire

suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects or disease, or other management activities.

Conformance. A proposed action shall be specifically provided for in the land use plan or, if not specifically mentioned, shall be clearly consistent with the goals, objectives, or standards of the approved land use plan.

Conservation measures. Measures to conserve, enhance, and/or restore Greater Sage-Grouse habitat by reducing, eliminating, or minimizing threats to that habitat.

Conservation plan. The recorded decisions of a landowner or operator, cooperating with a conservation district, on how the landowner or operator plans, within practical limits, to use his/her land according to its capability and to treat it according to its needs for maintenance or improvement of the soil, water, animal, plant, and air resources.

Conservation strategy. A strategy outlining current activities or threats that are contributing to the decline of a species, along with the actions or strategies needed to reverse or eliminate such a decline or threats. Conservation strategies are generally developed for species of plants and animals that are designated as BLM sensitive species or that have been determined by the US Fish and Wildlife Service or National Oceanographic and Atmospheric Administration-Fisheries to be federal candidates under the ESA.

Controlled surface use (CSU). CSU is a category of moderate constraint stipulations that allows some use and occupancy of public land while protecting identified resources or values and is applicable to fluid mineral leasing and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads). CSU areas are open to fluid mineral leasing but the stipulation allows the BLM to require special operational constraints, or the activity can be shifted more than 200 meters (656 feet) to protect the specified resource or value.

Cooperating agency. Assists the lead federal agency in developing an environmental assessment or environmental impact statement. These can be any agency with jurisdiction by law or special expertise for proposals covered by NEPA (40 CFR 1501.6). Any tribe or Federal, State, or local government jurisdiction with such qualifications may become a cooperating agency by agreement with the lead agency.

Council on Environmental Quality. An advisory council to the President of the US established by the National Environmental Policy Act of 1969. It reviews federal programs to analyze and interpret environmental trends and information.

Criteria pollutant. The US EPA uses six "criteria pollutants" as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards. The criteria pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter and lead.

Crucial wildlife habitat. The environment essential to plant or animal biodiversity and conservation at the landscape level. Crucial habitats include, but are not limited to, biological core areas, severe winter range, winter concentration areas, reproduction areas, and movement corridors.

Cultural resources. Locations of human activity, occupation, or use. Cultural resources include archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and locations of traditional cultural or religious importance to specified social and/or cultural groups.

Cumulative effects. The direct and indirect effects of a proposed project alternative's incremental impacts when they are added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action.

Decision area. Lands and federal mineral estate within the planning area that are administered by the BLM.

Deferred/deferred use. To set-aside, or postpone, a particular resource use(s) or activity(ies) on the public lands to a later time. Generally when this term is used the period of the deferral is specified. Deferments sometimes follow the sequence timeframe of associated serial actions (e.g., action B will be deferred until action A is completed, etc.).

Degraded vegetation. Areas where the plant community is not complete or is under threat. Examples include missing components such as perennial forbs or cool season grasses, weed infestations, or lack of regeneration of key species such as sagebrush or cottonwoods trees.

Designated roads and trails. Specific roads and trails identified by the BLM (or other agency) where some type of motorized/nonmotorized use is appropriate and allowed, either seasonally or year-long (H-1601-1, BLM Land Use Planning Handbook).

Desired future condition. For rangeland vegetation, the condition of rangeland resources on a landscape scale that meet management objectives. It is based on ecological, social, and economic considerations during the land planning process. It is usually expressed as ecological status or management status of vegetation (species composition, habitat diversity, and age and size class of species) and desired soil qualities (soil cover, erosion, and compaction). In a general context, desired future condition is a portrayal of the land or resource conditions that are expected to result if goals and objectives are fully achieved.

Desired outcomes. A type of land use plan decision expressed as a goal or objective.

Direct impacts. Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place.

Directional drilling. A drilling technique whereby a well is deliberately deviated from the vertical in order to reach a particular part of the oil- or gas-bearing reservoir. Directional drilling technology enables the driller to steer the drill stem and bit to a desired bottom hole location. Directional wells initially are drilled straight down to a predetermined depth and then

gradually curved at one or more different points to penetrate one or more given target reservoirs. This specialized drilling usually is accomplished with the use of a fluid-driven downhole motor, which turns the drill bit. Directional drilling also allows multiple production and injection wells to be drilled from a single surface location such as a gravel pad, thus minimizing cost and the surface impact of oil and gas drilling, production, and transportation facilities. It can be used to reach a target located beneath an environmentally sensitive area (Alaska Department of Natural Resources, Division of Oil and Gas 2009).

Disposal lands. Transfer of public land out of federal ownership to another party through sale, exchange, Recreation and Public Purposes Act of 1926, Desert Land Entry or other land law statutes.

Disruptive activities. Those public land resource uses/activities that are likely to alter the behavior, displace, or cause excessive stress to existing animal or human populations occurring at a specific location and/or time. In this context, disruptive activity(ies) refers to those actions that alter behavior or cause the displacement of individuals such that reproductive success is negatively affected, or an individual's physiological ability to cope with environmental stress is compromised. This term does not apply to the physical disturbance of the land surface, vegetation, or features. When administered as a land use restriction (e.g., *No Disruptive Activities*), this term may prohibit or limit the physical presence of sound above ambient levels, light beyond background levels, and/or the nearness of people and their activities. The term is commonly used in conjunction with protecting wildlife during crucial life stages (e.g., breeding, nesting, birthing, etc.), although it could apply to any resource value on the public lands. The use of this land use restriction is not intended to prohibit all activity or authorized uses.

Diversity. The relative abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

Easement. A right afforded a person or agency to make limited use of another's real property for access or other purposes.

Ecological emphasis area. The central and primary area of habitat for a population of a given species or group of species. These areas include corridors, which are strips of land that aid in the movement of species between disconnected emphasis areas of their natural habitat. Emphasis areas may be divided into smaller geographical zones.

Ecological site. A distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

Emergency stabilization. Planned actions to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life or property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources. Emergency stabilization actions must be taken within one year following containment of a wildfire.

Endangered species. Any species that is in danger of extinction throughout all or a significant portion of its range (BLM Manual 6840, Special Status Species Manual). Under the Endangered

Species Act in the US, "endangered" is the more-protected of the two categories. Designation as endangered (or threatened) is determined by USFWS as directed by the Endangered Species Act.

Endangered Species Act of 1973 (as amended). Designed to protect critically imperiled species from extinction as a consequence of economic growth and development untempered by adequate concern and conservation. The Act is administered by two federal agencies, USFWS and the National Oceanic and Atmospheric Administration. The purpose of the Act is to protect species and also the ecosystems upon which they depend (16 US Code 1531-1544).

Enhance. The improvement of habitat by increasing missing or modifying unsatisfactory components and/or attributes of the plant community to meet sage-grouse objectives.

Environmental assessment (EA). A concise public document prepared to provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. It includes a brief discussion of the need for the proposal, alternatives considered, environmental impact of the proposed action and alternatives, and a list of agencies and individuals consulted.

Environmental impact statement (EIS). A detailed statement prepared by the responsible official in which a major federal action that significantly affects the quality of the human environment is described, alternatives to the proposed action are provided, and effects are analyzed (BLM National Management Strategy for OHV Use on Public Lands).

Evaluation (plan evaluation). The process of reviewing the land use plan and the periodic plan monitoring reports to determine whether the land use plan decisions and National Environmental Policy Act of 1969 analysis are still valid and whether the plan is being implemented.

Exchange. A transaction whereby the federal government receives land or interests in land in exchange for other land or interests in land.

Exclusion area. An area on the public lands where a certain activity(ies) is prohibited to insure protection of other resource values present on the site. The term is frequently used in reference to lands/realty actions and proposals (e.g., rights-of-way, etc.), but is not unique to lands and realty program activities. This restriction is functionally analogous to the phrase "no surface occupancy" used by the oil and gas program, and is applied as an absolute condition to those affected activities. The less restrictive analogous term is avoidance area. Also see *"right-of-way exclusion area"* definition.

Exemplary (vegetation). An area of vegetation that does not show signs of degradation and which may serve as a comparison to illustrate what the vegetation potential is for a given type of environment.

Existing routes. The roads, trails, or ways that are used by motorized vehicles (jeeps, all-terrain vehicles, motorized dirt bikes, etc.), mechanized uses (mountain bikes, wheelbarrows,

game carts), pedestrians (hikers), and/or equestrians (horseback riders) and are, to the best of BLM's knowledge, in existence at the time of RMPA/EIS publication.

Exploration. Active drilling and geophysical operations to:

a. Determine the presence of the mineral resource; or

b. Determine the extent of the reservoir or mineral deposit.

Extensive Recreation Management Area (ERMA). Administrative units that require specific management consideration in order to address recreation use, demand, or Recreation and Visitor Services program investments. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. ERMA management is commensurate and considered in context with the management of other resources and resource uses.

Federal Land Policy and Management Act of 1976 (FLPMA). Public Law 94-579, October 21, 1976, often referred to as the BLM's "Organic Act," which provides most of the BLM's legislated authority, direction policy, and basic management guidance.

Federal mineral estate. Subsurface mineral estate owned by the US and administered by the BLM. Federal mineral estate under BLM jurisdiction is composed of mineral estate underlying BLM lands, privately owned lands, and state-owned lands

Fire frequency. A general term referring to the recurrence of fire in a given area over time.

Fire management plan (FMP). A plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire, prescribed fire, and wildland fire use). The plan is supplemented by operational plans including, but not limited to, preparedness plans, preplanned dispatch plans, and prevention plans. Fire Management Plans assure that wildland fire management goals and components are coordinated.

Fire Regime Condition Classification System (FRCCS). Measures the extent to which vegetation departs from reference conditions, or how the current vegetation differs from a particular reference condition.

Fire suppression. All work and activities connected with control and fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Fluid minerals. Oil, gas, coal bed natural gas, and geothermal resources.

Forage. All browse and herbaceous foods that are available to grazing animals.

Forage base. The amount of vegetation available for wildlife and livestock use.

Fragile soils. Soils having a shallow depth to bedrock, minimal surface layer of organic material, textures that are more easily detached and eroded, or are on slopes over 35 percent.

Fugitive dust. Significant atmospheric dust arises from the mechanical disturbance of granular material exposed to the air. Dust generated from these open sources is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream. Common sources of fugitive dust include unpaved roads, agricultural tilling operations, aggregate storage piles, and heavy construction operations.

General sage-grouse habitat. Is occupied (seasonal or year-round) habitat outside of priority habitat. These areas have been identified by the BLM in coordination with respective state wildlife agencies.

Geographic Information System (GIS). A system of computer hardware, software, data, people, and applications that capture, store, edit, analyze, and display a potentially wide array of geospatial information.

Geophysical exploration. Efforts to locate deposits of oil and gas resources and to better define the subsurface.

Geothermal energy. Natural heat from within the Earth captured for production of electric power, space heating, or industrial steam.

Goal. A broad statement of a desired outcome; usually not quantifiable and may not have established timeframes for achievement.

Grandfathered right. The right to use in a non-conforming manner due to existence prior to the establishment of conforming terms and conditions.

Grazing preference. Grazing preference or preference means the total number of animal unit months on public lands apportioned and attached to base property owned or controlled by a permittee, lessee, or an applicant for a permit or lease. Grazing preference includes active use and use held in suspension. Grazing preference holders have a superior or priority position against others for the purpose of receiving a grazing permit or lease (43 CFR 4100.0-5).

Grazing relinquishment. The voluntary and permanent surrender by an existing permittee or lessee, (with concurrence of any base property lienholder(s)), of their priority (preference) to use livestock forage allocation on public land as well as their permission to use this forage. Relinquishments do not require consent or approval by BLM. The BLM's receipt of a relinquishment is not a decision to close areas to livestock grazing.

Grazing retirement. Ending livestock grazing on a specific area of land.

Grazing system. Scheduled grazing use and non-use of an allotment to reach identified goals or objectives by improving the quality and quantity of vegetation. Include, but are not limited to, developing pastures, utilization levels, grazing rotations, timing and duration of use periods, and necessary range improvements.

Groundwater. Water held underground in soil or permeable rock, often feeding springs and wells.

Guidelines. Actions or management practices that may be used to achieve desired outcomes, sometimes expressed as BMPs. Guidelines may be identified during the land use planning process, but they are not considered a land use plan decision unless the plan specifies that they are mandatory. Guidelines for grazing administration must conform to 43 CFR 4180.2.

Habitat. An environment that meets a specific set of physical, biological, temporal, or spatial characteristics that satisfy the requirements of a plant or animal species or group of species for part or all of their life cycle.

Hazardous material. A substance, pollutant, or contaminant that, due to its quantity, concentration, or physical or chemical characteristics, poses a potential hazard to human health and safety or to the environment if released into the workplace or the environment.

Communication site. Sites that include broadcast types of uses (e.g., television, AM/FM radio, cable television, broadcast translator) and non-broadcast uses (e.g., commercial or private mobile radio service, cellular telephone, microwave, local exchange network, passive reflector).

Impact. The effect, influence, alteration, or imprint caused by an action.

Impairment. The degree to which a distance of clear visibility is degraded by man-made pollutants.

Implementation decisions. Decisions that take action to implement land use planning; generally appealable to Interior Board of Land Appeals under 43 CFR 4.410.

Implementation plan. An area or site-specific plan written to implement decisions made in a land use plan. Implementation plans include both activity plans and project plans.

Indicators. Factors that describe resource condition and change and can help the BLM determine trends over time.

Indirect impacts. Indirect impacts result from implementing an action or alternative but usually occur later in time or are removed in distance and are reasonably certain to occur.

Integrated ranch planning. A method for ranch planning that takes a holistic look at all elements of the ranching operations, including strategic and tactical planning, rather than approaching planning as several separate enterprises.

Intermittent stream. An intermittent stream is a stream that flows only at certain times of the year when it receives water from springs or from some surface sources such as melting snow in mountainous areas. During the dry season and throughout minor drought periods, these streams will not exhibit flow. Geomorphological characteristics are not well defined and are often inconspicuous. In the absence of external limiting factors, such as pollution and thermal modifications, species are scarce and adapted to the wet and dry conditions of the fluctuating water level.

Invertebrate. An animal lacking a backbone or spinal column, such as insects, snails, and worms. The group includes 97 percent of all animal species.

Key wildlife ecosystems. Specific areas within the geographic area occupied by a species in which are found those physical and biological features 1) essential to the conservation of the species, and 2) which may require special management considerations or protection.

Land health condition. A classification for land health which includes these categories: "Meeting Land Health Standard(s)" and "Not Meeting Land Health Standard(s)".

Land tenure adjustments. Land ownership or jurisdictional changes. To improve the manageability of the BLM-administered lands and their usefulness to the public, the BLM has numerous authorities for repositioning lands into a more consolidated pattern, disposing of lands, and entering into cooperative management agreements. These land pattern improvements are completed primarily through the use of land exchanges but also through land sales, through jurisdictional transfers to other agencies, and through the use of cooperative management agreements and leases.

Land treatment. All methods of artificial range improvement arid soil stabilization such as reseeding, brush control (chemical and mechanical), pitting, furrowing, water spreading, etc.

Land use allocation. The identification in a land use plan of the activities and foreseeable development that are allowed, restricted, or excluded for all or part of the planning area, based on desired future conditions (H-1601-1, BLM Land Use Planning Handbook).

Land use plan. A set of decisions that establish management direction for land within an administrative area, as prescribed under the planning provisions of FLPMA; an assimilation of land use plan level decisions developed through the planning process outlined in 43 CFR 1600, regardless of the scale at which the decisions were developed. The term includes both RMPs and management framework plans (from H-1601-1, BLM Land Use Planning Handbook).

Land use plan decision. Establishes desired outcomes and actions needed to achieve them. Decisions are reached using the planning process in 43 CFR 1600. When they are presented to the public as proposed decisions, they can be protested to the BLM Director. They are not appealable to Interior Board of Land Appeals.

Late brood-rearing area. Habitat includes mesic sagebrush and mixed shrub communities, wet meadows, and riparian habitats as well as some agricultural lands (e.g. alfalfa fields, etc).

Leasable minerals. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. These include energy-related mineral resources such as oil, natural gas, coal, and geothermal, and some non-energy minerals, such as phosphate, sodium, potassium, and sulfur. Geothermal resources are also leasable under the Geothermal Steam Act of 1970.

Lease. Section 302 of the Federal Land Policy and Management Act of 1976 provides the BLM's authority to issue leases for the use, occupancy, and development of public lands. Leases are issued for purposes such as a commercial filming, advertising displays, commercial or noncommercial croplands, apiaries, livestock holding or feeding areas not related to grazing permits and leases, native or introduced species harvesting, temporary or permanent facilities for commercial purposes (does not include mining claims), residential occupancy, ski resorts,

construction equipment storage sites, assembly yards, oil rig stacking sites, mining claim occupancy if the residential structures are not incidental to the mining operation, and water pipelines and well pumps related to irrigation and nonirrigation facilities. The regulations establishing procedures for processing these leases and permits are found in 43 CFR 2920.

Lease stipulation. A modification of the terms and conditions on a standard lease form at the time of the lease sale.

Lek. A traditional courtship display area attended by male sage-grouse in or adjacent to sagebrush dominated habitat. A lek is designated based on observations of two or more male sage-grouse engaged in courtship displays. Sub-dominant males may display on itinerant strutting areas during population peaks. Such areas usually fail to become established leks. Therefore, a site where less than five males are observed strutting should be confirmed active for two years before meeting the definition of a lek (Connelly et al 2000, Connelly et al. 2003, 2004). Each state may have a slightly different definition of lek, active lek, inactive lek, occupied lek, and unoccupied leks. Regional planning will use the appropriate definition provided by the state of interest.

Lek complex. A lek or group of leks within 2.5 km (1.5 mi) of each other between which male sage-grouse may interchange from one day to the next. Fidelity to leks has been well documented. Visits to multiple leks are most common among yearlings and less frequent for adult males, suggesting an age-related period of establishment (Connelly et al. 2004).

Active lek. Any lek that has been attended by male sage-grouse during the strutting season.

Inactive lek. Any lek where sufficient data suggests that there was no strutting activity throughout a strutting season. Absence of strutting grouse during a single visit is insufficient documentation to establish that a lek is inactive. This designation requires documentation of either: 1) an absence of sage-grouses on the lek during at least two ground surveys separated by at least seven days. These surveys must be conducted under ideal conditions (April 1-May 7 (or other appropriate date based on local conditions), no precipitation, light or no wind, half-hour before sunrise to one hour after sunrise) or 2) a ground check of the exact known lek site late in the strutting season (after April 15) that fails to find any sign (tracks, droppings, feathers) of strutting activity. Data collected by aerial surveys should not be used to designate inactive status as the aerial survey may actually disrupt activities.

Occupied lek. A lek that has been active during at least one strutting season within the prior 10 years.

Unoccupied lek. A lek that has either been "destroyed" or "abandoned."

Destroyed lek. A formerly active lek site and surrounding sagebrush habitat that has been destroyed and is no longer suitable for sage-grouse breeding.

Abandoned lek. A lek in otherwise suitable habitat that has not been active during a period of 10 consecutive years. To be designated abandoned, a lek must be "inactive" (see above criteria) in at least four non-consecutive strutting seasons spanning the 10 years. The site of an "abandoned" lek should be surveyed at least once every 10 years to determine whether it has been re-occupied by sage-grouse.

Lentic. Pertaining to standing water, such as lakes and ponds.

Locatable minerals. Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872, as amended. This includes deposits of gold, silver, and other uncommon minerals not subject to lease or sale.

Long-term effect. The effect could occur for an extended period after implementation of the alternative. The effect could last several years or more.

Lotic. Pertaining to moving water, such as streams or rivers.

Management decision. A decision made by the BLM to manage public lands. Management decisions include both land use plan decisions and implementation decisions.

Master development plans. A set of information common to multiple planned wells, including drilling plans, Surface Use Plans of Operations, and plans for future production.

Mechanized transport. Any vehicle, device, or contrivance for moving people or material in or over land, water, snow, or air that has moving parts.

Mineral. Any naturally formed inorganic material, solid or fluid inorganic substance that can be extracted from the earth, any of various naturally occurring homogeneous substances (as stone, coal, salt, sulfur, sand, petroleum, water, or natural gas) obtained usually from the ground. Under federal laws, considered as locatable (subject to the general mining laws), leasable (subject to the Mineral Leasing Act of 1920), and salable (subject to the Materials Act of 1947).

Mineral entry. The filing of a claim on public land to obtain the right to any locatable minerals it may contain.

Mineral estate. The ownership of minerals, including rights necessary for access, exploration, development, mining, ore dressing, and transportation operations.

Mineralize. The process where a substance is converted from an organic substance to an inorganic substance.

Mineral materials. Common varieties of mineral materials such as soil, sand and gravel, stone, pumice, pumicite, and clay that are not obtainable under the mining or leasing laws but that can be acquired under the Materials Act of 1947, as amended.

Mining claim. A parcel of land that a miner takes and holds for mining purposes, having acquired the right of possession by complying with the Mining Law and local laws and rules. A

mining claim may contain as many adjoining locations as the locator may make or buy. There are four categories of mining claims: lode, placer, millsite, and tunnel site.

Mining Law of 1872. Provides for claiming and gaining title to locatable minerals on public lands. Also referred to as the "General Mining Laws" or "Mining Laws."

Mitigation. Includes specific means, measures or practices that could reduce, avoid, or eliminate adverse impacts. Mitigation can include avoiding the impact altogether by not taking a certain action or parts of an action, minimizing the impact by limiting the degree of magnitude of the action and its implementation, rectifying the impact by repairing, rehabilitation, or restoring the affected environment, reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, and compensating for the impact by replacing or providing substitute resources or environments.

Modification. A change to the provisions of a lease stipulation, either temporarily or for the term of the lease. Depending on the specific modification, the stipulation may or may not apply to all sites within the leasehold to which the restrictive criteria are applied.

Monitoring (plan monitoring). The process of tracking the implementation of land use plan decisions and collecting and assessing data necessary to evaluate the effectiveness of land use planning decisions.

Motorized vehicles or uses. Vehicles that are motorized, including but not limited to jeeps, all-terrain vehicles (all-terrain vehicles, such as four-wheelers and three-wheelers), trail motorcycles or dirt bikes, and aircrafts.

Multiple-use. The management of the public lands and their various resource values so that they are used in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output (FLPMA) (BLM Manual 6840, Special Status Species Manual).

Municipal watershed. A watershed area that provides water for use by a municipality as defined by the community and accepted by the State.

National Environmental Policy Act of 1969 (NEPA). Public Law 91-190. Establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.

Native vegetation. Plant species which were found here prior to European settlement, and consequently are in balance with these ecosystems because they have well developed parasites, predators, and pollinators.

Natural processes. Fire, drought, insect and disease outbreaks, flooding, and other events which existed prior to European settlement, and shaped vegetation composition and structure.

Non-energy leasable minerals. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. Non-energy minerals include resources such as phosphate, sodium, potassium, and sulfur.

Nonfunctional condition. Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or woody debris to dissipate energies associated with flow events, and thus are not reducing erosion, improving water quality, etc.

No surface occupancy (NSO). A major constraint where use or occupancy of the land surface for fluid mineral exploration or development and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads) are prohibited to protect identified resource values. Areas identified as NSO are open to fluid mineral leasing, but surface occupancy or surface-disturbing activities associated with fluid mineral leasing cannot be conducted on the surface of the land. Access to fluid mineral deposits would require horizontal drilling from outside the boundaries of the NSO area.

Noxious weeds. A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the US.

Objective. A description of a desired outcome for a resource. Objectives can be quantified and measured and, where possible, have established timeframes for achievement.

Off-highway vehicle (OHV) (off-road vehicle). Any motorized vehicle capable of, or designated for travel on or immediately over land, water or other natural terrain, excluding: (1) any non-amphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used for national defense emergencies (43 CFR 8340.0-5).

Open. Generally denotes that an area is available for a particular use or uses. Refer to specific program definitions found in law, regulations, or policy guidance for application to individual programs. For example, 43 CFR 8340.0-5 defines the specific meaning of "open" as it relates to OHV use.

Ozone. A faint blue gas produced in the atmosphere from chemical reactions of burning coal, gasoline, and other fuels and chemicals found in products such as solvents, paints, and hairsprays.

Paleontological resources. The physical remains or other physical evidence of plants and animals preserved in soils and sedimentary rock formations. Paleontological resources are important for correlating and dating rock strata and for understanding past environments, environmental change, and the evolution of life.

Particulate matter (PM). One of the six "criteria" pollutants for which the US EPA established National Ambient Air Quality Standards. Particulate matter is defined as two categories, fine particulate, with an aerodynamic diameter of 10 micrometers (PM_{10}) or less, and fine particulate with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$).

Perennial stream. A stream that flows continuously. Perennial streams are generally associated with a water table in the localities through which they flow.

Permitted use. The forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease and expressed in AUMs (43 CFR 4100.0-5).

Permittee. A person or company permitted to graze livestock on public land.

Physiography. The study and classification of the surface features of the earth.

Plan of Operations. A Plan of Operations is required for all mining activity exploration greater than 5 acres or surface disturbance greater than casual use on certain special category lands. Special category lands are described under 43 CFR 3809.11(c) and include such lands as designated Areas of Critical Environmental Concern, lands within the National Wilderness Preservation System, and areas closed to off-road vehicles, among others. In addition, a Plan of Operations is required for activity greater than casual use on lands patented under the Stock Raising Homestead Act with Federal minerals where the operator does not have the written consent of the surface owner (43 CFR 3814). The Plan of Operations needs to be filed in the BLM field office with jurisdiction over the land involved. The Plan of Operations does not need to be on a particular form but must address the information required by 43 CFR 3809.401(b).

Planning area. The geographical area for which sage-grouse management plan amendments are developed and maintained. The NDFO Greater Sage-Grouse RMPA/EIS planning area boundary defines the area assessed in this RMPA. The planning area encompasses 963,017 acres in Bowman, Slope, and Golden Valley counties in southwestern North Dakota. The BLM administers 33,030 acres (about 3.4 percent) of the planning area, and 396,053 acres of federal mineral estate.

Planning criteria. The standards, rules, and other factors developed by managers and interdisciplinary teams for their use in forming judgments about decision making, analysis, and data collection during planning. Planning criteria streamlines and simplifies the resource management planning actions.

Planning issues. Concerns, conflicts, and problems with the existing management of public lands. Frequently, issues are based on how land uses affect resources. Some issues are

concerned with how land uses can affect other land uses, or how the protection of resources affects land uses.

Policy. This is a statement of guiding principles, or procedures, designed and intended to influence planning decisions, operating actions, or other affairs of the BLM. Policies are established interpretations of legislation, executive orders, regulations, or other presidential, secretarial, or management directives.

Prescribed fire. A wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA requirements (where applicable) have been met prior to ignition.

Primitive road. A linear route managed for use by four-wheel drive or high-clearance vehicles. Primitive roads do not normally meet any BLM road design standards.

Primitive route. Any transportation linear feature located within areas that have been identified as having wilderness characteristics and not meeting the wilderness inventory road definition (BLM Manual 6310 – Conducting Wilderness Characteristics Inventory on BLM Lands).

Priority sage-grouse habitat. Areas that have been identified as having the highest conservation value to maintaining sustainable sage-grouse populations. These areas would include breeding, late brood-rearing, and winter concentration areas. These areas have been identified by the BLM in coordination with respective state wildlife agencies.

Proper functioning condition. A term describing stream health that is based on the presence of adequate vegetation, landform and debris to dissipate energy, reduce erosion and improve water quality.

Public domain. The term applied to any or all of those areas of land ceded to the Federal Government by the Original States and to such other lands as were later acquired by treaty, purchase or cession, and are disposed of only under the authority of Congress.

Public land. Land or interest in land owned by the US and administered by the Secretary of the Interior through the BLM without regard to how the US acquired ownership, except lands located on the Outer Continental Shelf and land held for the benefit of Indians, Aleuts, and Eskimos (H-1601-1, BLM Land Use Planning Handbook).

Public lands not designated as recreation management areas. All lands not designated as an SRMA or ERMA.

Range improvement. The term range improvement means any activity, structure or program on or relating to rangelands which is designed to improve production of forage; change vegetative composition; control patterns of use; provide water; stabilize soil and water conditions; and provide habitat for livestock and wildlife. The term includes, but is not limited to, structures, treatment projects, and use of mechanical means to accomplish the desired results.

Range improvement project. An authorized physical modification or treatment which is designed to improve production of forage; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; restore, protect and improve the condition of rangeland ecosystems to benefit livestock, wild horses and burros, and fish and wildlife. This definition includes, but is not limited to: structures, treatment projects and use of mechanical devices, or modifications achieved through mechanical means.

Raptor. Bird of prey with sharp talons and strongly curved beaks, such as hawks, owls, falcons, and eagles.

Reasonable foreseeable development scenario. The prediction of the type and amount of oil and gas activity that would occur in a given area. The prediction is based on geologic factors, past history of drilling, projected demand for oil and gas, and industry interest.

Reclamation. The suite of actions taken within an area affected by human disturbance, the outcome of which is intended to change the condition of the disturbed area to meet pre-determined objectives and/or make it acceptable for certain defined resources (e.g., wildlife habitat, grazing, ecosystem function, etc.).

Recreation management area. Includes Special Recreation Management Areas (SRMAs) and Extensive Recreation Management Areas (ERMAs); see SRMA and ERMA definitions.

Recreation experiences. Psychological outcomes realized either by recreation-tourism participants as a direct result of their on-site leisure engagements and recreation-tourism activity participation or by nonparticipating community residents as a result of their interaction with visitors and guests within their community or interaction with the BLM and other public and private recreation-tourism providers and their actions.

Recreation opportunities. Favorable circumstances enabling visitors' engagement in a leisure activity to realize immediate psychological experiences and attain more lasting, value-added beneficial outcomes.

Recreation settings. The collective distinguishing attributes of landscapes that influence and sometimes actually determine what kinds of recreation opportunities are produced.

Reference state. The reference state is the state where the functional capacities represented by soil/site stability, hydrologic function, and biotic integrity are performing at an optimum level under the natural disturbance regime. This state usually includes, but is not limited to, what is often referred to as the potential natural plant community.

Rehabilitate. Returning disturbed lands as near to its predisturbed condition as is reasonably practical or as specified in approved permits.

Renewable energy. Energy resources that constantly renew themselves or that are regarded as practically inexhaustible. These include solar, wind, geothermal, hydro, and biomass. Although particular geothermal formations can be depleted, the natural heat in the Earth is a virtually inexhaustible reserve of potential energy.

Required design features (RDF). Means, measures, or practices intended to reduce or avoid adverse environmental impacts. A suite of features that would establish the minimum specifications for certain activities (i.e., water developments, mineral development, and fire and fuels management) and mitigate adverse impacts. These design features would be required to provide a greater level of regulatory certainty than through implementation of best management practices. In general, the design features are accepted practices that are known to be effective when implemented properly at the project level. However, their applicability and overall effectiveness cannot be fully assessed except at the project-specific level when the project location and design are known. Because of site-specific circumstances, some features may not apply to some projects (e.g., a resource is not present on a given site) and/or may require slight variations from what is described in the EIS/RMP amendment (e.g., a larger or smaller protective area). All variations in design features would require appropriate analysis and disclosure as part of future project authorizations. Additional mitigation measures may be identified and required during individual project development and environmental review.

Resource management plan (RMP). A land use plan as prescribed by the Federal Land Policy and Management Act that establishes, for a given area of land, land-use allocations, coordination guidelines for multiple-use, objectives, and actions to be achieved.

Restore/restoration. Implementation of a set of actions that promotes plant community diversity and structure that allows plant communities to be more resilient to disturbance and invasive species over the long term. The long-term goal is to create functional, high quality habitat that is occupied by sage-grouse. Short-term goal may be to restore the landform, soils and hydrology and increase the percentage of preferred vegetation, seeding of desired species, or treatment of undesired species.

Restriction/restricted use. A limitation or constraint on public land uses and operations. Restrictions can be of any kind, but most commonly apply to certain types of vehicle use, temporal and/or spatial constraints, or certain authorizations.

Revegetate/revegetation. The process of putting vegetation back in an area where vegetation previously existed, which may or may not simulate natural conditions.

Revision. The process of completely rewriting the land use plan due to changes in the planning area affecting major portions of the plan or the entire plan.

Right-of-way (ROW). Public lands authorized to be used or occupied for specific purposes pursuant to a right-of-way authorization, which are in the public interest and which require ROWs over, on, under, or through such lands.

Right-of-way avoidance area. An area identified through resource management planning to be avoided but may be available for ROW location with special stipulations.

Right-of-way exclusion area. An area identified through resource management planning that is not available for ROW location under any conditions.

Riparian area. A form of wetland transition between permanently saturated wetlands and upland areas. Riparian areas exhibit vegetation or physical characteristics that reflect the influence of permanent surface or subsurface water. Typical riparian areas include lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels. Excluded are ephemeral streams or washes that lack vegetation and depend on free water in the soil.

Riparian zone. An area one-quarter mile wide encompassing riparian and adjacent vegetation.

Road. A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.

Rotation. Grazing rotation between pastures in the allotment for the permitted time.

Routes. Multiple roads, trails and primitive roads; a group or set of roads, trails, and primitive roads that represents less than 100 percent of the BLM transportation system. Generically, components of the transportation system are described as "routes."

Sale (public land). A method of land disposal pursuant to Section 203 of FLPMA, whereby the US receives a fair-market payment for the transfer of land from federal ownership. Public lands determined suitable for sale are offered on the initiative of the BLM. Lands suitable for sale must be identified in the RMP. Any lands to be disposed of by sale that are not identified in the current RMP, or that meet the disposal criteria identified in the RMP, require a plan amendment before a sale can occur.

Saturated soils. Occur when the infiltration capacity of the soil is exceeded from above due to rainfall or snowmelt runoff. Soils can also become saturated from groundwater inputs.

Scoping process. An early and open public participation process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.

Season of use. The time during which livestock grazing is permitted on a given range area, as specified in the grazing lease.

Seeding. Seeding is a vegetation treatment that includes the application of grass, forb, or shrub seed, either aerially or from the ground. In areas of gentle terrain, ground applications of seed are often accomplished with a rangeland drill. Seeding allows the establishment of native species or placeholder species and restoration of disturbed areas to a perennial-dominated cover type, thereby decreasing the risk of subsequent invasion by exotic plant species. Seeding would be used primarily as a follow-up treatment in areas where disturbance or the previously described treatments have removed exotic plant species and their residue.

Short-term effect. The effect occurs only during or immediately after implementation of the alternative.

Special Recreation Management Area (SRMA). An administrative public lands unit identified in land use plans where the existing or proposed recreation opportunities and

recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation.

Special Recreation Permit (SRP). Authorization that allows for recreational uses of public lands and related waters. Issued as a means to control visitor use, protect recreational and natural resources, and provide for the health and safety of visitors. Commercial SRPs are also issued as a mechanism to provide a fair return for the commercial use of public lands.

Special status species. BLM special status species are: (1) species listed, candidate, or proposed for listing under the Endangered Species Act; and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the Endangered Species Act that are designated as BLM sensitive by the BLM State Director(s). All federally listed candidate species, proposed species, and delisted species in the five years following delisting are conserved as BLM sensitive species.

Split estate. This is the circumstance where the surface of a particular parcel of land is owned by a different party than the minerals underlying the surface. Split estates may have any combination of surface/subsurface owners: Federal/State; Federal/private; State/private; or percentage ownerships. When referring to the split estate ownership on a particular parcel of land, it is generally necessary to describe the surface/subsurface ownership pattern of the parcel.

Stabilize. The process of stopping further damage from occurring.

Standard. A description of the physical and biological conditions or degree of function required for healthy, sustainable lands (e.g., land health standards). To be expressed as a desired outcome (goal).

Standard lease terms and conditions. Areas may be open to leasing with no specific management decisions defined in a Resource Management Plan; however, these areas are subject to lease terms and conditions as defined on the lease form (Form 3100-11, Offer to Lease and Lease for Oil and Gas; and Form 3200-24, Offer to Lease and Lease for Geothermal Resources).

State. A state is comprised of an integrated soil and vegetation unit having one or more biological communities that occur on a particular ecological site and that are functionally similar with respect to the three attributes (soil/site stability, hydrologic function, and biotic integrity) under natural disturbance regimes.

Stipulation (general). A term or condition in an agreement or contract.

Stipulation (oil and gas). A provision that modifies standard oil and gas lease terms and conditions in order to protect other resource values or land uses and is attached to and made a part of the lease. Typical lease stipulations include No Surface Occupancy (NSO), Timing Limitations (TL), and Controlled Surface Use (CSU). Lease stipulations are developed through the land use planning (RMP) process.

Surface disturbance. Suitable habitat is considered disturbed when it is removed and unavailable for immediate sage-grouse use.

a. Long-term removal occurs when habitat is physically removed through activities that replace suitable habitat with long term occupancy of unsuitable habitat such as a road, powerline, well pad or active mine. Long-term removal may also result from any activities that cause soil mixing, soil removal, and exposure of the soil to erosive processes.

b. Short–term removal occurs when vegetation is removed in small areas, but restored to suitable habitat within a few years (< 5) of disturbance, such as a successfully reclaimed pipeline, or successfully reclaimed drill hole or pit.

c. Suitable habitat rendered unusable due to numerous anthropogenic disturbances

d. Anthropogenic surface disturbance are surface disturbances meeting the above definitions which result from human activities.

Surface disturbing activities. An action that alters the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other public land values. Examples of surface disturbing activities may include: operation of heavy equipment to construct well pads, roads, pits and reservoirs; installation of pipelines and power lines; and the conduct of several types of vegetation treatments (e.g., prescribed fire, etc.). Surface disturbing activities may be either authorized or prohibited.

Surface use(s). These are all the various activities that may be present on the surface or near-surface (e.g., pipelines), of the public lands. It does not refer to those subterranean activities (e.g., underground mining, etc.) occurring on the public lands or federal mineral estate. When administered as a use restriction (e.g., *No Surface Use [NSU]*), this phrase prohibits all but specified resource uses and activities in a certain area to protect particular sensitive resource values and property. This designation typically applies to small acreage sensitive resource sites (e.g., plant community study exclosure, etc.), and/or administrative sites (e.g., government ware-yard, etc.) where only authorized, agency personnel are admitted.

Sustained yield. The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple uses.

Temporary/temporary use. This term is used as the opposite of the term permanent/ permanent use. It is a relative term and has to be considered in the context of the resource values affected and the nature of the resource use(s)/activity(ies) taking place. Generally, a temporary activity is considered to be one that is not fixed in place and is of short duration.

Terrestrial. Living or growing in or on the land.

Threatened species. Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range (BLM Manual 6840, Special Status

Species Management). Under the Endangered Species Act in the US, "threatened" is the lesser-protected of the two categories. Designation as threatened (or endangered) is determined by USFWS as directed by the Endangered Species Act.

Timber. Standing trees, downed trees, or logs which are capable of being measured in board feet.

Timing limitation (TL). The TL stipulation, a moderate constraint, is applicable to fluid mineral leasing, all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads), and other surface-disturbing activities (i.e., those not related to fluid mineral leasing). Areas identified for TL are closed to fluid mineral exploration and development, surface-disturbing activities, and intensive human activity during identified time frames. This stipulation does not apply to operation and basic maintenance activities, including associated vehicle travel, unless otherwise specified. Construction, drilling, completions, and other operations considered to be intensive in nature are not allowed. Intensive maintenance, such as workovers on wells, is not permitted. TLs can overlap spatially with NSO and CSU, as well as with areas that have no other restrictions.

Total dissolved solids. Salt, or an aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts.

Total maximum daily load (TMDL). An estimate of the total quantity of pollutants (from all sources: point, nonpoint, and natural) that may be allowed into waters without exceeding applicable water quality criteria.

Trail. A linear route managed for human-power (e.g., hiking or bicycling), stock (e.g., equestrian), or off-highway vehicle forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

Transition. A shift between two states. Transitions are not reversible by simply altering the intensity or direction of factors that produced the change. Instead, they require new inputs such as revegetation or shrub removal. Practices, such as these, that accelerate succession are often expensive to apply.

Transmission. The movement or transfer of electric energy over an interconnected group of lines and associated equipment between points of supply and points at which it is transformed for delivery to consumers, or is delivered to other electric systems. Transmission is considered to end when the energy is transformed for distribution to the consumer.

