U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

July 2024

North Dakota Proposed Resource Management Plan and Final Environmental Impact Statement

***Volume 1** (Chapters 1-4, References, Glossary, Index)*

Prepared by:

US Department of the Interior
Bureau of Land Management

Cover Photo: the Lost Bridge area in Dunn County, North Dakota
(photo credit: Mitch Iverson)

Dear Reader:

Enclosed is the North Dakota Field Office Proposed Resource Management Plan (RMP) and Final Environmental Impact Statement (FEIS). The Bureau of Land Management (BLM) prepared this document in consultation with cooperating agencies and in accordance with the National Environmental Policy Act of 1969, as amended; the Federal Land Policy and Management Act of 1976, as amended; implementing regulations; the BLM's Land Use Planning Handbook (H-1601-1); and other applicable law and policy. The Proposed RMP provides a framework for the future management direction and appropriate use of the planning area.

The planning area includes the entire state of North Dakota, regardless of jurisdiction. The BLM will only make management decisions on the portions of the planning area that fall under BLM's jurisdiction. These include lands the BLM administers as well as the federal mineral estate where BLM has authority to make decisions. The decision area includes 58,500 acres of BLM-administered surface lands. The subsurface federal mineral estate in North Dakota includes over 4 million acres of coal, 489,300 acres of fluid minerals, and 362,600 acres of other minerals. When approved, this RMP will replace the 1988 North Dakota RMP, as amended.

The Proposed RMP/FEIS is a reasonable combination of objectives and actions from the alternatives analyzed in the Draft RMP/EIS, released on January 20, 2023. The Proposed RMP/FEIS contains the Agency Proposed Alternative, impacts of the Agency Proposed Alternative, a summary of comments received during the public review period for the Draft RMP/EIS, and BLM's responses to the comments.

Pursuant to the BLM's planning regulations at 43 CFR 1610.5-2, any person who participated in the planning process for the Proposed RMP/FEIS and has an interest that is or may be adversely affected by the planning decisions, may protest approval of the planning decisions within 30 days from the date the Environmental Protection Agency publishes the Notice of Availability in the *Federal Register*.

The regulations specify the required elements of your protest. Take care to document all relevant facts. As much as possible, reference or cite the planning documents or available planning records (e.g. meeting minutes or summaries, correspondence, etc.).

Instructions for filing a protest with the Director of the BLM regarding the Proposed RMP and Final EIS may be found online at https://www.blm.gov/programs/planning-and-nepa/public-participation/filing-a-plan-protest and at 43 CFR 1610.5-2. All protests must be in writing and mailed to the appropriate address, as set forth below, or submitted electronically through the BLM e-Planning project website at: https://eplanning.blm.gov/eplanning-ui/project/1505069/570. Protests submitted electronically by any means other than the ePlanning project website protest section will be invalid unless a protest is also submitted in hard copy. Protests submitted by fax will also be invalid unless also submitted either through the e-Planning project website protest section or in hard copy. All protests submitted in writing must be mailed to the following address:

BLM Director
Attention: Protest Coordinator (HQ210)
Denver Federal Center, Building 40 (Door W-4)
Lakewood, CO 80215

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

The BLM Director will make every attempt to promptly render a decision on each protest. The decision will be in writing and will be sent to the protesting party by certified mail, with return receipt requested. The BLM Director's decision shall be the Department of the Interior's final decision on each protest. Responses to protest issues will be compiled and formalized in a Director's Protest Resolution Report made available following issuance of the decisions.

Upon resolution of all land-use plan protests, the BLM will issue an Approved RMP and Record of Decision (ROD). The Approved RMP and ROD will be mailed or made available electronically to all who participated in the planning process and will be available on the BLM e-Planning project website at: https://eplanning.blm.gov/eplanning-ui/project/1505069/570.

Thank you for your continued interest in the North Dakota RMP/EIS.

Sincerely,

Wendy Warren
Eastern Montana/Dakotas District Manager
Bureau of Land Management

North Dakota Proposed Resource Management Plan and Final Environmental Impact Statement

1. Responsible Agency: United States Department of the Interior
   Bureau of Land Management
2. Type of Action: Administrative (X) Legislative ( )
3. Document Status: Draft ( ) Final (X)
4. Abstract: This Proposed Resource Management Plan (RMP) and associated Final Environmental Impact Statement (FEIS) for the North Dakota planning area has been prepared by the United States Department of the Interior, Bureau of Land Management (BLM) North Dakota Field Office. The decision area includes 58,500 acres of BLM-administered surface lands. The subsurface federal mineral estate in North Dakota includes over 4 million acres of coal, 489,300 acres of fluid minerals, and 362,600 acres of other minerals. When approved, this RMP will replace the 1988 North Dakota RMP, as amended.

   The need for the North Dakota RMP is to address changes in resource conditions, shifting demands for resource uses, new technologies, new program and resource guidance and policies, and new scientific information since the development of the 1988 RMP. The purpose of this RMP is to develop management direction to guide future land management in the decision area. These decisions establish goals and objectives for day-to-day and long-term resource management. To achieve these goals and objectives, the RMP identifies uses (allocations) that are allowed, restricted, or prohibited. BLM has identified four specific purposes that describe BLM's distinctive role in the North Dakota landscape: providing opportunities for mineral and energy development on BLM-administered lands, managing for the conservation and recovery of threatened, endangered, and special status species, providing for recreation opportunities, and managing for multiple other social and scientific values.

   In this Proposed RMP/FEIS, the BLM evaluated five alternatives for managing the planning area. Alternative A, the No Action Alternative, represents existing management described by current land use plans and provides the benchmark against which to compare the other alternatives. Alternative B emphasizes sustaining the ecological integrity of habitats for all priority plant, wildlife, and fish species, while allowing appropriate development scenarios for allowable uses (such as mineral leasing, recreation, rights-of-way, and livestock grazing). Alternative B.1 is a sub-alternative to Alternative B that provides the same management opportunities and protections as found under Alternative B for all resources except coal. Alternative C is similar to Alternative B but provides for more flexibility in management of natural and cultural resources with resource uses, such as mineral development, recreation, and rights-of-way; Alternative D combines management actions chosen from Alternatives A, B, and C, and represents the Proposed RMP.

   Alternatives B, B.1, C, and D were developed using input from the public, stakeholders, and cooperating agencies. Planning issues address leasable minerals, locatable minerals, mineral materials, air quality, climate change, greenhouse gases, socioeconomics, environmental justice, water resources, cultural resources, special status species, wildlife, recreation, and special designations. The alternatives also address designation of Areas of Critical Environmental Concern and Wild and Scenic River suitability findings.

5. Protest period: Protest on the North Dakota Proposed RMP/FEIS must be postmarked or received 30 days from the date the Environmental Protection Agency publishes a Notice of Availability in the *Federal Register*.

6. For further information, contact the following:

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Executive Summary

ES.1 INTRODUCTION

The United States Department of the Interior, Bureau of Land Management (BLM) North Dakota Field Office is revising the resource management plan (RMP) for the North Dakota planning area. Currently, the North Dakota Field Office is operating under the North Dakota RMP approved in 1988, as amended. The RMP revision will be supported by a National Environmental Policy Act of 1969 analysis in an environmental impact statement (EIS), hereinafter referred to as the North Dakota RMP/EIS. This RMP/EIS includes an analysis of all proposed management direction and alternatives within the plan. Management issues and concerns in the planning area encompass nearly all resource programs and aspects of public land management.

The planning area encompasses the entire state of North Dakota, regardless of jurisdiction (**Map 1-1** in **Appendix A**). The BLM will only make management decision on the portions of the planning area that fall under BLM's jurisdiction. These include lands the BLM administers as well as the federal mineral estate where BLM has authority to make decisions. The decision area includes 58,500 acres of BLM-administered surface lands (**Map 1-2** in **Appendix A**). The subsurface federal mineral estate in North Dakota includes over 4 million acres of coal, 489,300 acres of fluid minerals, and 362,600 acres of other minerals (**Map 1-3**, **Map 1-4**, and **Map 1-5** in **Appendix A**).

ES.2 PURPOSE OF AND NEED FOR THE PLAN

The need for the North Dakota RMP is to address changes in resource conditions, shifting demands for resource uses, new technologies, new program and resource guidance and policies, and new scientific information since the development of the 1988 RMP. The changes that have taken place in the planning area over the past 30 years have resulted in different users and uses of public lands. For example, in the past decade, the Bakken oil boom has dramatically changed the landscape in North Dakota, especially in the western part of the state. Many of the land use planning decisions required by specific program and resource guidance are not adequately addressed in the current RMP, and the existing analysis needs to be updated.

The purpose of the North Dakota RMP is to ensure that BLM-administered lands and minerals in the planning area are managed in accordance with the multiple-use and sustained yield principles stated in the Federal Lands Management and Policy Act of 1976 (43 United States Code 1701 et seq.). Therefore, this RMP provides planning-level management strategies that are expressed in the form of goals, objectives, allocations, and management direction for resources and resource uses. BLM has identified four specific purposes that describe BLM's distinctive role in the North Dakota landscape: provide opportunities for responsible mineral and energy development on BLM-administered lands, contribute to the conservation and recovery of threatened, endangered, and special status species, provide for recreation opportunities, and manage for multiple other social and scientific values.

This RMP/EIS includes an analysis of all proposed management direction and alternatives within the plan. Management issues and concerns in the planning area encompass nearly all resource programs and aspects of public land management. The RMP incorporates management decisions from the existing RMP and

amendments for those decisions that remain appropriate and provides updated decisions for the balance of the identified issues.

ES.3 Public Outreach, Consultation, and Coordination

The BLM initiated formal public scoping for the North Dakota RMP/EIS with the publication of a Notice of Intent on July 28, 2020 (85 *Federal Register* 45438). The BLM hosted two virtual public scoping meetings on August 18 and August 20, 2020. The meetings were intended to provide the public with an opportunity to participate in the scoping process and provide input through a web-based portal where viewers were able to view information about the planning process, pose questions, view answers, and submit comments to the BLM. The comment period ended on August 28, 2020. The BLM received 14 unique submissions that contained 85 separate substantive comments. The planning issues identified are presented in the North Dakota RMP/EIS Scoping Report, available at: https://eplanning.blm.gov/eplanning-ui/project/1505069/510. Public review of the Draft RMP/EIS was extended from 90 days to 120 days following its publication. During the public comment period, BLM received a total of 27 comment letter submissions that resulted in 535 unique substantive comments.

Throughout the planning process, the BLM actively engaged the public and its cooperating agencies, as well as consulted with the North Dakota State Historic Preservation Office and US Fish and Wildlife Service. The BLM also engaged in government-to-government consultation with Native American tribes. Information about the RMP/EIS process can be obtained by the public at any time by visiting the North Dakota RMP/EIS project website at the link above.

ES.4 Alternatives

The BLM identified four action alternatives in addition to the No Action Alternative (Alternative A) for consideration in the North Dakota Proposed RMP/Final EIS in response to the issues and management concerns raised above. All of the alternatives share common goals and objectives; however, they address these goals and objectives to varying degrees, with the potential for different long-range outcomes and conditions. The alternative themes or strategies are discussed below.

Alternative A (No Action Alternative) – This alternative continues current management direction and prevailing conditions derived from existing planning decisions. Goals and objectives for resources and resource uses are based on the applicable portions of the 1988 North Dakota RMP, along with associated amendments. Laws, regulations, and BLM policies that supersede RMP decisions would apply. Goals and objectives for BLM-administered lands and mineral estate would not change. Appropriate allocations and restrictions pertaining to activities such as mineral leasing and development, recreation, ROWs, and livestock grazing would also remain the same. Three river segments would be managed as eligible for inclusion in the National Wild and Scenic Rivers System. Under this alternative, the BLM would not modify existing criteria or establish additional criteria to guide the identification of site-specific use levels for implementation activities.

Alternative B (Preferred Alternative from Draft RMP/EIS) – Alternative B emphasizes sustaining the ecological integrity of habitats for all priority plant, wildlife, and fish species, while allowing appropriate development scenarios for resource uses (mineral and energy development, recreation, right-of-ways, and livestock grazing). Under Alternative B, the BLM would close low oil and gas development potential areas and state designated drinking water source protection areas to future federal oil and gas leasing and would make federal coal minerals outside a 4-mile development area unavailable for future consideration for

leasing. Where oil and gas is available for leasing, major or moderate stipulations would apply to most areas. Alternative B is proactive in promoting conservation and recovery of threatened and endangered and other special status species, as well as protecting other social and scientific values. Alternative B provides opportunities for recreation and improved access by designating one special recreation management area and two backcountry conservation areas. Alternative B would also manage for other social and scientific values by designating one Area of Critical Environmental Concern. Alternative B would also find segments of three eligible rivers suitable for Wild and Scenic River designation.