Transportation system. The sum of the BLM's recognized inventory of linear features (roads, primitive roads, and trails) formally recognized, designated, and approved as part of the BLM's transportation system.

Travel management areas. Polygons or delineated areas where a rational approach has been taken to classify areas open, closed or limited, and have identified and/or designated a network

of roads, trails, ways, landing strips, and other routes that provide for public access and travel across the planning area. All designated travel routes within travel management areas should have a clearly identified need and purpose as well as clearly defined activity types, modes of travel, and seasons or timeframes for allowable access or other limitations (BLM Handbook H-1601-1 Land Use Planning Handbook).

Trespass. Any unauthorized use of public land.

Tribal interests. Native American or Native Alaskan economic rights such as Indian trust assets, resource uses and access guaranteed by treaty rights, and subsistence uses.

Understory. That portion of a plant community growing underneath the taller plants on the site.

Unitization. Operation of multiple leases as a single lease under a single operator.

Unitized area. a group of contiguous oil and gas lease holdings where the lessee holds an agreement with the federal government so that exploration, drilling, and production of the resource proceeds in the most efficient and economical manner possible.

Utility corridor. Tract of land varying in width forming passageway through which various commodities such as oil, gas, and electricity are transported.

Valid existing rights. Documented, legal rights or interests in the land that allow a person or entity to use said land for a specific purpose and that are still in effect. Such rights include but are not limited to fee title ownership, mineral rights, rights-of-way, easements, permits, and licenses. Such rights may have been reserved, acquired, leased, granted, permitted, or otherwise authorized over time.

Vegetation manipulation. Planned alteration of vegetation communities through use of mechanical, chemical, seeding, and/or prescribed fire or managed fire to achieve desired resource objectives.

Vegetation treatments. Management practices which change the vegetation structure to a different stage of development. Vegetation treatment methods include managed fire, prescribed fire, chemical, mechanical, and seeding.

Vegetation type. A plant community with immediately distinguishable characteristics based upon and named after the apparent dominant plant species.

Visibility (air quality). A measure of the ability to see and identify objects at different distances.

Visitor day. Twelve visitor hours that may be aggregated by one or more persons in single or multiple visits.

Visual resources. The visible physical features on a landscape, (topography, water, vegetation, animals, structures, and other features) that comprise die scenery of the area.

Watershed. Topographical region or area delineated by water draining to a particular watercourse or body of water.

West Nile virus. A virus that is found in temperate and tropical regions of the world and most commonly transmitted by mosquitos. West Nile virus can cause flu-like symptoms in humans and can be lethal to birds, including sage-grouse.

Wildcat well. An exploratory oil well drilled in land not known to be an oil field.

Wilderness. A congressionally designated area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, that is protected and managed to preserve its natural conditions and that (1) generally appears to have been affected mainly by the forces of nature, with human imprints substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres or is large enough to make practical its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value. The definition is contained in Section 2(c) of the Wilderness Act of 1964 (78 Stat. 891).

Wilderness characteristics. Wilderness characteristics attributes include the area's size, its apparent naturalness, and outstanding opportunities for solitude or a primitive and unconfined type of recreation. They may also include supplemental values. Lands with wilderness characteristics are those lands that have been inventoried and determined by the BLM to contain wilderness characteristics as defined in section 2(c) of the Wilderness Act.

Wilderness Study Area (WSA). A designation made through the land use planning process of a roadless area found to have wilderness characteristics, as described in Section 2(c) of the Wilderness Act of 1964.

Wildland fire. Wildland fire is a general term describing any non-structure fire that occurs in the wildland. Wildland fires are categorized into two distinct types:

- Wildfires: Unplanned ignitions or prescribed fires that are declared wildfires.
- Prescribed fires: Planned ignitions.

Wildland fire use. *A term no longer used; the new terminology is "managed fire" (see "managed fire" definition).* A vegetation treatment that involves taking advantage of a naturally-ignited wildland fire in an area where fire would benefit resources. Wildland fire use would be conducted in specific areas needing treatment after a site-specific plan and NEPA analysis are completed and only if predetermined prescriptive parameters (e.g., weather/fire behavior) can be met. Until this planning and NEPA analysis are accomplished, wildland fires would be suppressed using an appropriate management response.

Withdrawal. An action that restricts the use of public land and segregates the land from the operation of some or all of the public land and mineral laws. Withdrawals are also used to transfer jurisdiction of management of public lands to other federal agencies.

Winter concentration areas. Sage-grouse winter habitats which are occupied annually by sage-grouse and provide sufficient sagebrush cover and food to support birds throughout the entire winter (especially periods with above average snow cover). Many of these areas support several different breeding populations of sage-grouse. Sage-grouse typically show high fidelity for these areas, and loss or fragmentation can result in significant population impacts.

Index

INDEX

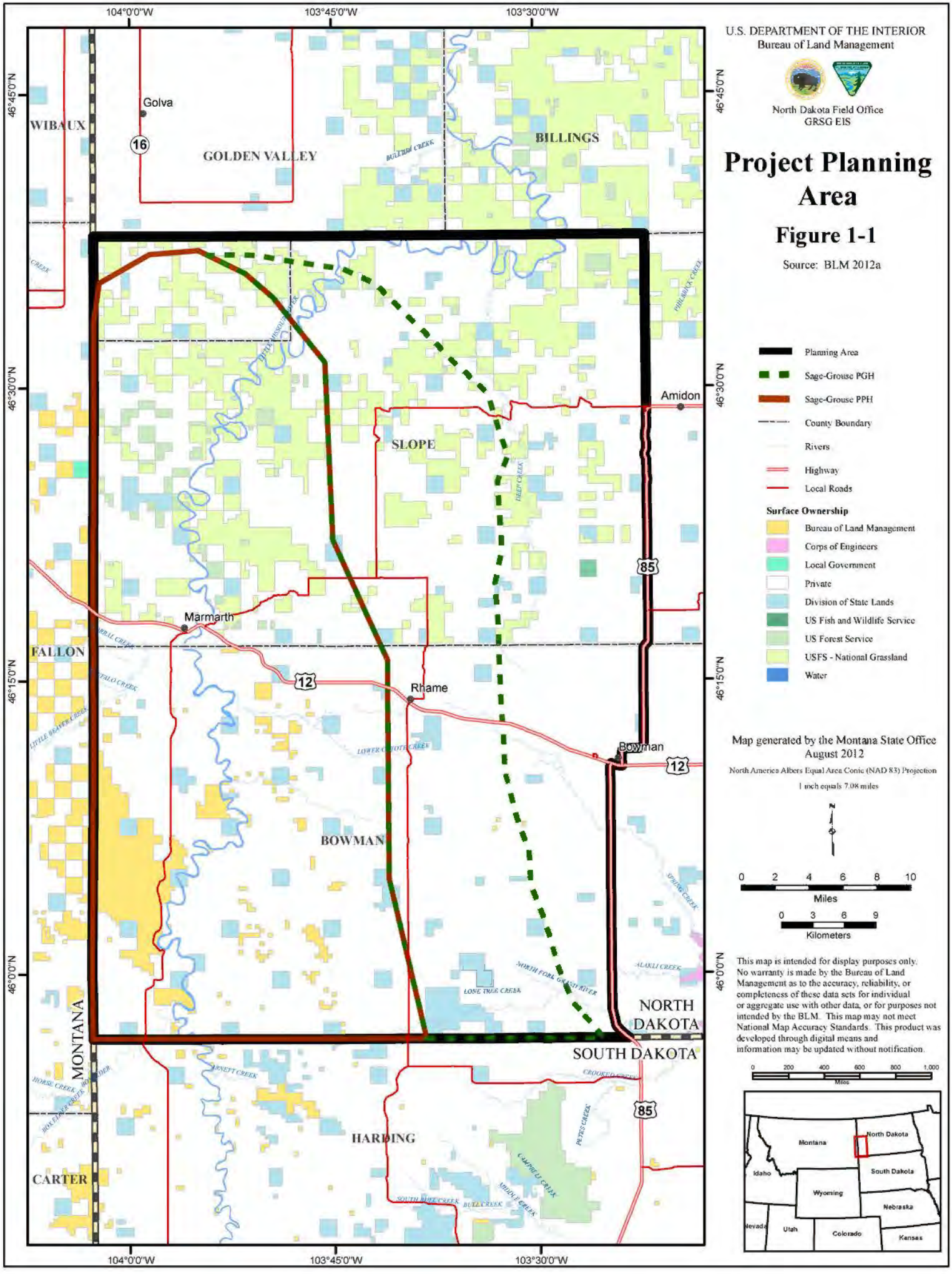
Appendices

Appendix A

Figures

APPENDIX A. FIGURES

This page intentionally left blank.



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Project Planning Area

Figure 1-1

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads

Surface Ownership

- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

North American Albers Equal Area Conic (NAD 83) Projection

1 inch equals 7.08 miles

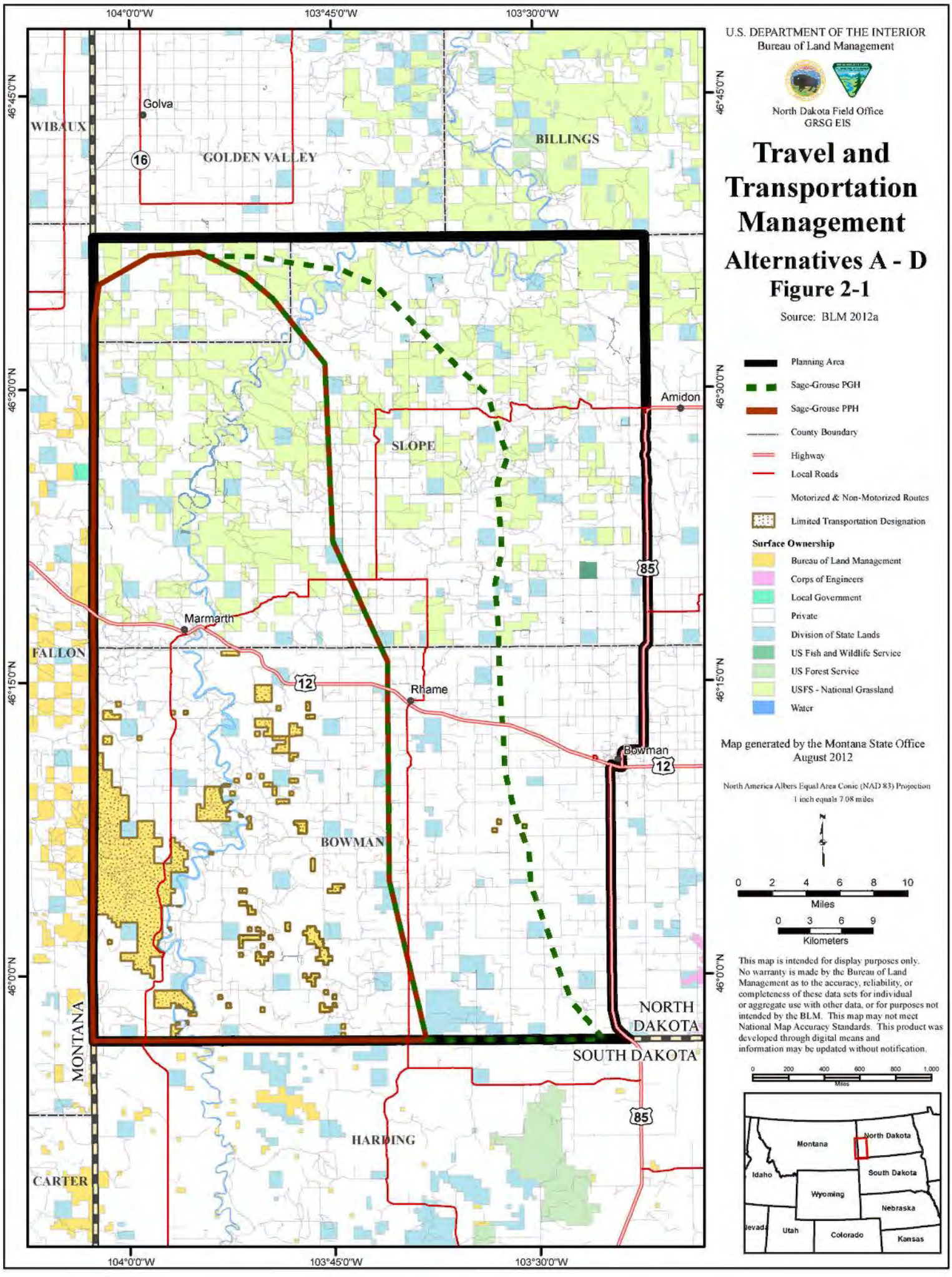
N

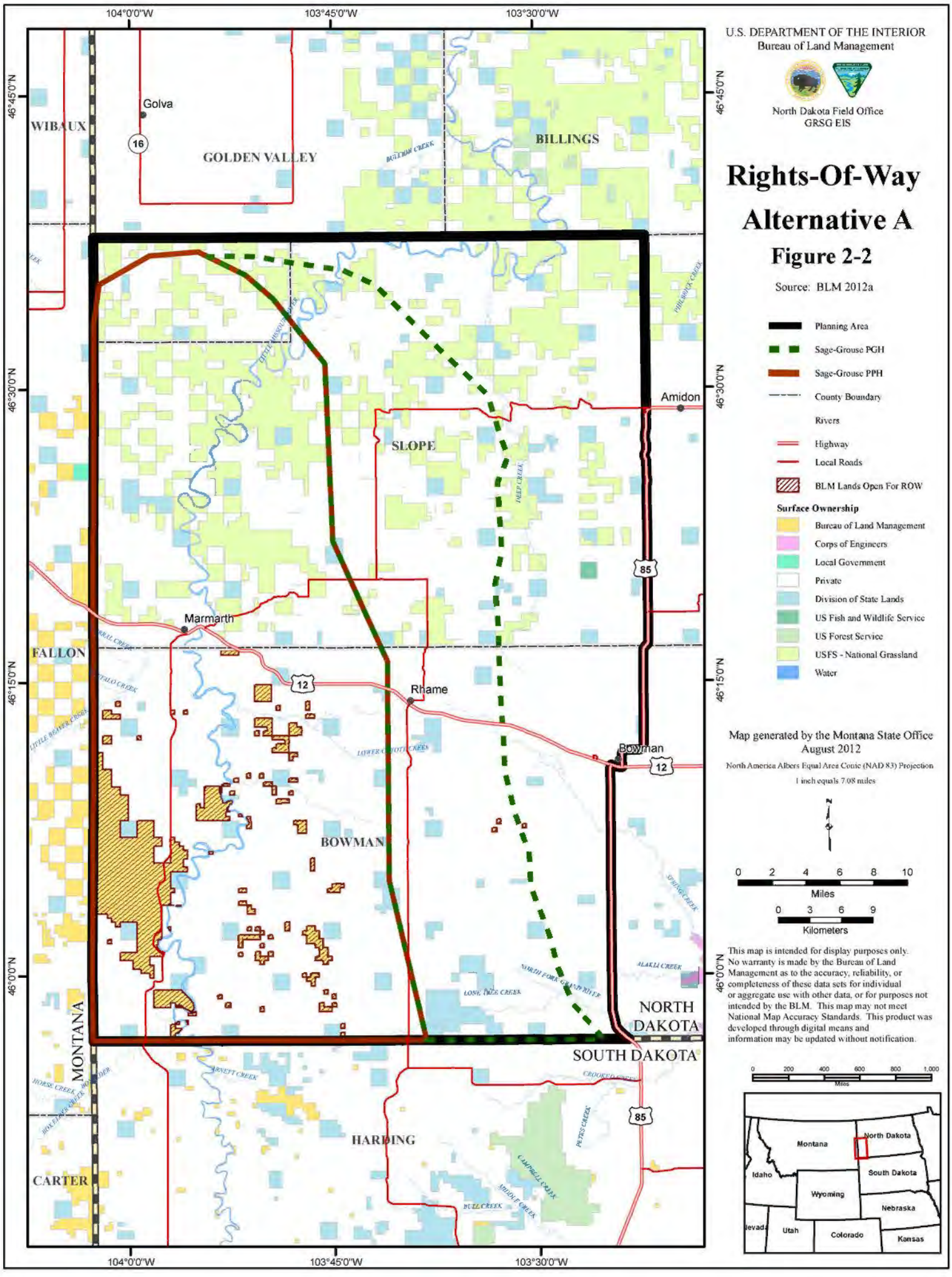
0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.

0 200 400 600 800 1,000
Miles


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
85
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Travel and Transportation Management
Alternatives A - D
Figure 2-1
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Highway
Local Roads
Motorized & Non-Motorized Routes
Limited Transportation Designation
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Rights-Of-Way Alternative A

Figure 2-2

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads
- BLM Lands Open For ROW

Surface Ownership

- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

North America Albers Equal Area Conic (NAD 83) Projection

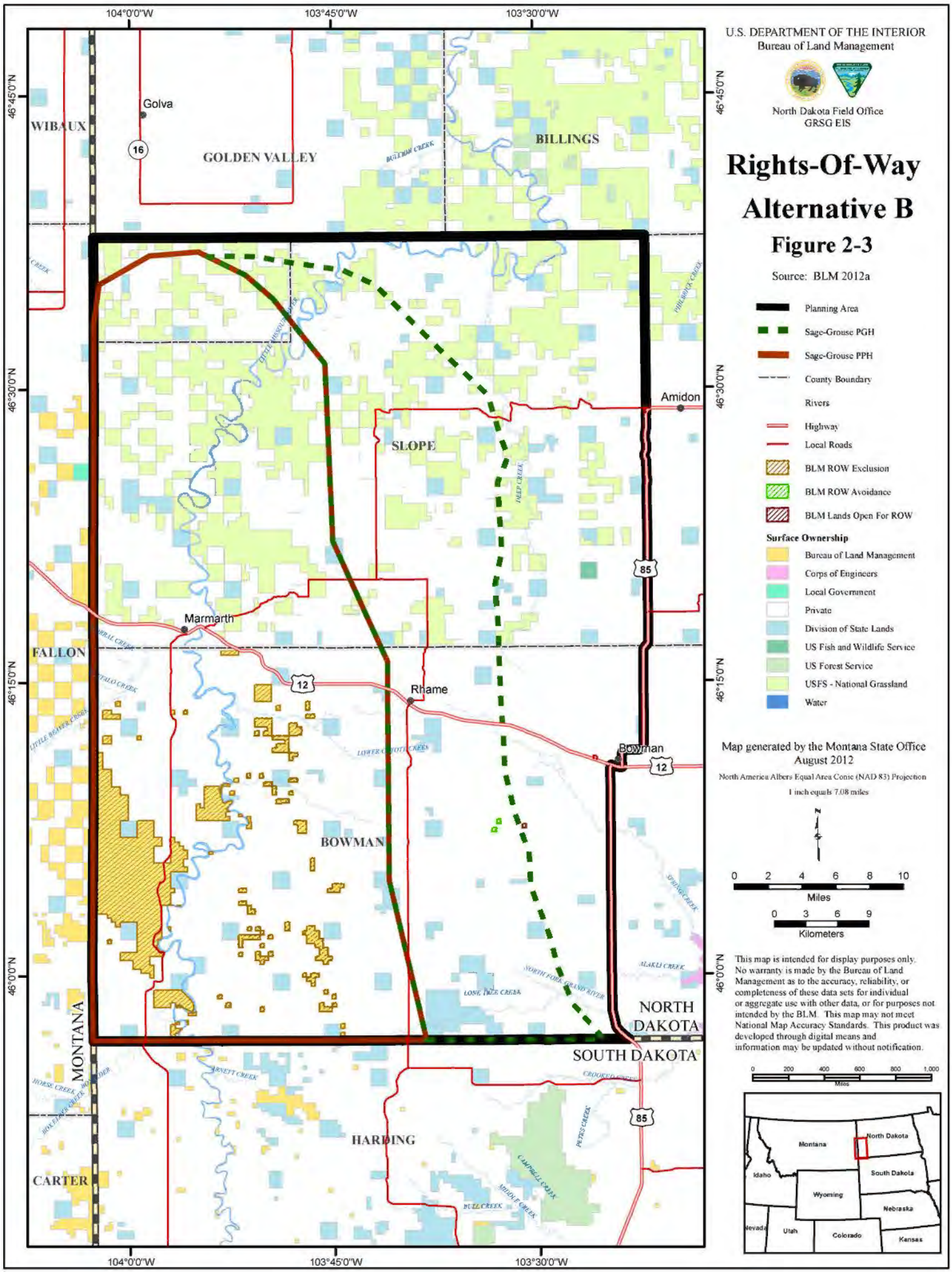
1 inch equals 7.08 miles

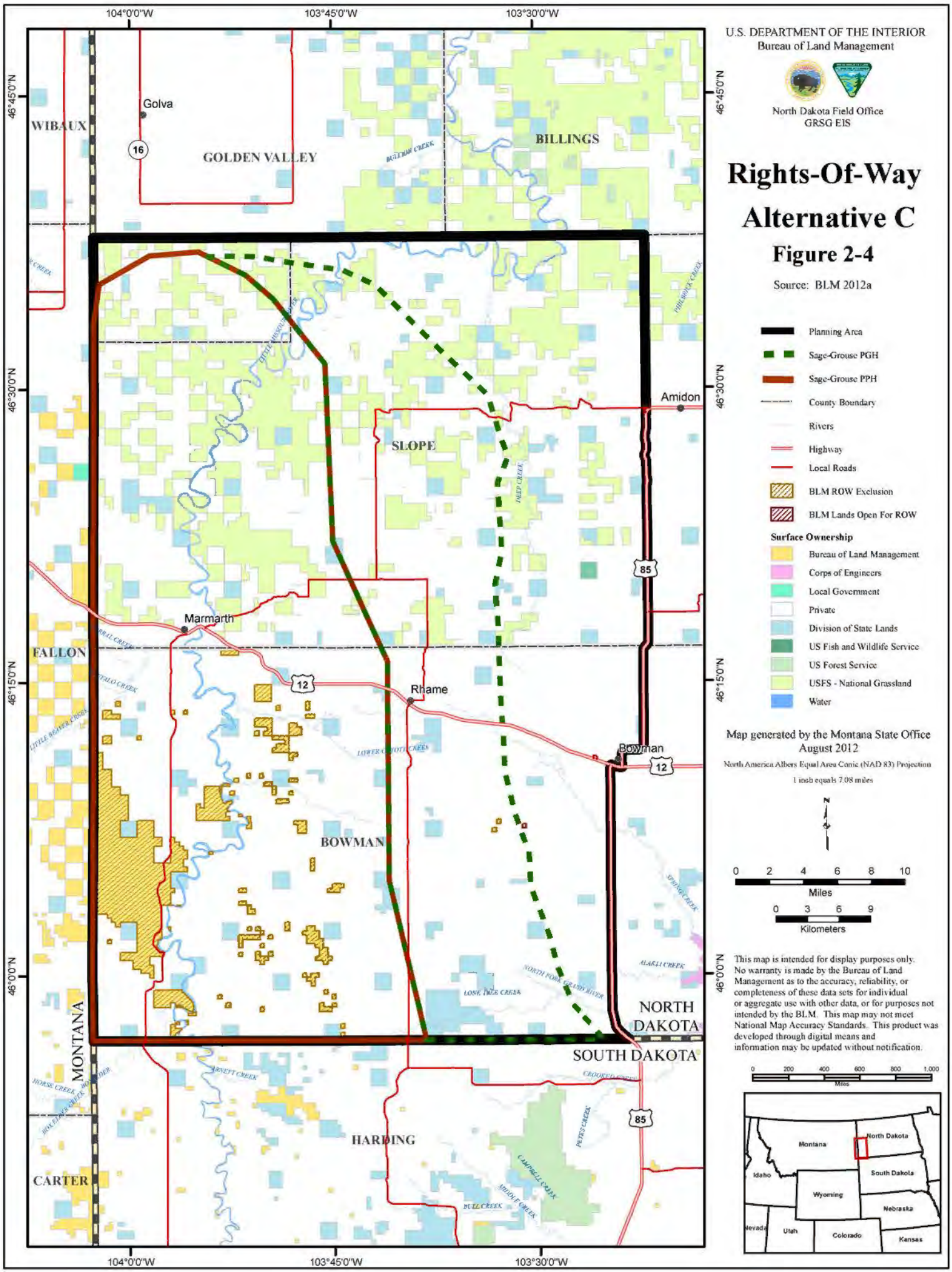
N

0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

0 200 400 600 800 1,000
Miles


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
85
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Rights-Of-Way
Alternative B
Figure 2-3
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
BLM ROW Exclusion
BLM ROW Avoidance
BLM Lands Open For ROW
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North American Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
N
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
85
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Rights-Of-Way
Alternative C
Figure 2-4
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
BLM ROW Exclusion
BLM Lands Open For ROW
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North American Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
N
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas

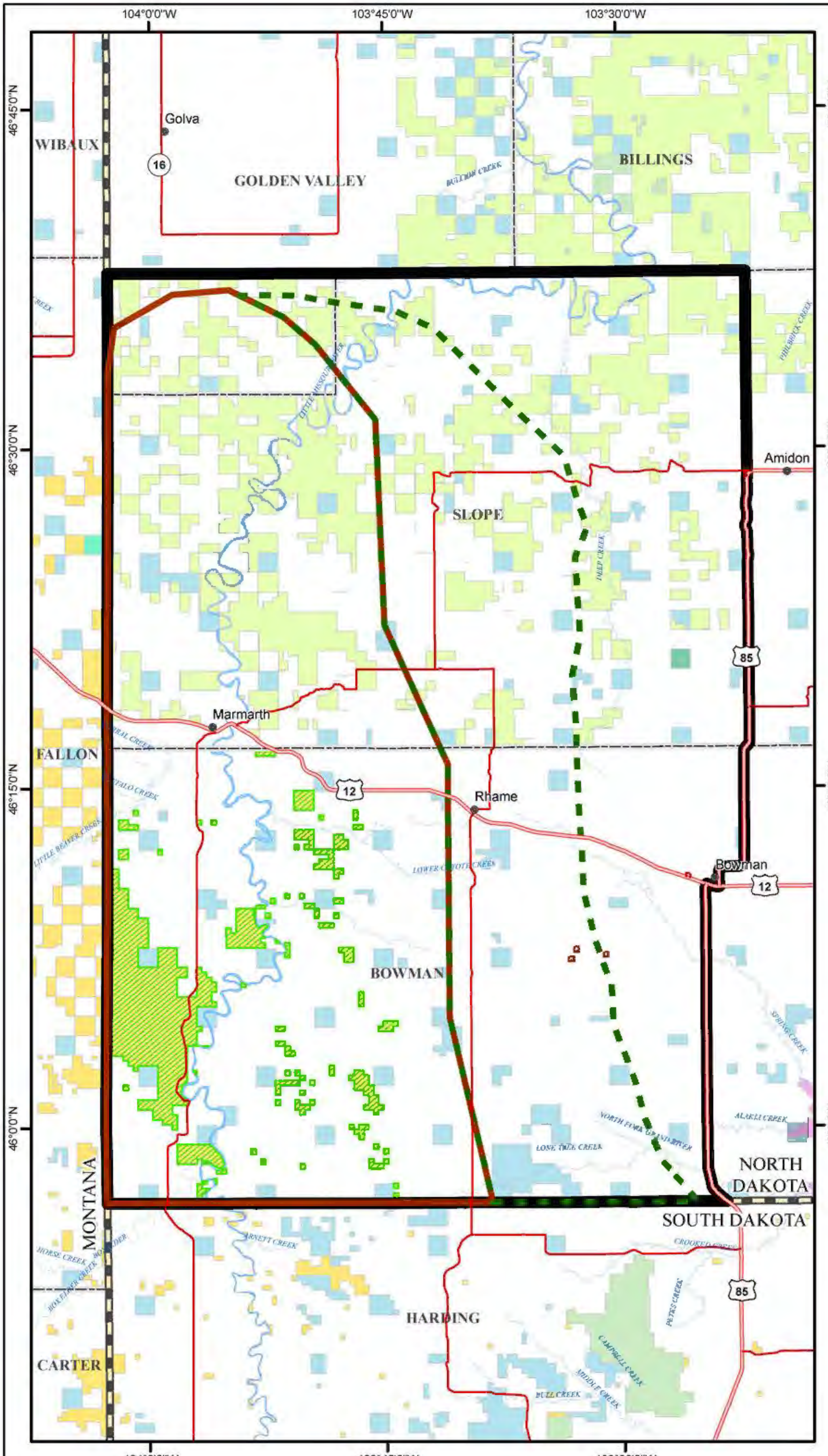
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Rights-Of-Way Alternative D

Figure 2-5

Source: BLM 2012a



Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
BLM ROW Avoidance
BLM Lands Open For ROW

Surface Ownership

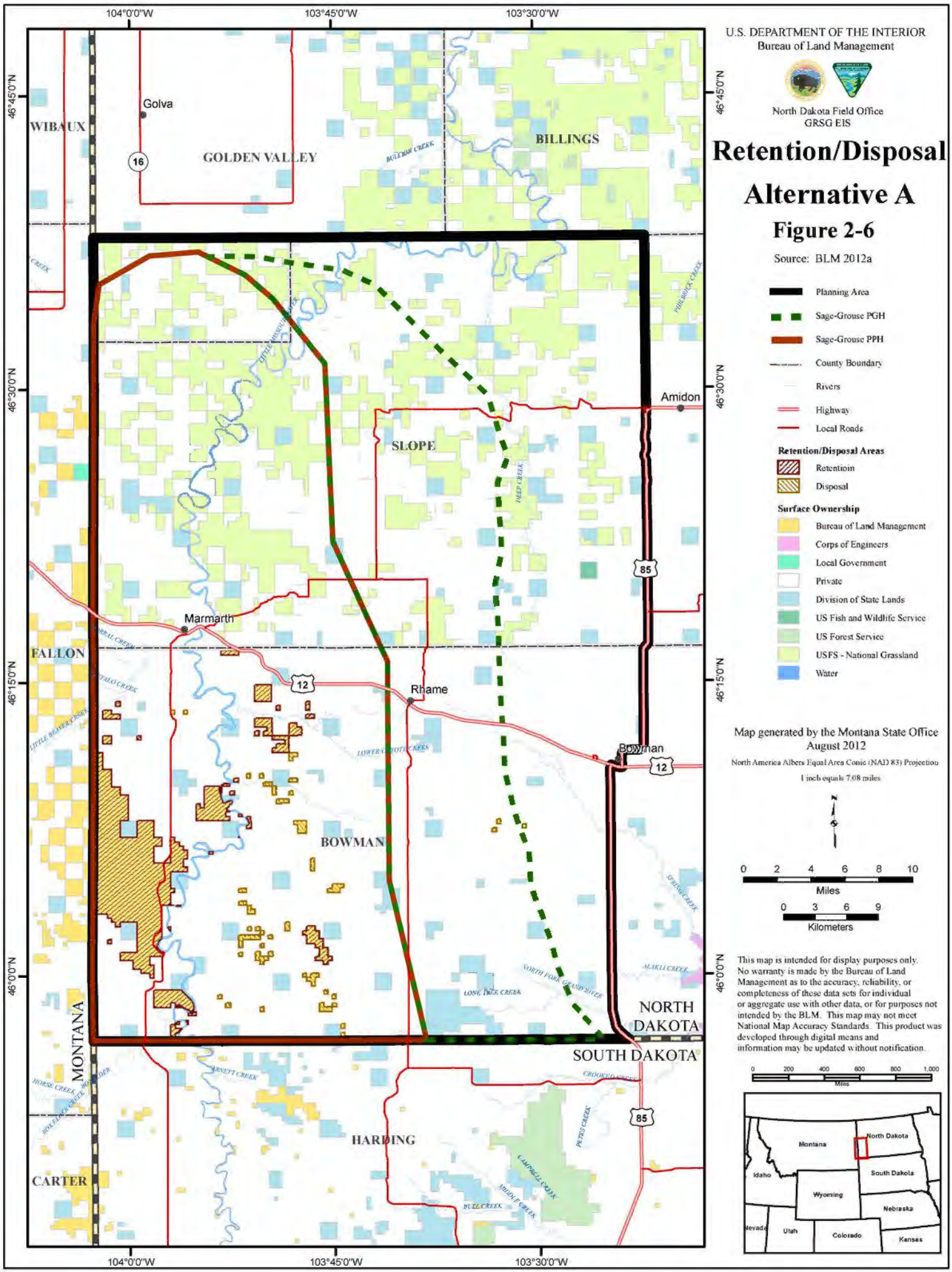
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water

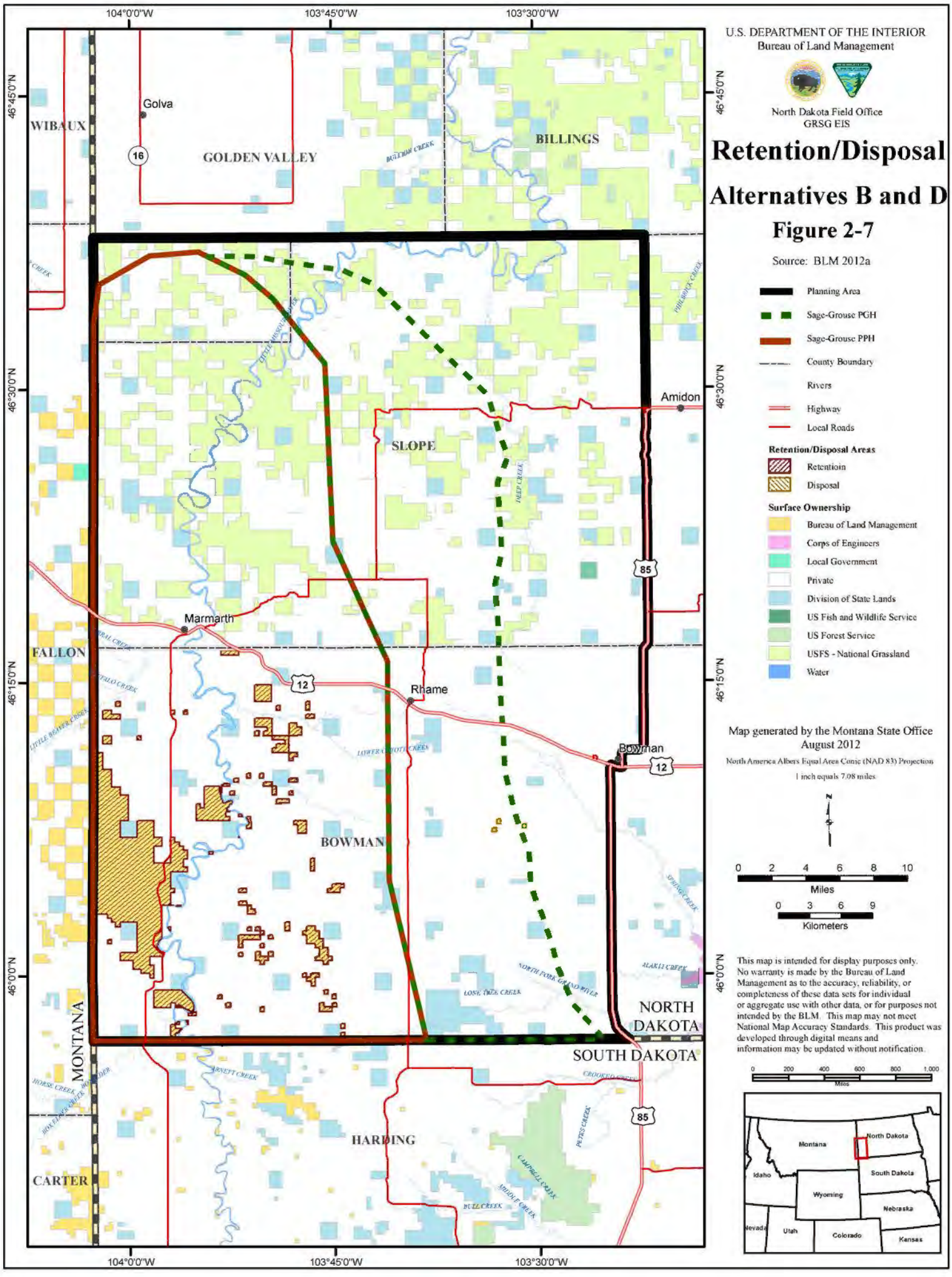
Map generated by the Montana State Office
August 2012

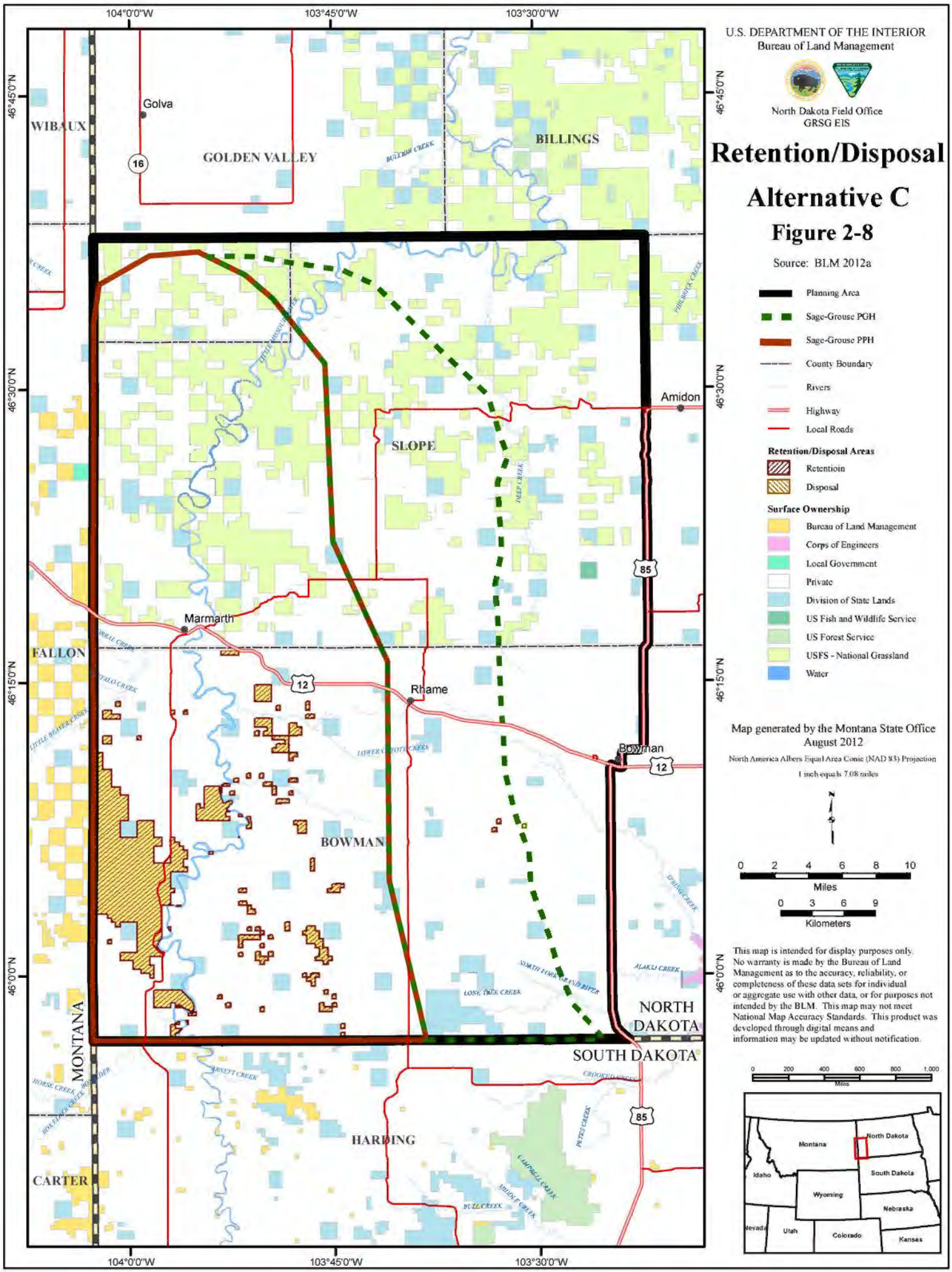
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles

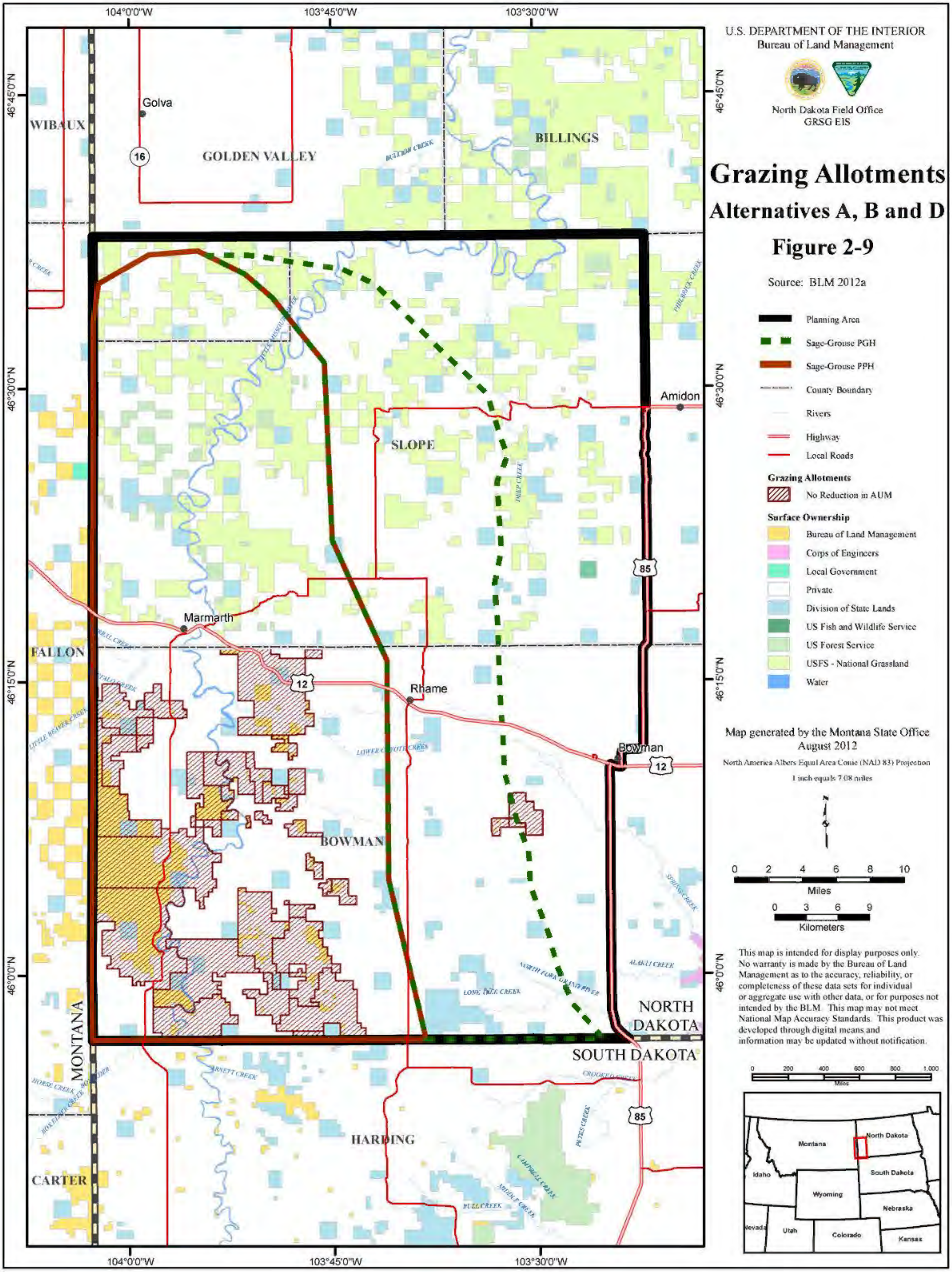
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers

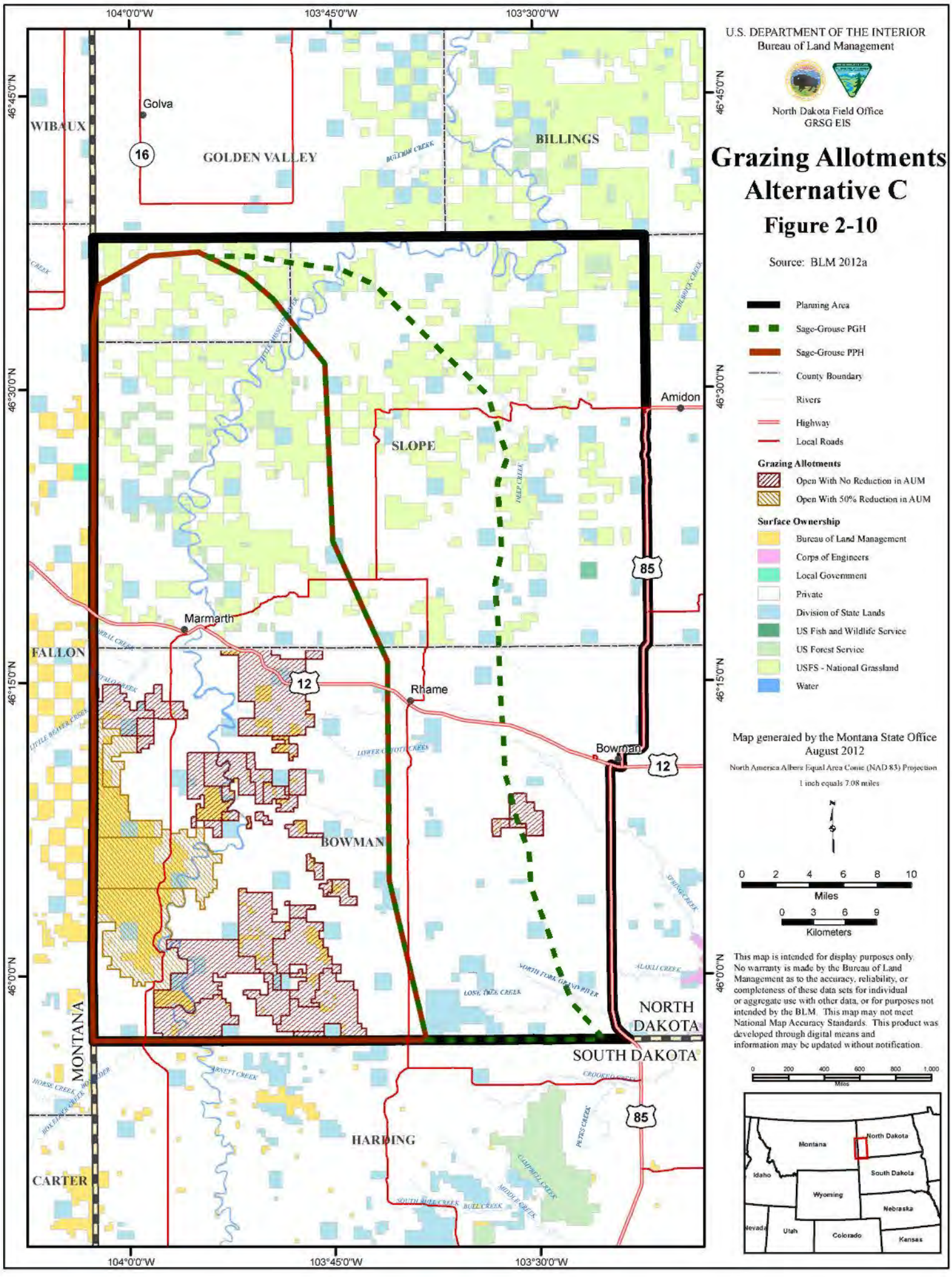
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
Marmarth
FALLON
Rhame
Bowman
BOWMAN
HARDING
CARTER
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
16
85
12
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Retention/Disposal
Alternative A
Figure 2-6
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Retention/Disposal Areas
Retentioin
Disposal
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
85
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Retention/Disposal
Alternatives B and D
Figure 2-7
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Retention/Disposal Areas
Retentioin
Disposal
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
N
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
Marmarth
FALLON
Rhame
Bowman
BOWMAN
HARDING
CARTER
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
16
85
12
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Retention/Disposal
Alternative C
Figure 2-8
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Retention/Disposal Areas
Retentioin
Disposal
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas


U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Grazing Allotments
Alternatives A, B and D
Figure 2-9
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Grazing Allotments
No Reduction in AUM
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
GOLDEN VALLEY
BILLINGS
Amidon
SLOPE
Marmarth
FALLON
Rhame
Bowman
BOWMAN
NORTH DAKOTA
SOUTH DAKOTA
MONTANA
HARDING
CARTER
16
12
85
Montana
North Dakota
South Dakota
Idaho
Wyoming
Nebraska
Utah
Colorado
Kansas



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Grazing Allotments Alternative C

Figure 2-10

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads

Grazing Allotments
- Open With No Reduction in AUM
- Open With 50% Reduction in AUM

Surface Ownership
- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

North America Albers Equal Area Conic (NAD 83) Projection

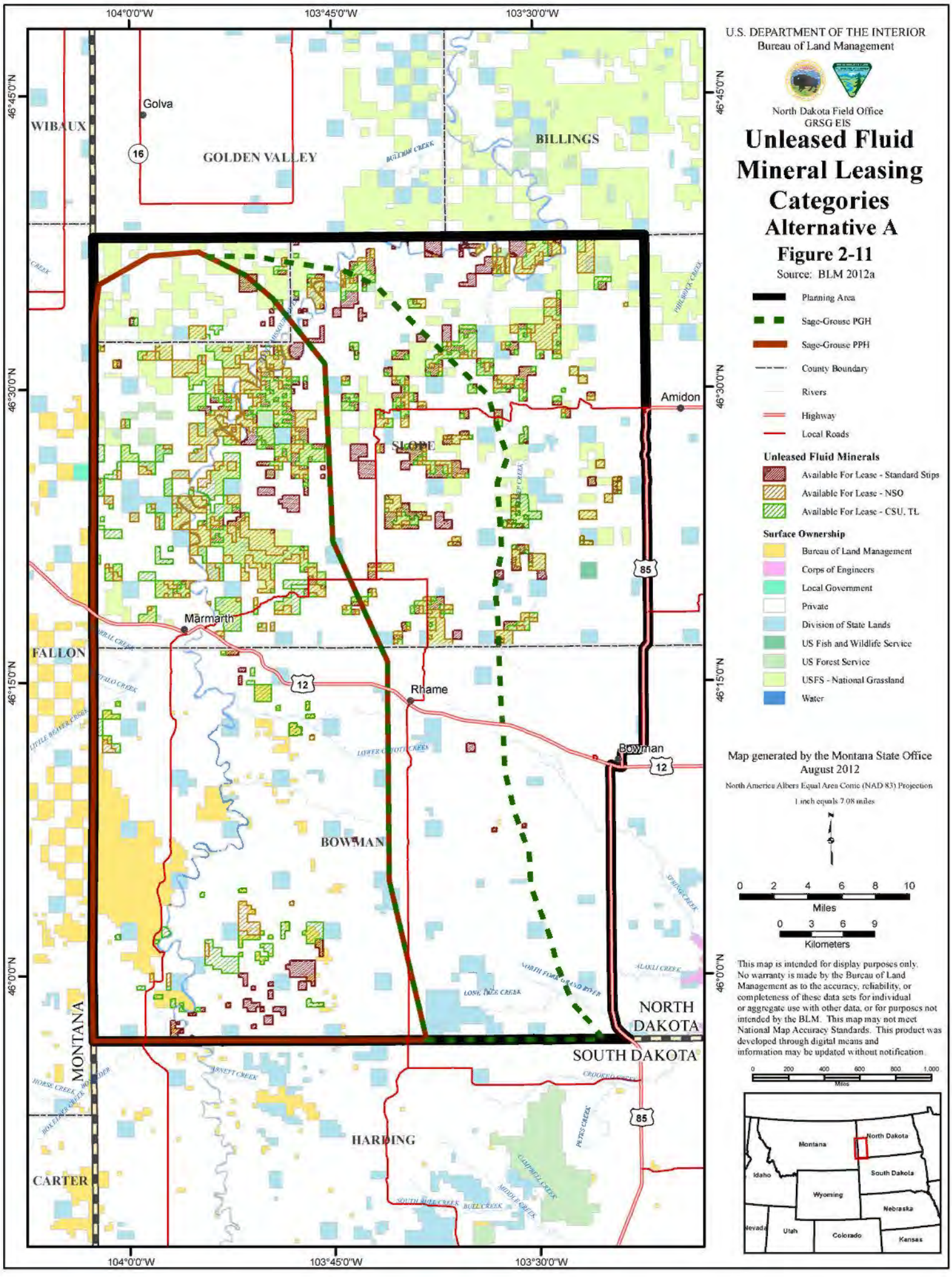
1 inch equals 7.08 miles

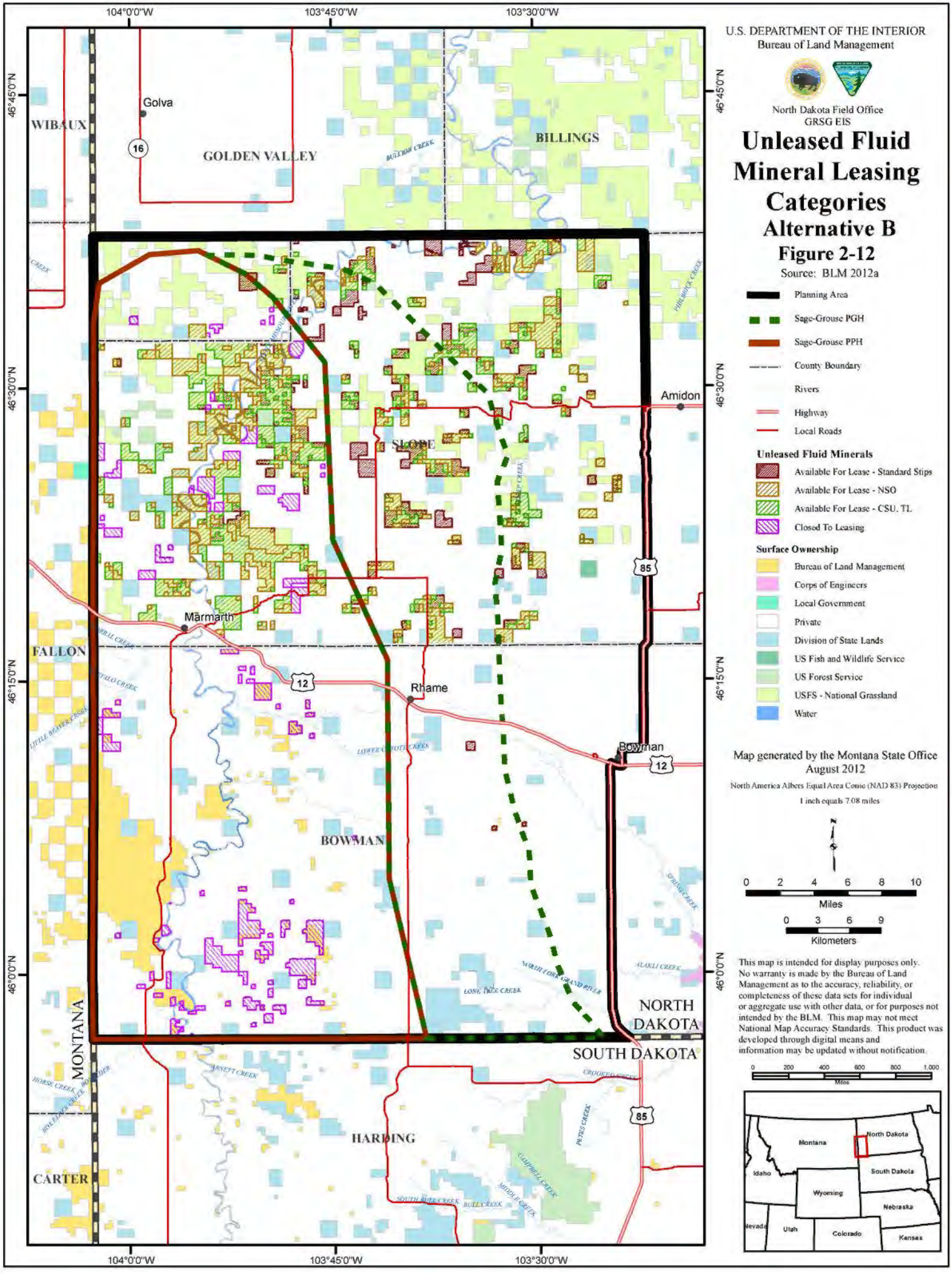
0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.

0 200 400 600 800 1,000
Miles


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
BULLTAIL CREEK
SLOPE
Amidon
85
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Unleased Fluid Mineral Leasing Categories
Alternative A
Figure 2-11
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Unleased Fluid Minerals
Available For Lease - Standard Stips
Available For Lease - NSO
Available For Lease - CSU, TL
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North American Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
N
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Unleased Fluid Mineral Leasing Categories

Alternative B

Figure 2-12

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads

Unleased Fluid Minerals

- Available For Lease - Standard Stips
- Available For Lease - NSO
- Available For Lease - CSU, TL
- Closed To Leasing

Surface Ownership

- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

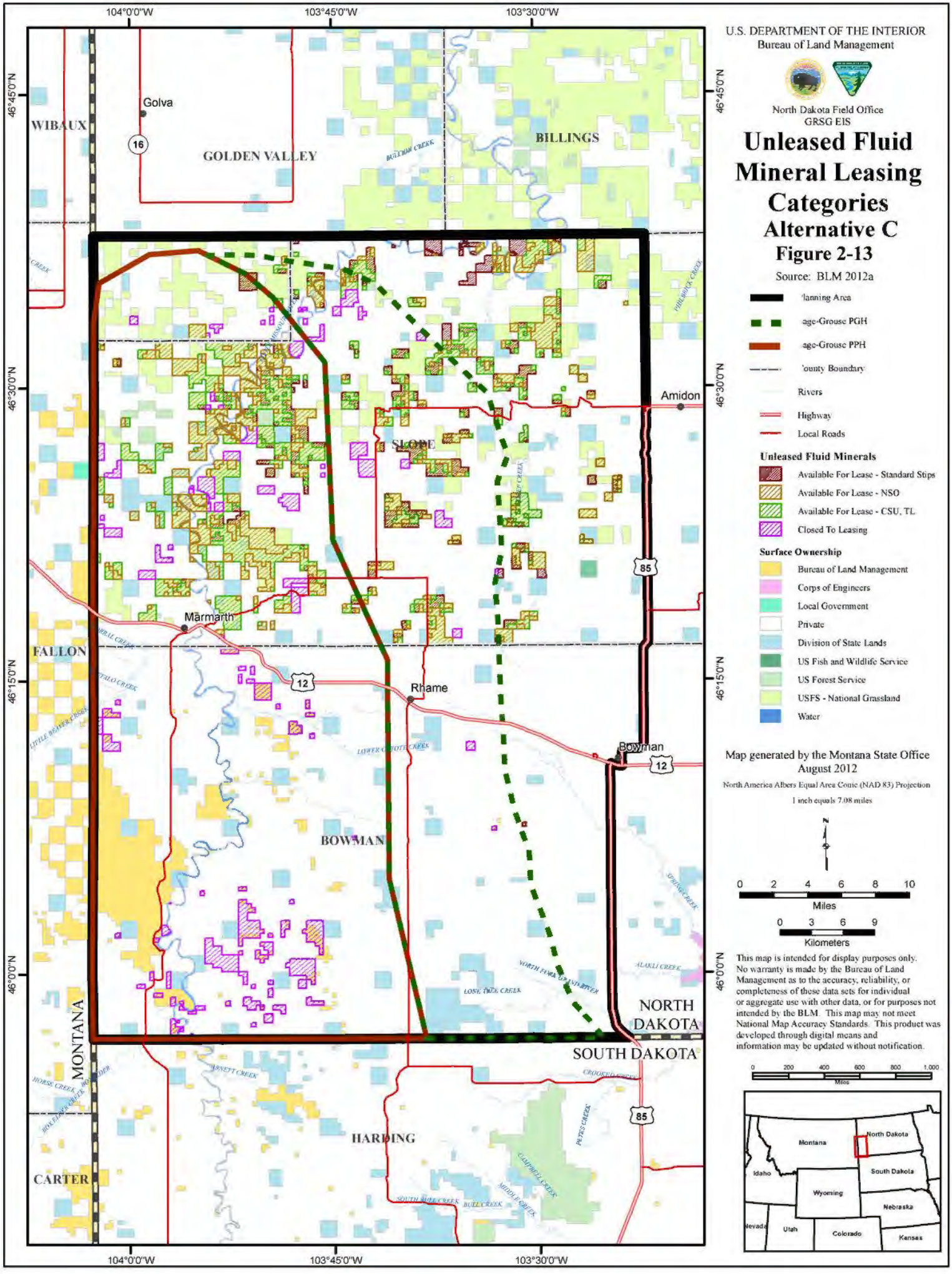
North America Albers Equal Area Conic (NAD 83) Projection

1 inch equals 7.08 miles

0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

0 200 400 600 800 1,000
Miles



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Unleased Fluid Mineral Leasing Categories
Alternative C
Figure 2-13

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads

Unleased Fluid Minerals
- Available For Lease - Standard Stips
- Available For Lease - NSO
- Available For Lease - CSU, TL
- Closed To Leasing

Surface Ownership
- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

North American Albers Equal Area Conic (NAD 83) Projection

1 inch equals 7.08 miles

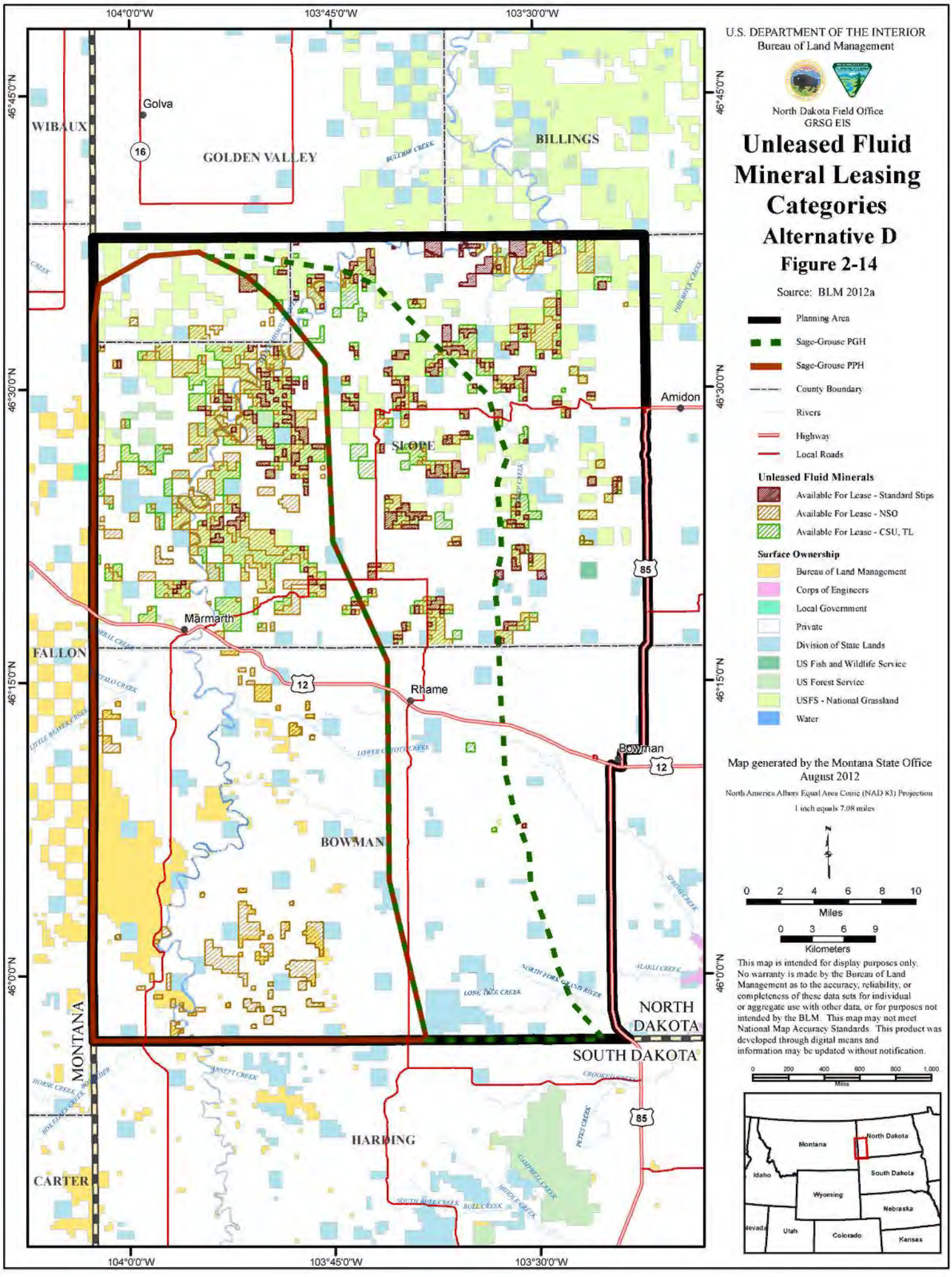
N

0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.

0 200 400 600 800 1,000
Miles



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Unleased Fluid Mineral Leasing Categories

Alternative D

Figure 2-14

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads

Unleased Fluid Minerals

- Available For Lease - Standard Stips
- Available For Lease - NSO
- Available For Lease - CSU, TL

Surface Ownership

- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

North American Albers Equal Area Conic (NAD 83) Projection

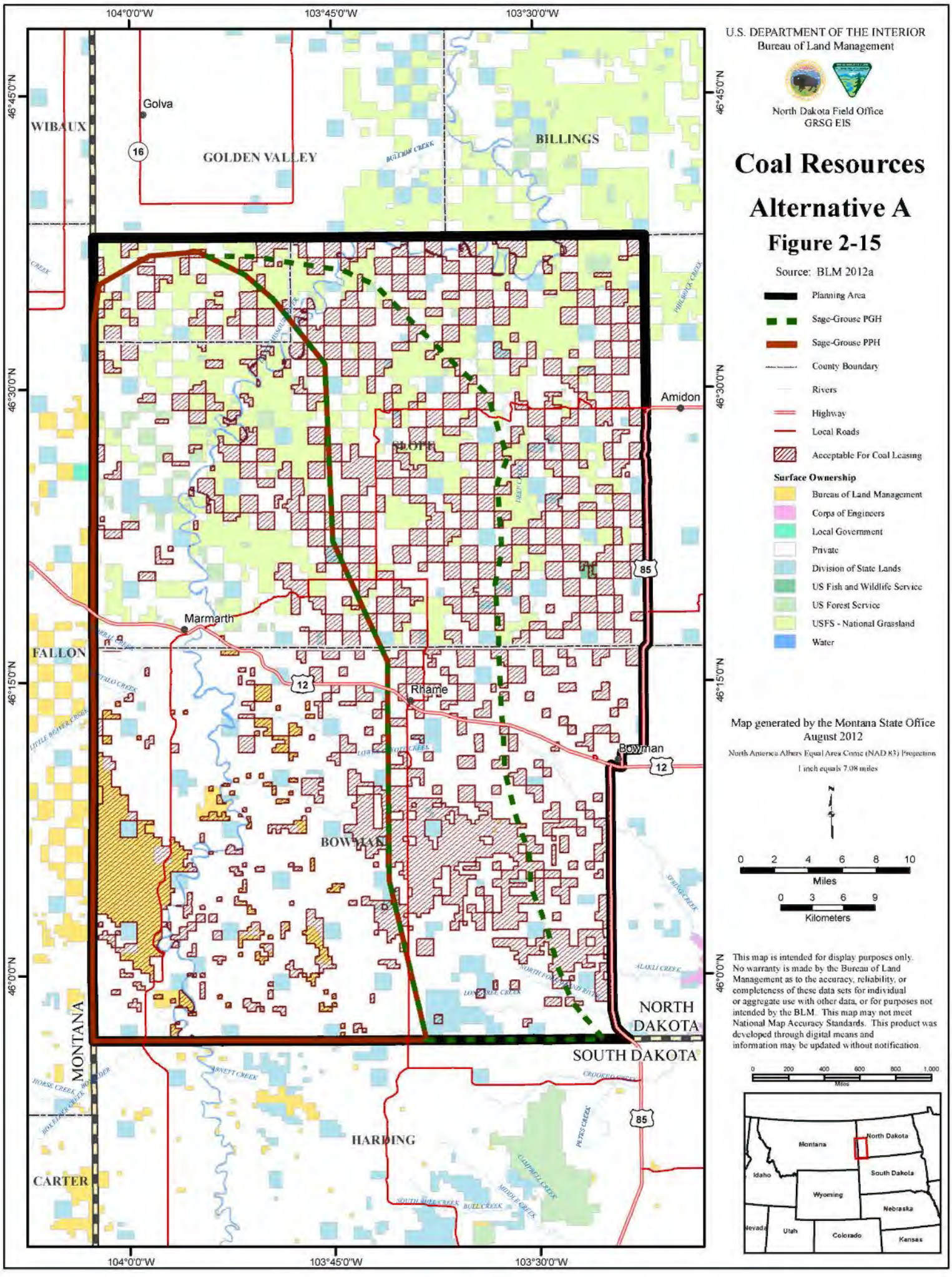
1 inch equals 7.08 miles

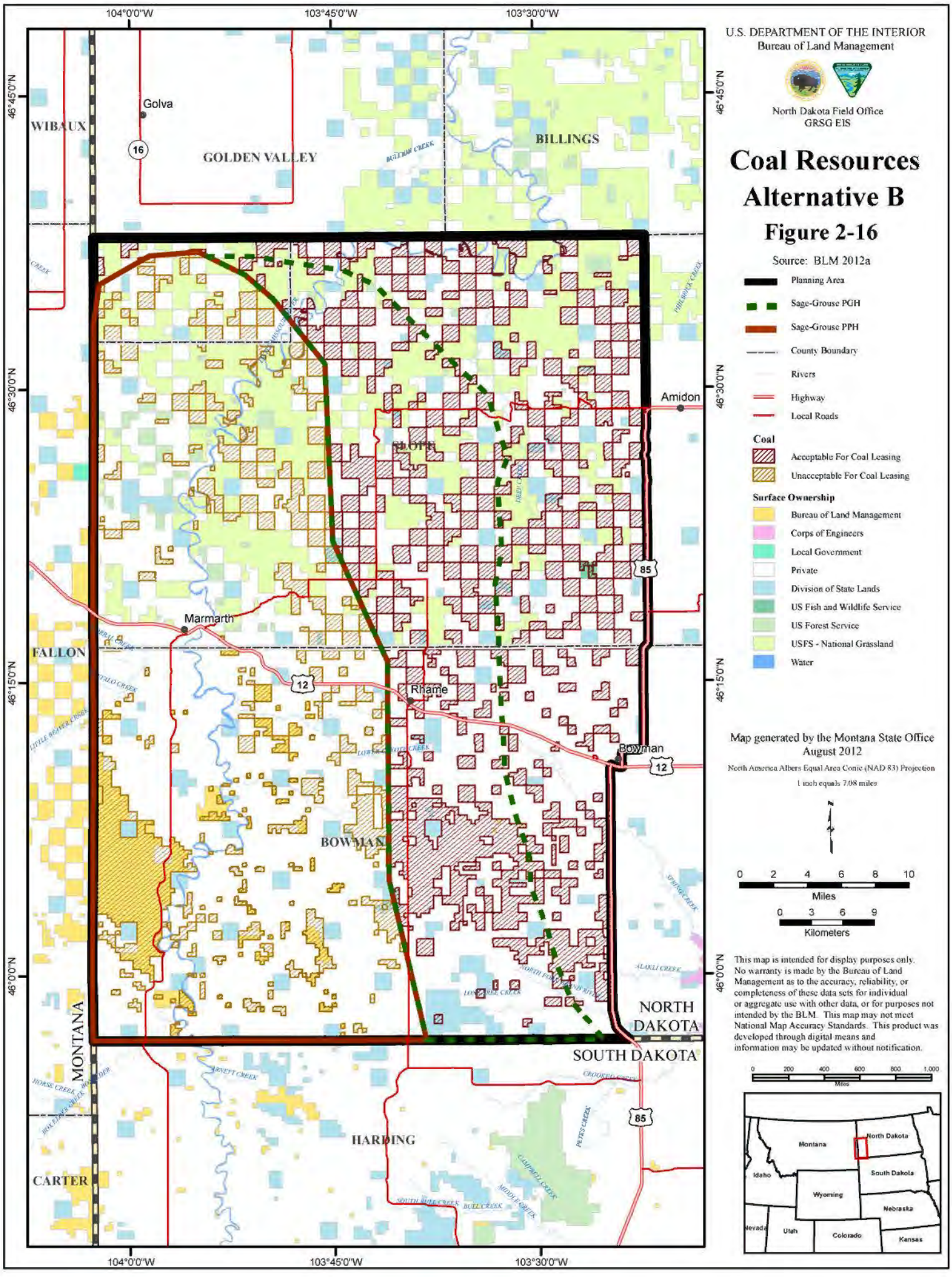
N

0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

0 200 400 600 800 1,000
Miles


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
Amidon
SLOPE
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
85
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Coal Resources
Alternative A
Figure 2-15
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Acceptable For Coal Leasing
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North American Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
N
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Coal Resources
Alternative B
Figure 2-16

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads

Coal
- Acceptable For Coal Leasing
- Unacceptable For Coal Leasing

Surface Ownership
- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

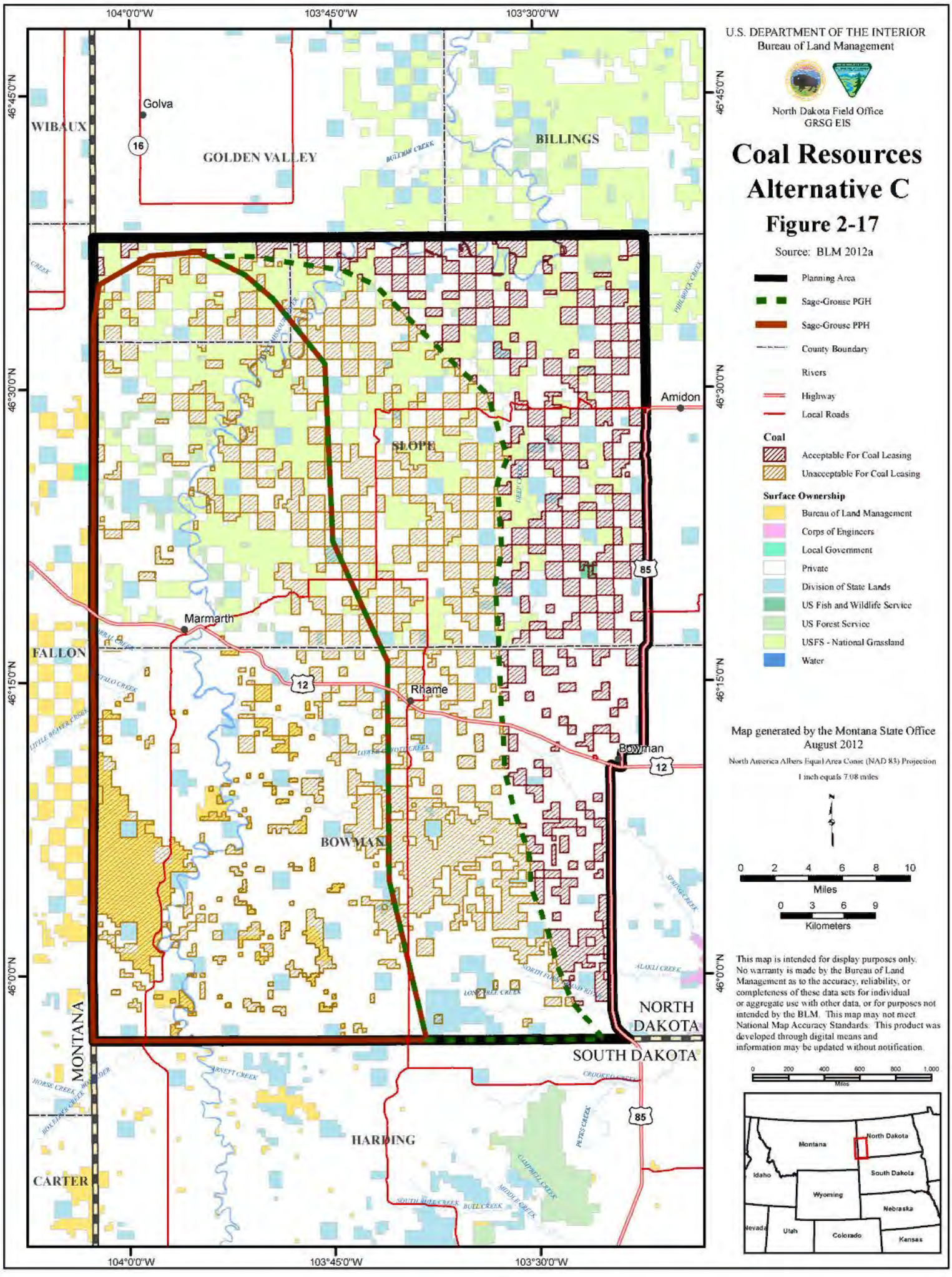
North America Albers Equal Area Conic (NAD 83) Projection