Alternative B.1 is a sub-alternative to Alternative B that provides the same management opportunities and protections as found under Alternative B for all resources except coal. Under this alternative, future leasing of federal coal would be further restricted by designating the area outside of the approved permit boundary at each mine (as of September 9, 2022) as unavailable for coal leasing. Alternative B.1 would reduce the potential for future expansion of federal coal mining at all active North Dakota mines: BNI Center, Coyote Creek, Falkirk, and Freedom mines. It would also reduce the proposed expansions of federal coal mining at the Falkirk and Freedom mines.

Alternative C – Alternative C is similar to Alternative B but provides for more flexibility in management of natural and cultural resources and resource uses. Under Alternative C, the BLM would provide opportunities for mineral and energy development with fewer restrictions than Alternative B, but more than Alternative A. Under Alternative C no areas would be closed to future federal oil and gas leasing, however more acres would be subject to major (NSO) lease stipulations than Alternative A. Under Alternative C fewer acres would be made unavailable under Coal Screen 3 (multiple-use tradeoffs) than Alternative B, but more than Alternative A. Alternative C provides opportunities for recreation and improved access by bringing the similar special designations forward from Alternative B, however under Alternative C the special recreation management area and two backcountry conservation areas would be reduced in size, and the eligible river segments would be determined not suitable for inclusion in the National Wild and Scenic River System due to segments being small, fragmented, and impractical to manage. Allocations and restrictions would be implemented to minimize impacts on natural and cultural resources throughout North Dakota.

Alternative D (Proposed RMP) – Alternative D carries forward many of the same management directions and allocations as Alternative B. Just like Alternative B, Alternative D would close low oil and gas development potential areas and state designated drinking water source protection areas to future federal oil and gas leasing and would make federal coal minerals outside a 4-mile development area unavailable for future consideration for leasing. Alternative D, however, would adjust fluid mineral lease stipulations for some wildlife species/habitat and would change some right-of-way exclusion areas to avoidance areas where the functionality of the habitat can be maintained with the inclusion of special stipulations and design features. Alternative D adjusted the application of Coal Screen 4 to look for clusters of opposition in determining lands as unavailable for future consideration of federal coal leasing. Alternative D would also determine river segments "Not Suitable" for inclusion in the National Wild and Scenic River System due to segments being small, fragmented and impractical to manage. Alternative D also reduces some visual resource management classifications, and includes approximately 100 acres in Land Tenure Category 3 (Disposal).

ES.5 ENVIRONMENTAL CONSEQUENCES

The purpose of the environmental consequences' analysis in this RMP/EIS is to determine the potential for significant impacts of the federal action on the human environment. The "federal action" is the BLM's selection of an RMP on which the North Dakota Field Office will base future land use actions. **Chapter 3** objectively evaluates the likely impacts on the human and natural environment in terms of environmental, social, and economic consequences that are projected to occur from implementing the alternatives. **Section 2.4** in **Chapter 2** provides a summarized comparison of the environmental consequences for the resources, resource uses, and special designations that could be affected by implementing the alternatives evaluated in this Proposed RMP/Final EIS.

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ACRONYMS AND ABBREVIATIONS

	Full Phrase
°C	degrees Celcius
°F	degrees Fahrenheit
AAQS	ambient air quality standards
ACEC	area of critical environmental concern
AMP	allotment management plan
AMS	analysis of the management situation
APD	application for permit to drill
AQRV	air quality related value
AQTSD	Air Quality Technical Support Document
AUM	animal unit month
BCA	backcountry conservation area
BLM	Bureau of Land Management
BMP	best management practice
CAA	Clean Air Act
CAMx	Comprehensive Air Quality Model with Extensions
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COA	condition of approval
COT	Conservation Objectives Team
CSU	controlled surface use
DEQ	Department of Environmental Quality
DFC	desired future conditions
EA	environmental assessment
EIA	US Energy Information Administration
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
ES&R	emergency stabilization and rehabilitation
FLPMA	Federal Lands Management and Policy Act of 1976
GHG	greenhouse gas
GHMA	general habitat management area
GIS	geographic information systems
GRSG	greater sage-grouse
GWP	global warming potential
HAP	hazardous air pollutant

IPCC	Intergovernmental Panel on Climate Change
IPM	integrated pest management
IWG	interagency working group
K-Pg	Cretaceous-Paleogene
kV	kilovolt
LN	lease notice
$\mu g/m^3$	microgram per cubic meter
MAGICC	Model for the Assessment of Greenhouse Gas Induced Climate Change
Mcf	thousands of cubic feet
mph	miles per hour
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NDAAQS	North Dakota ambient air quality standards
NDCC	North Dakota Century Code
NDFO	North Dakota Field Office
NDGFD	North Dakota Game and Fish Department
NEL	nonenergy leasable
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NHT	national historic trail
NO_2	nitrogen dioxide
NORM	naturally occurring radioactive materials
NOx	nitrogen oxides
NP	national park
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSO	no surface occupancy
NST	national scenic trail
NWSRS	National Wild and Scenic River System
OHV	off-highway vehicle
ORV	outstandingly remarkable value
OSMRE	Office of Surface Mining Reclamation and Enforcement
PFC	proper functioning condition
PFYC	Potential Fossil Yield Classification
PHMA	priority habitat management area
$PM_{2.5}$	particulate matter smaller than 2.5 microns
PM_{10}	particulate matter smaller than 10 microns
ppb	parts per billion
ppm	parts per million
PRPA	Paleontological Resources Preservation Act of 2009
PSC	Public Service Commission
PSD	prevention of significant deterioration

R&PP	recreation and public purposes
RAC	resource advisory council
RCP	representative concentration pathway
RDF	required design feature
RFD	reasonably foreseeable development
RMP	resource management plan
RMPA	resource management plan amendment
ROW	right-of-way
SC-CH_4	social cost of methane
SC-CO_2	social cost of carbon dioxide
SC-GHG	social cost of greenhouse gases
SC-N_2O	social cost of nitrous oxide
SHPO	State Historic Preservation Office
SMA	surface management agency
SO	secretarial order
SO_2	sulfur dioxide
SRMA	special recreation management area
SRP	special recreation permit
SSS	special status species
STC	standard terms and conditions
SWPA	source water protection area
TCP	traditional cultural property
THPO	Tribal Historic Preservation Office
TL	timing limitation
US	United States
USC	United States Code
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
VOC	volatile organic compound
VRI	visual resource inventory
VRM	visual resource management
WMA	weed management area
WSR	wild and scenic river

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Chapter 1. Introduction

1.1 INTRODUCTION

The United States (US) Department of the Interior, Bureau of Land Management (BLM) North Dakota Field Office (NDFO) is revising the resource management plan (RMP) for the North Dakota planning area. The RMP is supported by a National Environmental Policy Act of 1969 (NEPA) analysis in an environmental impact statement (EIS), hereinafter referred to as the North Dakota RMP/EIS. Currently, the NDFO operates under the North Dakota RMP approved in 1988, as amended.

1.2 PURPOSE OF AND NEED FOR THE PLAN

The purpose and need statement describes why the BLM is revising the 1988 RMP and what outcomes the BLM intends the RMP to achieve. The purpose and need statement helps define the range of alternatives that will be analyzed in the planning process because alternatives must respond to the purpose and need for action to be considered reasonable.

This plan revision process takes place against the backdrop of past and ongoing planning efforts, including the following:

- Vegetation Treatment on BLM Lands in Thirteen Western States Final EIS (BLM 1991a)
- Bighorn Sheep North Dakota RMP Environmental Assessment (EA)/Amendment (BLM 1991b)
- Final Activity Plan and EA for the Schnell Ranch Recreation Area (BLM 1996)
- Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997)
- Off-Highway Vehicle Plan (statewide amendment) (BLM 2001)
- Fire/Fuels Management Plan (statewide amendment) (BLM 2003)
- Greater Sage-Grouse RMP Amendment (BLM 2015a)
- Pending Greater Sage-Grouse RMP Amendment (BLM 2024; anticipated completion in 2024)

The BLM is currently considering amending the greater sage-grouse management rangewide to address a subset of the goals, objectives, allocations and management actions related to greater sage-grouse. Some of these need updates to ensure management on BLM-administered lands responds to changing land uses, improve efficiency and effectiveness of greater sage-grouse habitat management, provide for consistent conservation across state lines, and provide the BLM with locally relevant decisions that accord with range-wide greater sage-grouse conservation goals. When that effort is completed, the relevant decisions will be incorporated into this RMP.

These previous planning efforts and their supporting analyses, together with the results of the scoping process for this planning effort, help to inform the BLM's discretion in determining the purpose and need for this action and whether new land use planning decisions need to be explored and implemented.

1.2.1 Need for the Action

The transformations that have taken place in the planning area over the past 30 years have resulted in changed circumstances and different users and uses of BLM-administered lands in North Dakota. In 2007, the BLM conducted plan evaluations in accordance with its planning regulations, which require that RMPs

"shall be revised as necessary based on monitoring and evaluation findings, new data, new or revised policy and changes in circumstances affecting the entire plan or major portions of the plan" (43 Code of Federal Regulations [CFR] 1610.5-6). An RMP revision process was initiated for the NDFO, in coordination with the South Dakota Field Office; however, this effort was ultimately postponed due to the Bakken oil boom and the subsequent shift in workload priorities for the BLM. Though the larger RMP revision was postponed, the Greater Sage-Grouse RMP Amendment (BLM 2015a) did occur as part of the larger regional effort.

The existing RMP needs to be revised because of new or changing resource conditions, shifting demands for resource uses, new technologies, new program and resource guidance and policies, and new scientific information since the development of the 1988 RMP. These changes include, but are not limited to, the following:

- Horizontal drilling, hydraulic fracturing, and the dramatic increase in the amount of oil and gas development in western North Dakota.
- A changed land base resulting from acquisitions, exchanges, withdrawals, and disposals since 1988.
- An increasing community emphasis on recreation opportunities and access to BLM-administered lands.
- Updated scientific information, the evaluation of a proposed Area of Critical Environmental Concern (ACEC), suitability of stream segments for Wild and Scenic River (WSR) designation, and a visual resource inventory.

1.2.2 Purposes of the Action

The proposed action is to revise the 1988 RMP with land use allocations, management objectives, and management direction that best meet the purpose and need. The purpose of the proposed action is to make land use plan decisions to guide the management of BLM-administered lands. The following four purposes below describe the North Dakota BLM's distinctive role in the North Dakota landscape in contributing to the multiple use and sustained yield mission.

Provide Opportunities for Responsible Mineral and Energy Development

The purpose of the action includes providing opportunities for responsible mineral and energy development on BLM-administered lands. The significant amount of leasing, exploration, and development associated with the Bakken oil boom in western North Dakota is a driving force behind a comprehensive revision of the RMP. Records from federal, state, and oil industry data suggest there are currently approximately 25,800 active or open wells associated with petroleum development in North Dakota (IHS 2019).[1] This level of development has created a pressing need for new inventories and revised data to design appropriate lease stipulations. Previous reasonably foreseeable development scenarios (RFD scenarios) and RFD scenario amendments for the NDFO were completed in 1988, 2009, 2011, and 2014. Additionally, new technological developments such as horizontal drilling and hydraulic fracturing have opened new oil and gas reserves and created opportunities to shape development footprints. The BLM has also identified that the coal screens applied during issuance of federal coal leases need to be updated to reflect the best available data.

[1] An active well is a well that is actively producing oil or gas, or both. An open well is a well that has not been plugged and abandoned but is not actively producing; it could be converted back to active status. Open wells also include injection and support wells that assist petroleum development but do not produce oil or gas.

Contribute to the Conservation and Recovery of Special Status Species

The purpose of the action includes managing native prairie habitat and woody draws to contribute to the conservation and recovery of special status species in the planning area. Special status pollinator species such as the Dakota skipper, monarch butterfly, and western bumblebee rely on native prairie in the planning area. Native prairie also provides cover, nesting substrate, and forage for numerous special status bird species. It has been largely converted to farmland, so the native prairie that remains on BLM-administered lands is of high importance to maintaining the habitat. Woody draws with connections to water sources are important for the northern long-eared bat for foraging and roosting/maternity colonies. Since these habitats are localized and uncommon on the landscape, the BLM plays an essential role in maintaining and connecting woody draws to support this species.

Provide Recreational Opportunities and Improve Access to BLM-Administered Lands

The purpose of the action includes providing for recreation opportunities. Federal Land Policy and Management Act (FLPMA) requires that, among other uses, "the public lands be managed in a manner that will … provide for outdoor recreation" 43 USC 1701 [Sec. 102.a.8]. The Schnell Ranch Recreation Area is the only established recreation area on BLM-administered surface lands in the planning area; it was deeded directly to the BLM in 1993. Changes in BLM policy since the 1988 RMP for recreation land use allocations and management objectives necessitate updates to the management of this area. There is also a need to consider opportunities for establishing recreation management areas or backcountry conservation areas and for improving or providing new access to noncontiguous BLM-administered parcels to enhance dispersed recreational uses, including hunting.

Manage for Other Social and Scientific Values

The purpose of the action is also to manage for scientific, scenic, and historical values, including, but not limited to, geologic, cultural, and paleontological resources, special designations, and public health and safety that contribute an important part to the broader social and scientific values of North Dakota.

1.3 DESCRIPTION OF THE PLANNING AREA

The North Dakota RMP/EIS planning area includes the entire state of North Dakota (**Map 1-1** in **Appendix A**). Throughout this RMP, the term "planning area" will be used to refer to all lands within the state regardless of jurisdiction. The BLM, however, will only make management decisions on the portions of the planning area that fall under the BLM's jurisdiction. The number of surface acres administered by federal and state agencies in the planning area, excluding reservations, is shown in **Table 1-1**.

Table 1-1
Federal and State Surface Landownership in the Planning Area

Land Managing Agency	Acres[1]	Percentage of Planning Area
Forest Service	1,104,100	2.4
State of North Dakota	802,800	1.8
US Army Corps of Engineers	531,600	1.2
US Fish and Wildlife Service	516,200	1.1
National Park Service	71,700	0.2
Bureau of Land Management	58,500	0.1

Land Managing Agency	Acres[1]	Percentage of Planning Area
Bureau of Reclamation	57,800	0.1
Other Federal Agencies	5,400	<0.1

Source: BLM GIS 2021
[1] Acres are rounded to the nearest 100

Analysis Area. The analysis area refers to any lands, regardless of jurisdiction, for which the BLM analyzes and interprets data and information for the lands it administers. In the North Dakota RMP/EIS, the BLM will analyze the cumulative effects that a project may have on an area; this might expand beyond the decision area boundaries, depending on the resource or resource use.

Decision Area. The North Dakota RMP/EIS decision area is made up solely of lands in the planning area that the BLM administers, as well as federal mineral estate where the BLM has authority to make decisions. The decision area is, collectively, the surface estate and subsurface mineral estate lands in the planning area over which the BLM has authority to make land use planning and management decisions. These include BLM-administered surface lands over federal minerals, federal mineral estate under non-federal surface, and BLM surface lands over non-federal mineral estate.

The surface decision area is the 58,500 acres of BLM-administered surface lands (**Map 1-2** in **Appendix A**). Most BLM-administered surface lands in the planning area are located in Dunn, Bowman, and Stark Counties, which are in western North Dakota (see **Map 1-2** in **Appendix A**). In northwestern Dunn County, approximately 15,000 acres comprise the Lost Bridge area. In western Bowman County, about 22,000 acres are in the Big Gumbo area, and 2,000 acres comprise the Schnell Ranch Recreation Area (**Map 1-2** in **Appendix A** and Map 3-2 in the Analysis of the Management Situation (AMS) report (BLM 2020b). Most of the remaining BLM-administered surface lands are small, isolated tracts scattered throughout the state (see **Map 1-6** in **Appendix A**).

The subsurface decision area is divided into three decision areas comprised of federal minerals in the planning area: 1) coal; 2) fluid minerals; and 3) mineral materials, locatable minerals, and nonenergy leasable (NEL) minerals (see **Map 1-3, Map 1-4**, and **Map 1-5** in **Appendix A**). The majority of the federal subsurface mineral estate is coal (approximately 4 million acres, including areas with federal coal only, federal ownership of all minerals, and other minerals). Federal subsurface oil and gas mineral estate in the decision area (fluid minerals) comprise 489,300 acres and includes federal fluid minerals located under BLM surface, directly under non-federal surface, and the federal portion of "Fee/Fee/Fed" lands, which refers to situations where a well is located on non-Federal land overlying non-Federal minerals, but some portion of the wellbore enters and produces from the Federal mineral estate. Federal mineral estate for mineral materials, locatable minerals, and NEL minerals in the decision area comprises 362,600 acres of the decision area. Decisions in **Chapter 2** apply to the areas described to the extent that the BLM has jurisdiction.

The largest component of the NDFO's minerals management activities has been actions occurring on non-BLM-administered land over federal mineral estate, which is known as split-estate lands. Split-estate lands are lands where mineral rights were separated (severed) from the surface ownership and retained by the federal government (see **Appendix K** for more information on split-estate lands). This means that a state, Tribal, other federal agency, or a private landowner may own the right to manage the surface lands, while the BLM administers the right of entry and development of the federal mineral estate.

The North Dakota RMP/EIS does not make decisions pertaining to the land or minerals managed by other surface management agencies. For example, this plan does not make decisions pertaining to the availability of federal minerals for development in North Dakota underlying Bureau of Reclamation, Army Corps of Engineers, National Park Service, or National Forest System managed lands.

Table 1-2 shows the relative acres of BLM-administered minerals under BLM surface and non-federal surface. As shown in the table, the acres of federal mineral estate vary by mineral type. This is because in some places, either the mineral is not present across the entire federal mineral estate or the federal government does not own the rights to certain minerals in particular areas. In addition, in some places, the federal government owns the rights to all minerals and in other places the federal government may own the rights to one or two types of minerals. The acres in **Table 1-2** differ by mineral type and may overlap for this reason.

Table 1-2
BLM-Administered Surface and Federal Mineral Estate

Mineral Estate	BLM Surface and BLM Minerals (Acres)	BLM Surface and non-BLM Minerals (Acres)	BLM Mineral Decision Area (Acres)
Subsurface management, coal	51,300	7,200	4,071,600
Subsurface management, fluid minerals	54,100	4,400	489,300
Subsurface management, nonenergy leasable minerals, locatable minerals,[1] and mineral materials[2]	50,700	7,800	362,600

Source: BLM GIS 2021

[1] Recommendations for locatable mineral withdrawal only occur on BLM-administered surface and minerals.

[2] The decision area for locatable minerals and mineral materials does not include coal-only minerals. Coal reservation minerals, however, may potentially be disposed of through other mineral authorities, such as locatable and mineral materials, upon project-specific confirmation of federal mineral ownership and disposal authority. There are 3,702,100 acres of coal-only reservation minerals in the planning area that may be suitable for locatable and mineral materials deposits. Resource protections identified for mineral management would apply to coal-only areas, should an application be received.

1.4 PUBLIC INVOLVEMENT AND ISSUE IDENTIFICATION

The formal public scoping process for the North Dakota RMP/EIS began with the publication of the notice of intent on July 28, 2020 (85 *Federal Register* 45438); the BLM also posted the notice of intent on the project website (https://eplanning.blm.gov/eplanning-ui/project/1505069/510). The notice of intent served to notify the public of the BLM's intent to revise the RMP for the North Dakota planning area, provided information about the public scoping meetings, and identified the preliminary issues to be considered in the RMP revision process. This notice also requested public input on planning criteria and nominations for ACECs. Public notification of the scoping process also included press releases, newspaper advertisements, emails, postcards, letters, and social media postings. The comment period ended on August 28, 2020.

The BLM also hosted two virtual public scoping meetings on August 18 and August 20, 2020. The meetings were intended to provide the public with an opportunity to participate in the scoping process and provide input through a web-based portal where viewers were able to view information about the planning process, pose questions, view answers, and submit comments to the BLM.

The BLM received 14 unique submissions during public scoping.[2] These submissions contained 85 separate substantive comments. Detailed information about the comments received and about the public outreach process can be found in the North Dakota RMP/EIS Scoping Report (BLM 2020a). This report is available at https://eplanning.blm.gov/eplanning-ui/project/1505069/510.

A notice of availability announcing the release of the Draft RMP/EIS was published in the Federal Register on January 20, 2023, initiating the start of a 90-day public comment period. In response to public comments, the comment period was officially extended by 30 days, ending on May 22, 2023. During the public comment period, the BLM held in-person public meetings in Bowman on February 28, 2023, and in Dickinson on March 1, 2023, and a virtual public meeting on March 29, 2023. The BLM also hosted a web-based portal where interested parties were able to view information about the Draft and submit comments to the BLM. See **Chapter 4** for additional details on the public comment period for the Draft RMP/EIS. **Appendix M** includes the substantive comments received on the Draft RMP/EIS, as well as the BLM's responses to those substantive comments.

1.4.1 Issues Identified for Detailed Analysis

To initiate the RMP revision process, the BLM identified preliminary planning issues through internal scoping based on RMP evaluations, new program guidance, and staff input. Planning issues are disputes or controversies about existing and potential land and resource allocations, levels of resource use, production, and related management practices. The BLM then revised these planning issues based on input received during public scoping. The issues addressed in the RMP are provided at the beginning of each **Chapter 3** resource section. More detailed information of the issues identified during public scoping can be found in the North Dakota RMP/EIS Scoping Report (BLM 2020a).

1.4.2 Issues Considered But Not Analyzed in Detail

During scoping, commenters requested implementation-level (project- or site-specific) management actions that were outside the scope of this RMP/EIS. Comments of this type primarily included requests for decisions that are typically made through lower-level or project-level planning. These commenters often requested that the RMP/EIS include post-lease activities and requirements for mineral and energy development (BLM 2020a). Although the RMP/EIS can provide broad direction and guidance for these types of activities, the associated decisions of this nature are tiered down to implementation-level, site-specific planning.

In some cases, issues were identified for resources that are not present in the decision area. Lands with wilderness characteristics; oil shales, tar sands, and geothermal resources; caves and karst resources; and wild horses and burros are not known to be present in the decision area and therefore effects on or from these resources or uses are not analyzed in detail in the RMP/EIS.

1.5 Relationship to Other Policies, Plans, and Programs

The BLM's planning regulations require the North Dakota RMP/EIS to be consistent with approved or adopted plans, policies, and programs that are being implemented by other land managers and government agencies in North Dakota, to the extent possible. The RMP should also be consistent with the purposes, policies, and programs of federal laws and regulations applicable to BLM-administered lands and minerals

[2] A unique comment submission is a personalized email, letter, or verbal comment that is not part of a form letter or petition campaign.

(43 CFR 1610.3-2(a)). County, state, and other federal agency plans that were consulted, as applicable, during the North Dakota RMP/EIS planning effort are listed in the AMS (BLM 2020b).

1.6 COLLABORATION

The BLM is engaging in ongoing collaboration with federal, Tribal, state, and local governments as part of this planning process. This collaboration includes government-to-government consultation with affected Native American Tribes, the participation of cooperating agencies, and consultation with regulatory agencies, as required by law. **Chapter 4**, Consultation and Coordination, provides more information about the involvement of these stakeholders.

1.7 CHANGES BETWEEN DRAFT RMP/EIS AND PROPOSED RMP/FINAL EIS

Changes to create the Proposed RMP/Final EIS were made in response to public comment on the Draft RMP/EIS, cooperating agency input, and extensive internal BLM reviews of the Proposed RMP/Final EIS. The BLM considered all substantive comments and used many of them to assist in making changes or clarifications to the Proposed RMP/Final EIS. The Proposed RMP (Alternative D) includes management actions and allowable uses from Alternatives A, B, and C with consideration given to public comments, corrections, and rewording for clarification of purpose and intent. When developing the Proposed RMP, the BLM focused on addressing public comments on the Draft RMP/EIS, while continuing to meet its legal, regulatory, and policy mandates.

Key allocations from the preferred alternative in the Draft RMP/EIS were carried forward into the proposed alternative (Alternative D). Specifically, this includes much of the management direction for oil, gas, and coal, as well as the management direction that establishes the Special Recreation Management Area, two Backcountry Conservation Areas, and designates one Area of Critical Environmental Concern. Other factors contributed to the development of Alternative D, including cooperating agencies' input and special expertise, and best available science. Key changes included in the proposed alternatives from the preferred alternative (originally Alternative B in the Draft RMP/EIS) are summarized below.