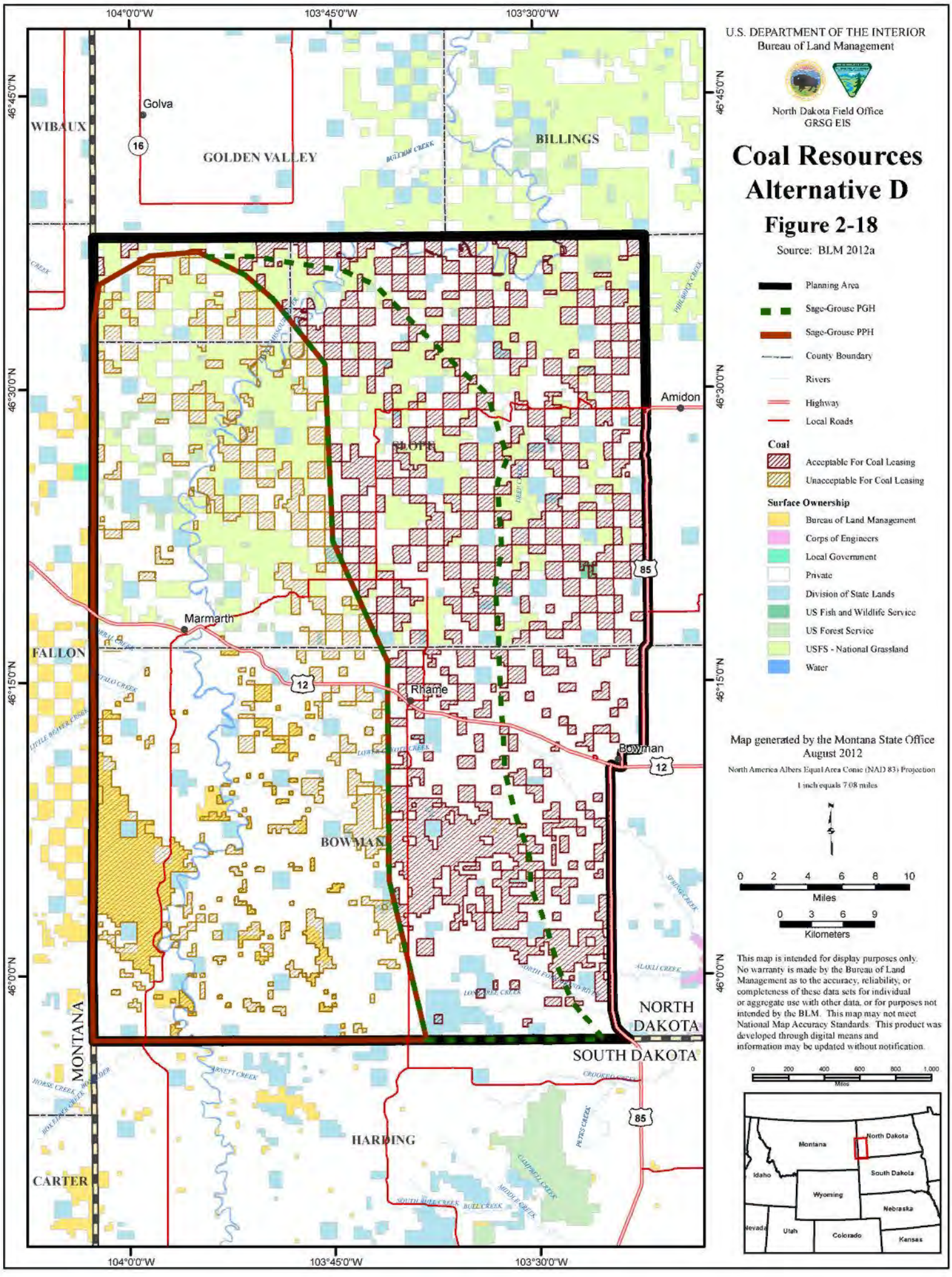
1 inch equals 7.08 miles

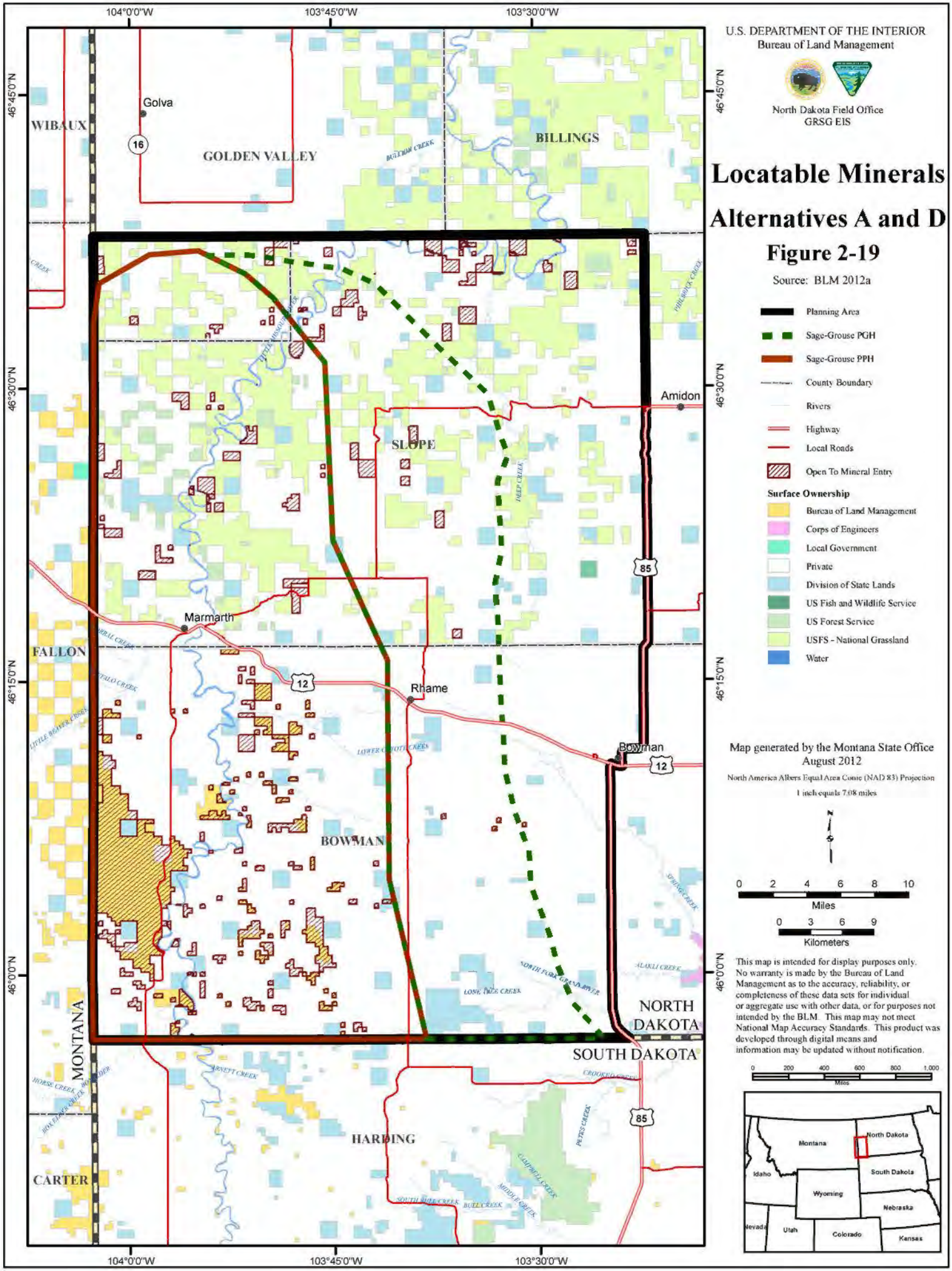
0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

0 200 400 600 800 1,000
Miles


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
85
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Coal Resources
Alternative C
Figure 2-17
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Coal
Acceptable For Coal Leasing
Unacceptable For Coal Leasing
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
BULLTAIL CREEK
Amidon
SLOPE
85
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Coal Resources
Alternative D
Figure 2-18
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Coal
Acceptable For Coal Leasing
Unacceptable For Coal Leasing
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
N
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Locatable Minerals
Alternatives A and D
Figure 2-19

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads
- Open To Mineral Entry

Surface Ownership

- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

North America Albers Equal Area Conic (NAD 83) Projection

1 inch equals 7.08 miles

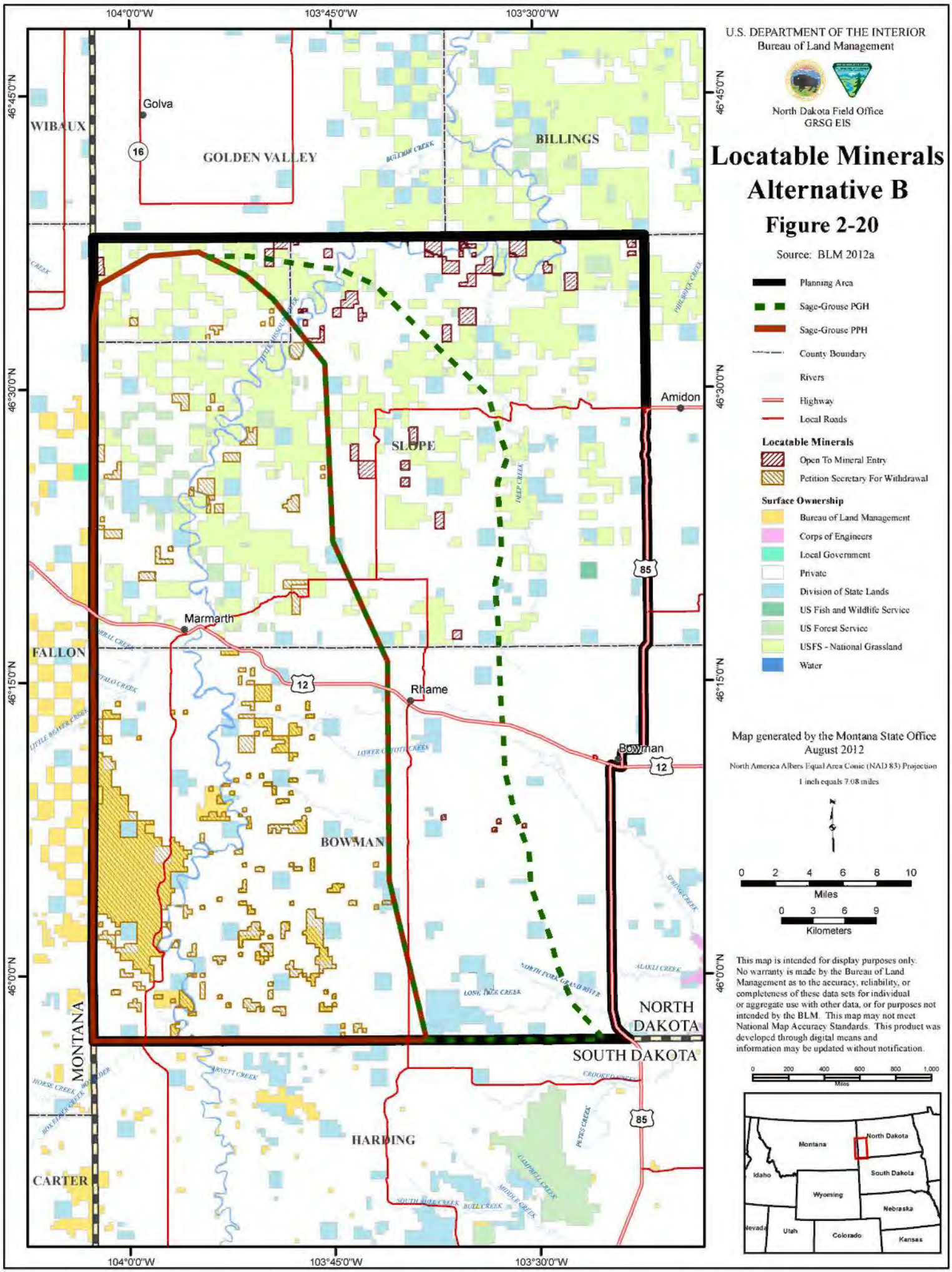
N

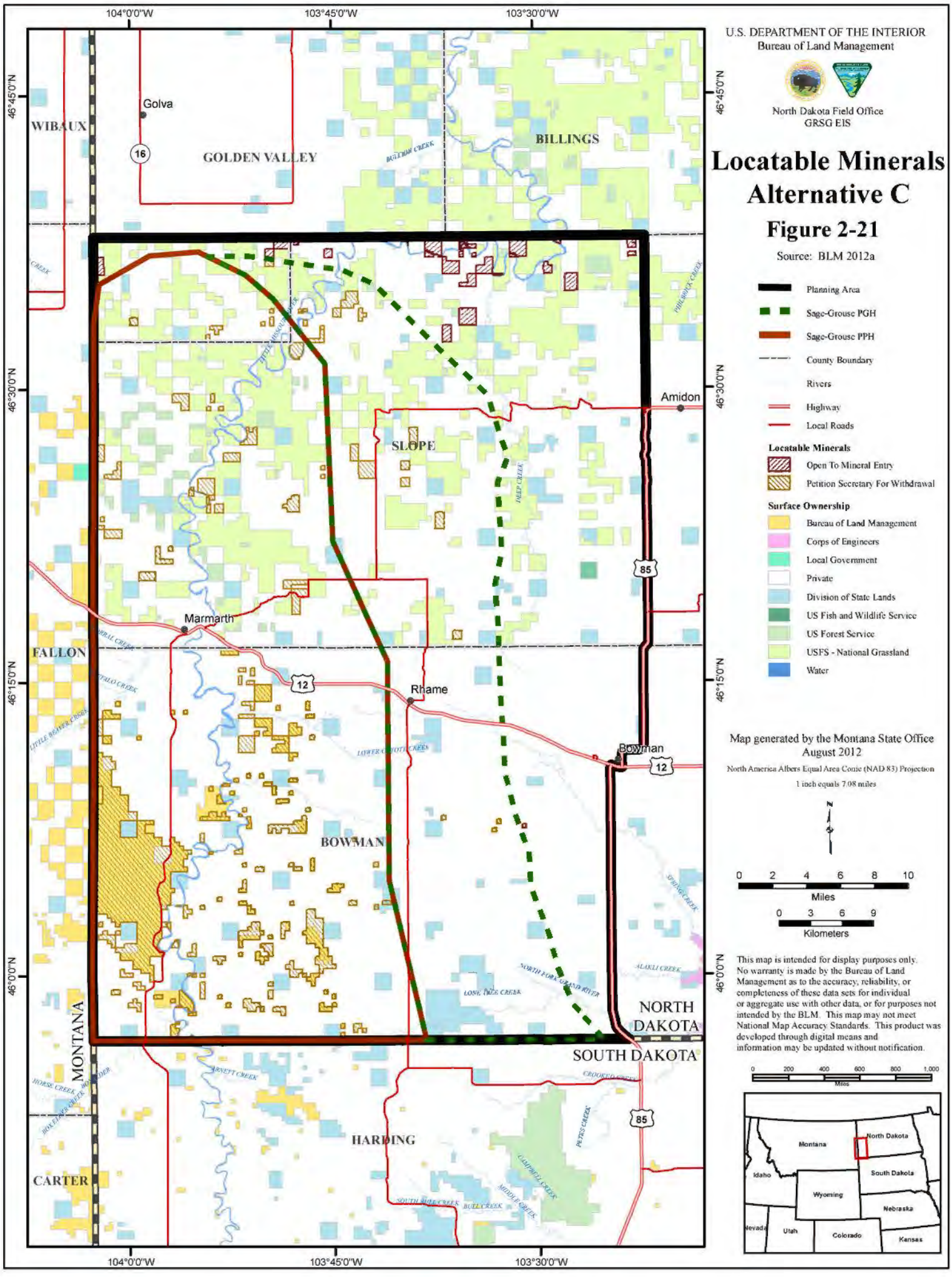
0 2 4 6 8 10
Miles

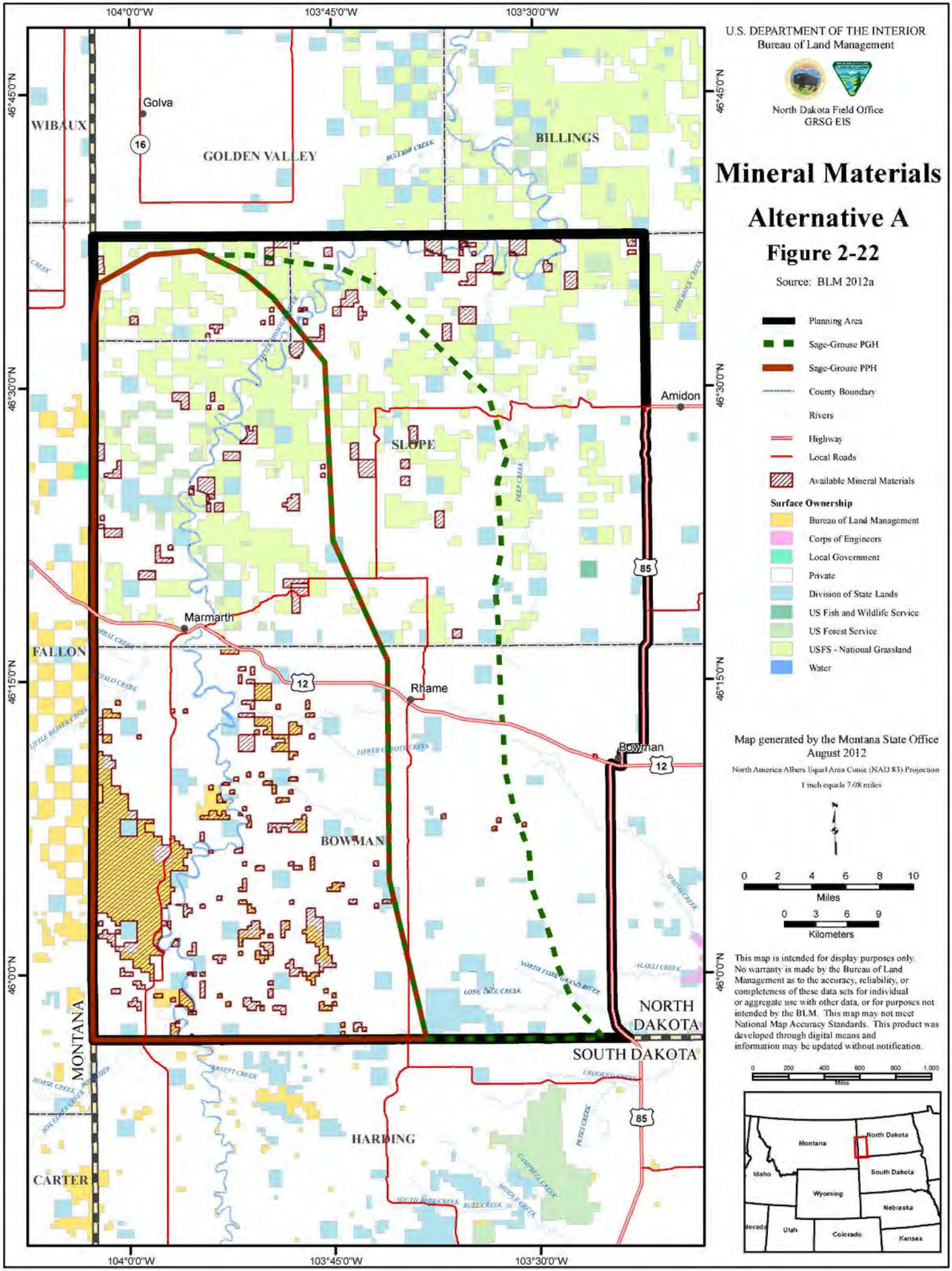
0 3 6 9
Kilometers

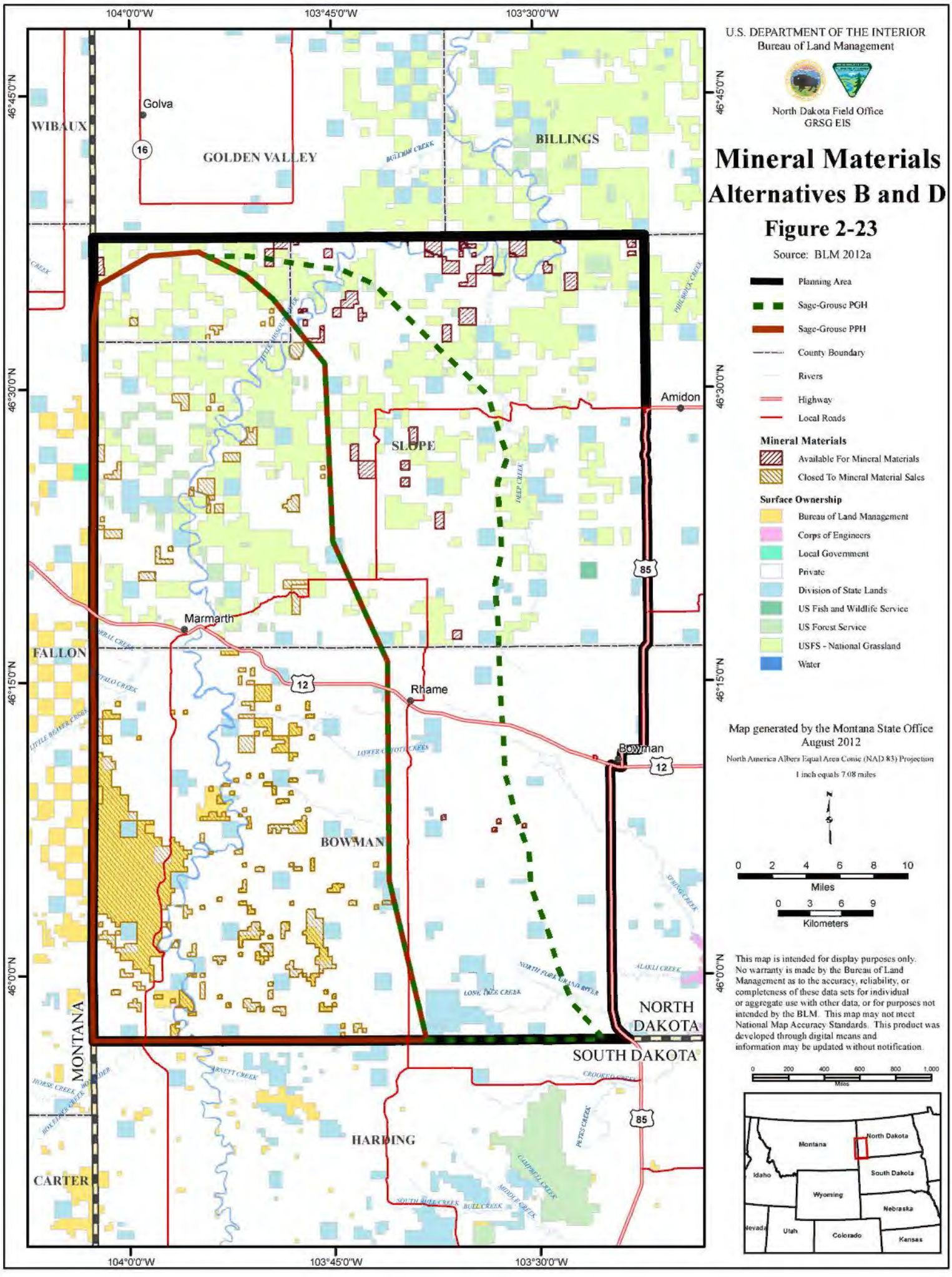
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.

0 200 400 600 800 1,000
Miles


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
85
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Locatable Minerals
Alternative B
Figure 2-20
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Locatable Minerals
Open To Mineral Entry
Petition Secretary For Withdrawal
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
Marmarth
FALLON
Rhame
Bowman
BOWMAN
HARDING
CARTER
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
16
85
12
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Locatable Minerals
Alternative C
Figure 2-21
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Locatable Minerals
Open To Mineral Entry
Petition Secretary For Withdrawal
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
South Dakota
Idaho
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
16
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
85
Marmarth
FALLON
12
Rhame
Bowman
BOWMAN
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
Mineral Materials
Alternative A
Figure 2-22
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
Available Mineral Materials
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Mineral Materials
Alternatives B and D
Figure 2-23

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads

Mineral Materials
- Available For Mineral Materials
- Closed To Mineral Material Sales

Surface Ownership
- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

North America Albers Equal Area Conic (NAD 83) Projection

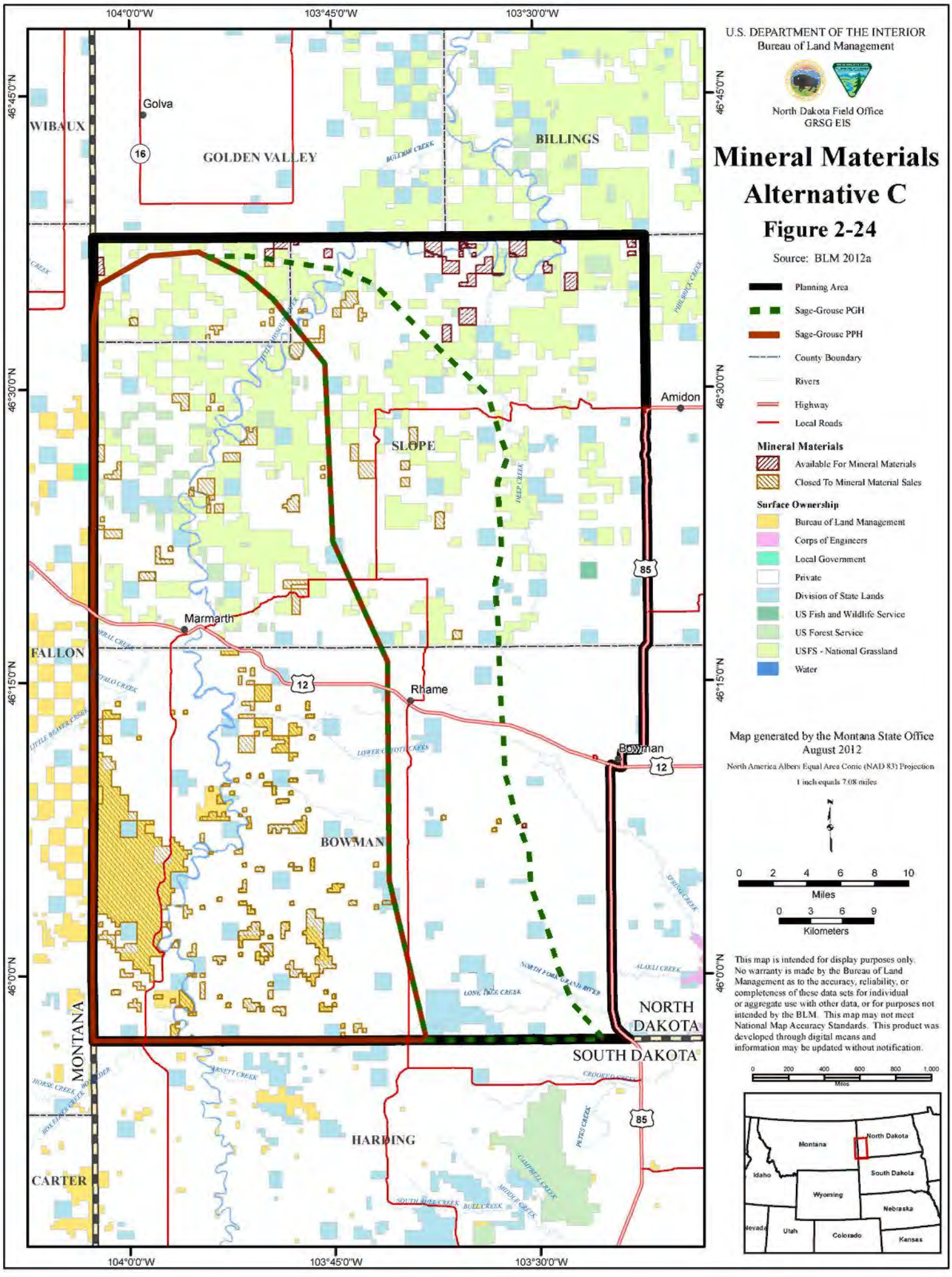
1 inch equals 7.08 miles

0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.

0 200 400 600 800 1,000
Miles



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office
GRSG EIS

Mineral Materials
Alternative C
Figure 2-24

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County Boundary
- Rivers
- Highway
- Local Roads

Mineral Materials
- Available For Mineral Materials
- Closed To Mineral Material Sales

Surface Ownership
- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

North America Albers Equal Area Conic (NAD 83) Projection

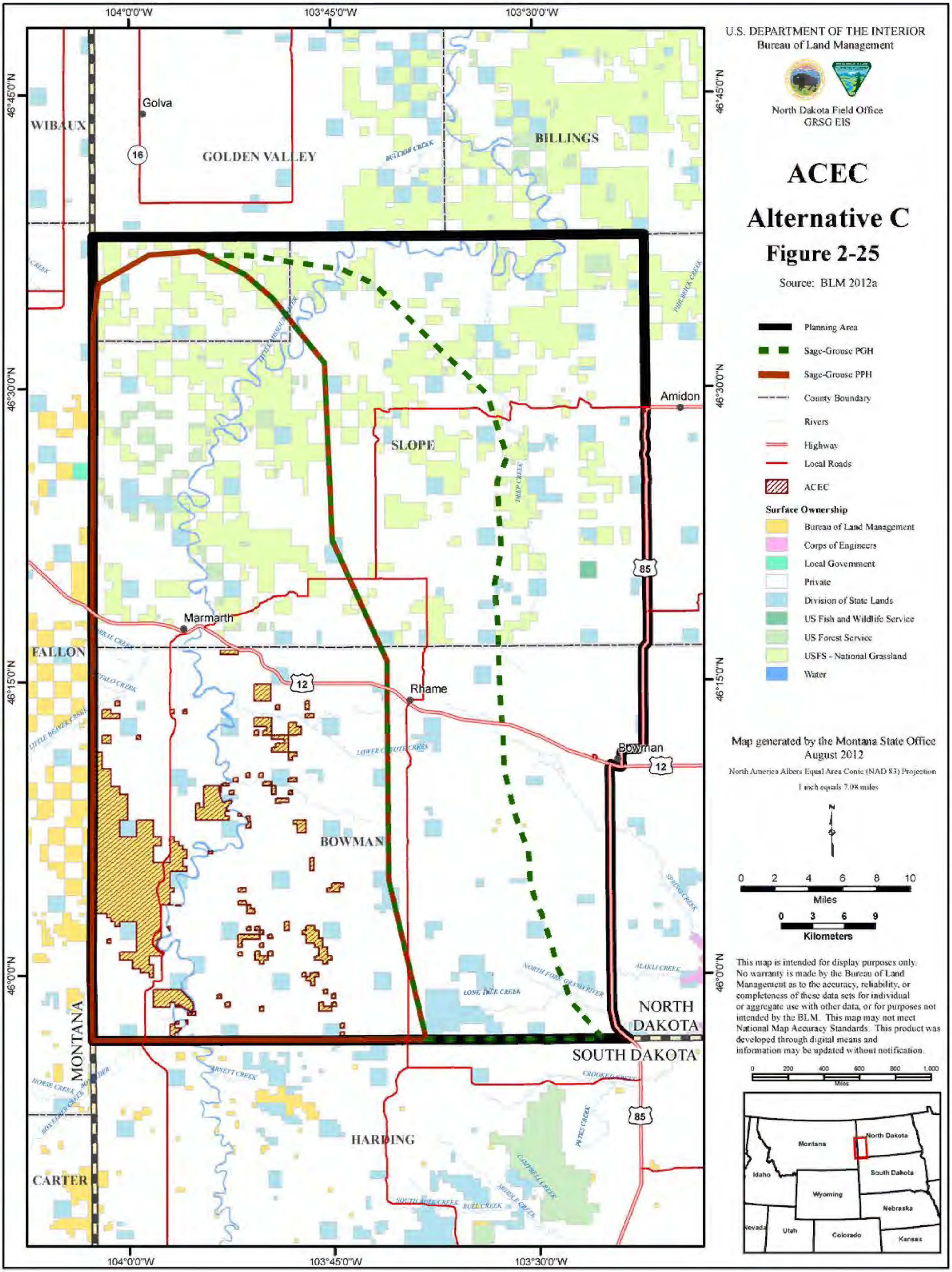
1 inch equals 7.08 miles

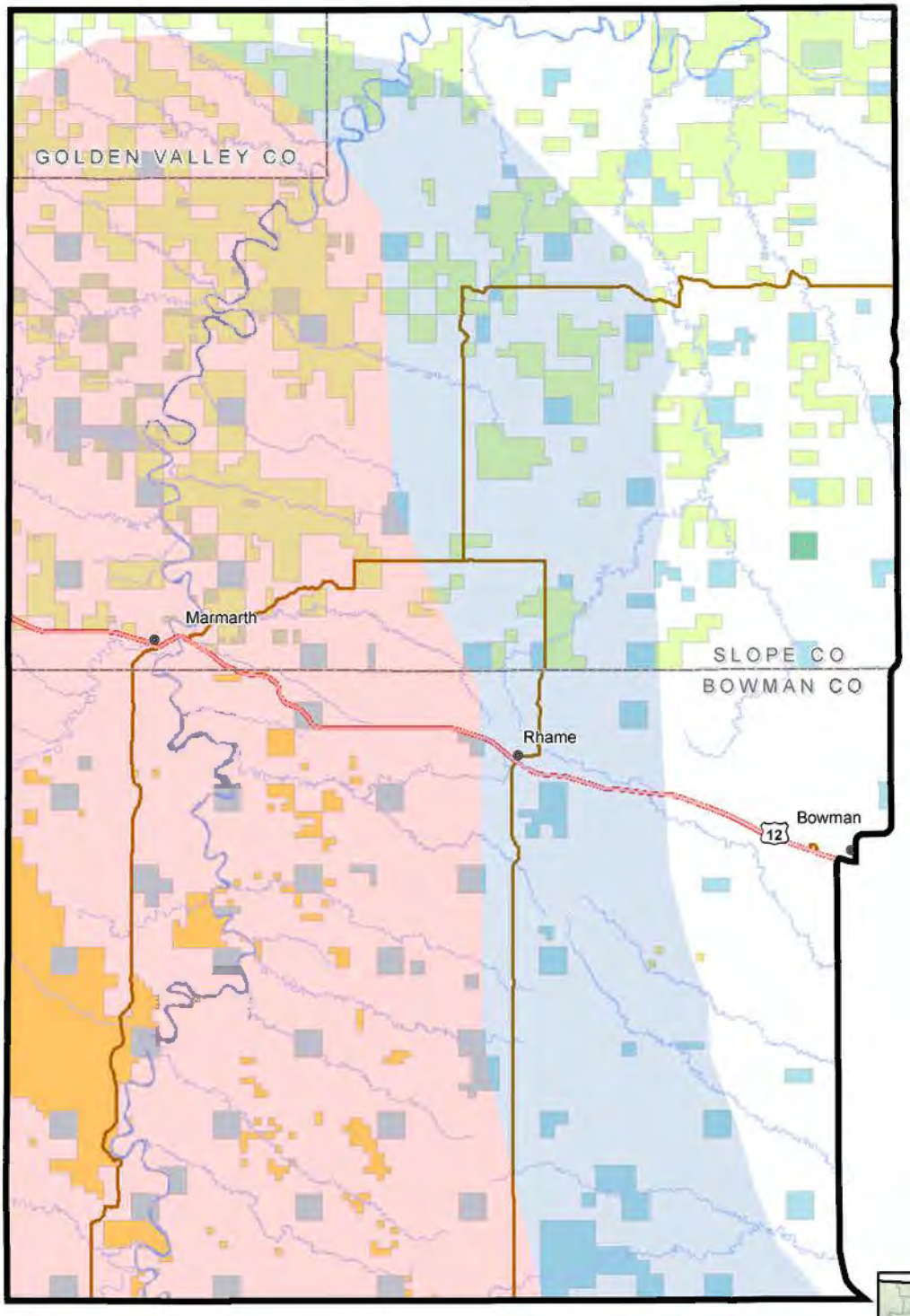
N

0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

0 200 400 600 800 1,000
Miles


U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
ACEC
Alternative C
Figure 2-25
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
ACEC
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North America Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
Miles
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
GOLDEN VALLEY
BILLINGS
SLOPE
FALLON
BOWMAN
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
HARDING
CARTER
Golva
Amidon
Marmarth
Rhame
Bowman
16
85
12
Montana
North Dakota
South Dakota
Wyoming
Idaho
Nebraska
Utah
Colorado
Kansas
Nevada



0 2.5 5 10

Miles

N

Location Map

- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water
- Planning Area Boundary
- County
- Highway
- Primary Roads
- Streams

Sage-Grouse

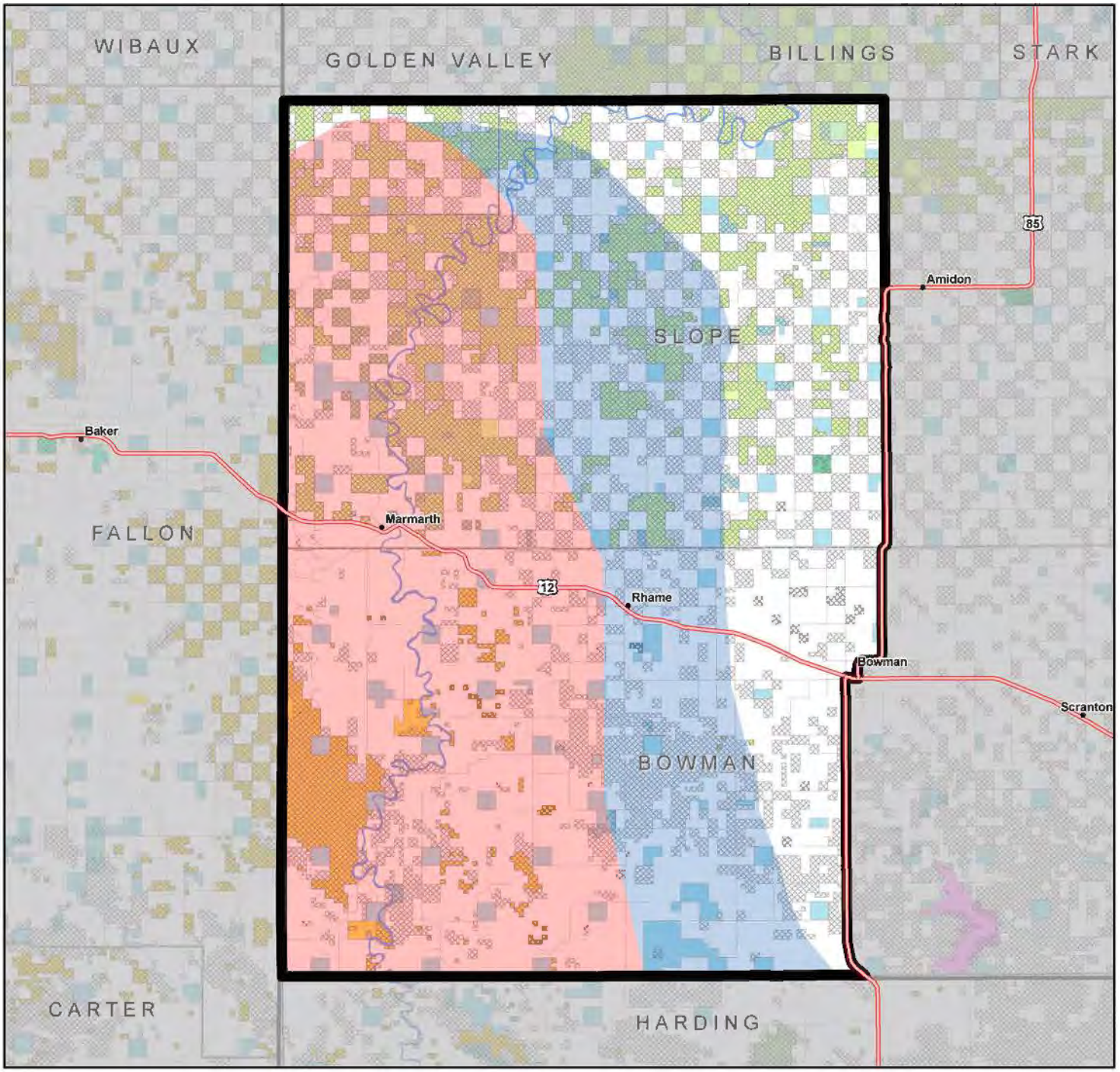
- Preliminary Priority Habitat
- Greater Sage-Grouse Distribution

Source: BLM 2012a

North Dakota Preliminary Sage-Grouse Habitat

Figure 3-1

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MONTANA/DAKOTAS



Greater Sage-Grouse Distribution and Preliminary Priority Habitat
North Dakota Field Office - Golden Valley, Slope, and Bowman Counties
Figure 3-2

Surface Ownership
- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water
- Federal Mineral Estate

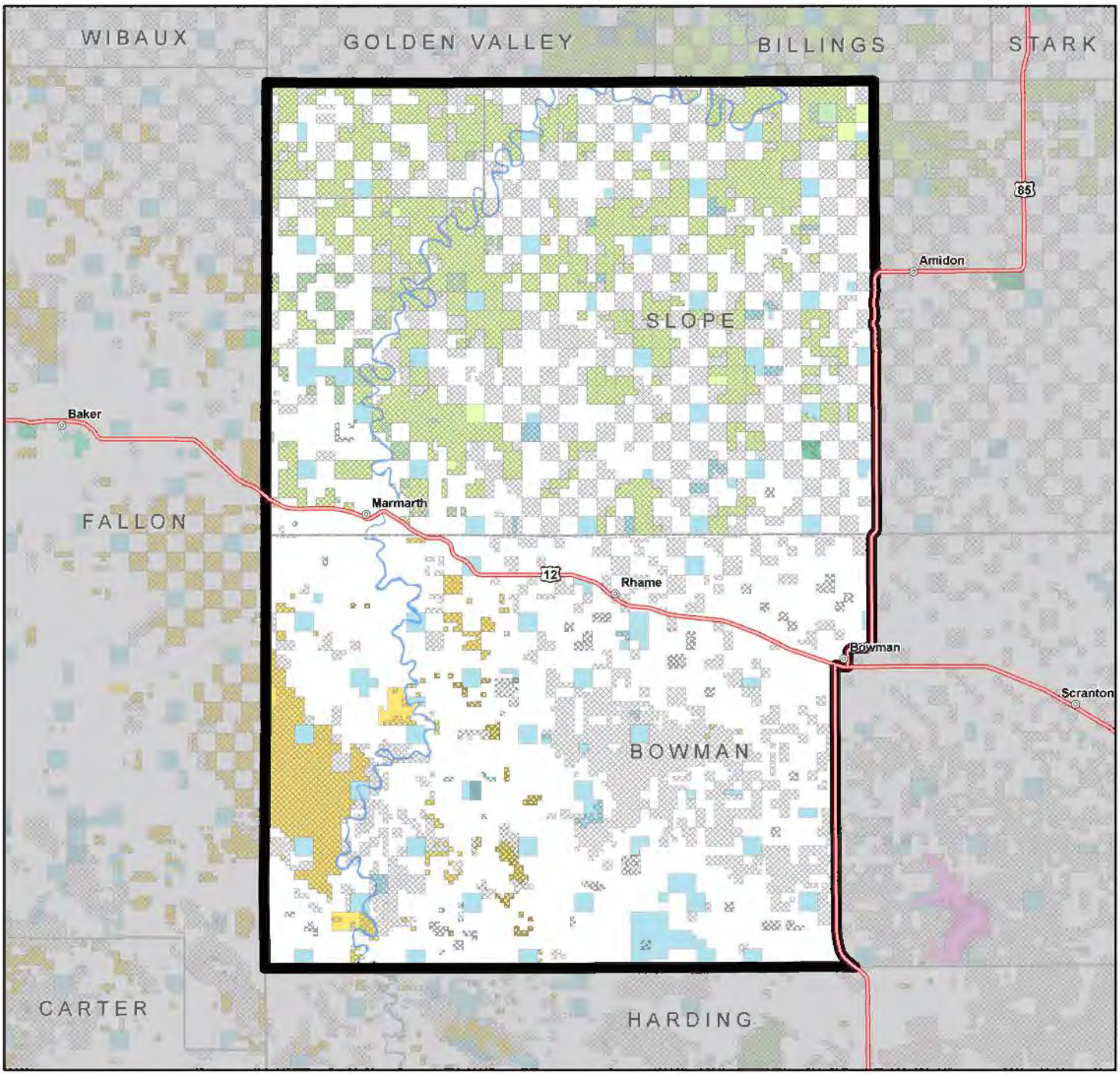
Sage-Grouse Habitat
- Preliminary Priority Habitat
- Greater Distribution