Fluid Mineral Lease Stipulations

- The Controlled Surface Use management allocation requiring a waste minimization plan changed to a Lease Notice.
- No Surface Occupancy stipulations for some wildlife species and habitat are instead addressed through Controlled Surface Use stipulations and Timing Limitations.

Fluid Mineral Leasing – Open versus Closed

- Recategorized approximately 6,000 acres from low oil and gas potential to moderate oil and gas potential in the RFD to more accurately describe areas with historical and ongoing development. This change resulted in a decrease in the area closed to oil and gas leasing.
- Added a provision that leasing in low development potential may be allowed to prevent drainage of federal minerals or if the oil and gas development potential categories are revised based on new data or information such as offset well production or geophysical surveys.

Coal and Other Minerals

- Adjusted the application of coal screen 4 (land owner consultation) to look for clusters of opposition to mining, rather than individual responses. Not finding clusters of significant opposition,

Alternative D did not remove lands under this screen, resulting in an additional 4,000 acres of federal coal as available for future consideration for leasing.

- Clarified the decision area for locatable and mineral materials with regards to coal-only reservations.
- Revised allocations for some non-energy leasable minerals, locatable minerals, and mineral materials to allow for activity level review.

Tribal Interests

- Removed Reservation boundaries from maps and instead show federal surface management agencies (determination of reservation boundaries is outside the scope of the RMP).

Lands and Realty

- Right-of-way exclusion areas changed to avoidance areas for some resources where the functionality of the habitat can be maintained with the inclusion of special stipulations and design features.
- Corrected for an error in the categorization of Greater Sage Grouse habitat by moving it from Land Tenure Category 1 (Retention) to Category 2 (Retention-Limited) per the 2015 GRSG amendment. Also adds 100 acres to Land Tenure Category 3 (Disposal) to allow flexibility for transfer, exchange, or direct sale of a handful of small, scattered parcels ranging in size from 0.1 -1.0 acres without public access.

Wild and Scenic Rivers

- Determined river segments not suitable for inclusion in the National Wild and Scenic River System due to these segments being small, fragmented, and interspersed with long stretches of private land making the areas impractical to manage. Other decisions for wildlife and visual are carried forward to provide protections for the resources that resulted in the eligibility determination.

Visual Resources

- Changed 1,800 acres of VRM Class II to VRM Class III. This change was due to areas along the Little Missouri River being found not suitable as a WSR as well as a change to the VRM class for the Lewis and Clark NHT corridor.

Chapter 2. Alternatives

This chapter details Alternatives A through D for the North Dakota Proposed RMP/Final EIS and includes references to maps (found in **Appendix A**) identifying where allocations would apply. The BLM formulated the alternatives in response to issues and concerns identified through public scoping and also in an effort to resolve deficiencies with current management strategies and to explore opportunities for enhanced management of resources and resource uses. A **Glossary** that provides a definition of terms can be found following the **References** section.

2.1 DESCRIPTION OF THE ALTERNATIVES

RMP decisions consist of identifying and clearly defining goals and objectives (desired outcomes) for resources and resource uses, followed by developing allocations for allowable resource uses (allocations) and management direction necessary for achieving the goals and objectives. These critical determinations guide future land management direction and subsequent site-specific implementation actions to meet multiple-use and sustained-yield mandates while sustaining land health.

Each alternative must respond to the issues identified during scoping, seek to resolve conflicts among resources and resource uses, meet the purpose of and need for the RMP, and be feasible to implement. After considering the issues and the purpose and need, the BLM developed four action alternatives to analyze in detail, in addition to the No Action Alternative (Alternative A). Each alternative contains a discrete set of objectives and management direction constituting a separate RMP. Resource program goals are met in varying degrees with the potential for different long-range outcomes and conditions.

The relative emphasis given to particular resources and resource uses also differs, including allocations, 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.

Meaningful differences among the alternatives are described in **Table 2-1**, Quantitative Summary of the Alternatives in Acres and Percent of Decision Area. **Table 2-2**, Land Use Plan Decisions by Alternative provides a complete description of proposed decisions for each alternative, including goals, objectives, management direction, and allocations for individual resource programs. Maps in **Appendix A** provide a visual representation of differences between alternatives.

GIS has been used to perform acreage calculations and to generate the maps in **Appendix A**. Calculations are dependent upon the quality and availability of data. Most calculations in this RMP are rounded to the nearest 100 acres or 0.10 miles. Some calculations in **Chapter 3**, Affected Environment and Environmental Consequences, are rounded to the nearest 1 mile. Given the scale of the analysis, the compatibility constraints between datasets, and the lack of data for some resources, all calculations are approximate; they serve for comparison and analytic purposes only. Likewise, the maps in **Appendix A** are provided for illustrative purposes and subject to the limitations discussed above. The BLM may receive additional or updated data; therefore, acreages may be recalculated and revised as a part of ongoing plan maintenance.

2.1.1 Alternative A (No Action Alternative)

Alternative A meets the requirement that a No Action Alternative must be considered. This alternative continues current management direction and prevailing conditions derived from existing planning

decisions. Goals and objectives for resources and resource uses are based on the applicable portions of the 1988 North Dakota RMP, along with associated amendments. Laws, regulations, and BLM policies that supersede RMP decisions would apply.

Goals and objectives for BLM-administered lands and mineral estate would not change. Appropriate allocations and restrictions pertaining to activities such as mineral leasing and development, recreation, rights-of-way [ROWs], and livestock grazing would also remain the same. Three river segments would be managed as eligible for inclusion in the NWSRS. Under this alternative, the BLM would not modify existing criteria or establish additional criteria to guide the identification of site-specific use levels for implementation activities.

2.1.2 Alternative B (Preferred Alternative from Draft RMP/EIS)

Alternative B emphasizes sustaining the ecological integrity of habitats for all priority plant, wildlife, and fish species, while allowing appropriate development scenarios for resource uses (minerals and energy development, recreation, ROWs, and livestock grazing). Under Alternative B, the BLM would close low oil and gas development potential areas and state designated drinking water source protection areas to future federal oil and gas leasing and would make federal coal minerals outside a 4-mile development area (4-miles from the approved permit boundary at each mine as of September 9, 2022) unavailable for future consideration for leasing. Where oil and gas is available for leasing, major or moderate stipulations would apply to most areas. Alternative B is proactive in promoting conservation and recovery of threatened and endangered and other special status species, as well as protecting other social and scientific values. Alternative B provides opportunities for recreation and improved access by designating one special recreation management area (SRMA) and two backcountry conservation areas (BCAs). Alternative B would also manage for other social and scientific values by designating one ACEC. Alternative B would also find three eligible WSRs suitable for designation.

Alternative B.1

Alternative B.1 is a sub-alternative to Alternative B that provides the same management opportunities and protections as found under Alternative B for all resources except coal. In addition to the coal screens applied under Alternative B, this sub-alternative further restricts federal coal leasing by designating the area outside of the approved permit boundary at each mine (as of September 9, 2022) as unavailable for coal leasing. The federal coal decision area within the mine permit boundaries as of September 9, 2022 includes a total of 17,668 acres, of which 11,528 acres have an active or closed lease, 4,708 acres are available for leasing, 473 acres have a pending lease application, and 959 acres are identified as unavailable for further consideration for leasing as a result of the coal screen process (**Map F-28** in **Appendix F** shows the location of the available coal leasing area under Alternative B.1). Alternative B.1 thus reduces the potential for expansion of federal coal mining at all active North Dakota mines: BNI Center, Coyote Creek, Falkirk, and Freedom. It also reduces the proposed expansion at the Falkirk and Freedom mines.

Analysis of impacts of coal management under Alternative B.1 is included in **Chapter 3**, Affected Environment and Environmental Consequences, under the analysis of Alternative B. Typically this management and the associated impacts are the same as under Alternative B; impacts associated with Alternative B.1 are only noted when they differ from Alternative B.

Table 2-1
Quantitative Summary of the Alternatives in Acres and Percent of Decision Area

Resource, Resource Use, or Special Designation (acres[1])	Alternative A	Alternative A % of decision area	Alternative B	Alternative B % of decision area	Alternative C	Alternative C % of decision area	Alternative D	Alternative D % of decision area
Visual resource management (VRM)								
VRM Class I	0	0	0	0	0	0	0	0
VRM Class II	0	0	15,700	27	8,400	14	13,900	24
VRM Class III	0	0	16,600	28	12,300	21	17,400	30
VRM Class IV	0	0	26,200	45	37,800	65	27,200	46
Unclassified	58,500	100	0	0	0	0	0	0
Total	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**
Lands and realty								
Right-of-way (ROW) exclusion area	0	0	36,000	62	<10	<1	2,700	5
ROW avoidance area[2]	35,700	61	21,600	37	57,400	98	54,600	93
Open to ROW authorization	22,800	39	900	2	1,100	2	1,200	2
Total	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**
Land tenure category 1 (retention) or category 2 (available for disposal through methods other than sale)	47,600	81	0	0	0	0	0	0
Land tenure category 1 (retention)	0	0	2,500	5	1,000	2	1,000	2
Land tenure category 2 (general retention/limited disposal)	0	0	56,000	95	56,700	97	57,400	98
Land tenure category 3 (disposal, including sale)	10,900	19	0	<1	800	1	100	<1
Total	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**
Fluid leasable minerals								
Closed to fluid mineral leasing	0	0	213,100	44	0	0	213,100	44
Open to fluid mineral leasing, with mapped stipulations	402,500	82	261,600	53	447,800	92	261,000	53
Open to fluid mineral leasing, subject to standard terms and conditions	86,800	18	14,600	3	41,500	8	15,200	3
Total	**489,300**	**100**	**489,300**	**100**	**489,300**	**100**	**489,300**	**100**
Open to fluid mineral leasing, subject to NSO[3]	202,600	41	180,200	37	250,100	51	130,000	27
Open to fluid mineral leasing, subject to CSU[3]	15,800	3	211,000	43	348,900	71	213,100	44
Open to fluid mineral leasing, subject to TLs[3]	328,600	67	179,200	37	337,100	69	183,000	37

Resource, Resource Use, or Special Designation (acres[1])	Alternative A	Alternative A % of decision area	Alternative B		Alternative B % of decision area		Alternative C	Alternative C % of decision area	Alternative D	Alternative D % of decision area
Solid leasable minerals			**Alt B**	**Alt B %**	**Alt B.1**	**Alt B.1 %**				
Coal Screen 1—BLM-administered federal coal minerals in coal development potential	1,009,700	25	1,096,400	27	1,096,400	27	1,096,400	27	1,096,400	27
Coal Screen 2—unsuitable	193,400	5	—	—	—	—	—	—	—	—
Coal Screen 2—unsuitable without exception, criteria 1, 16, and 19[4]	—	—	53,000	1	53,000	1	53,000	1	53,000	1
Coal Screen 2—unsuitable with exception, criteria 2, 3, 7, 9, 11, 13, 14, 15, and 17[4]	—	—	294,400	7	294,400	7	294,400	7	294,400	7
Coal Screen 3—multiple use (unacceptable for further consideration)	154,600	25	1,036,600		1,079,500	27	410,800	10	1,037,800	25
Coal Screen 4—surface owner consultation- not in favor (removed)	87,800	2	121,500	3	121,500	3	121,500	3	0[8]	0
Unacceptable to coal leasing	435,800	11	1,042,000	26	1,080,100	27	542,800	13	1,037,800	25
Acceptable to coal leasing	573,900	14	54,400	1	16,300	<1	553,600	14	58,600	1
Outside of coal development potential	3,061,900	75	2,975,200	73	2,975,200	73	2,975,200	73	2,975,200	73
Total	**4,071,600**	**100**	**4,071,600**	**100**	**4,071,600**	**100**	**4,071,600**	**100**	**4,071,600**	**100**
Closed to nonenergy solid mineral leasing	44,500	12	83,000			23	59,700	16	67,900	19
Open to nonenergy solid mineral leasing	318,100	88	279,600			77	302,900	84	294,700	81
Total	**362,600**	**100**	**362,600**			**100**	**362,600**	**100**	**362,600**	**100**
Locatable minerals										
Not open to locatable mineral entry (acquired lands)[5]	7,700	2	0	0	0	0	0	0	0	0
Acquired lands recommended for opening order for locatable mineral entry	0	0	7,700	2	7,700		2	7,700		2
Open to locatable mineral entry	354,900	98	354,900	98	354,900		98	354,900		98
Total	**362,600**	**100**	**362,600**	**100**	**362,600**		**100**	**362,600**		**100**
Recommend for withdrawal from locatable mineral entry	0	0	8,300	2	0		0	1,000		<1
Mineral materials										
Closed to mineral materials sales	44,500	12	206,500	57	59,700		16	198,900		55
Open to mineral materials sales[6]	318,100	88	156,100	43	302,900		84	163,700		45
Total	**362,600**	**100**	**362,600**	**100**	**362,600**		**100**	**362,600**		**100**
Recreation										
Schnell Ranch SRMA, West Zone	0	0	1,500	3	0		0	1,500		3
Schnell Ranch SRMA, East Zone	0	0	500	1	0		0	500		1
Schnell Ranch SRMA	0	0	0	0	2,000		3	0		0
Figure 4 Backcountry Conservation Area (BCA)	0	0	3,500	6	3,100		5	3,500		6

Resource, Resource Use, or Special Designation (acres[1])	Alternative A	Alternative A % of decision area	Alternative B	Alternative B % of decision area	Alternative C	Alternative C % of decision area	Alternative D	Alternative D % of decision area
Lost Bridge BCA	0	0	8,900	15	5,300	9	8,900	15
Total	**0**	**0**	**14,400**	**25**	**10,400**	**18**	**14,400**	**25**
Comprehensive trails and travel management								
Closed to off-highway vehicle (OHV) travel	2,000	3	2,900	5	2,000	3	2,900	5
Seasonally limited to maintained roads for OHV travel; limited to designated routes for the remainder of the year	29,800	51	32,300	55	33,200	57	32,300	55
Limited to OHV travel; limited to designated routes yearlong	26,700	46	23,300	40	23,300	40	23,300	40
Open to cross-country OHV travel	0	0	0	0	0	0	0	0
Total	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**
Livestock grazing								
Lands identified as suitable for livestock grazing	58,500	100	0	0	0	0	0	0
Available to livestock grazing, leased	0	0	52,200	89	52,200	89	52,200	89
Available to livestock grazing, unleased	0	0	0	0	4,300	7	4,300	7
Unavailable for standard term livestock grazing leases, unleased	0	0	6,300	11	2,000	3	2,000	3
Total	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**	**58,500**	**100**
Special designations and management areas								
Mud Buttes ACEC	0	0	960	2	960	2	960	2
Wild and scenic rivers, tentative classification, in miles[6, 7]	**Eligible[7]**	**—**	**Suitable[7]**	**—**	**Suitable[7]**	**—**	**Suitable[7]**	**—**
Little Missouri River, scenic	8.1	—	8.1	—	0	—	0	—
Missouri River, recreational	3.4	—	3.4	—	0	—	0	—
Yellowstone River, recreational	0.1	—	0.1	—	0	—	0	—
Total	**11.6**	**—**	**11.6**	**—**	**0**	**—**	**0**	**—**

Source: BLM GIS 2021

Note: Many allocations in Alternative A are due to greater sage-grouse (GRSG) management. Acres may differ from those presented in the 2015 Approved GRSG RMP Amendment (BLM 2015a) due to more accurate subsurface geographic information systems (GIS) data collected for this RMP.

[1] Acres are rounded to the nearest 100.

[2] The land use authorization section describes solar and wind-, aboveground-. and below ground-specific exclusion and avoidance areas.

[3] Fluid mineral leasing stipulations may overlap and therefore will be greater than the decision area.

[4] Criteria 4, 5, 6, 8, 10, 11, 12, 18, and 20 of Coal Screen 2 are not applicable in NDFO.

[5] Lands not open to entry under Alternative A are subject to interminable “temporary” segregations due to having undergone conveyance under Section 206 of FLPMA prior to November 21, 2000.

[6] The alternatives’ wild and scenic river GIS data include portions of rivers that BLM's Surface Management Agency (SMA) GIS data show as water but adjacent to BLM-administered surface. Given the fragmented nature of SMA ownership along the Little Missouri, Missouri, and Yellowstone Rivers, it is assumed that some portions of water are managed by the BLM. Therefore, when acreages or mileages are intersected with SMA GIS data, it is not an exact match to the acreages and mileages used in the alternatives.

[7] Miles presented for Alternative A are for miles determined eligible for inclusion in the National Wild and Scenic Rivers System (NWSRS). Miles presented for Alternatives B, C, and Dare for miles determined suitable for inclusion in the NWSRS.

[8] Under Alternative D, the BLM adjusted the application of coal screen 4 to look for clusters of opposition to mining, rather than individual responses. Not finding clusters of significant opposition, Alternative D did not remove any lands under this screen. Prior to leasing, BLM will survey surface owners again for surface owner qualification and agreement, in accordance with 30 CFR 1304(c).

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2.1.3 Alternative C

Alternative C is similar to Alternative B but provides for more flexibility in management of natural and cultural resources and resource uses. Under Alternative C, the BLM would provide opportunities for minerals and energy development with fewer restrictions than Alternative B, but more than Alternative A. Under Alternative C no areas would be closed to future federal oil and gas leasing, however more acres would be subject to major (NSO) lease stipulations than Alternative A. Under Alternative C fewer acres would be made unavailable under Coal Screen 3 (multiple-use tradeoffs) than Alternative B, but more than Alternative A. Alternative C provides opportunities for recreation and improved access by designating one SRMA and two BCAs; however, the size of these areas would be smaller than under Alternative B, and the management actions associated with each area would be less restrictive. Alternative C would also manage for other social and scientific values by designating one ACEC. Allocations and restrictions would be implemented to minimize impacts on natural and cultural resources throughout North Dakota.

2.1.4 Alternative D (Proposed RMP)

Alternative D carries forward many of the same management directions and allocations as Alternative B. Just like Alternative B, Alternative D would close low oil and gas development potential areas and state designated drinking water source protection areas to future federal oil and gas leasing and would make federal coal minerals outside a 4-mile development area unavailable for future consideration for leasing. Alternative D, however, would adjust fluid mineral lease stipulations for some wildlife species/habitat and would change some right-of-way exclusion areas to avoidance areas where the functionality of the habitat can be maintained with the inclusion of special stipulations and design features. It also revised allocations for some non-energy leasable minerals, locatable minerals, and mineral materials to allow for activity level review. Alternative D adjusted the application of Coal Screen 4 to look for clusters of opposition in determining lands as unavailable for future consideration of federal coal leasing. Alternative D would also determine river segments "Not Suitable" for inclusion in the National Wild and Scenic River System due to segments being small, fragmented and impractical to manage. Alternative D also reduces some VRM classifications and includes approximately 100 acres in Land Tenure Category 3 (Disposal).

2.1.5 Development of the Proposed RMP

The proposed alternative is a modification of Alternative B from the Draft RMP/EIS. In developing the proposed alternative (referred to as "Alternative D" throughout this plan), the BLM made modifications based on its internal review, new information and best available science, the need for clarification in the RMP, and ongoing coordination with stakeholders. The BLM also received many substantive public comments on the Draft RMP/EIS (**Appendix M**), which greatly informed the BLM's development of the proposed alternative. Changes in BLM regulations, policy, and guidance were also considered.

2.2 Alternatives Considered but Eliminated from Detailed Analysis

2.2.1 Prohibit Fluid Mineral Leasing throughout the Decision Area

The BLM eliminated from further analysis an alternative that would prohibit fluid mineral leasing throughout the decision area because it would have substantially similar effects as the analysis in Alternatives B, B.1, and D. These alternatives analyze the closure of federal minerals in state designated drinking water source protection zones and the closure of federal minerals with low potential for development to new leasing, which together is 44 percent of the total acreage of federal fluid minerals in the planning area. Of the remaining fluid minerals in the planning area analyzed, those with very high

potential for development are already 90 percent leased and those with high potential for development are already 93 percent leased.

In 2020, annual production of federal fluid minerals in North Dakota accounted for approximately 9 percent of all fluid minerals produced in the state (DMR 2022). In high development potential areas, approximately 90 percent of the federal fluid mineral estate is already leased, and 89 percent of those leases are held by production. The federal fluid mineral estate is predominately small, isolated pockets surrounded by private fluid minerals. BLM surface estate is similarly checkerboarded. This creates a situation where well pads can be located on private surface and first drill directly into private minerals before accessing federal minerals. When a wellbore enters federal minerals from nonfederal minerals under private surface, it creates a situation called fee/fee/federal. North Dakota's landownership and federal fluid mineral ownership patterns create high opportunities for fee/fee/federal situations compared with elsewhere in the US. Because of these opportunities, operators typically avoid locating wells and facilities on BLM-administered surface estate due to the additional permitting requirements. Instead, operators locate surface development on private lands and develop federal mineral estate using horizontal drilling. Due to the amount of private minerals and private surface lands in the planning area, and because most of the high development potential areas are already leased and held by production, the surface disturbance and well densities from prohibiting fluid mineral leasing throughout the decision area would not be expected to notably decrease from those presented in the RFD for oil and gas (BLM 2022a).

As a reference analysis, an alternative that closed the decision area to federal fluid mineral leasing would result in a reduction of approximately 97 producing wells from the total of 38,100 new producing wells projected to be developed in all of North Dakota, or less than 1 percent. As such, there would not be a measurable reduction in impacts within North Dakota even if federal fluid mineral leasing were prohibited throughout the decision area. Instead, federal royalties would be lost and development of surrounding non-BLM-administered minerals would likely be less efficient. Analysis of an alternative prohibiting fluid mineral leasing in the decision area would thus not have substantially different effects as the effects already analyzed in Alternative D.

2.2.2 Prohibit Coal Leasing throughout the Decision Area

The primary land use plan-level decision to be made regarding coal is identifying areas that are acceptable for further consideration for coal leasing and those that are not acceptable (BLM Land Use Planning Handbook H-1601-1, Appendix C). Although a land use planning-level decision can be made that precludes coal development throughout the planning area, it does so by making areas unacceptable for further consideration of leasing; the process undertaken to arrive at this land use plan allocation must be consistent with the federal regulations. Namely, the BLM is required to go through the coal screening process outlined in 43 CFR 3420 et seq. to arrive at its decision on coal allocations. As part of this process, the multiple-use screen is used to remove lands that would conflict with resources of high value from further consideration for coal leasing. Once the land use plan-level decision has identified areas as acceptable or unacceptable for further consideration of leasing, the decision whether to lease parcels is made at the application level; this is a discretionary action and the no-leasing/no-action alternative would be considered at this stage in the NEPA process.

The BLM's authority for coal leasing on BLM-administered lands is the Mineral Leasing Act of 1920 (as amended) and the Mineral Leasing Act for Acquired Lands of 1947 (as amended). The policy detailed in 43 CFR 3420.1–4e drives the determination of availability of lands for further consideration for coal

leasing. This is consistent with BLM Handbook 3420, which directs the BLM to prioritize energy development to support competitive energy markets and national energy objectives. The BLM's authorities are clear in their direction that coal availability for leasing is based on protecting specific, high-value resources. The coal resources in the planning area did not warrant closing the entire decision area.

An alternative that prohibits coal leasing throughout the decision area would be substantially similar in design and effects to Alternative B.1. Alternative B.1 would restrict federal coal leasing to within the current mine permit boundaries as of September 9, 2022 for each existing mine which would remove 99.6 percent of the total coal decision area from leasing. Of the remaining 0.4 percent of the coal decision area acceptable for further consideration of leasing, 71 percent is either already leased, part of a mined out and closed lease, or removed by the coal screening process.

2.2.3 Manage all Lands as Unavailable for Livestock Grazing and Eliminate Livestock Forage Allocations

No issues or conflicts have been identified during this planning effort to warrant the complete elimination of livestock grazing across the planning area; therefore, managing all lands in the planning area as unavailable for grazing is not responsive to the purpose and need and is not considered under any of the alternatives. 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.

Established livestock grazing allocations and permitted levels were included in the existing 1988 North Dakota RMP/EIS for the 82 grazing allotments in the planning area. Since 1988, permitted levels have not changed and generally remain consistent with vegetation production. Current resource conditions on BLM-administered land, including range vegetation, watershed conditions, and wildlife habitat, as reflected in land health assessments, do not warrant an area-wide elimination of livestock grazing because over 96 percent of the grazing allotments are meeting or making significant progress toward meeting the Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997). On the one allotment not meeting standards, 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. 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, 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 and Lost Bridges areas, much of the BLM-administered lands in the planning area are small in size, isolated, inaccessible, and scattered throughout the state. Eliminating livestock grazing on BLM-administered lands would be infeasible because it would require extensive fencing to segregate it from adjacent, intermingled private lands and North Dakota school trust lands to prevent unauthorized livestock grazing. In some cases, construction and maintenance of fences along public property boundaries would be very difficult and impractical due to excessively steep, rugged terrain. Additionally, the extensive fencing would create many new barriers for wildlife movement and, therefore,

would not meet the purpose of and need for the RMP, part of which is to contribute to special status species (SSS) conservation and recovery.