Source: BLM 2012a

N

0 2.5 5 7.5 10 Miles

Map Projection:
NAD 1983 Albers
Albers
False Easting: 0.000000
False Northing: 0.000000
Central Meridian: -106.000000
Standard Parallel 1: 43.500000
Standard Parallel 2: 48.000000
Latitude Of Origin: 42.500000



Surface and Mineral Management Status
North Dakota Field Office - Golden Valley, Slope, and Bowman Counties
Figure 3-3

Legend

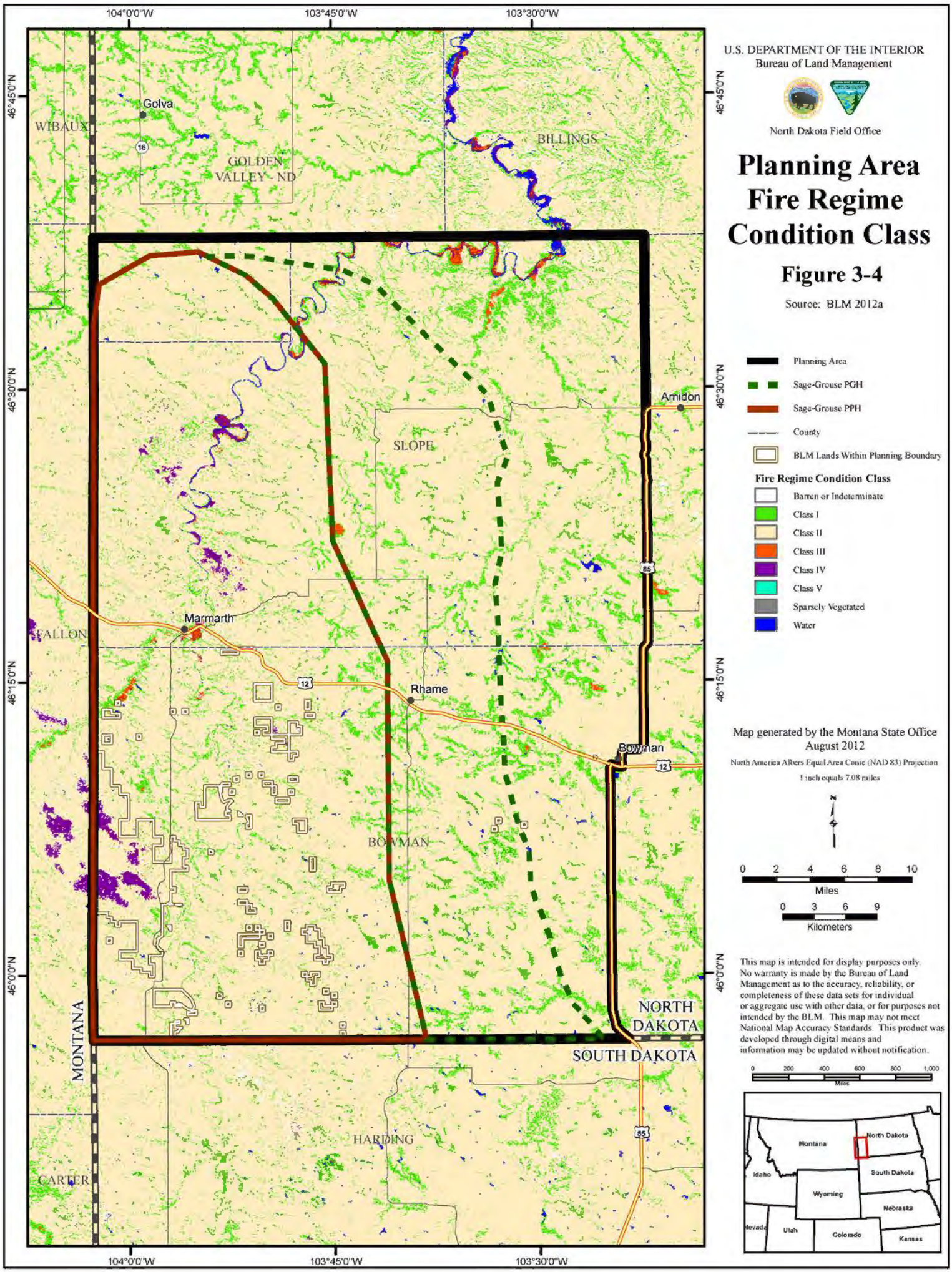
- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water
- Federal Mineral Estate

Source: BLM 2012a

0 2.5 5 7.5 10 Miles

N

Map Projection:
NAD 1983 Albers
Albers
False Easting: 0.000000
False Northing: 0.000000
Central Meridian: -106.000000
Standard Parallel 1: 43.500000
Standard Parallel 2: 48.000000
Latitude Of Origin: 42.500000



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office

Planning Area Fire Regime Condition Class

Figure 3-4

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County
- BLM Lands Within Planning Boundary

Fire Regime Condition Class

- Barren or Indeterminate
- Class I
- Class II
- Class III
- Class IV
- Class V
- Sparsely Vegetated
- Water

Map generated by the Montana State Office
August 2012

North America Albers Equal Area Conic (NAD 83) Projection

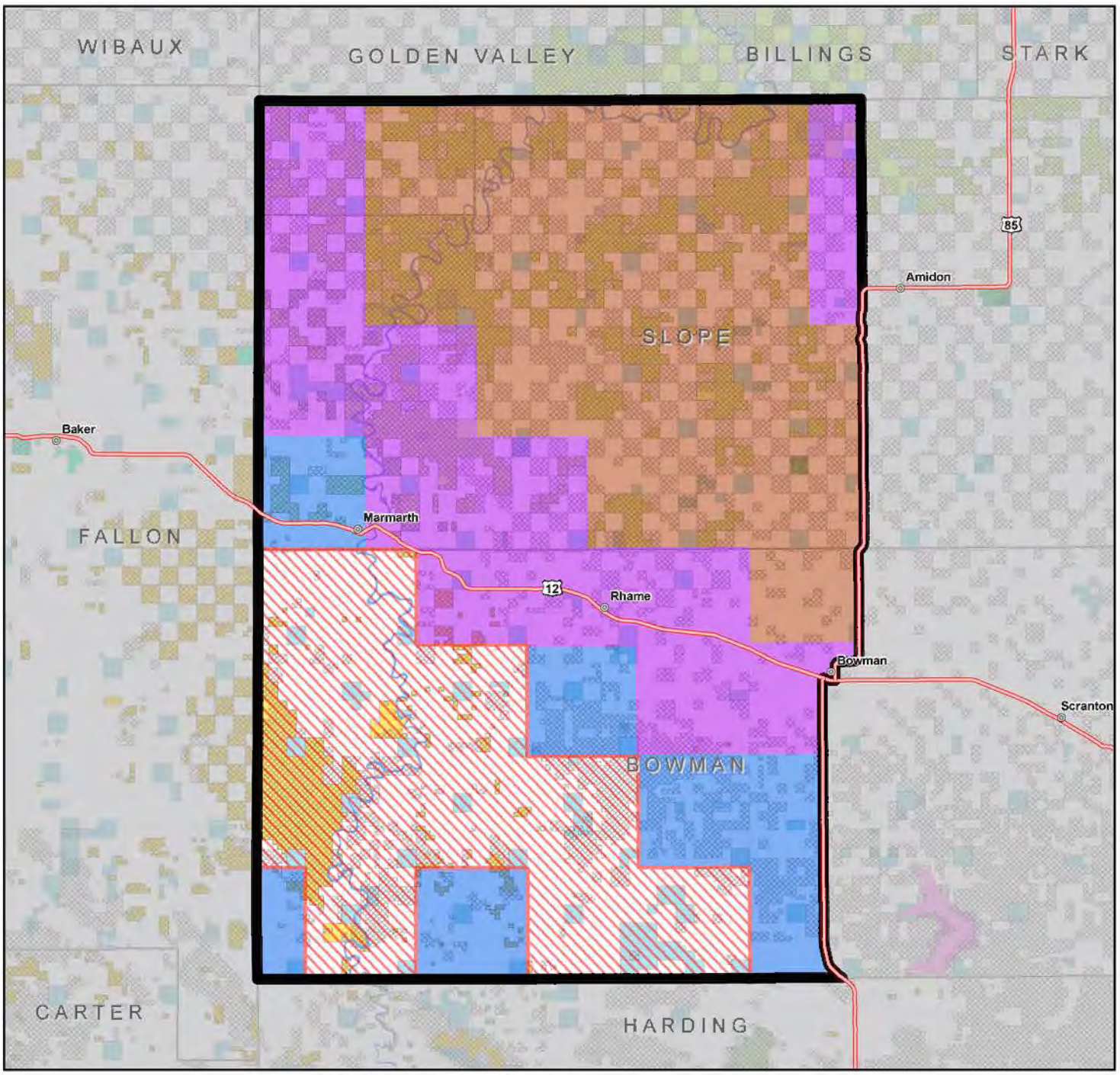
1 inch equals 7.08 miles

N

0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

0 200 400 600 800 1,000
Miles



Oil and Gas Potential
North Dakota Field Office - Golden Valley, Slope, and Bowman Counties
Figure 3-5

Surface Ownership
- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water
- Federal Mineral Estate

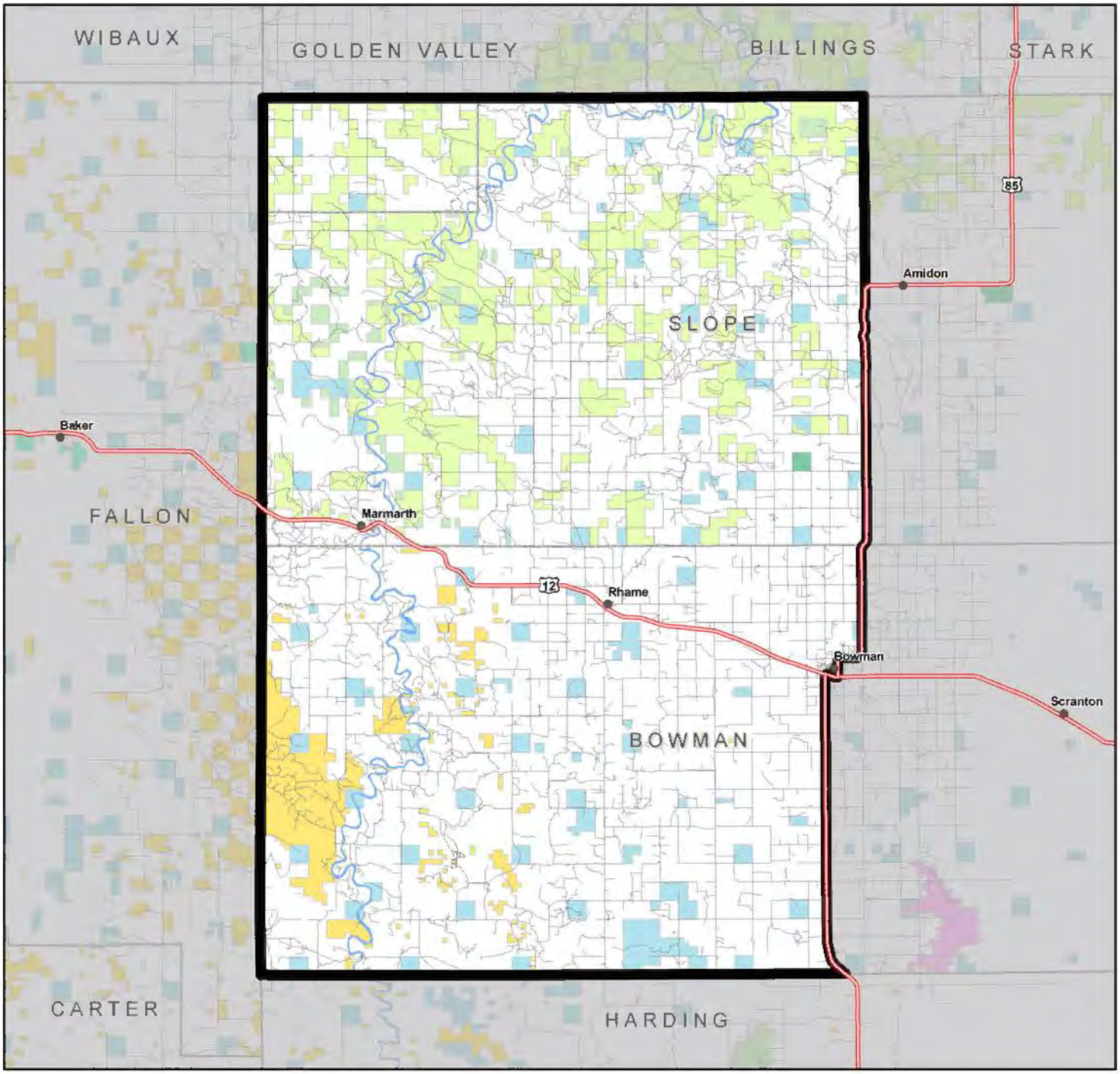
Oil and Gas Potential
- Very High
- High
- Medium
- Low
- Very Low
- Undetermined

Source: BLM 2012a

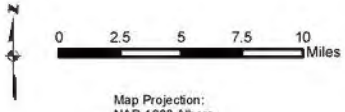
N

0 2.5 5 7.5 10 Miles

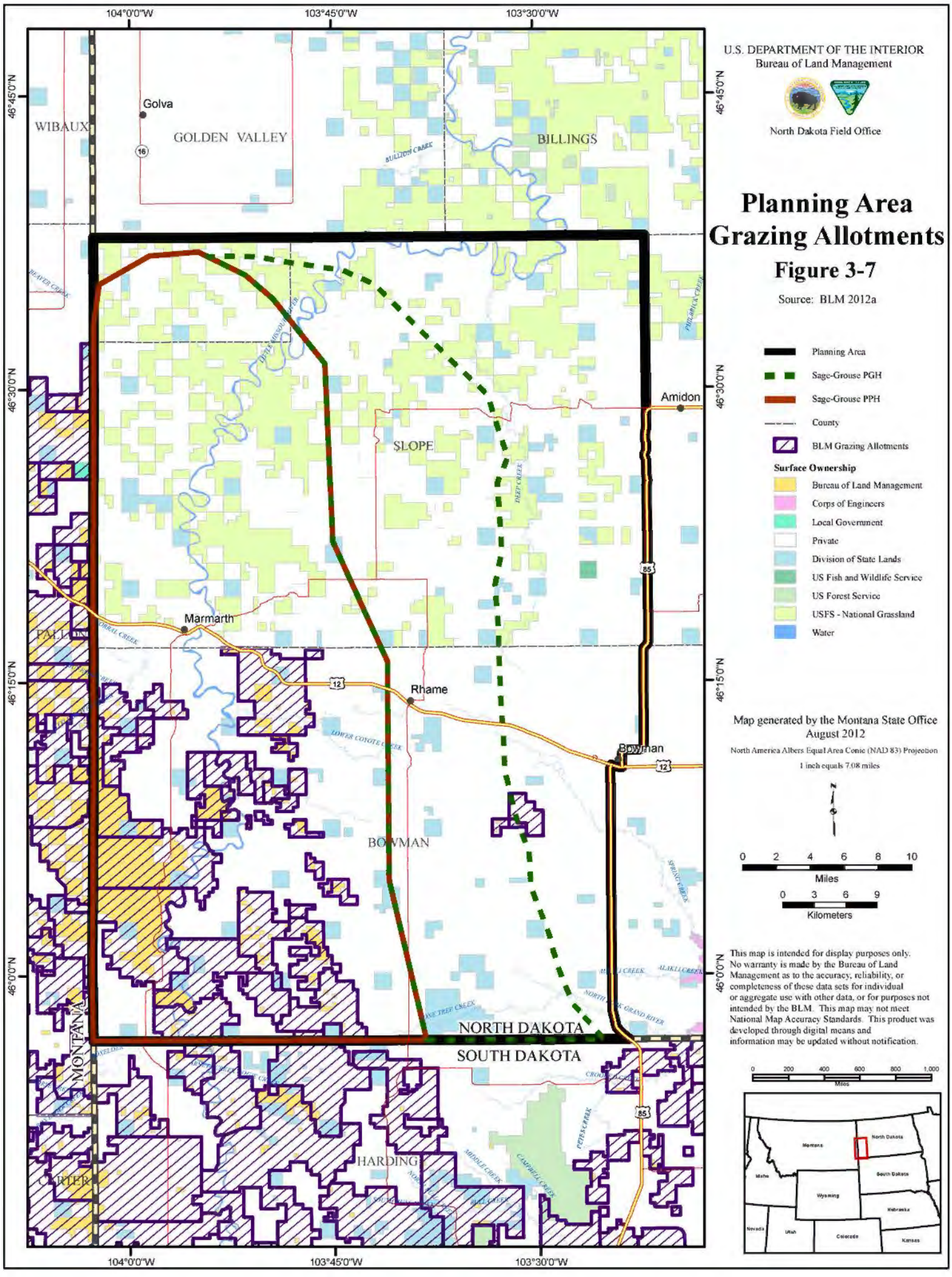
Map Projection:
NAD 1983 Albers
Albers
False Easting: 0.000000
False Northing: 0.000000
Central Meridian: -106.000000
Standard Parallel 1: 43.500000
Standard Parallel 2: 48.000000
Latitude Of Origin: 42.500000



Transportation Routes
North Dakota Field Office - Golden Valley, Slope, and Bowman Counties
Figure 3-6



Map Projection:
NAD 1983 Albers
Albers
False Easting: 0.000000
False Northing: 0.000000
Central Meridian: -106.000000
Standard Parallel 1: 43.500000
Standard Parallel 2: 48.000000
Latitude Of Origin: 42.500000



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

North Dakota Field Office

Planning Area Grazing Allotments

Figure 3-7

Source: BLM 2012a

- Planning Area
- Sage-Grouse PGH
- Sage-Grouse PPH
- County
- BLM Grazing Allotments

Surface Ownership

- Bureau of Land Management
- Corps of Engineers
- Local Government
- Private
- Division of State Lands
- US Fish and Wildlife Service
- US Forest Service
- USFS - National Grassland
- Water

Map generated by the Montana State Office
August 2012

North America Albers Equal Area Conic (NAD 83) Projection

1 inch equals 7.08 miles

N

0 2 4 6 8 10
Miles

0 3 6 9
Kilometers

0 200 400 600 800 1,000
Miles

Appendix B

Greater Sage-Grouse Habitat Required Design Features and Best Management Practices

APPENDIX B
GREATER SAGE-GROUSE HABITAT REQUIRED DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

B.1 INTRODUCTION

Required Design Features (RDFs) are a suite of features that would establish the minimum specifications for certain activities (i.e., water developments, fluid mineral development, and fire and fuels management) to help mitigate adverse impacts. In general, the design features are accepted practices that are known to be effective when implemented properly at the project level. However, their applicability and overall effectiveness cannot be fully assessed until the project-level when the project location and design are known. Because of site-specific circumstances, some features may not apply to some projects (e.g., a resource is not present on a given site) and/or may require slight variations (e.g., a larger or smaller protective area). All variations in design features would require appropriate analysis and disclosure as part of future project authorizations. Additional mitigation measures may be identified and required during individual project development and environmental review, and it is not possible to list them all at the planning level.

Best Management Practices (BMPs) are a suite of techniques that guide or may be applied to management actions to aide in achieving desired outcomes. BMPs are continuously improving as new science and technology become available and therefore are subject to change.

Alternatives Summary: There are no RDFs in the current North Dakota Resource Management Plan (RMP). Current management does include the use of BMPs at the project level; however, these are not a land use plan-level decision; for example, the fluid minerals program uses Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (The

Gold Book) – these standard and guidelines are updated as needed and not listed in the 1988 North Dakota RMP.

The RDFs listed below apply where applicable and appropriate for all action alternatives (Alternatives B-D) in the North Dakota Greater Sage-Grouse RMP Amendment/Environmental Impact Statement (EIS). An example of where an RDF would not be applicable would be Alternative C – for fluid minerals, the entire priority habitat (PH) and general habitat (GH) would be No Lease, so many of the fluid minerals RDFs would not be necessary. For Alternative D, PH is a no surface occupancy (NSO); therefore, many of the measures that discuss locating oil and gas facilities outside of PH would not be relevant.

B.2 ALTERNATIVES B-D REQUIRED DESIGN FEATURES

B.2.1 Required Design Features for how to make a pond that won't produce mosquitoes that transmit West Nile virus (from Doherty [2007])

1. Increase the size of ponds to accommodate a greater volume of water than is discharged. This will result in un-vegetated and muddy shorelines that breeding *Cx. tarsalis* avoid (De Szalay and Resh 2000). This modification may reduce *Cx. tarsalis* habitat but could create larval habitat for *Culicoides sonorensis*, a vector of blue tongue disease, and should be used sparingly (Schmidtmann et al. 2000). Steep shorelines should be used in combination with this technique whenever possible (Knight et al. 2003).
2. Build steep shorelines to reduce shallow water (>60 centimeters [cm]) and aquatic vegetation around the perimeter of impoundments (Knight et al. 2003). Construction of steep shorelines also will create more permanent ponds that are a deterrent to colonizing mosquito species like *Cx. tarsalis* which prefer newly flooded sites with high primary productivity (Knight et al. 2003).
3. Maintain the water level below that of rooted vegetation for a muddy shoreline that is unfavorable habitat for mosquito larvae. Rooted vegetation includes both aquatic and upland vegetative types. Avoid flooding terrestrial vegetation in flat terrain or low lying areas. Aquatic habitats with a vegetated inflow and outflow separated by open water produce 5-10 fold fewer Culex mosquitoes than completely vegetated wetlands (Walton and Workman 1998). Wetlands with open water also had significantly fewer stage III and IV instars which may be attributed to increased predator abundances in open water habitats (Walton and Workman 1998).

4. Construct dams or impoundments that restrict down slope seepage or overflow by digging ponds in flat areas rather than damming natural draws for effluent water storage, or lining constructed ponds in areas where seepage is anticipated (Knight et al. 2003).
5. Line the channel where discharge water flows into the pond with crushed rock, or use a horizontal pipe to discharge inflow directly into existing open water, thus precluding shallow surface inflow and accumulation of sediment that promotes aquatic vegetation.
6. Line the overflow spillway with crushed rock, and construct the spillway with steep sides to preclude the accumulation of shallow water and vegetation.
7. Fence pond site to restrict access by livestock and other wild ungulates that trample and disturb shorelines, enrich sediments with manure and create hoof print pockets of water that are attractive to breeding mosquitoes.

B.2.2 Literature Cited

De Szalay, F.A. and V.H. Resh. 2000. Factors influencing macroinvertebrate colonization of seasonal wetlands: responses to emergent plant cover. Freshwater Biology. 45: 295-308.

Doherty, M.K. 2007. Mosquito populations in the Powder River Basin, Wyoming: a comparison of natural, agricultural and effluent coal bed natural gas aquatic habitats. M.S. Thesis. Montana State University, Bozeman, U.S.A.

Knight, R.L., W.E. Walton, G.F. Meara, W.K. Riesen and R. Wass. 2003. Strategies for effective mosquito control in constructed treatment wetlands. Ecological Engineering. 21: 211-232.

Schmidtmann, E.T., R.J. Bobian, R.P. Beldin. 2000. Soil chemistries define aquatic habitats with immature populations of the *Culicoides variipennis* complex (Diptera: *Ceratopogonidae*). Journal of Medical Entomology. 37: 38-64.

Walton, W.E., and P.D. Workman. 1998. Effect of marsh design on the abundance of mosquitoes in experimental constructed wetlands in Southern California. Journal of the American mosquito control Association 14:95-107.

B.2.3 Required Design Features for Fluid Mineral Development

Priority Habitats

Roads

- Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.

- Locate roads to avoid important areas and habitats.
- Coordinate road construction and use among right-of-way (ROW) holders.
- Construct road crossing at right angles to ephemeral drainages and stream crossings.
- Establish speed limits on BLM system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
- Establish trip restrictions or minimization through use of telemetry and remote well control (e.g., Supervisory Control and Data Acquisition).
- Do not issue ROWs to counties on newly constructed energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
- Restrict vehicle traffic to only authorized users on newly constructed routes (use signing, gates, etc.)
- Use dust abatement practices on roads and pads.
- Close and rehabilitate duplicate roads.

Operations

- Cluster disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.
- Use directional and horizontal drilling to reduce surface disturbance.
- Place infrastructure in already disturbed locations where the habitat has not been restored.
- Consider using oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling.
- Apply a phased development approach with concurrent reclamation.
- Place liquid gathering facilities outside of priority areas. Have no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).
- Restrict the construction of tall facilities and fences to the minimum number and amount needed.
- Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.

- Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.
- Bury distribution power lines.
- Corridor power, flow, and small pipelines under or immediately adjacent to roads.
- Design or site permanent structures which create movement (e.g. a pump jack) to minimize impacts to sage-grouse.
- Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce sage-grouse mortality.
- Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.
- Control the spread and effects of non-native plant species (e.g. by washing vehicles and equipment).
- Use only closed-loop systems for drilling operations and no reserve pits.
- Restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007).
- Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat:
    - Overbuild size of ponds for muddy and non-vegetated shorelines.
    - Build steep shorelines to decrease vegetation and increase wave actions.
    - Avoid flooding terrestrial vegetation in flat terrain or low lying areas.
    - Construct dams or impoundments that restrict down slope seepage or overflow.
    - Line the channel where discharge water flows into the pond with crushed rock.
    - Construct spillway with steep sides and line it with crushed rock.
    - Treat waters with larvicides to reduce mosquito production where water occurs on the surface.

- Limit noise to less than 10 decibels above ambient measures (20-24 dBA) at sunrise at the perimeter of a lek during active lek season (Patricelli et al. 2010, Blickley et al. *In preparation*).
- Require noise shields when drilling during the lek, nesting, broodrearing, or wintering season.
- Fit transmission towers with anti-perch devices (Lammers and Collopy 2007).
- Require sage-grouse-safe fences.
- Locate new compressor stations outside PH and design them to reduce noise that may be directed towards PH.
- Clean up refuse.
- Locate man camps outside of PH.

Reclamation

- Include objectives for ensuring habitat restoration to meet sage-grouse habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve sage-grouse habitat needs.
- Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling and revegetating cut and fill slopes.
- Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.
- Irrigate interim reclamation if necessary for establishing seedlings more quickly.
- Utilize mulching techniques to expedite reclamation and to protect soils.

General Sage-Grouse Habitat

Make applicable BMPs mandatory as Conditions of Approval (COA) within GH. BMPs are continuously improving as new science and technology become available and therefore are subject to change. At a minimum include the following BMPs:

Roads

- Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
- Do not issue ROWs to counties on mining development roads, unless for a temporary use consistent with all other terms and conditions included in this document.

- Establish speed limits on BLM system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
- Coordinate road construction and use among ROW holders.
- Construct road crossing at right angles to ephemeral drainages and stream crossings.
- Use dust abatement practices on roads and pads.
- Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.

Operations

- Cluster disturbances associated with operations and facilities as close as possible.
- Use directional and horizontal drilling to reduce surface disturbance.
- Clean up refuse.
- Restrict the construction of tall facilities and fences to the minimum number and amount needed.
- Cover (e.g., fine mesh netting or use other effective techniques) all pits and tanks regardless of size to reduce sage-grouse mortality.
- Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.
- Use remote monitoring techniques for production facilities and develop a plan to reduce the frequency of vehicle use.
- Control the spread and effects of non-native plant species (Gelbard and Belnap 2003, Bergquist et al. 2007).
- Restrict pit and impoundment construction to reduce or eliminate augmenting threats from West Nile virus (Doherty 2007).

Reclamation

- Include restoration objectives to meet sage-grouse habitat needs in reclamation practices/sites. Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve sage-grouse habitat needs.

Literature Cited

Blickley, J.L., D. Blackwood, and G.L. Patricelli. In preparation. Experimental evidence for avoidance of chronic anthropogenic noise by greater sage-grouse. University of California-Davis, California, USA.

Bui, T.D., J.M. Marzluff, and B. Bedrosian. 2010. Common raven activity in relation to land use in western Wyoming: implications for greater sage-grouse reproductive success. Condor 112:65-78.

Doherty, M.K. 2007. Mosquito populations in the Powder River Basin, Wyoming: a comparison of natural, agricultural and effluent coal-bed natural gas aquatic habitats. M.S. thesis, Montana State University, Bozeman, Montana, USA.

Evangelista, P.H., A.W. Crall, and E. Bergquist. 2011. Invasive plants and their response to energy development. Pages 115-129 in D.E. Naugle, editor. Energy development and wildlife conservation in western North America. Island Press, Washington, D.C., USA.

Lammers, W.M., and M.W. Collopy. 2007. Effectiveness of avian predator perch deterrents on electric transmission lines. Journal of Wildlife Management 71:2752-2758.

Lyon, A.G. and S.H. Anderson. 2003. Potential gas development impacts on sage grouse nest initiation and movement. Wildlife Society Bulletin 31: 486-491.

Patricelli, G.L., J.L. Blickley, and S. Hooper. 2010. Incorporating the impacts of noise pollution into greater sage-grouse conservation planning. 27th Meeting of the Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee Workshop. Twin Falls, Idaho, USA.

Pyke, D.A. 2011. Restoring and rehabilitating sagebrush habitats. Pp. 531-548 in S.T. Knick and J.W. Connelly (editors). Greater sage-grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology 38. University of California Press. Berkeley, CA.

B.2.4 Required Design Features for Fire & Fuels

Fuels Management

1. Where applicable, design fuels treatment objective to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patters which most benefit sage-grouse habitat.
2. Provide training to fuels treatment personnel on sage-rouse biology, habitat requirements, and identification of areas utilized locally.
3. Use fire prescriptions that minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of hydrophobicity).
4. Ensure proposed sagebrush treatments are planned with interdisciplinary input from BLM and /or state wildlife agency

biologist and that treatment acreage is conservative in the context of surrounding sage-grouse seasonal habitats and landscape.

5. Where appropriate, ensure that treatments are configured in a manner (e.g., strips) that promotes use by sage-grouse (See Connelly et al. 2000*)
6. Where applicable, incorporate roads and natural fuel breaks into fuel break design.
7. Power-wash all vehicles and equipment involved in fuels management activities prior to entering the area to minimize the introduction of undesirable and/or invasive plant species.
8. Design vegetation treatment in areas of high frequency to facilitate firefighting safety, reduce the risk of extreme fire behavior; and to reduce the risk and rate of fire spread to key and restoration habitats.
9. Give priority for implementing specific sage-grouse habitat restoration projects in annual grasslands first to sites which are adjacent to or surrounded by sage-grouse key habitats. Annual grasslands are second priority for restoration when the sites not adjacent to key habitat, but within two miles of key habitat. The third priority for annual grasslands habitat restoration projects are sites beyond two miles of key habitat. The intent is to focus restoration outward from existing, intact habitat.
10. As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.
11. Emphasize the use of native plant species, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions.
12. Remove standing and encroaching trees within at least 100 meters of occupied sage-grouse leks and other habitats (e.g., nesting, wintering, and brood rearing) to reduce the availability of perch sites for avian predators, as appropriate, and resources permit.
13. Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.
14. Reduce the risk of vehicle or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g., green-strips) paralleling road rights-of-way.
15. Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, and strictly managed grazed strips) to ail in controlling wildfire should wildfire occur near key habitats or

important restoration areas (such as where investments in restoration have already been made).

Fire Management

1. Develop state-specific sage-grouse toolboxes containing maps, a list of resource advisors, contact information, local guidance, and other relevant information.
2. Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildfire suppression resources and designing suppression tactics.
3. Assign a sage-grouse resource advisor to all extended attack fires in or near key sage-grouse habitat areas. Prior to the fire season, provide training to sage-grouse resource advisors on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals.
4. On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in sage-grouse habitat areas.
5. During periods of multiple fires, ensure line officers are involved in setting priorities.
6. To the extent possible, locate wildfire suppression facilities (i.e., base camps, spike camps, drop points, staging areas, heli-bases) in areas where physical disturbance to sage-grouse habitat can be minimized. These include disturbed areas, grasslands, near roads/trails or in other areas where there is existing disturbance or minimal sagebrush cover.
7. Power-wash all firefighting vehicles, to the extent possible, including engines, water tenders, personnel vehicles, and all-terrain vehicles prior to deploying in or near sage-grouse habitat areas to minimize noxious weed spread.
8. Minimize unnecessary cross-country vehicle travel during fire operations in sage-grouse habitat.
9. Minimize burnout operations in key sage-grouse habitat areas by constructing direct fireline whenever safe and practical to do so.
10. Utilize retardant and mechanized equipment to minimize burned acreage during initial attack.
11. As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.

Literature Cited

Connelly, J.W., M.A Schroeder, A.R. Sands, and C.E. Braun 2000. Guidelines to Manage Sage-grouse Populations and Their Habitats. Wildlife Society Bulletin 28:967-985.

B.3 ALTERNATIVES B-D SOLID MINERALS DEVELOPMENT – REQUIRED DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

B.3.1 Introduction

The following measures would be applied as RDFs for all solid minerals, except locatable minerals. The measures outlined below would be applied as recommended BMPs for locatable minerals. The RDFs or BMPs would be applied as appropriate in PH and GH, and to the extent allowable by law (i.e., to prevent unnecessary and undue degradation). For example, Alternative B proposes to withdraw PH from mineral entry; therefore, these measures would not be relevant to PH, but would apply to GH. Alternative C proposes to withdraw minerals from both PH and GH; therefore, these measures would not be necessary.

Roads

- Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
- Locate roads to avoid important areas and habitats.
- Coordinate road construction and use among ROW holders.
- Construct road crossing at right angles to ephemeral drainages and stream crossings.
- Establish speed limits on BLM system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
- Do not issue ROWs to counties on mining development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
- Restrict vehicle traffic to only authorized users on newly constructed routes (e.g., use signing, gates, etc.)
- Use dust abatement practices on roads and pads.
- Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.

Operations

- Cluster disturbances associated with operations and facilities as close as possible.

- Place infrastructure in already disturbed locations where the habitat has not been restored.
- Restrict the construction of tall facilities and fences to the minimum number and amount needed.
- Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.
- Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.
- Bury power lines.
- Cover (e.g., fine mesh netting or use other effective techniques) all pits and tanks regardless of size to reduce sage-grouse mortality.
- Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.
- Control the spread and effects of non-native plant species (Gelbard and Belnap 2003, Bergquist et al. 2007).
- Restrict pit and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007).
- Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat:
- Overbuild size of ponds for muddy and non-vegetated shorelines.
- Build steep shorelines to decrease vegetation and increase wave actions.
- Avoid flooding terrestrial vegetation in flat terrain or low lying areas.
- Construct dams or impoundments that restrict down slope seepage or overflow.
- Line the channel where discharge water flows into the pond with crushed rock.
- Construct spillway with steep sides and line it with crushed rock.
- Treat waters with larvicides to reduce mosquito production where water occurs on the surface.
- Require sage-grouse-safe fences around sumps.
- Clean up refuse (Bui et al. 2010).
- Locate man camps outside of PH.

Reclamation

- Include restoration objectives to meet sage-grouse habitat needs in reclamation practices/sites.
- Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve sage-grouse habitat needs.
- Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling and revegetating cut and fill slopes.
- Restore disturbed areas at final reclamation to pre-disturbance landform and desired plant community.
- Irrigate interim reclamation as necessary during dry periods.
- Utilize mulching techniques to expedite reclamation.

Literature Cited

Bergquist, E., P. Evangelista, T. J. Stohlgren, and N. Alley. 2007. Invasive species and coal bed methane development in the Powder River Basin, Wyoming. Environmental Monitoring and Assessment 128:381-394.

Bui, T.D., J.M. Marzluff, and B. Bedrosian. 2010. Common raven activity in relation to land use in western Wyoming: implications for greater sage-grouse reproductive success. Condor 112:65-78.

Doherty, M.K. 2007. Mosquito populations in the Powder River Basin, Wyoming: a comparison of natural, agricultural and effluent coal bed natural gas aquatic habitats. Thesis. Montana State University, Bozeman, U.S.A.

Gelbard, J.L., and J. Belnap. 2003. Roads as conduits for exotic plant invasions in a semiarid landscape. Conservation Biology 17:420-432.

This page intentionally left blank.

Appendix C
Oil and Gas Stipulations

APPENDIX C
OIL AND GAS STIPULATIONS

ALTERNATIVE A

Serial Number_____

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed within **one-quarter mile of active sage-grouse strutting grounds**.

On the lands described below:

For the purpose of:

Protect sage-grouse leks. (NDRMP, p. 20)

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes.

NSO 11-35

Serial Number_____

TIMING LIMITATION STIPULATION

No surface use is allowed within two miles of active strutting grounds during the following time period:

March 1 to June 15

This stipulation does not apply to the operation and maintenance of production facilities.

On the lands described below:

For the purpose of:

Protect sage-grouse strutting activities. (NDRMP, p. 20)

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes.

TL 13-17

Serial Number_____

CONTROLLED SURFACE USE STIPULATION

Surface occupancy or use would be subject to the following special operating constraint:

> No surface use would be allowed within two miles of active strutting grounds during the following time period: March 1 to June 15.

This stipulation does not apply to operating and maintenance of production facilities.

On the lands described below:

For the purpose of:

Protection of sage-grouse strutting activities. (NDRMP, p. 20)

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes.

CSU 12-16

ALTERNATIVE B

General Habitat

Alternative A stipulations above apply to all general habitat (GH).

Priority Habitat

No Lease in priority habitat (PH).

ALTERNATIVE C

Priority and General Habitat

No Lease in PH and GH.

ALTERNATIVE D

General Habitat

Stipulation: Controlled Surface Use (CSU). All identified Greater Sage-Grouse (GRSG) habitat within GH is subject to the following operating constraints:

Maintain GRSG habitat to promote movement and genetic diversity of GRSG populations.