2.2.4 Designate Leasing Areas for Wind Energy

Overall, wind energy potential across most of North Dakota is classified as fair (Class 3 with wind speeds of 14.3 to 15.7 miles per hour [mph] at 164 feet [50 meters]) to good (Class 4 with wind speeds of 15.7 to 16.8 mph at 164 feet). Areas with excellent wind resource potential (Class 5 with wind speeds of 16.8 to 17.9 mph at 164 feet) are scattered across the south, west, and north-central parts of the state, while areas of marginal wind resource potential (Class 2 with wind speeds of 12.5 to 14.3 mph at 164 feet) are found in western and eastern North Dakota. Only a relatively small area near the southern North Dakota border has outstanding wind energy resource potential (Class 6 with wind speeds of 17.9 to 19.7 mph at 164 feet). Lands with a wind power classification of 4, 5, or 6 and within 20 miles of a 115- to 230-kilovolt (kV) power line are defined as having high wind energy resource potential. BLM-administered lands in the planning area, primarily those in the west and along the Little Missouri River, are mostly Class 2 and 3 for wind energy resource potential, but may also include some Class 4, 5, and 6 areas (BLM 2020b, Figure 3-1).

Commercial wind developments have been constructed on private lands in the eastern and central parts of North Dakota, and there has been recent development of wind farms in the western part of the state; however, there has been no interest in developing wind farms on any BLM-administered lands in North Dakota. While the NDFO contains wind resources that could be developed, the only large contiguous blocks of BLM-administered land that would be suitable for consideration as designated leasing areas are in GRSG priority habitat management areas (PHMA) and general habitat management areas (GHMA), which are exclusion and avoidance areas, respectively, for wind and solar development. Given this, identification of wind leasing areas would be made available through a competitive process, as provided for under the 43 CFR 2800 regulations finalized in January 2017 and is not warranted in the North Dakota RMP/EIS.

2.2.5 Designate Right-of-Way Utility Corridors

A major ROW corridor is not practical in the NDFO because the BLM manages too little surface in the planning area in areas where a corridor would be most likely (such as near I-94) to make a ROW corridor an effective planning and management tool. However, in consideration of corridors, the North Dakota RMP/EIS does state in the *Lands and Realty, Land Use Authorizations* alternatives, “Where practicable, co-locate new ROWs, including those associated with valid existing rights, within or adjacent to existing ROWs or where it best minimizes effects.” (Alternatives B and C).

2.2.6 Reintroduce Bison as Wildlife onto BLM-Administered Lands

On BLM-administered lands, primary authority and responsibility for management of fish and resident wildlife, which includes wild bison, rests with the states (43 CFR 24.4(c)). At this time, the state of North Dakota has not proposed to reintroduce wild bison on any BLM-administered lands managed by the NDFO. The BLM therefore determined that it was not necessary to evaluate in detail an alternative to reintroduce bison as wildlife onto BLM-administered lands in this RMP process. If in the future the state of North Dakota proposes reintroducing wild bison on BLM-administered lands, the BLM will follow MS-1745 manual direction for any proposed reintroduction as well as work closely with the state of North Dakota through BLM's established planning processes. Any consideration of placing bison on BLM-administered lands would also include full involvement by Tribal and local governments as well as the public.

Privately owned bison are considered livestock and can therefore be permitted by the BLM (43 CFR 4130.3-2(e)). The primary test in making this distinction is if the owner of the animal qualifies as an applicant under the requirements of the BLM's grazing regulations. The grazing regulations define qualified applicants and apply equally to all qualified applicants, regardless of the kind of livestock. Privately owned bison may be authorized to graze under the BLM's grazing regulations provided it is consistent with multiple use objectives. As with other types of livestock, bison grazing may be permitted where environmental review indicates no conflict with resource objectives and attainment of Standards for Rangeland Health.

2.3 MANAGEMENT GUIDANCE FOR ALTERNATIVES A, B, C, AND D

Table 2-2 is a description of all decisions proposed for each alternative, including goals and objectives. All decisions in **Table 2-2** are land use plan-level decisions.

Stipulation decisions (such as applying an NSO, a controlled surface use [CSU], or a timing limitation [TL]) apply to fluid mineral leasing and development of federal mineral estate underlying BLM-administered surface lands, private lands, and state trust lands. Stipulations do not apply to lands managed by other surface management agencies. Definitions of these stipulations are provided in **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing.

Acreages for alternatives in this chapter and stipulations in **Appendix B** are calculated based on current information and may be adjusted in the future through RMP maintenance as conditions warrant.

2.3.1 How to Read Table 2-2

The following describes how **Table 2-2** is written and formatted to show the land use plan decisions proposed for each alternative. Refer to the diagram on the next page for an example of how to read **Table 2-2**.

- Per Appendix C of the BLM's Land Use Planning Handbook H-1601-1, land use plan decisions are broad-scale decisions that guide future land management direction and subsequent site-specific implementation decisions. Land use plan decisions fall into two categories, which establish the base structure for **Table 2-2:** desired outcomes (**goals** and **objectives**), and **allocations for allowable resource uses** and **management direction** to achieve outcomes.
  - *Goals* are broad statements of desired outcomes and management direction that usually are not quantifiable.
  - *Objectives* identify specific desired outcomes for resources. Objectives may be quantifiable and measurable and may have established timeframes for achievement, as appropriate.
  - *Management Direction* identifies actions to attain desired outcomes (objectives), including program constraints, general management practices, and support actions. These are measures that will be applied to all subsequent relevant implementation activities to achieve management objectives.
  - *Allocations for Allowable Resource Use* identify uses, or allocations, that are allowable, restricted, or prohibited on BLM-administered lands and mineral estate.
  - *Designations* identify geographic areas of BLM-administered land where management is directed toward one or more priority resource values or uses. They include two types:

  - *Administrative designations*, identified in BLM or Department of the Interior's program-specific polices or regulations, are established through the BLM's land use planning process to achieve RMP objectives; and
  - *Nondiscretionary designations* are those that can only be established by the President, Congress, or the Secretary of the Interior pursuant to specific legal authority.
- In general, only those resources and resource uses that have been identified as planning issues have notable differences between the alternatives.
- Management direction that is applicable to all alternatives is shown in one cell across a row and would be implemented regardless of which alternative is ultimately selected.
- Management direction that is applicable to more than one but not all alternatives is indicated by either combining cells for the same alternatives, or by denoting those objectives or management direction as the "same as Alternative B," for example.
- **Table 2-2** presents the multiple-use screen (Screen 3) decisions for coal leasing because they are plan-level decisions. However, **Appendix F**, Coal Screening Process details the application and outcomes of Screens 1, 2, and 4 because they are provided for in regulation and are not discretionary.

Diagram 2-1
How to Read Table 2-2

1.	Alternative A (No Action Alternative)	Alternative B	Alternative C
2.	**Air Quality**		
3.	**Goals:** • Protect the quality of air and atmospheric values in the planning area. • Maintain or enhance air quality and air quality-related values at sensitive areas (for example, Class I areas) in and near the planning area. • Minimize emissions from BLM actions, within the scope of the BLM's authority, that contribute to atmospheric deposition, visibility degradation, or exceedances of ambient air quality standards (AAQS). • Reduce greenhouse gas (GHG) emissions from BLM-authorized activities.		
4.	**Objective:** No similar objective.	**Objective:** Manage air resources within the planning area in accordance with the Air Resources Management Plan (**Appendix C**).	
5.	**Management Direction:** No similar management direction.	**Management Direction:** Use authorization, leasing stipulations, and conditions of approval (COA) for mineral development activities to support the air quality goals and prevent significant impacts.	**Management Direction:** Condition BLM actions or authorizations resulting in air quality or visibility degradation to prevent violating AAQS.
6.	**Management Direction:** Advise the North Dakota Department of Environmental Quality (DEQ) and the Three Affiliated Tribes if the analysis shows the potential for any BLM-authorized action to exceed the AAQS and the prevention of significant deterioration (PSD) standards.	**Management Direction:** Work cooperatively with the North Dakota DEQ and Tribal and local agencies to minimize impacts on air quality from BLM-authorized actions.	
7.	**Management Direction:** Complete all maintenance and operations established for managing air resources in the Montana BLM system. These activities are (a) air quality and climate monitoring, (b) air quality monitoring to support other activities, and (c) maintenance of existing management developments.	**Management Direction:** Support air resource monitoring to determine existing conditions, long-term trends, and the effectiveness of air resource management strategies. Work collaboratively with state, local, and Tribal agencies; industry; and stakeholders to gather, share, and analyze air quality monitoring data to achieve air quality goals and objectives.	
8.	**Management Direction:** No similar management direction.	**Management Direction:** Prioritize ROW actions for gas-gathering pipelines and consider other management actions to reduce gas venting and flaring.	
9.	**Management Direction:** Require air pollution control devices or other mitigation, and notify the North Dakota DEQ if air quality standards are being exceeded by oil and gas wells that must flare.	**Management Direction:** To prevent air quality or air quality related value (AQRV) degradation, incorporate strategies such as field design strategies (for example, reinjection, cogeneration, centralized facilities, three-phase transport, and delivery systems), emissions controls, or design features to reduce venting and flaring from BLM-authorized oil and gas wells.	**Management Direction:** Require emission controls or design features in collaboration with the North Dakota DEQ when significant impacts on air quality or AQRV from venting and flaring at BLM-authorized oil and gas wells are identified.
10.	**Management Direction:** No similar management direction.	**Management Direction:** To minimize fugitive dust emissions from BLM-authorized activities, require a fugitive dust control plan or dust abatement measures developed in coordination with Tribal, state, and local agencies and based on best management practices (BMPs) (**Appendix D**, Design Features and Best Management Practices).	**Management Direction:** Apply, on a case-by-case basis, dust abatement measures for BLM-authorized activities.
11.	**Management Direction:** No similar management direction.	**Management Direction:** Where feasible, promote the design of field systems that reduce air emissions, such as liquids-gathering and delivery systems, centralized treatment systems, storage facilities, and field compression systems.	
12.	**Management Direction:** No similar management direction.	**Management Direction:** Develop and apply COAs to reduce impacts on air resources when the analysis at the permitting or project stage shows significant adverse impacts on ambient air quality standards or air quality related values.	

475.	**Management Direction:** Make lands identified for disposal or exchange and not presently leased for grazing available for grazing using temporary, nonrenewable leases.	**Management Direction:** No similar management direction.	**Management Direction:** No similar management direction.
476.	**Management Direction:** When grazing leases are issued or renewed, address potential impacts on special status plants through environmental review.	**Management Direction:** Manage livestock grazing in special status plant areas to improve habitat or population resiliency.	**Management Direction:** Same as Alternative A.

Goals, objectives, management direction, or allocations that are applicable to more than one alternative are indicated by combining cells for the same alternative.

Where a management direction in one or more alternatives does not apply to another, for example Alternative A, it states, "No similar management direction."

Management direction that is the same as another alternative but whose cells cannot be combined is noted as, "Same as Alternative__."

Use the hyperlinks in the following table to access the applicable section of the alternative's matrix, below.

Table 2-2
Land Use Plan Decisions by Alternative

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
1.	**Air Quality**			
2.	**Goals:** Protect the quality of air and atmospheric values in the planning area. Maintain or enhance air quality and air quality-related values at sensitive areas (for example, Class I areas) in and near the planning area. Minimize emissions from BLM actions, within the scope of the BLM's authority, that contribute to atmospheric deposition, visibility degradation, or exceedances of ambient air quality standards (AAQS). Reduce greenhouse gas (GHG) emissions from BLM-authorized activities.			
3.	**Objective:** No similar objective.	**Objective:** Manage air resources within the planning area in accordance with the Air Resources Management Plan (**Appendix C**).		
4.	**Management Direction:** No similar management direction.	**Management Direction:** Use authorization, leasing stipulations, and conditions of approval (COA) for mineral development activities to support the air quality goals and prevent significant impacts.	**Management Direction:** Condition BLM actions or authorizations resulting in air quality or visibility degradation to prevent violating AAQS.	**Management Direction:** Use authorization, leasing stipulations, and conditions of approval (COA) for mineral development activities to support the air quality goals and prevent significant impacts.
5.	**Management Direction:** Advise the North Dakota Department of Environmental Quality (DEQ) and the Three Affiliated Tribes if the analysis shows the potential for any BLM-authorized action to exceed the AAQS and the prevention of significant deterioration (PSD) standards.	**Management Direction:** Work cooperatively with the North Dakota DEQ and Tribal and local agencies to minimize impacts on air quality from BLM-authorized actions.		
6.	**Management Direction:** Complete all maintenance and operations established for managing air resources in the Montana BLM system. These activities are (a) air quality and climate monitoring, (b) air quality monitoring to support other activities, and (c) maintenance of existing management developments.	**Management Direction:** Support air resource monitoring to determine existing conditions, long-term trends, and the effectiveness of air resource management strategies. Work collaboratively with state, local, and Tribal agencies; industry; and stakeholders to gather, share, and analyze air quality monitoring data to achieve air quality goals and objectives.		
7.	**Management Direction:** No similar management direction.	**Management Direction:** Prioritize ROW actions for gas-gathering pipelines and consider other management actions to reduce gas venting and flaring.		
8.	**Management Direction:** Require air pollution control devices or other mitigation, and notify the North Dakota DEQ if air quality standards are being exceeded by oil and gas wells that must flare.	**Management Direction:** To prevent air quality or air quality related value (AQRV) degradation, incorporate strategies such as field design strategies (for example, reinjection, cogeneration, centralized facilities, three-phase transport, and delivery systems), emissions controls, or design features to reduce venting and flaring from BLM-authorized oil and gas wells.	**Management Direction:** Require emission controls or design features in collaboration with the North Dakota DEQ when significant impacts on air quality or AQRV from venting and flaring at BLM-authorized oil and gas wells are identified.	**Management Direction:** To prevent air quality or AQRV degradation, incorporate strategies such as field design strategies (for example, reinjection, cogeneration, centralized facilities, three-phase transport, and delivery systems), emissions controls, or design features to reduce venting and flaring from BLM-authorized oil and gas wells.
9.	**Management Direction:** No similar management direction.	**Management Direction:** To minimize fugitive dust emissions from BLM-authorized activities, require a fugitive dust control plan or dust abatement measures developed in coordination with Tribal, state, and local agencies and based on best management practices (BMPs) (**Appendix D**, Design Features and Best Management Practices).	**Management Direction:** Apply, on a case-by-case basis, dust abatement measures for BLM-authorized activities.	**Management Direction:** To minimize fugitive dust emissions from BLM-authorized activities, require a fugitive dust control plan or dust abatement measures developed in coordination with Tribal, state, and local agencies and based on BMPs (**Appendix D**, Design Features and Best Management Practices).
10.	**Management Direction:** No similar management direction.	**Management Direction:** Where feasible, promote the design of field systems that reduce air emissions, such as liquids-gathering and delivery systems, centralized treatment systems, storage facilities, and field compression systems.		
11.	**Management Direction:** No similar management direction.	**Management Direction:** Develop and apply COAs to reduce impacts on air resources when the analysis at the permitting or project stage shows significant adverse impacts on ambient air quality standards or air quality related values.		
12.	**Allocation:** No similar allocation.	**FEDERAL CLASS I AREAS** **Allocation:** NSO–New: Prohibit surface occupancy within 1 mile of the boundary of the Lostwood Wilderness or the Theodore Roosevelt National Park Class 1 Area.		
13.	**Allocation:** No similar allocation.	**FEDERAL CLASS I AREAS** **Allocation:** CSU–New: Surface use and occupancy within 2 miles of the boundary of the Lostwood Wilderness or Theodore Roosevelt National Park is subject to the following conditions; prior to surface occupancy and use, the operator must submit an air analysis, including near field dispersion modeling, that demonstrates that proposed exploration or development operations will not result in adverse impacts to air quality and air quality related values and will meet air quality goals, objectives, standards and thresholds for the Class 1 areas. The BLM may require modifications to or disapprove a proposed activity that would result in an adverse impact to air quality, exceed an AAQS, or exceed a level of concern for an AQRV.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C		Alternative D (Proposed Plan)
14.	**Allocation:** No similar allocation.	**AIR RESOURCE PROTECTION** **Allocation:** CSU–New: Surface use and occupancy is subject to approval of a waste minimization plan that includes design features to minimize air pollutants released from venting, flaring, and leaks during drilling, completion, and production operations.			**AIR RESOURCE PROTECTION** **Allocation:** Lease Notice–New: Waste Minimization (see **Appendix B**), is applied to reduce the waste of natural gas from venting, flaring, and leaks during oil and gas production activities on federal leases.
15.	**Allocation:** No similar allocation.	**Allocation:** **Alternative B (Preferred Alternative):** The area outside 4 miles from existing coal mine permit boundaries as of September 9, 2022, is unacceptable for further consideration for coal leasing (multiple-use screen 3).	**Allocation:** **Alternative B.1:** The areas outside the existing mine permit boundaries as of September 9, 2022, for all active North Dakota mines (BNI Center, Coyote Creek, Falkirk, and Freedom) are unacceptable for further consideration for coal leasing (multiple-use screen 3).	**Allocation:** No similar allocation.	**Allocation:** The area outside 4 miles from existing coal mine permit boundaries as of September 9, 2022, is unacceptable for further consideration for coal leasing (multiple-use screen 3).
16.	**Management Direction:** No similar management direction.	**Management Direction:** Support, conduct, or require a regional air modeling analysis, as needed and in accordance with the Air Resources Management Plan (**Appendix C**), to assess cumulative air quality impacts from reasonably foreseeable emissions-producing activities in the planning area. Cumulative air quality modeling is part of a comprehensive strategy to prevent BLM-permitted activities from causing or contributing to violations of ambient air quality standards or causing significant adverse impacts on AQRVs.			
17.	**Management Direction:** No similar management direction.	**Management Direction:** Determine, on a case-by-case basis and in accordance with the Air Resources Management Plan (**Appendix C**), the appropriate level of air analysis necessary to determine potential air quality impacts from proposed actions and subsequent potential mitigation strategies for project-level EISs and EAs.			
18.	**Management Direction:** No similar management direction.	**Management Direction:** Consider and prioritize actions that reduce or mitigate GHG emissions, such as enhanced energy efficiency, use of lower GHG-emitting technologies, capture or beneficial use of methane emissions, and/or sequestration of carbon dioxide through enhanced oil recovery.			
19.	**Management Direction:** No similar management direction.	**Management Direction:** Prioritize processing of ROW applications for infrastructure (for example, pipelines) that maximize the recovery and delivery of natural gas from well sites to meet the objectives of reducing lost produce and minimizing air pollutant emissions from venting and flaring.			
20.	**Management Direction:** No similar management direction.	**Management Direction:** Minimize impacts on climate change from anthropogenic GHG emissions associated with its authorizations, routine maintenance, and administrative operations by seeking opportunities to reduce the use of fossil fuels and may require and implement GHG reduction strategies in its authorizations and operations such as: • use electric or solar powered tools and equipment • use electric vehicles • use alternative (nonfossil fuel) energy sources at facilities and authorized operations • reduce use of fossil fuel vehicles on BLM-administered roads and trails • provide increased access for human, animal, and electric powered recreation			
21.	**Soil Resources**				
22.	**Goal:** Maintain, improve, or restore the health and productivity (chemical, physical, and biotic properties) of soil by reducing erosion and compaction—identified using proper functioning condition (PFC), Standards for Rangeland Health, and Guidelines for Livestock Grazing Management—while supporting multiple use.				
23.	**Objective:** No similar objective.	**Objective:** Maintain and/or improve soil productivity by reducing soil compaction and erosion, establishing desirable plant communities, maintaining existing desirable vegetative ground cover composition consistent with the ecological site characteristics, and sustaining other ground cover, including biotic crusts and litter to maintain or increase soil stability and nutrient cycling as required and as measured by Land Health Assessments.			
24.	**Management Direction:** Analyze proposed surface-disturbing projects to determine the suitability of soils to support or sustain such projects. Design projects to minimize soil loss. Management actions will be consistent with soil resource capabilities.	**Management Direction:** Analyze proposed surface disturbing projects to determine the suitability of soils to support or sustain such activities. Design projects to minimize soil loss. Management actions will be consistent with soil resource capabilities and objectives for other resources/uses, while allowing for multiple use.			
25.	**Management Direction:** No similar management direction.	**Management Direction:** Apply design features (to be determined at the project level) and reclamation standards to surface-disturbing activities (see **Appendix D**, Design Features and Best Management Practices, and **Appendix E**, Reclamation Standards).			
26.	**Objective:** No similar objective.	**Objective:** Prioritize designated areas for soil resource protection and minimize ground disturbance.			
27.	**Management Direction:** No similar management direction.	**Management Direction:** Require that surface-disturbing activities occurring on prime farmland be reclaimed to pre-disturbance productivity levels.			
28.	**Allocation:** Allow no surface coal mining through a multiple-use tradeoff screen on up to 79,478 acres with slopes greater than 30 percent over federal coal to protect it from excessive erosion.	**Allocation:** Slopes greater than 30 percent covering more than 10-acre area are unacceptable for coal leasing under the multiple-use screen (Screen 3).	**Allocation:** No similar allocation.		**Allocation:** Slopes greater than 30 percent covering more than 10-acre area are unacceptable for coal leasing under the multiple-use screen (Screen 3).