To minimize the impacts of surface disturbing/disruptive activities and insure maintenance of habitat for sustainable populations of GRSG within GH, surface disturbing and disruptive activities are subject to the following requirements.

a) Surface disturbing/disruptive activities will prevent or minimize disturbance to GRSG or their habitat. Except as identified above or during emergency situations, activities will not compromise the functionality of the habitat.

b) Continuous noise (related to long-term operations and/or activities) would be no greater than 49 decibels at 1/4 mile from the perimeter of the lek.

c) Temporary noise (related to installation, maintenance, one-time use, emergency operations, etc.) exceeding 49 decibels at 1/4 mile from the perimeter of a lek or surface disturbing/disruptive activities may be allowed, but only from 10 a.m. to 4 p.m. between March 15 and May 15.

d) Manage water developments to reduce the spread of West Nile virus within GRSG habitat areas.

e) Site and/or minimize linear ROW to reduce disturbance to sagebrush habitats.

f) Maximize placement of new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.

g) Power lines would be buried, eliminated, designed or sited in a manner which does not impact GRSG.

h) Placement of other high profile structures, exceeding 10 feet in height, would be eliminated, designed or sited in a manner which does not impact GRSG.

i) Remote monitoring of production facilities must be utilized and all permit applications must contain a plan to reduce the frequency of vehicle use.

j) Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling and revegetating cut and fill slopes.

k) Restore disturbed areas at final reclamation to pre-disturbance conditions or desired plant community.

l) Permanent (longer than two months) structures which create movement must be designed or sited to minimize impacts to GRSG.

m) Consider use of off-site mitigation, (e.g., creation of sagebrush habitat, purchase conservation easements, or buying down grazing) with proponent dollars to offset habitat losses.

n) Consider creation of a "Mitigation Trust Account" when impacts cannot be avoided, minimized, or effectively mitigated through other means. If approved by the BLM, the proponent may contribute funding to maintain habitat function based on the estimated cost of habitat treatments or other mitigation needed to maintain the functions of impacted habitats. Off-site mitigation should only be considered when no feasible options are available to adequately mitigate within and immediately adjacent to the impacted site, or when the off-site location would provide more effective mitigation of the impact than can be achieved on-site.

Objective: Within GH, maintain integrity of the habitat, to support sustainable GRSG populations.

Exception: The authorized officer may grant an exception to specific requirements of this stipulation if the action, as proposed or conditioned would not compromise the functionality of the habitat for GRSG and meet the goals for GRSG habitat.

Modification: The authorized officer may modify the area subject to the stipulation if an environmental analysis finds a portion of GH is nonessential or no longer GRSG habitat.

Waiver: This stipulation may be waived, if 1) after consultation with the appropriate North Dakota Game and Fish Department, it is determined significant portions of GH have been altered to the point GRSG no longer occupy the site and there is no reasonable likelihood of functional habitat being restored, or 2) GRSG are no longer a BLM Special Status Species and are not listed as threatened or endangered by the US Fish and Wildlife Service, or 3) no reasonable alternative development scenario mitigating the impacts is possible.

Priority Habitat

Stipulation: Surface occupancy and use is prohibited (NSO) within GRSG PH.

Objective: To protect the integrity of the habitat to maintain or improve GRSG populations.

Waiver: The stipulation may be waived if the authorized officer, in consultation with North Dakota Game and Fish Department, determines that the entire leasehold is no longer greater sage-grouse habitat.

Exception: The authorized officer, in consultation with North Dakota Game and Fish Department may grant an exception if portions of the area can be occupied without adversely affecting GRSG habitat.

Modification: The boundaries of the stipulated area may be modified if the authorized officer, in consultation with North Dakota Game and Fish Department, determines that portions of the area can be occupied without adversely affecting GRSG. The authorized officer, in consultation with North Dakota Game and Fish Department, may also modify the size and shape of the area based on studies documenting actual habitat suitability and/or actual use.

Appendix D

Area of Critical Environmental Concern Evaluation of Relevance and Importance Criteria

APPENDIX D
AREA OF CRITICAL ENVIRONMENTAL CONCERN EVALUATION OF RELEVANCE AND IMPORTANCE CRITERIA

Areas of Critical Environmental Concern (ACECs) are BLM-administered lands where special management attention is needed to protect important and relevant values. Special management attention refers to management prescriptions developed during preparation of a resource management plan (RMP) or RMP amendment (RMPA) expressly to protect the important and relevant values of an area from the potential effects of actions permitted by the RMP, including proposed actions deemed to be in conformance with the terms, conditions, and decisions of the RMP (BLM Manual 1613).

To be a potential ACEC, a nominated area must meet the criteria of relevance and importance as outlined in 43 CFR 1610.7-2 and BLM Manual 1613. If the relevance and importance criteria are met, an area must be identified as a potential ACEC and considered for designation and management in the resource planning process. Designation is based on whether or not a potential ACEC requires special management attention in the selected plan alternative.

An area meets the "**relevance**" criteria if it contains one or more of the following relevance values:

- A significant historic, cultural, or scenic value (including but not limited to rare or sensitive archeological resources and religious or cultural resources important to Native Americans).
- A fish and wildlife resource (including but not limited to habitat for endangered, sensitive, or threatened species or habitat essential for maintaining species diversity).

- A natural process or system (including but not limited to endangered, sensitive, or threatened plant species; rare, endemic, or relic plants or plant communities, which are terrestrial, aquatic, or riparian; or rare geological features).
- Natural hazards (including but not limited to areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the resource management planning process that it has become part of a natural process.

The value, resource, system, process, or hazard described above must have substantial significance and values in order to satisfy the "**importance**" criteria. This generally means that the value, resource, system, process, or hazard is characterized by one or more of the following:

- More than locally significant qualities which give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.
- Qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.
- Recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of Federal Land Policy and Management Act (FLPMA).
- Qualities which warrant highlighting in order to satisfy public or management concerns about safety and public welfare.
- Poses a significant threat to human life and safety, or to property.

Because the importance criteria are subjective, it is essential to create common assumptions on how they are applied by the RMPA. The facts on the ground need to support the decisions made. BLM, working with State Fish and Wildlife agencies, has developed preliminary priority habitat (PPH) maps, displaying habitat that has been identified as the most important to the long-term viability of the Greater Sage-Grouse (GRSG).

In response to the "Notice of Intent to Prepare Environmental Impact Statements To Incorporate Greater Sage-grouse Conservation Measures Into Land Use Plans and Land Management Plans" (76 Fed. Reg. 77008), the BLM received an ACEC nomination for GRSG that was considered in this planning process. This report presents the completed evaluation form for the nominated ACEC in the planning area (**Table D-1**, Greater Sage-Grouse Relevance and Importance Evaluation). An ACEC that meets both relevance and importance

Table D-1
Greater Sage-Grouse Relevance and Importance Evaluation

Area Considered: Bowman County, North Dakota		
General Location: BLM –administered lands managed by the North Dakota Field Office in the southwestern portion of North Dakota		
General Description: Priority habitat areas for Greater Sage-Grouse		
Acreage: 32,900 acres		
Values Considered: Greater Sage-Grouse Habitat		
Relevance Value	**Yes/No**	**Rationale for Determination**
A significant historic, cultural, or scenic value	No	No significant historic or cultural values are known. Scenic values are moderate and are similar to those of many other areas in the planning area.
A fish and wildlife resource	Yes	The nomination meets the relevance criterion for wildlife resources. The nominated area provides habitat for Greater Sage-Grouse (GRSG) (32,900 BLM-administered acres), a BLM sensitive species, and the area has also been identified as preliminary priority habitat (PPH) by North Dakota Game and Fish Department and BLM.
A natural process or system	Yes	The nomination also meets the criterion for a natural system or process because of the condition of the sagebrush habitat in portions of the nomination area.
Natural hazards	No	No natural hazards are known.
Importance Value	**Yes/No**	**Rationale for Determination**
More than locally significant qualities	No	Although the area contains habitat for GRSG conservation as noted in the nomination material, the area is not significantly unique or more important than other habitat areas in this region. GRSG are distributed throughout the western United States. The portion of the distribution in Montana, Wyoming, North Dakota, South Dakota, Alberta, and Saskatchewan are designated as Western Association of Fish and Wildlife Agencies (WAFWA) Management Zone I (Stiver et al. 2006). While all of these areas are considered important to GRSG conservation, the areas are dispersed throughout the region and are not significantly unique to a specific region or planning unit. In addition, GRGS habitat in these core areas is owned by a number of different entities and habitat on BLM-administered lands is not distinct from habitat managed by other ownership.
Special qualities	No	The area is not particularly fragile or sensitive to change as compared to other sites in North Dakota.
Warrants national priority/FLPMA protection	Yes	Satisfies national priority concerns.
Safety/public welfare concerns	No	No safety or public welfare concerns are known.
Poses a significant threat	No	No significant threats.

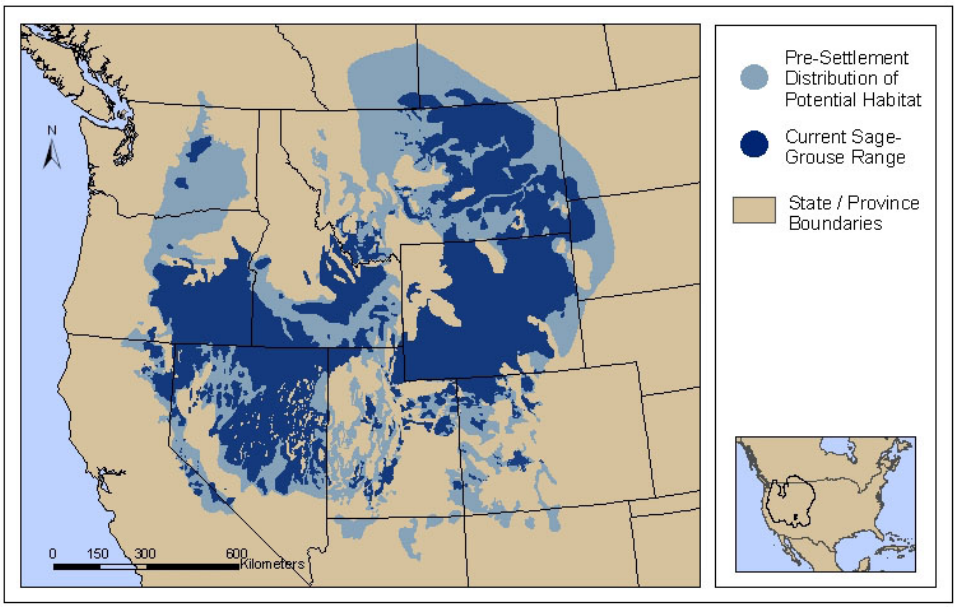
criteria is included in at least one management alternative analyzed in the RMPA/environmental impact statement (EIS). The attached map identifies the locations of the nominated ACEC.

Whether a particular ACEC nomination meets the relevance and importance criteria depends on the specific facts of each area. GRSG conservation is a national priority, and PPH has been recognized as having the highest conservation value to maintaining sustainable populations. This Appendix documents and substantiates how the nomination meets the existing relevance and importance criteria.

A finding that the ACEC nomination meets the relevance and importance criteria does not mean that it requires special management attention or will be designated as an ACEC. However, it does mean that the ACEC nomination will be carried forward for the development of management prescriptions in at least one alternative.

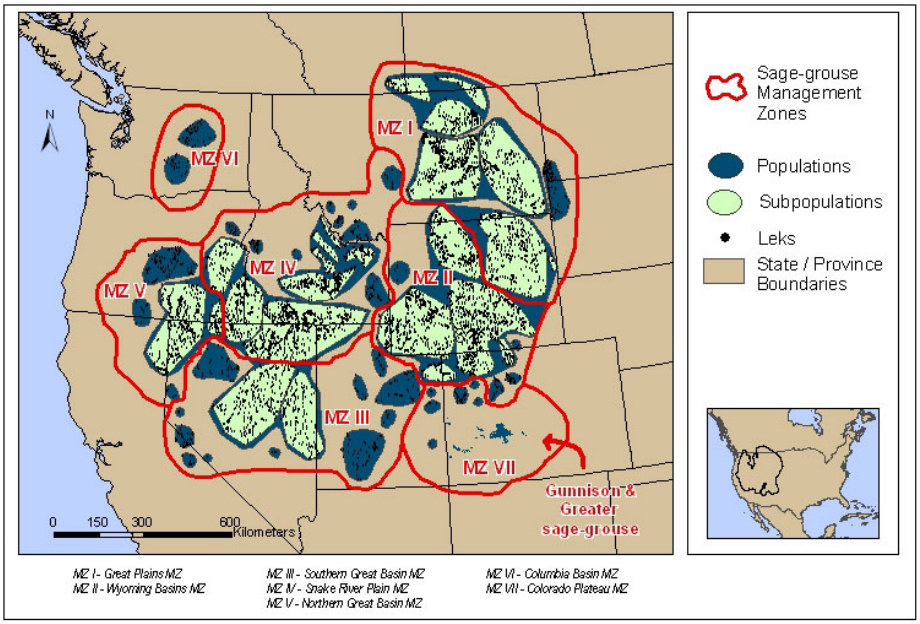
Background Information: GRSG are distributed throughout the western United States (**Figure D-1**, Greater Sage-Grouse Distribution). The portion of the distribution in Montana, Wyoming, North Dakota, South Dakota, Alberta, and Saskatchewan is designated as WAFWA Management Zone I (**Figure D-2**, Greater Sage-Grouse Management Zones (MZ)) (Stiver, et al. 2006). Management zones are delineations of GRSG populations and sub-populations within floristic zones with similar management issues. Within MZ I in Montana, Montana Fish, Wildlife and Parks (MFWP) designated core areas (MFWP 2009) and Wyoming Game and Fish has also designated core areas in Wyoming (Wyoming Game and Fish, 2009). In addition, Montana Audubon has also designated five important bird areas for sage-steppe associated birds, including GRSG, in Montana, most of which are contained within the MFWP core areas. North Dakota has identified PPH.

Figure D-1
Greater Sage-Grouse Distribution

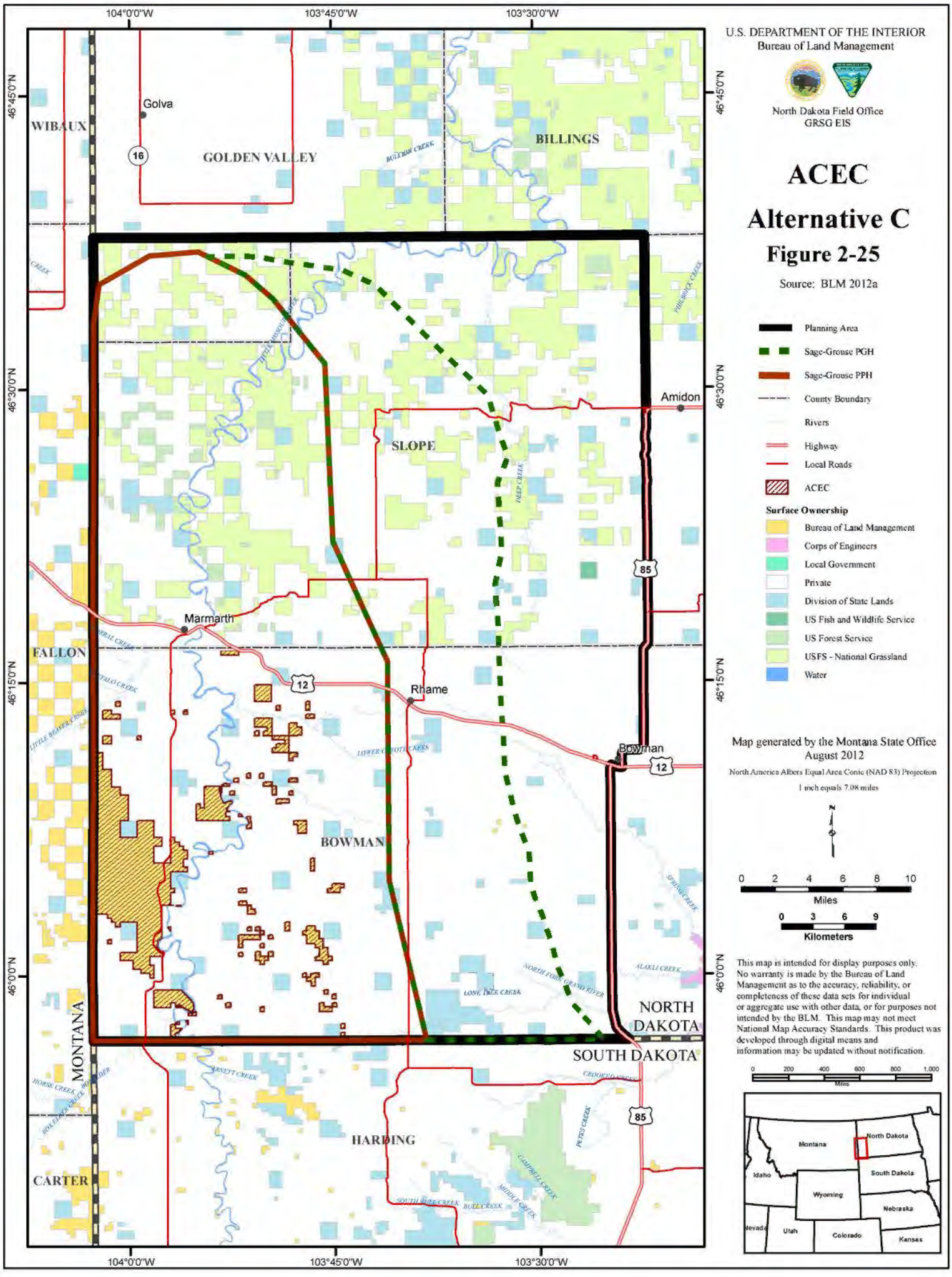


Source: Stiver, et al. 2006

Figure D-2
Greater Sage-Grouse Management Zones (MZ)



Source: Stiver, et al. 2006


104°0'0"W
103°45'0"W
103°30'0"W
46°45'0"N
46°30'0"N
46°15'0"N
46°0'0"N
WIBAUX
Golva
GOLDEN VALLEY
BILLINGS
SLOPE
Amidon
Marmarth
FALLON
Rhame
Bowman
BOWMAN
HARDING
CARTER
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
16
85
12
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
North Dakota Field Office
GRSG EIS
ACEC
Alternative C
Figure 2-25
Source: BLM 2012a
Planning Area
Sage-Grouse PGH
Sage-Grouse PPH
County Boundary
Rivers
Highway
Local Roads
ACEC
Surface Ownership
Bureau of Land Management
Corps of Engineers
Local Government
Private
Division of State Lands
US Fish and Wildlife Service
US Forest Service
USFS - National Grassland
Water
Map generated by the Montana State Office
August 2012
North American Albers Equal Area Conic (NAD 83) Projection
1 inch equals 7.08 miles
N
0 2 4 6 8 10
Miles
0 3 6 9
Kilometers
This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data sets for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.
0 200 400 600 800 1,000
Miles
Montana
North Dakota
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas

Appendix E

Regional Mitigation Strategy

APPENDIX E
REGIONAL MITIGATION STRATEGY

INTRODUCTION

Mitigation strategies, which take into account the mitigation hierarchy (avoid, minimize, restore, offset), are an important tool for ensuring the US Bureau of Land Management (BLM) meet their Greater Sage-Grouse (GRSG) resource objectives while continuing to honor our multiple-use mission. The BLM priority is to mitigate impacts to an acceptable level onsite, to the extent practical, through avoidance (not taking a certain action or parts of an action), minimization (limiting the degree or magnitude of the action and its implementation), rectification (repairing, rehabilitating, or restoring the affected environment), or reduction of impacts over time (preservation and maintenance operations during the life of the action). While mitigating impacts for proposed projects to an acceptable level onsite is typically analyzed and determined through site-specific, implementation-level National Environmental Policy Act (NEPA) documents and their commensurate decision documents, the analysis and mitigation for project level activities would be tiered to the analysis and mitigation proposed throughout each of the action alternatives in this Resource Management Plan (RMP) amendment.

For those impacts that cannot be sufficiently avoided or minimized onsite, the BLM must ensure implementation of effective measures to offset (or compensate for) such impacts and to maintain or improve the viability of GRSG habitat and populations over time, as described in the US Fish and Wildlife Service (USFWS) Conservation Objectives Team Report. Regional mitigation may be a necessary component for many large renewable and nonrenewable energy development projects as well as many smaller projects with cumulative effects on the GRSG and its habitat.

Any regional mitigation strategy for BLM-administered lands would comply with BLM's Regional Mitigation Manual Section (MS) 1794, which provides policies, procedures, and instructions for:

1. Adopting a regional approach to planning and implementing mitigation, including pre identifying potential mitigation sites, projects, and measures; and
2. Identifying the type of mitigation that is needed to compensate for impacts to resources or values caused by a land use authorization.

It is important to note that any mitigation strategy must include the cooperation and coordination of appropriate and pertinent federal, state and local land and resource management agencies across the landscape. The final strategy adopted and implemented within a landscape would be dependent on the unique resources and values of the regional landscape and the mitigation strategies and resources contributed by the regional partners. It is important to acknowledge that the North Dakota Game and Fish Department (NDGFD) working with the BLM as a cooperating agency on this RMP amendment may have already completed, or is currently working on, statewide mitigation strategies. The BLM would continue to work with and support those NDGFD efforts.

The BLM would establish a Mitigation Implementation Team for each of the six Western Association of Fish and Wildlife Agencies (WAFWA) management zones in the West, following the completion of each of the 15 sub-regional EISs that are associated with the National Greater Sage-Grouse Planning Strategy. The planning area presented in this sub-regional EIS lies within WAFWA Management Zone I. The teams are responsible for developing a Mitigation Strategy consistent with BLM MS 1794, as appropriate. The teams would coordinate recommended mitigation strategies between RMP planning areas, WAFWA management zones, and local and state jurisdictions for mitigation consistency, where appropriate.

These implementation teams would be responsible for implementing BLM MS 1794, and making recommendations regarding the following items related to compensatory mitigation:

1. A structure for determining appropriate mitigation, including impact (debit) and benefit (credit) calculation methods, mitigation ratios, mitigation "currency" (i.e., numbers of birds, acres, etc.), location, and performance standards options by considering local and regional, mitigation options;
2. How to resolve mitigation oriented discrepancies that arise within the WAFWA management zone or between zones;
3. The application and the holding and disposition of any mitigation funds;
4. The most appropriate mitigation for impacts from a given land use authorization and type of seasonal habitat impacted;

5. Prioritization of potential mitigation sites, projects, and measures, as guided by conservation strategies (e.g. Priority Areas of Conservation (PACs), priority habitat areas); and
6. Reviewing mitigation monitoring reports and analyzing and reporting on project effectiveness, corrective measures/adaptive management (where required), and cumulative effects of mitigation actions at the PAC and the WAFWA management zone.

These WAFWA management zone Implementation Teams would function as inter-disciplinary teams (IDTs) composed of BLM, US Forest Service, USFWS and state fish and game agencies. The Mitigation Implementation Team would make recommendations to the BLM Authorized Officer. If the recommendations are rejected for any reason, the Mitigation Implementation Team would be re-convened to develop additional recommendations.

This page intentionally left blank.

Appendix F

Greater Sage-Grouse Monitoring Framework

APPENDIX F
GREATER SAGE-GROUSE DRAFT MONITORING FRAMEWORK

INTRODUCTION

The purpose of this Draft US Bureau of Land Management (BLM) Greater Sage-grouse Monitoring Framework (hereafter, draft monitoring framework) is to evaluate the implementation and success of the BLM resource management plans (RMP) in maintaining and restoring habitat conditions necessary to support sustainable greater sage-grouse (hereafter, sage-grouse) populations. Monitoring data will also be used to help inform adaptive management under these plans.

This draft framework outlines the general monitoring approach, consisting of implementation monitoring and effectiveness monitoring. Implementation monitoring will evaluate whether (and to what extent) the RMP decisions to ameliorate threats to sage-grouse have been implemented. Effectiveness monitoring will consist of a multi-scale analysis of our habitat and disturbance monitoring data. Best available population data, provided by the states, will be used to supplement effectiveness analysis.

This draft monitoring framework establishes the use of measurable quantitative indicators for habitat availability and maintenance of habitat types (e.g., priority and general habitats) to ensure BLM's ability to make broad (yet consistent) generalizations about habitat across the range of the species. Monitoring methods and indicators are derived from the best available science. Corporate data-sets will be established or acquired so that data can easily be "rolled up" for reporting monitoring results across the range of sage-grouse, as defined by Schroeder et al. (2004); by populations and subpopulations as defined by Connelly et al. (2004); by RMP area; by the six Western Association of Fish and Wildlife Agencies (WAFWA) Sage-grouse Management Zones (Stiver et al. 2006) covered by the planning efforts; by BLM Priority and General Habitat; and by Priority Areas for Conservation (PACs) as defined in the sage-grouse

Conservation Objectives Team (COT) Report (US Fish and Wildlife Service 2013). Funding support and dedicated personnel for broad and mid-scale monitoring will be renewed annually through the normal budget process.

Sage-grouse are a landscape species, and conservation is a scale-dependent process whereby priority landscapes are identified across the species range and appropriate conservation actions are implemented within seasonal habitats to benefit populations. Following guidelines established by multiple agencies in the Sage-grouse Habitat Assessment Framework (HAF; Stiver et al. 2010), this approach uses the four orders of sage-grouse habitat selection (Johnson 1980): first order (broad scale), second order (mid-scale), third order (fine scale), and fourth order (site scale). Because RMP decisions are made largely at the broad and mid-scale, this draft monitoring framework focuses on these two larger spatial scales. The need for fine and site scale habitat monitoring may vary by area depending on existing conditions, habitat variability, threats, and land health; however indicators at these scales will be consistent with the HAF. Thus, this draft monitoring framework includes methods, data standards, and intervals of monitoring at the broad and mid scales, while outlining indicators to be measured at all scales.

BROAD AND MID SCALES

First order habitat selection at the broad scale describes the selection of physical or geographical range of a species. There is one first order habitat, the range of the species defined by populations of sage-grouse associated with sagebrush landscapes (Schroeder et al. 2004; Connelly et al. 2004). Additionally, there is an intermediate scale between the broad and mid scales that was delineated from floristic provinces within which similar environmental factors influence vegetation communities. This scale was developed by WAFWA and is referred to as the WAFWA Sage-grouse Management Zones.

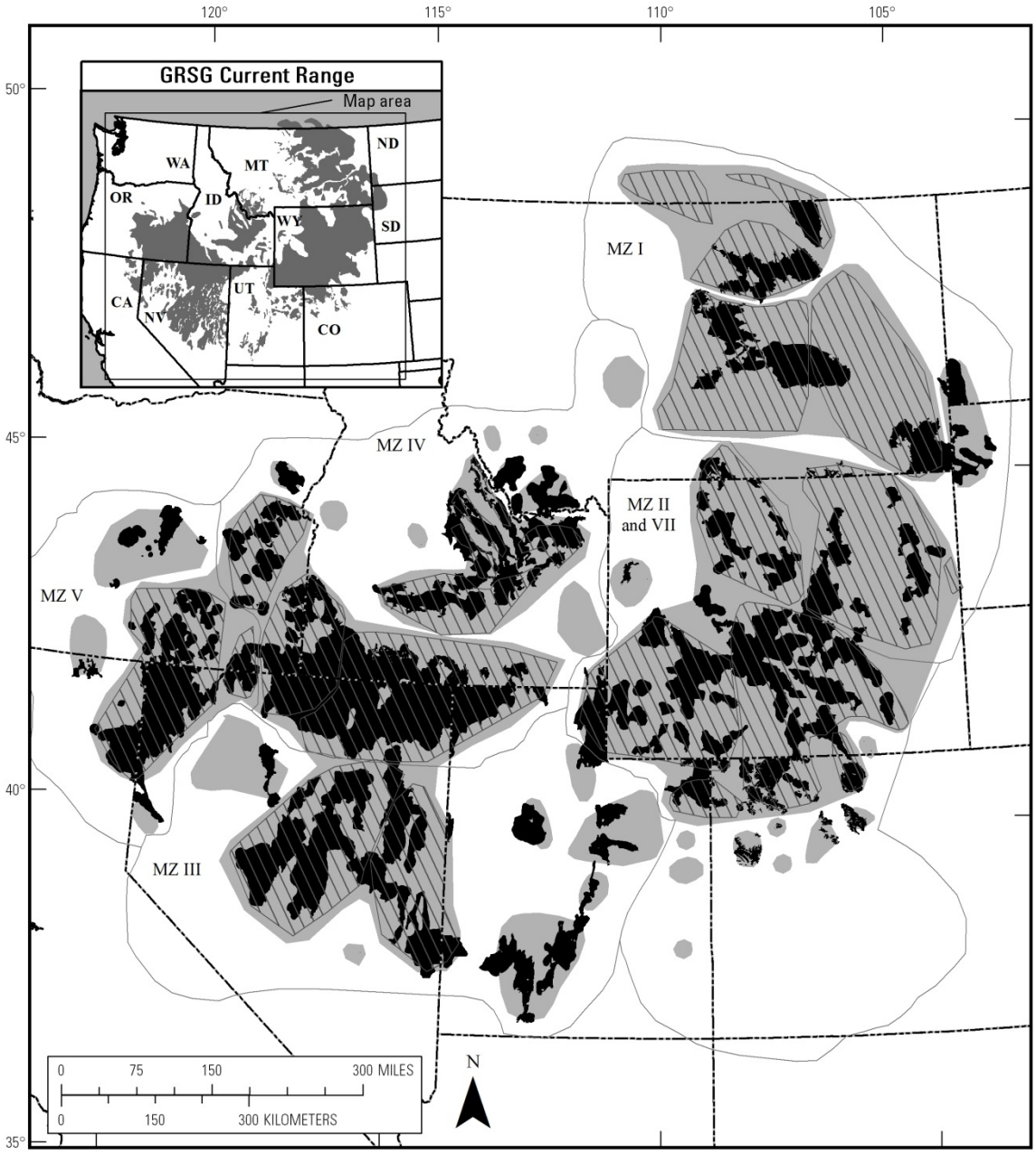
Second order habitat selection at the mid-scale includes sage-grouse populations, subpopulations, and PACs. The second order includes at least 40 discrete populations and subpopulations (Connelly et al. 2004). Subpopulations range in area from 300 to 22,400 square miles, while populations range in area from 150 to 54,600 square miles. PACs range from 20 to 20,400 square miles.

Broad- and mid-scale monitoring results will be reported at the appropriate and applicable geographic scale (**Table F-1**, Indicators for Monitoring Implementation of Decisions, Sage-grouse Habitat, and Sage-grouse Populations at the Broad and Mid Scales, and **Diagram F-1**, GRSG Priority Areas for Conservation, Subpopulations, and Populations).

Table F-1
Indicators for Monitoring Implementation of Decisions, Sage-grouse Habitat, and Sage-grouse Populations at the Broad and Mid Scales

	Implementation	Habitat		Population (States)
Geographic Scales	**Decisions**	**Disturbance**	**Vegetation**	**Demographics**
Broad Scale: From the range of sage-grouse to WAFWA Management Zones	RMP objectives, thresholds, and management actions	Distribution of sagebrush within occupied habitat		WAFWA Management Zone population level and population trends
Mid-Scale: From WAFWA Management Zone scale to subpopulation/ Priority Area for Conservation scale	RMP decisions, vegetation/ mid-scale decisions	Percent of sagebrush per unit area, anthropogenic footprint, density of energy development	Sagebrush patch characteristics, sage-grouse habitat indicators	Subpopulation scale, dispersal, and lek complex trends

Diagram F-1. GRSG Priority Areas for Conservation, Subpopulations, and Populations



GRSG PACs, Subpopulations and Populations

LEGEND

- Subpopulations
- COT PACs
- Populations

Sources:
Current Range: Schroeder et al., 2004
Populations: Connelly et al., 2004
Subpopulations: Connelly et al., 2004
PACs: USFWS COT Report, 2013

Implementation (Decision) Monitoring

The regulations for the BLM (43 CFR 1610.4-9) require that RMPs establish intervals and standards for monitoring and evaluations, based on the sensitivity of the resource decisions involved. Implementation monitoring is the process of tracking and documenting the implementation (or the progress toward implementation) of land use plan decisions. A North Dakota Greater Sage-Grouse Implementation Workbook will be completed within one year of the Record of Decision to track the number and type of applicable implementation actions related to each decision for each resource program, and maintained as actions occur. The BLM will be documenting progress annually toward full implementation of the RMP.

Habitat (Vegetation) Monitoring

The current geographic extent of sagebrush vegetation within the rangewide distribution of sage-grouse populations will be ascertained using the most recent version of the Existing Vegetation Type (EVT) layer in LANDFIRE (2006). LANDFIRE EVT was selected to serve as the base sagebrush layer for five reasons: 1) it is the only nationally consistent vegetation layer that has been updated since 2001; 2) the ecological systems classification includes multiple sagebrush type classes that, when aggregated, provide more accurate (compared to individual classes) and seamless sagebrush base layer across jurisdictional boundaries; 3) LANDFIRE performed a vigorous spatial accuracy assessment from which to derive the rangewide uncertainty of the base map 4) LANDFIRE EVT can be compared against the geographic extent of land that has the capability to support sagebrush vegetation using LANDFIRE Biophysical Setting (BpS) to provide a reference point for understanding how much sagebrush can be supported in a defined geographic area, and 5) LANDFIRE is consistently used in several recent analyses of sagebrush habitats (Knick et al, 2011, Leu and Hanser 2011, and Knick and Hanser 2011). Therefore, BLM has determined that LANDFIRE provides the best available data at broad and mid scales to serve as an initial base layer for monitoring habitat characteristics and by which disturbance changes are measured, incorporated, and reported. Along with the aggregated sagebrush base map, BLM will aggregate the accuracy assessment reports from LANDFIRE to document the cumulative accuracy for our final base map. Looking at the long-term, BLM through its AIM program and specifically the Landscape Monitoring Framework, will provide field data to the LANDFIRE program to support overall accuracy improvements in their products.

Within isolated areas, field office-wide existing vegetation classification mapping and inventories are available that provide a much finer level of data than provided through LANDFIRE. Where available, these products are useful below the mid-scale for establishing baseline conditions for monitoring. The fact that they are not available everywhere however limits their utility for monitoring at the broad and mid-scale where consistency of data products is necessary regardless of land ownership.

The BLM is improving the quality of vegetation map products for broad and mid-scale analyses through the Grass/Shrub mapping effort in partnership with the Multi-Resolution Land Characteristics Consortium (MRLC). The Grass/Shrub mapping effort applies the Homer et al. (2009) methodology to spatially depict fractional percent cover estimates for four components range and west-wide. These four components are the percent cover of sagebrush vegetation, percent bare ground, percent herbaceous vegetation (grass and forbs combined), and percent shrubs. One of the benefits of the design of these fractional cover maps is that they facilitate monitoring "with-in" class variation. This "with-in" class variation can serve as one indicator of sagebrush quality that we cannot derive from vegetation type information from LANDFIRE.

The base sagebrush layer, whether derived from LANDFIRE or Grass/Shrub, will allow for estimation of mid-scale indicators, e.g. patch size and number, patch connectivity, linkage areas, and landscape matrix and edge effects (Stiver et al. 2010). The actual methods used to calculate these metric will be derived from existing literature (Knick et al, 2011, Leu and Hanser 2011, and Knick and Hanser 2011). Disturbance updates, generated annually, will be included into the base layer and the landscape metrics will be recalculated to examine changes in pattern and abundance of sagebrush at the various geographic boundaries. The appropriate geographic boundaries for this base layer include the range, management zone, population, subpopulation, and PAC. Other data sources would need to be used to report landscape metrics any finer than the PAC.

The sagebrush base layer and disturbance data provide the ability to calculate landscape metrics as one element of habitat monitoring at the broad and mid scales. Habitat quality, however, will be monitored using field data collected with a statistically valid sampling design (e.g., Landscape Monitoring Framework, a collaborative effort with NRCS on BLM-administered lands (USDI-BLM 2011); AIM monitoring data (Toevs et al. 2011); and see "II. Fine and Site Scales"). These efforts can quantify indices such as percent annual grasses, species composition, sagebrush height, and bare ground at the PAC scale with known error estimates that are continually reduced as more data are collected. Point data will also be used to enhance the accuracy and precision of the Shrub/Grass mapping product. This product can in turn provide additional information about habitat quality at the mid-scale. Long-term, BLM will be able to provide a suite of monitoring metrics for the PACs and larger scales that will provide a comprehensive view of sagebrush and sage-grouse habitat condition when combined with population data supplied by the states.

Habitat (Disturbance) Monitoring

Most of the decisions in this RMP are in response to "Factor A: The Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range" in the US Fish and Wildlife Service's (USFWS's) 2010 listing decision for sage-grouse (75 FR 13910 2010). The USFWS identified several "threats" affecting Factor A; therefore, the BLM will monitor the relative extent of these threats

on sagebrush, both spatially and temporally, to report on conditions at the appropriate and applicable geographic scales and boundaries.

Disturbance data will include:

1. Agriculture
2. Urbanization
3. Habitat treatments
4. Wildfire
5. Invasive plants
6. Conifer encroachment
7. Energy (oil and gas wells and development facilities)
8. Energy (coal mines)
9. Energy (wind towers)
10. Energy (solar fields)
11. Energy (geothermal)
12. Mining (active developments; locatable, leasable, salable)
13. Infrastructure (roads)
14. Infrastructure (railroads)
15. Infrastructure (power lines)
16. Infrastructure (communication towers)
17. Infrastructure (other vertical structures)
18. Other developed right-of-ways

Cumulative disturbance monitoring will aggregate these 18 threats into the following three general measures (see **Attachment A**, Geospatial data layers used to determine three factors for greater sage-grouse habitat disturbance monitoring at the broad and mid scales):

1. Percent of sagebrush per unit area
2. Percent of non-habitat (human footprint) per unit area
3. Number of energy facilities and mining locations per unit area (density)

To accomplish disturbance monitoring, the BLM will begin with a base layer of sagebrush described previously in Habitat (Vegetation) Monitoring. Restored areas will also be considered when evaluating the percentage of sagebrush on the landscape.

Next, the BLM will use the best available rangewide data (external and/or internal data) to evaluate anthropogenic and natural disturbances (direct physical footprint) of sage-grouse habitat based on threats listed in Factor A. The Sage-Grouse Baseline Environmental Report (BER; Manier et al. 2013) essentially provided a baseline collection of datasets across jurisdictions where available, however for some threats, the data were for federal lands only. Most of the data used in the BER were from external data sources; therefore, the BLM will use the most currently available versions to evaluate changes (additional footprints) from the baseline dataset. A subset of these data (e.g. fire perimeters, mine and energy sites), provided by BLM field and state offices will be updated and reported to agency headquarters annually. The BLM will report the change in footprints for each of the 18 threats as well as cumulatively for the three general measures described previously.

Population (Demographics) Monitoring

State wildlife management agencies are responsible for monitoring sage-grouse populations within their respective states. The BLM has initiated a process to establish that WAFWA will coordinate collection of annual population data by state agencies. To establish certainty that the data will be provided to the BLM, the existing memorandum of understanding signed by WAFWA, the BLM, the Natural Resources Conservation Service, and the USFWS (http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/fish_wildlife_and/sage-grouse.Par.6386.File.dat/MOU%20on%20Greater%20Sage-Grouse.pdf) could be revised to outline collaboration, process, and responsibilities for data analysis and transfer related to management of sage-grouse. These population data will be used for analysis at the applicable scale to supplement habitat effectiveness monitoring of management actions.

Effectiveness Monitoring

The BLM will analyze the monitoring data to characterize the relationship among the disturbance, implementation actions, and habitat condition at the appropriate and applicable geographic scale or boundary to accomplish effectiveness monitoring for the North Dakota Greater Sage-Grouse RMPA. This will involve evaluating the change in habitat conditions from the baseline conditions in relation to the goals and objectives of the plan and other rangewide conservation strategies (US Department of the Interior 2004; Stiver et al. 2006; US Fish and Wildlife Service 2013). When available from WAFWA and/or state wildlife agencies, effectiveness monitoring can be supplemented with population trends (taking into consideration the lag effect response of populations to habitat changes [Garton et al. 2011]). The compilation of broad and mid-scale data (and population trends as available) will be on a five-year reporting schedule or as needed to respond to emerging issues. In addition, effectiveness monitoring will be used to identify emerging issues and research needs and will be consistent with and inform the BLM adaptive management strategy (see **Chapter 2**, **Section 2.5**, Adaptive Management of the North Dakota Greater Sage-Grouse Draft RMP amendment/EIS).

FINE AND SITE SCALES

Third order habitat selection at the fine scale describes the physical and geographic area within home ranges. At this level, maps of seasonal habitats (breeding, summer, and winter) and the connectivity between these seasonal use areas can be examined to determine limiting factors for populations, subpopulations, and PACs.

Fourth order habitat selection at the site scale is based on physical conditions and the geographic area within seasonal ranges to meet life requisite needs (e.g., nesting and brood rearing). Specific habitat measures are used at this scale as microsite conditions within the seasonal range to determine distribution and use. These measures are typically sampled across a defined area to inform third order habitat selection.

Details and application of monitoring at these two scales will be determined during implementation of the North Dakota Greater Sage-Grouse RMPA. The need for fine- and site-scale specific habitat monitoring will vary by area depending on proposed projects, existing conditions, habitat variability, threats, and land health. For example, implementation monitoring will track decisions in priority habitat; habitat vegetation monitoring will be conducted to evaluate projects targeting sage-grouse habitat enhancement and/or restoration; habitat disturbance monitoring will be conducted where mid-scale monitoring indicates the need for fine-scaled anthropogenic disturbance footprints; and population monitoring (in cooperation with state wildlife agencies) will be analyzed below the subpopulation/PAC level where needed for more specific effectiveness monitoring (some RMP objectives, activity plans, development plans, leasing plans, etc.).

Habitat indicator data collected at the fine and site scales will be consistent with the HAF and information provided in the sage-grouse guidelines (Connelly et al. 2000) as well as the core indicators in the assessment, inventory and monitoring (AIM) strategy (Toevs et al. 2011). However the metrics for quantifying the indicators can be adjusted for local conditions. If local adjustments to metrics are made, the adjustments will be appropriate to the floristic province/sage-grouse management zone where the data were collected and reflect local plant productivity and sage-grouse habitat data collected within the area. In short, adjustments will be science-based (i.e., predicated on data collected locally and published in a peer-review outlet) and ecologically defensible (i.e., generally supported by the broad base of knowledge on sagebrush and sage-grouse provided in the peer-review literature). When evaluating the land health habitat standard in designated sage-grouse habitats, the BLM will analyze core indicators and other supplemental site scale sage-grouse habitat indicators (see HAF) as appropriate for the seasonal habitat. The activity level plans will describe a sampling scheme for collecting indicators with a non-biased sampling design for vegetation treatments or management actions implemented at the site scale. In addition, the consistent collection of these data will be used to inform the

classification and interpretation of imagery and habitat quality at the mid-scale as described above.

For examples of current applications of disturbance and reclamation monitoring at the fine scale, see the BLM Wyoming Density and Disturbance Calculation Tool (http://ddct.wygisc.org/) and the BLM White River Data Management System (WRDMS) in development with the USGS.

FINAL MONITORING PLAN

This draft monitoring framework was developed for draft environmental impact statements to describe the proposed monitoring activities for this plan. The BLM will consider public comments and collaborate with other agencies to finalize the North Dakota Greater Sage-Grouse RMPA Sage-grouse Monitoring Plan.

REFERENCES

Connelly, J.W., S.T Knick, M.A. Schroeder, and S.J. Stiver. 2004. Conservation assessment of greater sage-grouse and sagebrush habitats. Western Association of Fish and Wildlife Agencies, unpublished report, Cheyenne, Wyoming, USA. http://sagemap.wr.usgs.gov/docs/Greater_Sage-grouse_Conservation_Assessment_060404.pdf

Endangered and threatened wildlife and plants; 12-month findings for petitions to list the greater sage-grouse (*Centrocercus urophasianus*) as threatened or endangered. Proposed Rule. 75 Fed. Reg. 13910 (March 23, 2010).

Garton, E.O., J.W. Connelly, J.S. Horne, C.A. Hagen, A. Moser, and M. Schroeder. 2011.Greater sage-grouse population dynamics and probability of persistence. Pp. 293 – 382 in S.T. Knick and J.W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian biology (vol. 38). University of California Press, Berkeley, CA.

Homer, C.G., Aldridge, C.L., Meyer, D.K., Coan, M.J., and Bowen, Z.H., 2009, Multiscale sagebrush rangeland habitat modeling in southwest Wyoming: U.S. Geological Survey Open-File Report 2008–1027, 14 p.

Johnson, D. H. 1980. The comparison of usage and availability measurements for evaluating resource preference. Ecology 61:65-71.

Knick, S. T., and J. W. Connelly (editors). 2011. Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology Series (vol. 38), University of California Press, Berkeley, CA.

LANDFIRE. 2006.National existing vegetation type layer. USDI Geological Survey. http://gisdata.usgs.net/website/lanfire/ (21 August 2009).

Manier, D.J., D.J.A Wood, Z.H. Bowen, R.M. Donovan, M.J. Holloran, L.M. Juliusson, K.S. Mayne, S.J. Oyler-McCance, F.R. Quamen, D.J. Saher, and A.J.Titolo 2013. Summary of science, activities, programs, and policies that influence the rangewide conservation of greater sage-grouse (*Centrocercus urophasianus*): US Geological Survey Open–File Report 2013–1098, 170 pp.

Schroeder, M.A., C.L. Aldridge, A.D. Apa, J.R. Bohne, C.E. Braun, S.D. Bunnell, J.W. Connelly, P.A. Deibert, S.C. Gardner, M.A. Hilliard, G.D. Kobriger, S.M. McAdam, C.W. McCarthy, J.J. McCarthy, D.L. Mitchell, E.V. Rickerson, and S.J. Stiver. 2004. Distribution of sage-grouse in North America. Condor 106: 363-376.

Stiver, S.J., A.D. Apa, J.R. Bohne, S.D. Bunnell, P.A. Deibert, S.C. Gardner, M.A. Hilliard, C.W. McCarthy, and M.A. Schroeder. 2006. Greater sage-grouse comprehensive conservation strategy. Western Association of Fish and Wildlife Agencies. Unpublished report. Cheyenne, WY, USA. http://www.wafwa.org/documents/pdf/GreaterSage-grouseConservationStrategy2006.pdf

Stiver, S.J., E.T. Rinkes, and D.E. Naugle. 2010. Sage-grouse habitat assessment framework – a multi-scale habitat assessment tool. Bureau of Land Management Unpublished Report. US Department of the Interior, BLM, Idaho State Office, Boise, ID. http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/SG_HABITATASESSMENT0000669.pdf

Toevs, G.R., J.J. Taylor, C.S. Spurrier, W.C. MacKinnon, and M.R. Bobo. 2011. Assessment, inventory, and monitoring strategy: For integrated renewable resource management. US Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO.

U.S. Department of the Interior. 2004. Bureau of Land Management national sage-grouse habitat conservation strategy. US Department of the Interior, Bureau of Land Management, Washington, DC.

United States Department of the Interior, Bureau of Land Management. 2011. BLM Memorandum of Understanding Washington Office 220-2011-02. BLM Washington Office, Washington D.C.

US Fish and Wildlife Service. 2013. Greater sage-grouse (*Centrocercus urophasianus*) conservation objectives: final report. US Fish and Wildlife Service, Denver, CO.

ATTACHMENT A, GEOSPATIAL DATA LAYERS USED TO DETERMINE THREE FACTORS FOR GRSG HABITAT DISTURBANCE MONITORING AT THE BROAD AND MID SCALES

Geospatial Data Layer	Percent of Sagebrush	Percent of Non-habitat (Human Footprint)	Number of Energy and Mining Facilities
Sagebrush	X		
Areas with biotic potential for sagebrush	X		
Agriculture	X		
Urbanization	X		
Habitat treatments	X		
Wildfire	X		
Invasive plants	X		
Conifer encroachment	X		
Energy (oil and gas wells and development facilities)		X	X
Energy (coal mines)		X	X
Energy (wind towers)		X	X
Energy (solar fields)		X	X
Energy (geothermal)		X	X
Mining (active locatable, leasable, and salable developments)		X	
Infrastructure (roads)		X	
Infrastructure (railroads)		X	
Infrastructure (power lines)		X	
Infrastructure (communication towers)		X	
Infrastructure (other vertical structures)		X	
Other developed rights-of-ways		X	

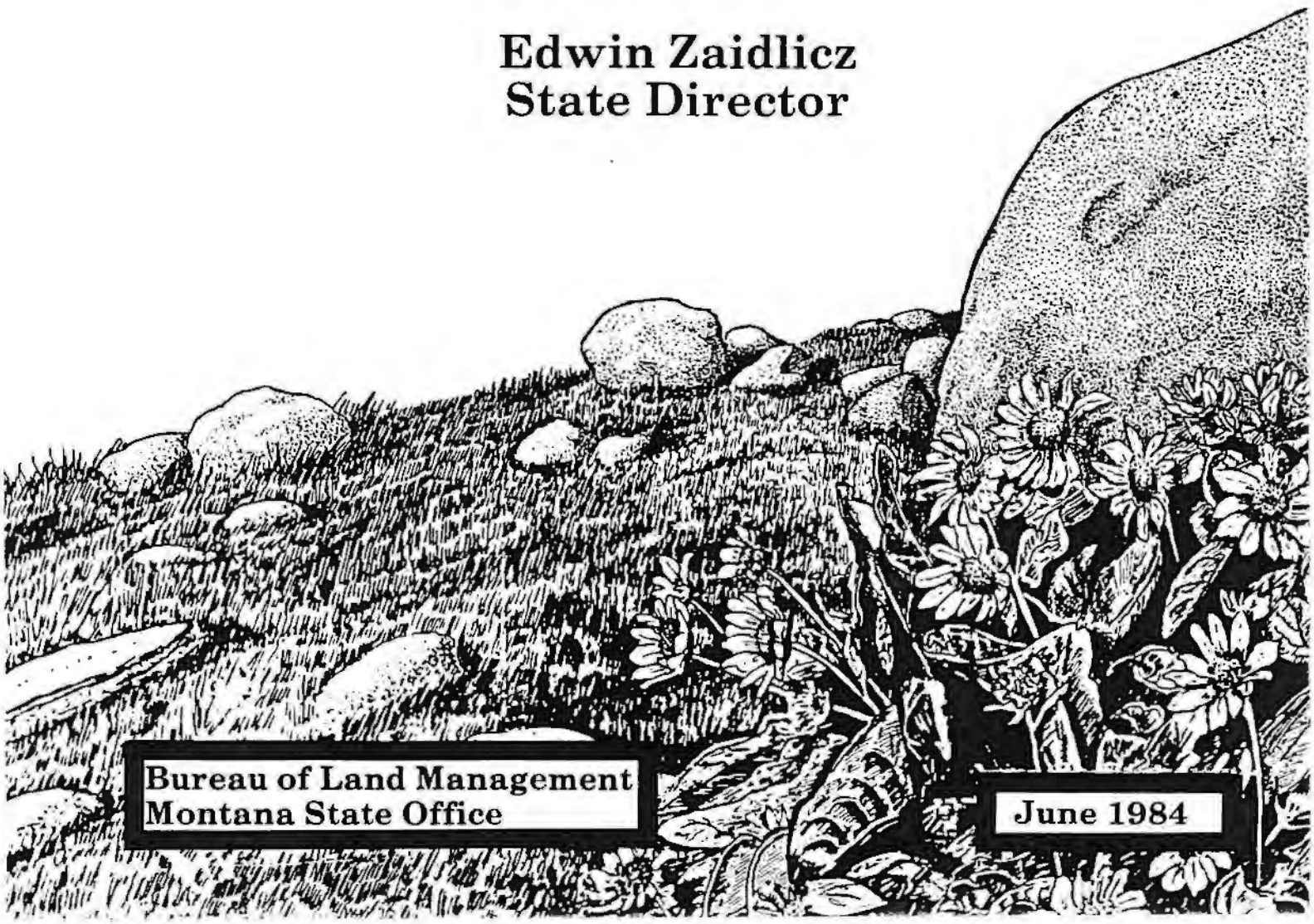
Appendix G

Land Pattern Review and Land Adjustment

LAND PATTERN REVIEW AND LAND ADJUSTMENT

Supplement to State Director Guidance for Resource Management Planning in Montana and the Dakotas

Edwin Zaidlicz
State Director



Bureau of Land Management
Montana State Office

June 1984

BLM-MT-PT-84-015-4111

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
222 North 32nd Street
P.O. Box 30157
Billings, Montana 59107

1601 (930)

June 8, 1984

Dear Reader:

This supplement to the "State Director Guidance for Resource Management Planning in Montana and the Dakotas" encorporates changes and corrections resulting from the public review of the March 1984 draft. The document updates and replaces the Land Adjustment portion of the April 1983 State Director Guidance.

The portions of the 1983 document replaced are as follows: on page B-1 beginning with the "Land Pattern Review and Adjustments" paragraph continuing to "Corridor Planning" on the middle of page B-6. Appendix 1 is deleted because this information has been revised and incorporated into the Supplement. The Recreation Program Guidance (pages H-1 through H-3) is replaced with minor revisions.

I appreciate the effort and concern of all who submitted comments on the draft. All comments were carefully considered and many of the suggestions have been incorporated.

Response to Comments Not Incorporated

Some comments urged greater emphasis on wildlife values in the planning for land adjustment, and to eliminate reference to economics, agricultural and community expansion interests. We believe the criteria as developed provide a balanced treatment of all resources and public interests. This is an objective we strive for as a multiple use agency, within the constraints established by the law and national policy.

Questions were raised regarding definition of several terms such as public interest and public values. These are general terms which we believe should not be rigidly defined in a broad scope guidance document. They take on specific meaning as land adjustments are considered and processed. At each step relevant laws, regulations, national policies and public involvement guide the Bureau in defining what decisions are in the public interest or which may reflect the highest public interest.

In response to a question raised about the program specific acquisition criteria, no priority is implied by the order of their listing.

Concern was expressed over the Bureau's evaluation of the resources involved in exchanges or other land adjustments. The information and

rationale for BLM land adjustments are always open to public scrutiny, and opportunity for formal comment or protest occurs at key points in the process (i.e., during land use planning and when a Notice of Realty Action is issued).

One commentor perceived differences between field offices in making land adjustment decisions. All such variation cannot be eliminated, but it is one of the purposes of this guidance to increase consistency across our three states. It also provides standards against which consistency can be measured.

More exchanges between the BLM and the US Forest Service were urged and we are open to these opportunities. We plan to act on these opportunities within priorities as they are established for the limited resources available for land adjustment.

In a similar vein we were urged to support three-way exchanges involving the state or other Federal agencies. Such actions are within the scope of the guidance as written. However, regardless of the agencies involved BLM will evaluate the lands to be disposed or acquired against the criteria in this document and the overall objective under the Federal Land Policy and Management Act that the bulk of the public lands be retained and managed for multiple use and sustained yield.

Finally, one commentor urged that an Environmental Impact Statement (EIS) be prepared on the Guidance Supplement. An EIS was not prepared for the following reasons: The document is guidance for preparation of land use plans and subsequent program management. A land use plan (Resource Management Plan) includes an EIS and a plan amendment requires an Environmental Assessment (EA) or possibly an EIS. Every specific land adjustment proposal requires its own EA and technical report on the land involved. Environmental impacts will be thoroughly examined, and, most appropriately, at the stages in case processing when the actions are tangible and meaningful analysis can be done.

Map Revisions

We have reprinted the South Dakota map because of several errors. There were minor errors on the Montana map and the North Dakota map which are addressed with the enclosed errata sheet.

Some commentors seemed concerned that the maps present final Bureau decisions. This is not the case; the maps are generalized graphic displays of long term goals and expectations for the Land Adjustment Program. As was explained in the document, exceptions will be made in both retention and non-retention zones as the adjustment process unfolds and more detailed information is acquired on specific land transactions.

It should not be assumed that lands outside a retention zone are automatically intended for disposal. For example, concern was expressed over some small BLM tracts at Big Lake in Yellowstone County. These lands are involved in a cooperative wildlife project and will be retained. The overriding issue is not the zone in which a tract of land is displayed but whether it meets criteria for retention or disposal. The zones provide insight into Bureau emphasis and the most probable type of adjustment action, but are not meant to be tract specific in most cases.

One comment requested widening the retention zone along the Yellowstone River between Glendive and Sidney. We believe that expanding this corridor might raise the issue of conflict with important agricultural development in this area. We intend to retain and acquire lands in this corridor which have wildlife and recreation values but which are not primarily valuable for agricultural use. We do not intend to pursue acquisitions in conflict with productive agriculture.

Finally, two larger retention areas were inadvertently omitted from the Montana map. These involve BLM lands on the upper Stillwater River in Stillwater County and land along the lower Missouri River extending to the North Dakota border. These areas are defined in more detail on the errata sheet and will be added to the map when next revised.

Sincerely yours,

Ed Zaidlicz

Ed Zaidlicz
State Director

2 Enclosures
Encl. 1 - Guidance Supplement
Encl. 2 - South Dakota Map

ERRATA

Land Pattern Adjustment Maps

Montana Map

Roosevelt County — Within T. 27 N., R. 59 E., an area of approximately 2,500 federally-owned acres should be mapped as a retention zone. Other lands north of the Missouri River which possess river access will also be considered for retention. The retention zone south of the Missouri in Richland County should also be extended eastward to the North Dakota state line. This includes the area in Townships 26 N. and 27 N.

Stillwater County — BLM administered land in the upper Stillwater drainage should be mapped as a retention zone. These lands are in Bad Canyon and south of Beehive. In total about 2,500 acres are involved and lie primarily in Township 4 S., R. 16 E.

North Dakota Map

Burleigh—Morton Counties — A zone along the Missouri should be mapped for retention from the upper end of Oahe Reservoir northward approximately six miles.

McKenzie County — The retention zone on the lower Yellowstone is incorrectly placed on the east side of the river. This retention zone should include both sides of the Yellowstone and extended to its confluence with the Missouri.

CONTENTS

STATE DIRECTOR GUIDANCE LAND BASE ADJUSTMENT SUPPLEMENT

RECREATION PROGRAM GUIDANCE REVISIONS

STATE DIRECTOR GUIDANCE
LAND BASE ADJUSTMENT SUPPLEMENT

This supplement replaces the "Land Pattern Review and Land Adjustments" Section of the 1983 State Director Guidance beginning on page B-1 through midpage B-6 and including Appendix 1. In addition, pages H-1 through H-3 of the Recreation Program Guidance are revised and included with the Supplement.

INTRODUCTION

A new era in public land management began with the enactment of the Federal Land Policy and Management Act (FLPMA) in 1976. Prior to FLPMA public land management policy emphasized custodial management pending disposal. FLPMA prescribed retention of the public lands, but also authorizes BLM to enter into land adjustments.

The 8.4 million acre public land pattern in Montana and the Dakotas is characteristically fragmented, and typically consists of lands left over after the most desirable areas were placed in private ownership. Some 2.5 million acres exist in a scattered pattern of relatively small tracts from 40 to 160 acres in size.

Additional large but fragmented areas of split mineral estate occur, particularly in eastern Montana and the Dakotas. Some of these areas are underlain by minable coal deposits and/or have oil and gas development potential. The remaining public lands occur in relatively large tracts but it is usually only coincidental when the BLM lands are in a pattern conducive to ease of management or optimum utilization of the resources.

Major types of land adjustment concerning the BLM in Montana and the Dakotas are:

State Exchange
Regular Private Exchange
Multi-party Exchanges
State Selection
Mineral Exchanges
Acquisition
BLM/Forest Service Jurisdictional Transfers
Withdrawals
Community Expansion
Public Sale

No particular priority is implied by this list other than state land adjustments will take precedence over private proposals.

The State Director Guidance issued in April 1983 included criteria for planning decisions involving exchanges, jurisdictional transfers, or land sales. This supplement integrates existing plans and categorizes lands to provide a framework for future planning. Using this framework and the 1983 State Director Guidance we have completed maps showing areas where public lands will generally be retained. Until such time as land use plans are amended or revised, these maps will serve as a guide for all land adjustments.

The land retention maps are presented as a general policy guide to aid the public and agency personnel in evaluating proposals for land transactions. They should be helpful in distinguishing between proposals worthy of more detailed evaluation and those which are not. These maps and the accompanying analysis provide an indication of the probable long term magnitude of land adjustment in Montana and the Dakotas. This guidance supplement also provides an opportunity to revise and clarify the criteria published in 1983 and for public review and comment on these revisions.

Tract-specific land adjustments must be based upon land use plan decisions followed by more detailed activity planning. Land exchanges will be based upon the voluntary offering by the owners of the land which BLM may acquire, and will involve exchange of appraised value for value. This does not mean that the same kind of values must be exchanged. Relative abundance of the resources involved and their place in agency and public priorities must be considered.

SCOPE OF THE PROGRAM

Of the 8.4 million acres administered by BLM in Montana and the Dakotas, 7.3 million acres (87 percent) are classified within retention zones. Approximately 1.1 million acres (13 percent) lie outside these retention zones, and it is estimated that over the expected life of the program (7 to 10 years) roughly half of this acreage may be involved in some type of land adjustment.

A stable level of land adjustment actions over the life of the program is our objective, however, some year-to-year variation will occur. Long-term accomplishments will depend upon public response in offering suitable lands in exchange for BLM disposal tracts as well as the availability of budgets to carry through the necessary planning and implementation action. Other factors which may limit the level of adjustment actions include the presence of mining claims, sensitive resource values such as archeological sites, unique fish, wildlife and recreational values, and economic limitations on the capacity of some adjacent landowners to participate.

Land adjustment would be predominately through exchanges. A small acreage may be disposed of under the Recreation and Public Purposes Act and some acreage may be involved in boundary adjustments with the U.S. Forest Service. Based on experience to date, sales will be a very minor part of the total land transactions. Although exchange will predominate there could be some reduction in total federal ownership because many transactions will require that the BLM acreage be greater than the acreage acquired to equalize values.

Goals and Objectives

The overall goal of the land adjustment program is a public land pattern which balances multiple resource values while at the same time brings about better manageability. No individual land adjustment will achieve all resource objectives listed in this document, but the cumulative effect of land adjustments should result in improved multiple use management. These adjustments will achieve better overall public usability, greater management efficiency, and optimum accomplishments for all resource interests.

The Bureau's adjustment decisions should be made after thorough analysis and study of land use potential and should achieve the following long term objectives:

1. Retain those public lands having significant public values; acquire (primarily by exchange) other lands which will contribute significantly to accomplishing public land management objectives.
2. Adjust the BLM land pattern to get the highest public value.
3. Land use planning and public review and participation will occur as required by FLPMA, NEPA, and other related legislation.
4. Identify and transfer those public lands which could attain a higher and better use in the private sector or if managed by another public agency.

MAP BASIS AND INTERPRETATION

Public Review

The land retention maps in this supplement were prepared using criteria published in the 1983 State Director Guidance. This guidance, and in particular the land review and adjustment criteria, received extensive inter-governmental and public review. In accordance with the majority of the comments received, the land adjustment program will emphasize exchanges.

Planning

The land review criteria were applied in four recently completed land use plans. These are the Billings and Headwaters Resource Management Plans (RMPs) in Montana and the Southwest and McKenzie-Williams Management Framework Plans (MFPs) in North Dakota. RMPs are in progress in the Powder River, Garnet and South Dakota Resource Areas.

The maps in this supplement incorporate decisions made in the recently completed plans. In areas where plans are under way, the retention zones are preliminary and may be adjusted when the land use plans are completed. In other areas retention zones were developed by District interdisciplinary teams applying the adjustment criteria and using existing planning documents and inventory.

Map Interpretation

As stated earlier, the maps of public land retention zones are presented as a policy guide, not as a rigid prescription. Future land use plans may revise the boundaries currently drawn. Activity plans done on individual tracts may reveal lands within the retention zone appropriate for disposal and many tracts outside the retention zones essential to retain or acquire.

Retention Zones

The retention zones define areas where BLM intends primarily to retain or enhance the existing public land holdings. Public lands in most of these zones amount to sizeable acreages, most are in reasonably consolidated holdings or contain resource values appropriate for public ownership.

Individual tracts in retention zones may be exchanged when significant management efficiency or a greater public values would be acquired. Under some circumstances a tract may be sold to serve an important public purpose. Public land acreage within these zones is not anticipated to decline but may increase because land acquisition in exchanges will be concentrated in these zones.

Other Lands

Public lands in this area are open to consideration on their individual merits for retention, exchange, transfer or sale. In general, the lands are in small tracts, widely scattered and often without legal or physical access. It is in this zone that the majority of disposal tracts will be found. Lands meeting the retention criteria (having significant public values) will be retained or exchanged for land with higher public values.

The preferred action regarding lands which fit the disposal criteria is to exchange them for lands within a retention zone. Recent examples include the acquisition of recreation and wildlife lands on Holter Lake near Helena and Howery Island on the Yellowstone River in exchange for a number of rangeland tracts in eastern Montana. Exchanges may also be considered which will acquire publicly desirable tracts outside the retention zones. A net reduction in BLM administered acreage outside the retention zones is expected.

LAND PATTERN REVIEW AND LAND ADJUSTMENT PROGRAM (EXCHANGES, JURISDICTION TRANSFERS, SALES)

Land Adjustment Program Phases

Phase I—State Director Guidance

Published in 1983 and containing criteria for categorizing public lands, State Director Guidance is revised with this supplement.

Phase II—Land Categorization

Retention areas are delineated through use of existing completed plans, ongoing planning and the State Director Guidance Supplement. The current delineation/categorization effort is summarized in this supplement and may be modified as a result of future land use planning.

Phase III—Land Activity Planning and Realty Implementation

Program priorities are developed followed by implementation which includes site specific land report-environmental analysis, appraisal, decisionmaking and land title processing.

Land Pattern Review and Adjustment Criteria

Three types of criteria are presented (retention, disposal, and acquisition) to provide guidance in categorizing the public lands and in making decisions concerning specific land pattern adjustment actions.

The criteria range from specific to general and give direction for statewide consistency while allowing the manager flexibility in responding to local circumstances.

The criteria will be applied on an interdisciplinary basis. This requires consideration of all resource values, but since all values are not normally represented on every tract of land, trade-offs between resource values will usually be necessary when making decisions on specific land adjustment actions. Such trade-offs will be based on a hierarchy of values defined as follows:

1. Requirements of applicable laws, executive orders and regulations will be followed.
2. Priority will be determined by the area directly impacted and the significance of the resources in descending order of national, regional, statewide, and local. Both economic and non-economic values will be considered in assessing resource significance.
3. A critical level of significance will be assigned to resource values if they are adversely impacted over an area larger than the specific tract being considered for land adjustment action.
4. Public value losses which cannot be mitigated will be assigned a higher level of significance than those which can be mitigated.
5. A higher level of significance will be assigned to public values which are associated with solving chronic management problems which past efforts have failed to resolve and for which no other solutions are evident.

Retention

These are lands which will remain in public ownership and be managed by BLM. BLM is interested in exchanges to improve manageability of areas with important public values. Although the underlying philosophy is long term public ownership, minor adjustments involving sales and exchanges of lands may occur when the public interest is better served.

1. Areas of national environmental significance: These include but are not limited to:
   a. Wilderness, Wilderness Study Areas and Former WSAs being Studied for Protective Management
   b. Wild & Scenic Rivers
   c. National Scenic & Historic Trails and Study Trails
   d. Lands containing nationally significant cultural resource sites nominated to or eligible for the National Register of Historic Places
   e. National Conservation Areas
   f. Wetlands and Riparian Areas under Executive Order 11990
   g. Other Congressionally Designated Areas and Study Areas
   h. Wild Horse Management Areas
   i. Areas of Critical Environmental Concern

2. Areas of national economic significance: these include but are not limted to:
   a. Designated Mineral Resource Areas where disposal of the surface would unnecessarily interfere with the logical development of the mineral estate, e.g., surface minerals, coal, phosphate, known geologic structures, etc.
   b. Public lands containing strategic minerals needed for national defense.
3. Public lands used in support of national defense: these include but are not limited to National Guard maneuver areas.
4. Areas where management is cost-effective or lands containing other important characteristics and public values which can best be managed in public ownership by BLM will be retained. These include but are not limited to:
   a. strategic tracts along rivers, streams, lakes, ponds, springs, and trails
   b. community watersheds and/or flood plains
   c. wildlife priority areas as defined under acquisition criteria for wildlife habitat areas
   d. Important hunting or fishing areas
   e. Recreation sites and areas
   f. Cultural resource sites where the cost of mitigation actions required by disposal would exceed the public benefits of land disposal.
5. Lands with a combination of multiple use values which dictate they should be retained in public ownership and managed by BLM.
6. Areas where future plans will lead to further consolidation and improvement of land patterns and management efficiency.
7. Areas which the general public, state and local government consider suitable for permanent public ownership.
8. Public lands withdrawn by the BLM or another federal agency for which the purpose of the withdrawal remains valid and the resource uses can be managed concurrently by BLM.
9. Public lands that contribute significantly to the stability of the local economy by virture of federal ownership.
10. Public lands which provide public access and contain previously mentioned public values which, when considered together, warrant their retention.

Guidelines for the retention of the mineral estate are fairly well described and are mandated under FLPMA. These require that the mineral estate will be reserved by the U.S. in all land disposals except in some cases where exchanges are involved. In exchanges, the mineral estate may be reserved by both parties presuming no material interference with development of the mineral resource due to disposal of the surface estate. If values are equal, title may pass with the surface estate.

Disposal

These are lands identified for potential removal from BLM administration through exchange, through transfer to federal, state, county or local public entities or through sale. In addition to land internally identified for disposal, BLM will respond to proposals from the public. Disposal decisions will be made in the public interest based upon the following criteria:

1. Lands specifically identified through land use plans for exchange, transfer, Recreation and Public Purposes Act applications or sale.
2. Lands of limited public value.
3. Widely scattered parcels which are difficult for BLM to manage with anything beyond minimal custodial administration and have no significant public values.
4. Lands with high public values proper for management by other federal agencies, or state or local government.
5. Lands which will serve important public objectives (such as community expansion) as provided in FLPMA Sec. 203(a)(3).
6. Lands where disposal would aid in aggregating or repositioning other public lands or public land resource values in retention areas to facilitate national, state and local objectives.

7. Lands acquired for a specific federal purpose which are no longer required for that or any other federal purpose.
8. Lands with long term unauthorized use problems, if the lands are not required for public purposes.
9. Lands in which the highest public value will be attained through long term agricultural, commercial or industrial development.

Acquisition Criteria

These are used to evaluate proposals which would result in the acquisition of lands, easements or minerals by the Bureau of Land Management through exchange or other transactions.

These criteria help to assure that any BLM decision to acquire a tract of land provides significant public benefits. The criteria range from "general" standards to evaluate all proposals, to "specific" guidelines covering the selected or prioritized program areas.

These standards are designed to provide consistent direction, while allowing management flexibility to meet local, state and national needs.

General Criteria for Acquisition (and Retention Decisions)

All proposals will be evaluated to determine if the acquired lands will:

1. Facilitate access to areas retained for long term public use.
2. Enhance Congressionally designated areas, rivers or trails.
3. Be primarily focused in the "retention" areas. Acquisition outside the retention areas will only be considered if the action leads to and/or facilitates long term needs or program objectives.
4. Facilitate national, state and local BLM priorities or mission statement needs.
5. Place emphasis where BLM land use or activity plans are completed. Proposals must facilitate implementation and/or be consistent with these plans.
6. Stabilize or enhance local economies or values.
7. Meet long term public land management goals as opposed to short term.
8. Be of sufficient size to improve use of adjoining public lands or, if isolated, large enough to allow the identified potential public land use.
9. Allow more diverse use, more intensive use, or a change in uses to better fulfill the Bureau's mission.
10. Enhance the opportunity for new or emerging public land uses or values.
11. Contribute to a wide spectrum of uses or large number of public land users.
12. Facilitate management practices, uses, scale of operations or degrees of management intensity that are viable under economic program efficiency standards.
13. Secure for the public significant water related land interests. These interests will include lake shore, river front, stream, pond or spring sites.

Program Specific Acquisition Criteria

Any of these program criteria may provide the rationale for acquiring a particular tract of land in land adjustment transaction; however, priority will be determined on the basis of multiple use analysis. That is, the greater the number of programs and public values served, the higher the priority for acquisition.

Minerals

1. Consolidation of [redacted] mineral estates—from the minerals program viewpoint this is probably the most important reason for acquisition. The primary purpose for consolidation of estates is improvement of potential for development while improving resource management and economic values.

   This concept can be applied to some deposits of coal, phosphate, potash, oil shale and tar sands. It is difficult to envision that this approach would be useful for oil and gas or locatable minerals.

2. Acquisition in response to a federal project need, as in the case of a dam project. Criteria for this type of acquisition would generally include:
   a. Where development of the federal project would preclude the mineral estate owner from exercising development rights; or
   b. Where the exercise of the mineral estate owners right of development would materially interfere with the federal project.
3. Acquisition mandated by law. The best example of this would be where an alluvial valley floor has precluded coal mining, triggering an exchange.

Livestock Management

Acquire non-federal holdings in key allotments which will enhance manageability and investment opportunity in improvement and maintenance category allotments.

Timber Management

Focus acquisition priority on areas:

1. Which exceed 30 cu. ft/acre in growth of commercial timber unless the areas will enhance the harvest of adjacent lands. In this case, the standard may be lowered to 20 cu. ft/acre in annual growth.
2. Contiguous to, or which facilitate access to public forest land.
3. Containing 80 acres or more of commercial timber. If less than 80 acres, the tract(s) must be logical logging unit(s) or facilitate commercial management of adjacent public forest land.
4. Containing enough harvestable volume for a feasible commercial logging unit after physical, biological or other land use constraints are considered.

Recreation

Acquire lands with the following significant public values:

1. National Values
   a. Congressionally designated areas/rivers/trails
   b. Congressionally designated study areas/rivers/trails
2. State Values
   a. Select lands that enhance state recreation trails and waterways (see State Comprehensive Outdoor Recreation Plan; SCORP Vol. 2, 1978, p. 149) or those with interstate, state, and multi-county use significance
   b. Other statewide and multi-county values
3. Local values for extensive use, such as hunting, fishing, ORV and snowmobile use. Higher priority will be given to acquisition of these values where such extensive use will compliment and enhance these uses on public lands.
4. Acquire access through easement to the above significant values as needed to facilitate public use if surface acquisition is undesirable or not possible.

Wilderness

Acquire in-holdings within the boundaries of Congressionally designated wilderness areas under BLM administration. Priorities are:

1. State in-holdings to be acquired through exchange only
2. Private in-holdings to be acquired by mutual agreement involving exchange, purchase, or gift

In the acquisition of access to designated wilderness areas highest priority will be:

1. Where no access exists
2. Where it is needed for proper management as identified in wilderness management plans

Cultural Resources

Any cultural site to be acquired should meet the following evaluation standards of MSO Manual Supplement 8111.24:

1. High Research Value
2. Moderate Scarcity
3. Possess some other unique values such as association with an important historic person or high aesthetic values, or
4. Contribute significantly to interpretive potential of cultural resources already in public owner ship.

Strong consideration should be given to manageability. There are only a limited number of potential uses to which a cultural resource can be put (see IM 78-339). The principal use is probably research. Any site acquired for this purpose should be protectable and accessible. The second most important use may be some form of visitor or recreation use. Acquired sites in this case should be in areas also important to the Recreation Program unless they can stand on their own.

The major deciding factor for site acquisition after applying the basic criteria should be the potential for actively managing the site. Sites should not be acquired on scattered or isolated parcels unless they are of overwhelming cultural importance.

Wildlife Habitat Management

In general, areas with important wildlife habitat which are large enough and suitable for public hunting, fishing and trapping and areas suitable for cooperative management under the Sikes Act.

High priority areas for retention and acquisition will be lands with significant wildlife values as defined below. These areas may be of any size.

1. *Threatened and Endangered Species* (approved recovery plans will also govern actions on these areas)
   a. *Black-footed Ferret.* Occupied habitat or areas identified through planning for future ferret populations.
   b. *Grizzly Bear.* Lands containing grizzly population centers (Management Situation 1 and 2 Lands*).
   c. *Whooping Crane.* Suitable or potential habitat.
   d. *Bald Eagle.* Historical nest sites with remaining potential, present nest sites, or documented roosting or wintering areas.
   e. *Grey Wolf.* Occupied habitat.
   f. *Peregrine Falcon.* Verified nest areas and suitable sites for reestablishment.
2. *Fisheries.*** Access to or larger areas adjacent to Class 1, 2 or 3 streams** and lake and pond fisheries. Stream areas with restoration potential to become Class 1, 2 or 3 streams. Sites to develop additional fisheries especially near population centers. Sites supporting spawning or nursery areas which may be temporal in nature but important to downstream fisheries. Land that would enable us to acquire needed instream flow reservations.
3. *Big Game.* Important habitat areas such as crucial winter and associated spring/fall transition areas, kidding/fawning/calving/lambing areas, crucial wallow complexes, mineral licks, and security areas.
4. *Upland Game Birds, Migratory Birds and Waterfowl.* Crucial breeding, nesting, resting, roosting, feeding and wintering habitat areas or complexes. These will vary in size, for example, a highly productive one acre wetland or 100 acres of nesting cover for pheasants.
5. *Raptors.* Existing and potential nesting areas for sensitive species or significant nesting complexes for nonsensitive species.
6. *Nongame.* Crucial habitat complexes.

*From Guidelines for Management Involving Grizzly Bears in Yellowstone Area, USFS, NPS 1979.

**Class of streams defined by Montana Department of Fish, Wildlife and Parks, 1980. Stream Evaluation Map State of Montana.

MAP ANALYSIS

Table I summarizes the acreage identified for retention by district and by state. Montana districts range from 91 percent retention in Lewistown to 85 percent in Miles City. The state average is 88 percent. Retention percentages in North and South Dakota are 65 and 68 percent respectively, but because of smaller total acreages in those states, the three-state average is 87 percent.

TABLE I
POTENTIAL LAND ADJUSTMENT SUMMARY
BLM ACREAGE (X 1000)

	In Retention Zones	Percent of Total	Other Lands Outside Retention Zone	Percent Total	Total
Montana*	7,122	88%	987	12%	8,109
South Dakota	177	68%	85	32%	262
North Dakota	44	65%	24	35%	68
Three State	7,343	87%	1,096	13%	8,439
*Break-down of Montana by District Office:					
Butte DO	1,259	88%	175	12%	1,434
Lewistown DO	3,119	91%	315	9%	3,434
Miles City DO[1]	2,744	85%	497	15%	3,241
Montana Total	7,122		987		8,109

[1]Miles City DO total does not include South Dakota Resource Area.

Retention Zones

These zones predominantly contain public lands that meet the retention criteria.

All BLM lands in nationally designated areas will be retained: including the Upper Missouri National Wild and Scenic River, all wilderness study areas, Lewis and Clark National Historic Trail, Pryor Mountain Wild Horse Range, Square Butte Outstanding Natural Area and all designated National Register Historical and Cultural Sites.

Other Lands

These lands generally are scattered tracts that are difficult to manage due to their small size, very limited legal access, and distance from the office administering them. In many cases, the resource values of these lands are low.

Although these lands are open to consideration for all types of land adjustment actions, many parcels of land where significant resource values are found will be retained under BLM management. Also, some parcels may be encumbered in a variety of ways that require public retention. Examples are withdrawals, recreation and public purpose leases, or mining claims. The Dillon Resource Area has several strips of land withdrawn for stock driveways that lie in the open zone. Land within a municipal watershed would be retained. Also, tracts would be retained to be consistent with state and local land use plans or other agency's policies. Enhancement of national historic trails such as the Continental Divide Trail may require that isolated tracts be retained.

The Montana Map

The BLM ownership information on this map was taken from a base prepared several years ago and is no longer completely accurate; however, the retention zone boundaries were developed using current larger scale work maps.

In Montana the retention zones encompass large, generally compact areas of public land which provide for the most efficient management and the fewest access problems. Smaller units were delineated where resource values are high. This includes areas along rivers or where the lands reflect public priorities such as wilderness study areas. In eastern Montana some areas of rather limited surface ownership are classified for retention because of a significant Federal mineral estate.

The zones, as delineated, are generally consistent with existing plans and plans in progress. However, in the Dillon Resource Area (southwest Montana) the land use plan completed in 1979 did not identify zones, but instead identified specific tracts for acquisition and disposal. A programmatic environmental assessment was completed for these disposal tracts in October 1983. The adjustment zones as defined in this document are not entirely consistent with the terms of the Dillon MFP, in that considerations of any additional land sale proposals not covered in the programmatic environmental assessment in 1983 would require plan amendments.

A substantial block of BLM-adminstered land in the Big Snowy Mountains adjacent to the Lewis and Clark National Forest is not included in a retention zone. This apparent inconsistency results from a decision in the Billings Resource Management Plan to transfer this land to the U.S. Forest Service at some future date.

South Dakota Map

The South Dakota Resource Area, under the Miles City District, covers the entire state. The lands administered by BLM in South Dakota total approximately 262,000 acres. A single map showing the BLM lands in South Dakota was not available, therefore, the retention zones were delineated from large scale working maps. The BLM ownership within the retention zones was then drafted using current information. BLM ownership outside the retention zone is not shown.

A total of 177,000 acres or 68 percent of the BLM lands in South Dakota are contained in the retention zones. These are in four relatively compact clusters in the northwest quarter of the State. These zones were defined to correspond to the larger concentrations of public lands. A number of the tracts contained in the eastern-most zone along the Oahe Reservoir also reflect high recreation values.

A total of 85,000 acres or 32 percent of the lands administered by BLM in this resource area lie outside the retention zones. These are scattered tracts mostly in the western part of the state and intermingled with state lands, other federal lands and tribal lands.

North Dakota Map

The Dickinson District contains all of the BLM administered lands in North Dakota, a total of approximately 68,000 acres. Most BLM lands are in the western half of the state and there are only two areas of significant concentration. These lie along the Little Missouri River in Dunn County and western Bowman County in the southwest corner of the state. As in South Dakota, a single current map of BLM administration in North Dakota was not available. Retention zones were identified from larger scale maps and within those zones the current land holdings are shown.

The retention zones contain approximately 44,400 acres or 65 percent of the total surface acreage BLM administers in North Dakota. About 40,600 acres of the BLM lands within these zones are in two counties, Dunn and Bowman; and there are minor acreages in Williams, McHenry, Divide, Burleigh and McLean counties, totalling 3,800 acres.

Generally, lands within the retention zone will be retained in federal ownership or exchanged for other lands within these zones. These lands may also serve as core areas for acquiring adjacent lands in exchange for BLM lands categorized for disposal outside the retention zones.

There are many valuable resources on BLM lands in Bowman and Dunn Counties, and a variety of uses occur, including grazing, dispersed recreation, hunting, fishing, and oil and gas development. Lands located within the retention zones in other counties may also contain many resources or may be wetlands or riparian lands with more limited uses, such as providing wildlife habitat, recreation or water storage.

The area outside the retention zones contains approximately 23,600 acres or 35 percent of the BLM surface in North Dakota. Of this, 6,000 acres are located in Bowman County, and the remaining 17,600 are scattered among 31 counties across the State. Generally, the tracts of land within this zone

RECREATION PROGRAM GUIDANCE REVISIONS

are available for disposal, except for wetlands, which have public value for water retention and wildlife habitats. Lands that fall within this area are available for disposal through exchange or transfer to another public agency or through sale. Preference will be given to exchanging lands in this area for lands within the retention zone.

It is also recognized that limited acquisition outside the retention zones may be justified on the basis of one or more of the acquisition criteria listed in this document.

The primary objectives of adjusting BLM land pattern are to: improve management efficiency; make the public lands in North Dakota more accessible and usable by the general public; and, in general, enhance recreation opportunities and natural resource protection in the State.

LAND ADJUSTMENT IMPACTS

About 1.1 million acres of BLM administered land is found outside the designated retention areas. Less than half of this acreage may actually be affected by land adjustments because of a variety of constraints. If a detailed examination of any tract finds values that fulfill the retention criteria it will normally be retained. Opportunities for publicly beneficial exchanges or transfers may not be found for many tracts of otherwise disposable land.

Resource Impacts

Effects on the Bureau's resource programs are expected to be significantly positive. Under terms of the land adjustment criteria the lands important to BLM resource management programs will be retained. Lands of lesser value will generally be exchanged for lands which will make a greater contribution to public resource management objectives.

Some adverse effects may occur to lands which pass out of Bureau control because the Bureau cannot guarantee the future stewardship of the new owner. However, it is BLM policy to avoid disposal actions where the intended future use is harmful to the resource base or to community interests. Generally the lands coming into federal ownership and control will be important for public use.

Management and Access

By consolidating its land holdings the BLM can increase its management efficiency through economics of scale. This could be the result of working with fewer livestock operators, decreased travel costs to manage isolated tracts and decreased paperwork associated with casefiles and other management problems.

Consolidation would facilitate such management projects as land, watershed or vegetative treatments or wildlife habitat programs. Transfers of some public land tracts could make management more efficient and produce more public benefits under management of another agency or organization.

Access to public lands should be enhanced by the BLM acquiring key tracts or easements that would assure the public legal access to blocks of public lands. Improved access will generally increase recreational use in areas where a checkerboard ownership pattern now restricts public use.

Social and Economic Effects

The BLM is required by law to establish through standard appraisal procedure the fair market value of lands to be exchanged or sold.

In some cases a private landowner who adjoins a piece of public land and wishes to add it to his agricultural operation may feel that such a valuation greatly exceeds the return that can reasonably be expected from the agricultural use of the land. This can result because the appraisal considers comparable sales on the open market and the potential highest and best use in economic terms, such as rural subdivision.

Therefore, they fear loss of agricultural use of the public land to individuals who will pay fair market value because they intend to convert the land to another use such as homesites.

Similarly, the holder of a grazing lease on a tract identified by BLM for disposal will be offered the opportunity to acquire it through exchange or purchase. The ability of the lessee to participate can vary widely and there is a potential for adverse impacts to some operations through loss of the leased area or through additional financial burdens resulting from its acquisition.

County governments will experience some effect on Payments in Lieu of Taxes (PILT) and payments from grazing and mineral receipts if public lands in their counties are exchanged for lands in another county. When public lands are transferred to private ownership the tax base in the affected county will thereby be increased and the PILT and other payments decreased.

The net fiscal effects on local governments depend upon the type of land adjustment. They depend upon whether the land adjustments are with private landowners, state governments, local governments or other federal agencies. They would also depend upon whether exchanges are largely within or between counties and how the tax return on lands passing into private ownership compares with the level of PILT payments and grazing and mineral fees returned for these lands. Tax exempt lands acquired from state or local governments through exchanges would be excluded from PILT.

Public attitudes regarding specific land adjustments may also vary widely depending upon the type of land transfer, the reasons for the transfer and individual perceptions of who may gain or lose from the transfer.

RECREATION

The Bureau has demonstrated a limited capability to obtain funds to sustain any kind of consistent recreation development programs.

However, we should take advantage of existing situations and capabilities to provide for future public needs. We are in a better position, in terms of skills and land pattern, than any other Federal agency to acquire recreation opportunities through purchase or exchanges. We have the capability to use the scattered tracts of public land as a trading base to acquire areas or easements for access. This is particularly true in locations where there is no single Federal reserve and where there are limited public use areas, whether State or Federal. Through acquisition the public will be provided use of such areas (described below) or they can be held for future public management options.

The RMP should identify access needs to recreation resources of national or state value. We would then be in a position to acquire such values when opportunities for purchase or exchange present themselves. Parameters of such a program are listed below, but generally, the objective is to provide both legal and physical access to strategic locations. For example, for river floating the strategic location could be—one access point per four hours of float or at highway crossings; for historic battlefields—one prominent viewpoint; or for National trails—one access point per 10-15 miles or at State highway crossing. Location and number of access points will depend on the significance of the value and the anticipated demand. Both of these should be determined through the planning system with public involvement.

New, fully developed destination type areas will not be provided by the Bureau in the tri-state area, unless there is a significant issue identified that suggests Bureau development. Generally, this type of facility will be recognized as being provided by other Federal or the State agencies.

The following are the parameters of the suggested recreation program. These are outside parameters and a general (not absolute) hierarchy from most important to lowest priority.

Opportunities beyond those listed can be identified and discussed in the RMPs, but should be looked on as recreation resources to manage on a custodial basis until some other agency, group or individual can be found to take over management. Such management can be by lease, cooperative agreement, or transfers.

Kinds of Ownership Actions We Will Take

1. Retention of public use areas and access routes (trail or motorized) to public lands involving the opportunities described below.
2. Acquisition of strategically located lands for public use of recreation opportunities described below. These can be through exchange, purchase, contributions or easements.
3. Acquisition of access to opportunities or strategically located lands for public use of recreation opportunities described below.

Generally, we will not assist other Federal agencies in blocking up or eliminating in-holdings for recreation purposes unless public support and interest is generated during the planning effort.

Kinds of Opportunities on Which We Will Concentrate Our Efforts

1. Existing nationally recognized resources (Congressionally designated):
   - A. Upper Missouri Wild and Scenic River
   - B. Lewis and Clark National Historic Trail
     - (1) Upper Missouri Wild and Scenic River segment
     - (2) Yellowstone River segment
     - (3) Upper Missouri River area
     - (4) Lower Missouri River segment
     - (5) Land based trail, Three Forks to Park City
     - (6) Marias River area
     - (7) Blackfoot River
   - C. Continental Divide Natio .. Scenic Trail
   - D. National Wilderness areas under BLM management
   - E. National Conservation, Natural Historic or other special type areas (Pryor Mtn. Wild Horse Range).

2. Potential national values (designated by Congress for study):
   A. Nez Perce Trail
   B. Yellowstone River
   C. North Country Trail
3. Statewide recognized values defined in the Statewide Comprehensive Outdoor Recreation Plan (SCORP) as a Federal role or identified for cooperative management.
   A. Recreation trails, waterways or rivers/streams with free flowing value (see SCORP Vol.2, 1978, p. 149).
   B. Other recognized recreation sites/areas, cultural, natural or scenic values under BLM management: Garnet, Fort Meade, and Square Butte.
4. Local recreation areas (see FLPMA, Sec. 206a) for extensive use such as hunting, fishing, and snowmobile use.

Kinds and Levels of Development We Will Consider

1. Limited development/ uncontrolled use. Development will be limited to identification through signs and maps of public use areas and access routes. Heavy reliance will be put on map handouts.
2. Primitive facilities where use exceeds natural carrying capacity. Development probably limited to parking, privy, and water access ramp on sites 10 acres or less.
3. Access development: Low standard (e.g., foot trails, ORV trails, or primitive roads).
4. Low level development site with camp unit, loop road, privies, water and other support facilities as necessary. Development will not exceed 20 units on sites of 50 acres or less.

Off-Road Vehicle Designations

Formal designations will be made for areas where problems have been identified. Plans are to identify areas in which ORV use is restricted or closed. All other areas will be considered open and receive formal designation only when considered necessary by the District Manager.

Each activity specialist shall have the responsibility for considering ORV designation needs to protect his own particular resource values by using the following minimum set of planning criteria:

1. Damage caused by ORV use to soils, watershed and vegetation shall be minimized.
2. Harassment of wildlife or significant disruption of habitat shall be minimized.
3. Conflicts between ORV use and other existing or proposed uses for the same or neighboring public or private lands shall be minimized; e.g., wilderness.

Appendix H
Drought Policy

APPENDIX H
DROUGHT POLICY

Bureau of Land Management
POLICY FOR ADMINISTERING PUBLIC LAND GRAZING
IN
MONTANA, NORTH AND SOUTH DAKOTA
DURING PERIODS OF DROUGHT

H.1 INTRODUCTION

Livestock grazing is but one of the activities that BLM manages on the public lands. Drought stresses many resources and resource uses including recreation, soils, timber, vegetation, watersheds, and wildlife as well as livestock forage. However, only livestock and human activities can be readily controlled or restricted from access to public lands. The other resources are either immobile or not readily controlled. This policy deals with livestock use and implements provisions of current laws and regulations. Other uses that may require special consideration during severe drought may be addressed in separate policy statements or actions.

Vegetation cover is one part of productive rangelands because it strongly affects soil moisture. When drought reduces the total forage produced and the normal residual vegetation (standing and down plant material) is used by livestock, insects, and other grazing animals, soil moisture and temperature are affected. Soil temperatures are lowered by the residual cover during warm periods and are raised by the residual cover during cold periods. Moisture intake and penetration into soils is keyed to the amount and type of residual cover found on a soil/ecological site. In fact, with little or no residual cover on rangelands, moisture events will likely produce little effective penetration into the soil. Residual cover provides protection for soils, vegetation, wildlife, watersheds, and for the many other resources dependent upon good vegetation and livestock management.

H.2 AUTHORITY

This document implements provisions of:

- Taylor Grazing Act of June 28, 1934, as amended;
- Federal Land Policy and Management Act of 1976, as amended;
- Public Rangelands Improvement Act of 1978;
- Regulations in 43 code of Federal Regulations, Group 4100(43 CFR 4100).

H.3 POLICY

This policy is meant to supplement the national drought policy as set forth by Washington Office Instruction Memorandum 2013-094.

It is the policy and objective of the BLM to: manage the public lands and authorize livestock grazing under the principles of multiple use and sustained yield; provide for the orderly administration of grazing by domestic livestock on the public lands; and provide for productive and healthy soil and vegetation resources as well as other environmental values.

Accomplishment of these objectives becomes more difficult during periods of range depletion caused by drought. Normal grazing schedules and livestock management practices may have to be modified. Additional coordination, consultation, and data exchange between livestock operators and Bureau personnel will be required, over and above the level normally practiced. Appropriate local, state and Federal agencies and the interested public will have to be involved at times and consistently kept informed.

The principal thrust of the policy and procedures in this document, and other regulatory and procedural requirements not repeated here, will be for the livestock operator and BLM to jointly develop strategies for livestock use on public land during and following drought. Strategies selected should be those that best protect rangeland resources while minimizing impacts on the operator to the extent possible. To that end, every degree of flexibility provided by the laws and implementing regulations will be available to authorized officers of the Bureau.

Voluntary adjustments in livestock use of public lands should be sought at the earliest date it becomes apparent that "normal" grazing schedules cannot be followed, or, if followed, would result in long-term resource degradation. The earlier an agreement can be reached or a decision made that "normal" grazing schedules cannot be followed, the more opportunities livestock operators will have to consider alternatives to minimize impacts on his or her operation. Waiting until the last minute before scheduled turnout to make a determination or decision will reduce the options available to both the operator and the Bureau.

An interdisciplinary approach (within the confines of scarce skills availability) to identify natural resources and other applicable public values vulnerable to drought will be used to prioritize allotments for attention. Second, efforts to manage public rangeland under drought conditions will be directed next to allotments with resource concerns—typically "I" category allotments. Specific allotments in the "M" and "C" categories can also be considered high priority when resource values or conditions so require. Regardless of the category assigned to an allotment, operators should be aware of the procedures and flexibilities available for dealing with drought conditions.

BLM fully expects that the vast majority of livestock operators will recognize the need and voluntarily make adjustments in livestock use of public lands the longer a drought persists. These adjustments will be recognized during the application process and grazing bills will be adjusted accordingly. Adjustments in grazing use may include but are not limited to reducing livestock numbers, shortening the season of use, altering pasture move dates, changing pasture rotations, authorizing water hauling (after documenting NEPA compliance), closing allotments to grazing use, or allowing use in vacant allotments.

- Regulatory mechanisms to voluntarily implement grazing use changes include approval of applications for voluntary non-use (43 CFR 4130.2(g)), or approving applications for changes within the terms and conditions of permits and leases (43 CFR 4130.4(b)), or some combination.
- Line officers also have the option to implement needed changes through a formal agreement between the BLM and grazing operator (which is recommended to be implemented by decision) that specifies the drought-related grazing adjustments (43 CFR 4110.3-3(a)), or by temporarily suspending or otherwise modifying use via a decision that may be put into immediate effect, if necessary (43 CFR 4110.3-2(a) and 3-3(b)).[2]
- If using an agreement or decision, indicate within it the intended duration of the drought-related adjustments and include supporting rationale for the indicated timeframe.
- Regulation 43 CFR 4130.6-2 provides the mechanism for the BLM to authorize use in vacant allotments. Do not modify permits and leases (43 CFR 4130.3-3) to make drought responsive short-term grazing use adjustments.

Offices are required to screen any proposed drought mitigation strategies and actions to determine if they trigger the requirement for National Environmental Policy Act (NEPA) compliance documentation and if so, whether existing documentation is adequate or whether additional analysis is needed. Addressing drought management in Resource Management Plans or Allotment Management

Plans, or preparing programmatic drought action plans, provides pro-active opportunities to address potential conditions and contingencies.

In those situations where agreement cannot be reached, authorized officers of the Bureau have the final responsibility and accountability for ensuring that public lands are not permanently damaged by improper use. If issuance of a decision concerning livestock use becomes necessary, the procedure specified in 43 CFR 4160 will be followed. It should be further understood that final decisions can be modified or rescinded, if the conditions that existed when the decision was issued no longer exist. If significant amounts of precipitation occur during the growing season, producing significant changes in the amount of moisture available to plants, this may cause decisions to be reconsidered. The consultation, cooperation, and coordination process will be used to obtain livestock operator and stakeholder involvement in such cases.

H.4 PROCEDURES AND GUIDELINES

The following guidelines and procedures are intended to provide the data, flexibility and direction for public land managers and livestock operators to develop strategies and make decisions during drought conditions. Consultation and coordination with livestock operators and other interested parties will be carried out during all procedural steps.

H.4.1 Winter Assessment (Late-October - February)

Analysis

1. Review the past season's monitoring results. Analyze plant growth, actual use, insect infestation occurrences, utilization, use pattern maps, residual cover, and especially the use of "rest" pastures. Review the past season's land health assessments in areas of concern.
2. Analyze precipitation records and distribution patterns from the National Weather Service, the Montana Drought and Water Information website, the North Dakota Drought website, the South Dakota Drought website, local cooperators, BLM, and other agencies. Tabulate moisture departures from normal levels and timing of precipitation in relation to past years' growing season.
3. Determine whether currently available data is sufficient to inform and support drought responsive actions.
4. In identified priority or "I" allotments where there is concern because there is limited residual cover, effective precipitation well below normal, rest pastures already used, abnormally high utilization or use patterns, etc., field offices may opt to measure soil moisture in representative areas for additional data. Where available, use RAWS/OMNI sites, existing soil moisture stations, NRCS SCAN soil climate monitoring sites, etc. Additional soil moisture samples

are to be taken at the rooting depth of major forage species in representative areas using techniques found in agency manuals/handbooks, the professional literature and extension publications.

Action

1. Where it is apparent resource degradation might occur if drought continues, begin to notify operators through letters and news releases that the coming year's livestock grazing could be affected.
2. Set up range user meetings in affected communities to discuss available information and possible actions to prevent range resource damage.
3. Encourage operators to make needed changes in their grazing schedules, including applying for non-use. If non-use is taken, but activated later should conditions change, BLM will waive the $10 service fee in accordance with 43 CFR 4130.8.3. Authorized officers may issue refund or credit of grazing fees under 43 CFR 4130.8-2(b).
4. Meet with individual operators when available information indicates a particular allotment is affected by severe drought condition. Attempt to reach agreement on alternative grazing strategies if conditions do not change.

H.4.2 Late Winter and Spring Assessment (February - April)

Analysis

1. Review precipitation and soil moisture data for winter and early spring.
2. Review the effects of winter grazing use; snow pack influence for stock water, soil temperatures, etc-
3. Continue soil moisture measurements or monitoring where problems are apparent or in areas of concern. Measurements at rooting depth to measure available water for plants will be especially important during this period.
4. Assess availability of livestock water, in consultation with permittees.
5. Assess the availability of water for wildlife.

Action

1. If drought conditions are continuing, or becoming more severe, follow up winter letters and news releases with updates and attachments to grazing applications. Conduct meetings with Cooperative State Grazing Districts and Resource Advisory

Councils. Meetings are encouraged with other concerned individuals and agencies as a part of the grazing management strategy.

2. Contact remaining operators who have not voluntarily made needed changes. Where you believe you have enough information to indicate an allotment is in severe drought condition, meet with the operator to review and explain the information you have and attempt to reach agreement on a grazing strategy. If an agreement cannot be reached and, especially if the allotment has a relatively early turnout date, issue a proposed decision. The extent of use adjustment contained in this decision (delayed turnout, reduction in numbers or duration, total exclusion, etc.) will depend on your assessment of all the factors involved. These include past grazing use, range condition, residual cover, precipitation, soil moisture and the land use objectives for the allotment.

3. If soil moisture is very dry and tending to blow away (Quick Assessment), or below the average soil moisture between field capacity and wilting point (Volumetric Measurement), delay turnout until key forage plants have grown to the 3-4 leaf stage (approximately one-half their normal height--for most of our native grass species about 6 inches). (Manske 2003, Manske 2011, Fraser 2003))

H.4.3 Continuing Assessment (throughout grazing season)

Analysis

1. Continue to closely monitor precipitation in "I" allotments and areas of concern. Attention is directed to determining effective (soil moisture) growing season precipitation.

2. Closely monitor utilization of key plant species and key areas. Remember to consider management objectives when selecting key species and areas.

3. Continue to monitor soil moisture in "I" allotments and areas of concern.

4. Monitor factors other than livestock grazing, such as insect infestations, congregations of wildlife, availability of livestock water, etc.

5. Monitor forage, habitat and water needs for wildlife. Consult with state wildlife agencies as needed.

Action

1. If soil moisture drops below the average soil moisture between field capacity and wilting point (Volumetric Measurement) and utilization has reached objective levels or a maximum of 30 percent utilization has occurred, livestock are to be removed.

2. If soil moisture remains unacceptable (completely dry and blows away (Quick Assessment)) or below wilting point soil moisture levels (Volumetric Measurement) during most of the spring and early summer with little or no growth in primary forage species for livestock (i.e., range readiness has not been reached), advise affected permittees that fall and winter ranges may not be available for use during the current year. Also advise that production in subsequent years may be affected if plant basal areas and density have been severely reduced.
3. For those permittees in "I", allotments with AMPs having available standing forage in rest pastures or fall or winter use pastures, advise the permittees that livestock must be removed from public lands when consumption of standing forage has reached objective levels or a maximum of 50 percent.
4. Adjust monitoring plans to collect data concerning residual cover, plant death, loss of basal area, density, and yield for analysis and use in later years.
5. Utilize interdisciplinary teams to ensure wildlife forage and water requirements are considered when determining adjustments.

H.4.4 Other Considerations

1. The use of salt, mineral, and certain mineral supplements as necessary to overcome natural shortages of minerals in rangeland forage may be authorized as necessary to provide for proper range management(4130.3-2(c)).
2. Maintenance feeding on public lands is not authorized except under very unusual short-term conditions and by permit only. Maintenance feeding during drought conditions is specifically excluded.
3. Applications for a maintenance feeding permit due to poor forage conditions associated with drought should be denied and livestock removed or not allowed.
4. Review RMP guidance on wildlife habitat objectives.

H.4.5 Definitions

Available water: That portion of water in a soil that plants can extract from the soil—generally measured per unit volume of soil; the amount of water in a soil between field capacity and permanent wilting point.

Basal area (range): The area of ground surface covered by the stem or stems of a range plant, usually measured 1 inch above the soil in contrast to the full spread of the foliage.

Density: (1) The number of individual plants per unit area; (2) Refers to the relative closeness of plants to one another.

Field Capacity: The maximum amount of water held in a soil, measured a few days after it has been thoroughly soaked and allowed to drain freely.

Flexibility: The ability to alter the grazing management plan to meet changing conditions.

Flushing: Feeding female animals a concentrated feed shortly before and during the breeding period for the purpose of stimulating ovulation.

Growing season: In temperate climates, that portion of the year when temperature and moisture are usually most favorable for plant growth.

Key species: (1) Forage species whose use serves as our indicator to the use of associated species; (2) Those species which must, because of their importance, be considered in the management program.

Maintenance feeding: Supplying feed to range animals when available forage is too limited to meet their minimum daily requirement (examples are cubes, pellets, baled or loose hay).

Permanent Wilting Point (PWP): The soil water content at which water is no longer available to plants, causing them to wilt because they cannot extract enough water to meet their requirements.

Phenology: The study of periodic biological phenomenon such as flowering, seeding, etc., especially as related to climate.

Range readiness: The defined stage of plant growth at which grazing may begin under a specific management plan without causing permanent damage to vegetation or soil.

Supplemental feed: A feed which supplements the forage available from the public lands and is provided to improve livestock nutrition and good animal husbandry and rangeland management practices. An example is salt or mineral block. Creep feeders to supplement feed for calves and supplemental feeding to "flush" cattle and sheep for breeding may be authorized on public lands when compatible with the resource management objectives.

H.4.6 Soil Moisture Monitoring Methods Appendix

Quick Assessment

Soil moisture readings taken from 3 rooting depths of key forage species (e.g., 4-6 inches, 10-12 inches, 16 inches up to 3 feet) will indicate whether various key forage species have adequate moisture for growth. Squeeze the soil in your hand. Does it form a ball? If so, you probably have adequate soil moisture for growth. If it doesn't form a ball, but your hand feels cool, you probably have some soil moisture left. If the soil is completely dry and blows away, there is likely not enough moisture to sustain plant growth. (Howery 1999).

% Available water remaining	Coarse (Sand - Loamy Sand)	Light (Sandy Loam)	Medium (Loam, Silt Loam, Silty Clay Loam, Clay Loam, Sandy Clay Loam)	Heavy (Sandy Clay, Silty Clay, Clay)
0 (PWP or drier)	Dry, loose, single grained, flows through fingers	Dry, loose, flows through fingers	Powdery, dry, sometimes slightly crusted but easily breaks down into powdery condition	Hard, baked, cracked, sometimes has loose crumbs on surface
< 50	Still appears to be dry; will not form a ball with pressure	Still appears to be dry; will not form a ball	Somewhat crumbly but will hold together from pressure	Somewhat pliable, will ball under pressure
50-75	Still appears to be dry; will not form a ball with pressure	Tends to ball under pressure but seldom will hold together	Forms a ball, somewhat plastic, will sometimes slick slightly with pressure	Forms a ball, will ribbon out between thumb and forefinger

(Table adapted from Manitoba 2013)

Volumetric Measurement

The soil moisture content may be expressed by weight as the ratio of the mass of water present to the dry weight of the soil sample, or by volume as ratio of volume of water to the total volume of the soil sample. To determine any of these ratios for a particular soil sample, the water mass must be determined by drying the soil to constant weight and measuring the soil sample mass after and before drying. The water mass (or weight) is the difference between the weights of the wet and oven dry samples. The criterion for a dry soil sample is the soil sample that has been dried to constant weight in an oven at temperature between 100 – 110°C (105°C is typical). Normally drying is conducted on samples for at least 24 hours. A precision balance scale is needed (±0.001 g.) Volumetric soil moisture can then be determined.

Gravimetric soil moisture (W%) = $\frac{\text{wt. (wet soil)} - \text{wt. (oven dry soil)}}{\text{wt. (oven dry soil)}} \times 100\%$

Volumetric soil moisture (θ%) = gravimetric soil moisture x bulk density
{Note: Bulk densities for specific soils can be obtained from the Web Soil Survey.}

Soil moisture measurements can then be compared with water content-15 bar and water content 1/3 bar data for a specific soil from the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/). Water content, 15 bar, is the amount of soil water retained at a tension of 15 bars, expressed as a volumetric percentage of the whole soil material. Water retained at 15 bars is significant in the determination of soil water-retention difference, which is used as the initial estimation of available water capacity for some soils. Water retained at 15 bars is an estimation of the wilting point. Water content, one-third bar, is the amount of soil water retained at a tension of 1/3 bar, expressed as a volumetric percentage of the whole soil. Water retained at 1/3 bar is significant in the determination of soil water-retention difference, which is used as the initial estimation of available water capacity for some soils. Water retained at 1/3 bar is the value commonly used to estimate the content of water at field capacity for most soils.

As soil moisture levels approach the wilting point of a soil, the less water available for plants. Plant growth becomes marginal and the plant is stressed. If the plant is further stressed by removal or damage to the top growth, it will begin to lose vigor, roots and thus its ability to grow. It is not unusual to reach this moisture level during late summer in much of Montana, Dakotas, and other semi-arid areas.

Other Soil Moisture Considerations

When monitoring soil moisture the following information should be kept in mind:

1. Soil moisture is measured at the depth of plant roots or to a root limiting layer. It will vary by plant(s) and soil type.
2. Soluble salts, gravel and heavy clay will decrease plant available water capacity.
3. Organic matter, good soil structure will increase plant available water capacity (The capacity increases about 1 percent for each 1 percent of organic matter).
4. Soils with water restricting layers like naturally compact subsoil, shallow bedrock or stratification can increase plant available water capacity of the overlying soil layers.
5. Soils that are deep, medium textured and uniform can have decreased plant available water but allow for deeper rooting.

H.4.7 References

Fraser, D. A. 2003. Using range readiness criteria. Forest Practices Branch, British Columbia Ministry of Forests, Victoria, B.C. Rangeland Health Brochure 5.

Howery, Larry. 1999. Rangeland Management Before, During, and After Drought, AZ1136 University of Arizona Cooperative Extension, 6p. ag.arizona.edu/pubs/natresources/az1136.pdf.

Manitoba Agriculture Food and Rural Initiatives Soil Management Guide, table 3-2, website accessed April 2013, http://www.gov.mb.ca/agriculture/soilwater/soilmgmt/fsm01s03.html

Manske, L.L. 2003. Biologically Effective Management of Grazinglands, NDSU Dickinson Research Extension Center, Rangeland Research Extension Program 4005. 268p.

Manske, L.L. 2011. Biologically Effective Grazing Management Reduces the Detrimental Effects from Drought Conditions on Grasslands--2nd Edition. NDSU Dickinson Research Extension Center. Range Science Report. 7p.

This page intentionally left blank.

Appendix I

GRSG Wildfire and Invasive Species Habitat Assessment

APPENDIX I
GRSG WILDFIRE AND INVASIVE SPECIES HABITAT ASSESSMENT

The following process is a suggestion for a consistent approach in conducting an assessment of the GRSG habitat and wildfire threat at the local planning area level. Variations to this approach may be made based on ID team discussion or unique issues in a given planning area. This example format is intended to portray the degree of specificity required for offices which will complete these assessments. Note that this process has similarities to watershed analysis and ecoregional assessments, and as such these documents may prove useful where they exist.

INTRODUCTION

Greater Sage-Grouse (GRSG) Wildfire and Invasive Species Habitat Assessments (hereafter referred to as "stepdown assessments") are interdisciplinary evaluations of the threats posed by wildfire and invasive species, as well as identification of priority areas/treatment opportunities for fuels management, fire management, and restoration. Priority areas are spatial delineations where treatments, management actions, or other emphasis should be placed due to factors such as habitat quality, threats, or opportunities to protect, enhance, and restore GRSG habitat. The stepdown assessments will serve as a bridge between RMPs and project level planning, and will position planning efforts to conduct project-scale NEPA following RMP Records of Decision.

The stepdown assessment process involves four steps, beginning with characterization of the planning area and concluding with spatial delineation of priority areas. The content and methods used by the Bureau of Land Management (BLM) in these documents should be consistent to ensure that priority areas are defined using similar criteria. These criteria and methods should be narratively described such that the US Fish and Wildlife Service (USFWS) and other audiences can understand the factors considered.

STEP 1: CHARACTERIZATION OF GREATER SAGE-GROUSE HABITAT

The purpose of this step is to broadly establish context of the planning area and sage-grouse habitat.

Location and Spatial Extent

- Describe the location of the planning area, and the relationship of GRSG habitat within the planning area.

Relationship to the Larger Scale Setting

- How does the planning area lie within the larger context of GRSG habitat?

Quantifying Habitat within Planning Area

- Brief description of GRSG habitat described in terms of acreage, habitat classes (e.g., PPH, PGH, and/or PACs)
- Note: A summary map showing the planning area with habitat features is appropriate in Step 1. A tabular summary may also be included.

STEP 2: ISSUES AND KEY MANAGEMENT QUESTIONS

The purpose of this step is to devise management questions related to the issues of fuels management, fire management, and restoration. Note that this step should not answer each management question. Rather, management questions are answered in Step 4 through specific, quantified data.

Overview

- In coordination with state wildlife agencies, the USFWS, and your interdisciplinary team, develop an introductory section here which describes why fire or vegetation conditions pose a threat to GRSG in the local planning area. Describe where fire or vegetation conditions are a significant threat to GRSG habitat, and where fire, fuels, and restoration activities may help enhance habitat. In a brief paragraph or two, summarize the relationships between wildland fire, fuels management and invasives/restoration in the planning area. Examples would include annual grass/wildfire cycle, juniper encroachment into GRSG habitat, recently disturbed areas, etc.

Key Management Questions

Issue #1: Fuels Management

- In narrative format, develop management questions such as:
    1. Based on fire risk to important GRSG habitats, what types of fuels treatments should be implemented that will reduce the risk? Where should fuels treatments be prioritized, and what's the amount of treatment acres/miles needed for long-term enhancement and protection of GRSG habitat?

2. Based on opportunities for fire to improve/restore GRSG habitats, what types of fuels treatments should be implemented that will increase ability to allow fire? Where should fuels treatments be prioritized, and what amount of treatment is needed for long-term enhancement and protection of GRSG habitat?
3. What fuel reduction techniques will be most effective; including, but not limited to grazing, prescribed fire, chemical, biological and mechanical treatments?
4. What are the criteria for defining priority fuels management areas (example would be the intersection of high burn probability, PPH, lek locations, and established GRSG population)?
5. Are there opportunities to utilize a coordinated approach across jurisdictional boundaries?
6. Are there areas where fuel treatments help restore GRSG habitat as well as reduce risk?

Issue #2: Fire Management

- In narrative format, develop management questions such as:

1. Where is the greatest wildfire risk, considering trends in fire occurrence, fuel conditions, and highly valued GRSG habitat?
2. Where will fire suppression resources be most successful to mitigate the risk and protect GRSG Habitats?
3. Where do opportunities exist that could enhance or improve suppression capability in important GRSG habitats?
    a. For example, increased water availability through installation of heli wells or water storage tanks.
    b. Decreased response time through pre-positioned resources or staffing remote stations.
4. Where should wildfire be managed to achieve RMP objectives for improving or restoring GRSG habitat (limiting juniper expansion)?
5. What are the criteria for defining priority fire management areas? An example would be the intersection of PPH, lek locations, and high burn probability.
6. How can fire management be coordinated across jurisdictional boundaries to reduce risk or to improve GRSG habitat?

Issue #3: Restoration

- In narrative format, develop management questions such as:

    1. Are there opportunities for restoration treatments to protect, enhance or maintain GRSG habitat? Assume that funding is not a constraint, and describe which sites are biologically suitable for restoration to GRSG habitat in a reasonable period.
    2. Considering the entire planning area, what are the site conditions, such as dominant vegetation, elevation, or precipitation zones, where restoration efforts have been proven to be most successful in the recent past? An example would be mountain sagebrush sites over 5,000' in elevation, and in a 16" or greater precipitation zone.
    3. What are the criteria for defining priority restoration areas? An example would be recent burns, moderately disturbed sites, or recovering allotment pastures which have not crossed ecological thresholds or become highly degraded. These may or may not be covered by existing ESR plans.
    4. Are there opportunities to utilize a coordinated approach across jurisdictional boundaries?

STEP 3: CURRENT CONDITIONS AND TRENDS

The purpose of this step is to develop information relevant to the issues and key questions identified in Step 2. It provides a snapshot of the present condition, statement of causal factors, and a summary of the trends which are occurring.

Biological Summary of Vegetation, Invasive Species, and Fire Regimes

[In this introductory section, provide a general biological summary of the planning area. Provide a narrative description of ecological trends, including description of plant communities, fire regimes, and other dominant biological factors affecting GRSG habitat.]

- Describe how fire has influenced current vegetation patterns. Are there large areas of even-aged communities, fine-scale mosaics, annual grass monocultures?
- Describe if fire regimes are intact, or if they are altered. If they are altered, describe why. Use fire regime variables such as fire frequency, severity, or size to elucidate your points.
- Describe dominant cover types making up the planning area. These can be broad seral stage groupings, general lifeforms, or more fine-scale information such as plant associations, habitat types, or ecological systems. Note: this information should be available in the RMP.

- What has been the impact of fire exclusion (e.g., increased conifer encroachment, decadent shrub communities, etc)?
- What is the current extent of annual grasses and other invasive species?
- What are the effects of invasive species on land health? On trends in plant succession? On fire regimes?

Fuels Management

- Describe current fuels management practices within the planning area (what are the types of fuels treatments commonly applied to which management issues) ?
- How has past fuels management influenced today's planning area (e.g., creation of mosaics, protecting certain features, increasing invasives, etc)?
- What are causal factors which have created a need for fuels management practices?
- What are the trends in the fuels management program related to budget or capability?

Fire Management

- Describe the current fire suppression workload.
- Describe fire occurrence trends (include discussion of fire size, numbers of starts, ignition locations)
- Describe causal factors influencing suppression effectiveness.
- Describe suppression capabilities. Discuss types and numbers of resources within office, through interagency agreements, and through resource sharing

Restoration

- Describe invasive species which are present in the planning area
- Describe landscape conditions which may be suitable for restoration within the planning area, and the results of recent restoration efforts in the planning area
- Describe invasive species occurrence
- Describe causal factors influencing restoration needs.

Methodology

- What are the analysis methods to be utilized and analysis assumptions?

Use of best available Science

- Describe data sets used, such as the FSIM layer, local data, etc. [Many data sets being used in RMPs will also be applicable to stepdown assessments].
- What are the elements of science used?

STEP 4: IDENTIFICATION OF TREATMENT OPPORTUNITIES, PRIORITY AREAS, AND ACTIONS

The purpose of this step is to utilize the information from steps 2 and 3 in order to quantify the overall need for treatment or other actions. Specifically, this step should spatially identify and quantify priority areas, using the criteria established in Step 2. Next, this step should identify treatment opportunities which fall within priority areas. Furthermore, treatments should be prioritized and an implementation schedule developed, reflecting the reality that not every acre in need of treatment can receive action within the planning horizon.

Fuels Management

- Spatially delineate priority areas for fuels management, based upon criteria established in Step 2. Fuels priority areas should be delineated by type, such as:
  - Linear fuel break along roads
  - Other linear fuel breaks to create anchor points
  - Prescribed burning
  - Mechanical (e.g., conifer removal)
  - Other mechanical, biological, or chemical treatment
- Quantify the number of acres of needed fuels treatments.
- If they exist, spatially delineate areas where fuel treatments would increase the ability to use fire to improve/enhance GRSG habitat?
  - Include tables, maps or appropriate info.
- Identify coordination needed between renewable resource, fire management, and fuels management staff to facilitate planning and implementation of fuels treatments.
- Quantify a projected level of treatment within fuels management priority areas.
- Identify treatments to be planned within fuels management priority areas.
- Include a priority or implementation schedule for proposed treatments.

Fire Management

- Spatially delineate priority areas for fire suppression, based upon criteria established in Step 2. Priority areas for fire management should be delineated by type, such as:
  - Initial attack priority areas;
  - Resource pre-positioning and movement priority areas;
  - Remote station staffing priority areas, if appropriate
  - Include tables, maps or other supporting information
- Quantify the number of acres of GRSG habitats for aggressive initial attack that were identified at highest risk from losing key habitat components.
- Quantify the number and type of suppression resources that will be staged or otherwise pre-positioned, as well as the associated conditions, in order to enhance initial attack capabilities.
- Spatially delineate areas where opportunities exist to enhance or improve suppression capability.
  - Include tables, maps or other supporting information.
- Spatially delineate areas where wildfire can be managed to achieve RMP objectives.
  - Include tables, maps or appropriate info.
- Quantify the number of acres within fire management priority areas
- Include a priority or implementation schedule for fire suppression proposed actions.

Restoration

- Spatially delineate priority areas for restoration, using criteria established in Step 2. Priority areas for restoration should be delineated by type, such as:
  - Seeding priority areas (aerial, drill, broadcast, or other);
  - Invasive species priority areas (herbicide, mechanical, biological, combination);
  - Priority areas requiring combinations of treatments (e.g., herbicide followed by seeding).
  - Include tables, maps or appropriate info.
- Identify locations where post-fire restoration treatments should be focused.
  - Include tables, maps or appropriate info.
- Spatially identify invasive species occurrence

- Identify coordination needed between renewable resource, fire management, and fuels management staff to facilitate planning and implementation of restoration treatments.
- Quantify the projected level of treatment within restoration priority areas.
- Identify treatments to be planned within restoration priority areas.
- Include a priority or implementation schedule for proposed restoration treatments.

Annual Treatment Needs

1. Based on the information above and within the planning area, what are the annual needs based on the key questions and summary statements?

Annual Treatment Abilities

1. Putting GRSG habitat protection and enhancement into perspective with other high valued resources and important land management goals, how does the annual need relate to capabilities?
2. What are the realistic annual expectations in fire management, fuels management, and restoration for the next 5 years?