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
29.	**Allocation:** No similar allocation.	**SOILS, SENSITIVE SOILS** **Allocation:** CSU 12-24: Surface occupancy and use is subject to the following operating constraints: prior to surface disturbance on sensitive soils, a reclamation plan must be approved by the administrative officer. Sensitive soils are determined using a combination of slope and chemical and physical properties to determine suitability to reclamation. The plan must demonstrate the following: • no other practicable alternatives exist for relocating the activity, • the activity will be located to reduce impacts to soil and water resources, • site productivity will be maintained or restored, • surface runoff and sedimentation will be adequately controlled, • on- and off-site areas will be protected from accelerated erosion, • that no areas susceptible to mass wasting would be disturbed, and • surface-disturbing activities will be prohibited during extended wet periods.		
30.	**Allocation:** No similar allocation.	**BADLANDS, ROCK OUTCROP** **Allocation:** NSO 11-69 Badlands, Rock Outcrops. Surface occupancy and use is prohibited on badlands and rock outcrops.		
31.	**Allocation:** No similar allocation.	**Allocation:** Manage sensitive soils as exclusion areas for all types of ROWs.	**Allocation:** Manage sensitive soils as avoidance areas for all types of ROWs. Where authorized, implement BMPs, design features and reclamation standards upon decommissioning (**Appendix D** and **Appendix E**, respectively).	**Allocation:** Manage sensitive soils as avoidance areas for all types of ROWs. Where authorized, implement BMPs, design features and reclamation standards upon decommissioning (**Appendix D** and **Appendix E**, respectively). Additionally, a reclamation plan would be submitted to and approved by the Authorized Officer prior to granting the ROW.
32.	**Allocation:** No similar allocation.	**Allocation:** Manage slopes greater than 30 percent and rock outcrops as exclusion areas for all types of ROWs.	**Allocation:** Manage slopes greater than 30 percent and rock outcrops as avoidance areas for all types of ROWs. Where authorized, implement BMPs and design features and reclamation standards upon decommissioning (**Appendix D** and **Appendix E**, respectively).	**Allocation:** Manage slopes greater than 30 percent and rock outcrops as avoidance areas for all types of ROWs. Where authorized, implement BMPs and design features and reclamation standards upon decommissioning (**Appendix D** and **Appendix E**, respectively) Additionally, a reclamation plan would be submitted to and approved by the Authorized Officer prior to granting the ROW.
33.	**Allocation:** Limit off-highway vehicle (OHV) use on 29,800 acres in the Big Gumbo area to periods of the year generally characterized by dry and stable soils (June 2–February 28).	**Allocation:** Limit OHV use on BLM-administered lands in Bowman County. In spring (March 1–June 1), unsurfaced routes (for example, two-track routes) are closed (except for administrative or authorized purposes) to protect against erosion.		
34.	**Management Direction:** No similar management direction.	**Management Direction:** Apply design features (to be determined at the project level) and reclamation standards to surface-disturbing activities (see **Appendix D,** Design Features and Best Management Practices and **Appendix E**, Reclamation Standards).		
35.	**Water Resources**			
36.	**Goals:** Maintain, enhance, or restore the geomorphological, chemical, and biological integrity of waters to protect all beneficial uses as determined by the State of North Dakota. In accordance with parameters of 43 USC 666, follow established North Dakota water permitting requirements to ensure that water is legally and physically available when and where it is needed to achieve the BLM's related multiple-use management objectives and legal mandates. Manage surface water and groundwater quality on BLM-administered lands to protect, maintain, improve, and/or restore the chemical, physical, and biological integrity of waters to protect beneficial uses as determined by the State of North Dakota. Follow established North Dakota water permitting requirements to manage water quantity and quality to meet, exceed, or make significant and measurable progress toward achieving North Dakota State water quality standards, while ensuring that sufficient water quantity and quality are available to support BLM resources and resource uses (Dakota Standard 3). Protect, restore, and maintain the chemical, physical, and biological (ecological) services of surface water and groundwater to support resource management needs and all associated beneficial use standards. Maintain and/or restore natural hydrological processes.			
37.	***Water Quantity***			
38.	**Objective:** No similar objective.	**Objective:** Support natural surface water flow regimes.		
39.	**Objective:** No similar objective.	**Objective:** Maintain or increase the frequency and extent of stream-floodplain interactions to buffer flooding, increase natural water storage within the valley bottom, and elevate base flows.		
40.	**Objective:** Manage groundwater to maintain the integrity of aquifer systems, both in quantity and quality.	**Objective:** Manage groundwater to maintain the integrity of aquifer systems, both in quantity and quality.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
41.	**Objective:** No similar objective.	**Objective:** In accordance with parameters of 43 USC 666, follow North Dakota law in order to acquire, perfect, and protect water rights necessary to carry out current and future BLM-administered land management purposes.		
42.	**Management Direction:** No similar management direction.	**Management Direction:** Work cooperatively with North Dakota to properly acquire and perfect federal reserved water rights necessary to carry out BLM-administered land management purposes where possible under state law. If a federal reserved water right is not available, then work with the North Dakota Department of Water Resources to determine the availability of water on BLM land and follow state law in order to acquire permits for the use of available water.		
43.	**Management Direction:** No similar management direction.	**Management Direction:** Ensure that land use authorizations granted to third parties contain appropriate terms and conditions to protect water rights administered by the BLM and water uses implemented by the BLM.		
44.	**Management Direction:** No similar management direction.	**Management Direction:** Work to acquire private water rights that are located on BLM-administered lands and put them in the BLM's name.		
45.	**Management Direction:** Develop new sources of water on BLM-administered lands, especially in the Big Gumbo area. Methods include snow management, pothole blasting, and reservoir excavation.	**Management Direction:** Support water development for multiple resources where land health standards are not being met due to a lack of water availability.		
46.	**Management Direction:** No similar management direction.	**Management Direction:** Design projects to ensure that state and federal water quality standards are met or exceeded, and water quantity is both physically and legally available in accordance with federal and state laws.		
47.	**Objective:** No similar objective.	**Objective:** Manage water developments and impoundments to supply water when and where it is needed to achieve current or future authorized uses, while using BMPs that minimize related impacts on the hydrologic and ecologic systems.		
48.	**Objective:** No similar objective.	**Objective:** Ensure that water consumption is sustainable, so that surface and groundwater resources will remain available to sustain the yield and productivity of resources for current and future generations.		
49.	**Management Direction:** No similar management direction.	**Management Direction:** Work cooperatively with the North Dakota Department of Water Resources and other state programs and federal agencies to obtain and share information regarding groundwater and surface water availability and sustainability.		
50.	***Water Quality***			
51.	**Objective:** No similar objective.	**Objective:** Locate, prevent, or minimize, and remediate sources of point and nonpoint source pollution entering or originating on BLM-administered lands and that are contributing to water quality impairment.		
52.	**Management Direction:** No similar management direction.	**Management Direction:** Maintain or improve the health, complexity, and spatial extent of riparian areas, wetlands, and aquatic ecosystems. Implement active and/or passive restoration actions to accelerate progress toward potential natural condition, where needed, to sequester contaminants, especially from upstream sources.		
53.	**Management Direction:** No similar management direction.	**Management Direction:** Implement BMPs and design features (to be determined at the project level) to minimize, avoid, or reduce erosion and the transport of pollutants to downstream waterbodies (see **Appendix D**, Design Features and Best Management Practices).		
54.	**Management Direction:** No similar management direction.	**Management Direction:** Coordinate, cooperate, and consult with federal, Tribal, state, and local agencies; private landowners; and stakeholder organizations to foster a watershed-based approach to water resource stewardship.		
55.	**Management Direction:** Design management actions on BLM-administered land in municipal watersheds and Source Water Protection Areas (SWPAs) (municipal and rural) to protect the water quality and quantity.	**Management Direction:** No similar management direction.		
56.	**YELLOWSTONE RIVER FLOODPLAIN** **Allocation:** NSO 11-36: No surface occupancy or use is allowed in the floodplain of the Yellowstone River.	**Allocation:** No similar allocation *(see NSO 11-70)*		
57.	**MISSOURI RIVER FLOODPLAIN** **Allocation:** NSO 11-39: No surface occupancy or use is allowed on lands within the floodplain of the Missouri River.	**Allocation:** No similar allocation *(see NSO 11-70)*		
58.	**WETLANDS, LAKES AND PONDS** **Allocation:** NSO 11-33: No surface occupancy or use is allowed within 200 feet of wetlands, lakes, or ponds to protect surface water and related vegetation.	**STREAMS, WATERBODIES, RIPARIAN AREAS, WETLANDS, AND FLOODPLAINS** **Allocation:** NSO 11-70 Streams, Waterbodies, Riparian Areas, Wetlands, and Floodplains: Surface occupancy and use is prohibited within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas.		
59.	**RIPARIAN AREAS OF WETLANDS, STREAMS, AND RIVERS** **Allocation:** CSU 12-5: Surface occupancy or use will be subject to the following special operating constraint: No disturbance of riparian areas of wetlands, intermittent, ephemeral, or perennial streams and rivers would be allowed, except for essential road and utility crossings.	**RIPARIAN AREAS, WETLANDS, STREAMS, AND WATERBODIES** **Allocation:** CSU–New: Surface occupancy and use is subject to the following operating constraints: Prior to surface occupancy and use within 300 feet of riparian areas, wetlands, ephemeral, intermittent, and perennial drainages, and waterbodies, a plan must be approved by the BLM Authorized Officer with design features that demonstrate how actions would maintain or improve the functionality of the resource. The plan would address: 1) mitigation to reduce impacts to a level where the project is neutral or positive to the resource; 2) interim and final reclamation; and 3) monitoring. Following established protocols, the operator must conduct monitoring capable of detecting early signs of changing conditions.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
60.	**Management Direction:** Maintain or enhance drainage stability. Headcuts will receive the focus of attention.	**Management Direction:** No similar management direction (this is rolled up into goals and objectives)		
61.	**Management Direction:** No similar objective.	**Management Direction:** In accordance with Executive Orders 11988 and 11990, floodplains and/or wetlands will be avoided to the greatest extent possible. Where no practical alternative exists, the BLM Authorized Officer may approve development if the development is shown to minimize the potential for adverse impacts.		
62.	**Objective:** No similar objective.	**Objective:** Maintain and improve watersheds that meet PFC. Provide a scientific, watershed approach to meet PFC on natural and human-influenced watersheds that do not.		
63.	**Objective:** No similar objective.	**Objective:** Increase the percentage of lotic riparian and wetland miles that meet PFC on natural ecosystems and potential natural ecosystems, including those streams listed as water quality impaired. Meet desired future condition (DFC).		
64.	**Management Direction:** No similar management direction.	**Management Direction:** Through assessment of PFC, identify those elements that are limiting PFC attainment and develop management directions that move toward PFC.		
65.	**Management Direction:** No similar management direction.	**Management Direction:** Coordinate, cooperate, and consult with federal, state, Tribal, and local agencies; private landowners; and stakeholder organizations to foster a watershed-based approach to water resource stewardship.		
66.	**Management Direction:** No similar management direction.	**Management Direction:** Manage impoundments and supplemental water to provide resource values that support the BLM's multiple-use objectives in a manner that minimizes adverse effects on water quality, riparian habitat, and watershed function.		
67.	**Objective:** No similar objective.	**Objective:** Consult with the North Dakota Department of Water Resources and Environmental Quality to protect municipal supply watersheds and drinking water source protection zones.		
68.	**Management Direction:** No similar management direction.	**Management Direction:** Engage in collaborative planning, protection, and remediation efforts that focus on municipal supply watersheds and drinking water source protection zones.		
69.	**Allocation:** No similar allocation.	**SOURCE WATER PROTECTION AREAS** **Allocation:** Close state-designated SWPAs to fluid mineral leasing.	**SOURCE WATER PROTECTION AREAS** **Allocation:** NSO 11-71**:** SWPAs – Surface occupancy and use is prohibited within state-designated SWPAs.	**SOURCE WATER PROTECTION AREAS** **Allocation:** Close state-designated SWPAs to fluid mineral leasing.
70.	**Allocation:** No similar allocation.	**MISSOURI RIVER** **Allocation:** NSO-New: Surface occupancy and use is prohibited within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe.	**Allocation:** No similar allocation.	**MISSOURI RIVER** **Allocation:** NSO-New: Surface occupancy and use is prohibited within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe.
71.	**Riparian Areas and Wetlands**			
72.	**Goal:** Maintain or improve the condition of riparian areas, wetlands, and aquatic ecosystems to achieve related resource goals and objectives, including for water quantity, water quality, habitat for terrestrial and aquatic species, recreation, wildland fire mitigation, floodwater retention, and drought resilience.			
73.	**Objective:** Improve riparian areas and wetlands toward PFC or a higher ecological status.	**Objective:** Manage riparian areas and wetlands to attain PFC. Manage riparian areas and wetlands to a condition beyond PFC where needed to achieve related resource objectives (such as, water quantity, water quality, habitat for terrestrial and aquatic species, recreation, wildland fire mitigation, floodwater retention, and drought resilience).		
74.	**Management Direction:** No similar management direction.	**Management Direction:** Manage uses of BLM-administered lands, including but not limited to, range management and fluid mineral development, to avoid or minimize impacts on wetlands and riparian areas. Implement active and/or passive restoration actions to accelerate progress toward PFC, where conditions warrant.		
75.	**Management Direction:** Develop site-specific objectives and management strategies for riparian areas and wetlands during the development and implementation of proposed actions and activity plans.			
76.	**Management Direction:** No similar management direction.	**Management Direction:** In accordance with Executive Orders 11988 and 11990, floodplains and/or wetlands will be avoided to the greatest extent possible. Where no practical alternative exists, the BLM Authorized Officer may approve development if the development is shown to minimize the potential for adverse impacts.		
77.	**Management Direction:** No similar management direction.	**Management Direction:** Maintain or improve the health, complexity, and spatial extent of riparian areas, wetlands, and aquatic ecosystems. Implement active and/or passive restoration actions to accelerate progress toward potential natural conditions, where needed to achieve site-specific objectives.		
78.	**YELLOWSTONE RIVER FLOODPLAIN** **Allocation:** NSO 11-36: No surface occupancy or use is allowed in the floodplain of the Yellowstone River.	**Allocation:** No similar allocation *(see NSO 11-70)*		
79.	**MISSOURI RIVER FLOODPLAIN** **Allocation:** NSO 11-39: No surface occupancy or use is allowed on lands within the floodplain of the Missouri River.	**Allocation:** No similar allocation *(see NSO 11-70)*		
80.	**WETLANDS, LAKES AND PONDS** **Allocation:** NSO 11-33: No surface occupancy or use is allowed within 200 feet of wetlands, lakes, or ponds.	**STREAMS, WATERBODIES, RIPARIAN AREAS, WETLAND, AND FLOODPLAINS** **Allocation:** NSO 11-70 Streams, Waterbodies, Riparian Areas, Wetlands, and Floodplains: Surface occupancy and use is prohibited within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas.		
81.	**WATERFOWL NESTING HABITAT** **Allocation:** TL 13-15: No seismic exploration is allowed within 500 feet of waterfowl nesting habitat from March 1 through July 1 to protect nesting waterfowl.			

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
82.	**RIPARIAN AREAS OF WETLANDS, STREAMS, AND RIVERS** **Allocation:** CSU 12-5: Controlled surface occupancy or use will be subject to no disturbance of riparian areas or wetlands; intermittent, ephemeral, or perennial streams; and rivers.	**RIPARIAN AREAS, WETLANDS, STREAMS, AND WATERBODIES** **Allocation:** CSU–New: Surface occupancy and use is subject to the following operating constraints: Prior to surface occupancy and use within 300 feet of riparian areas, wetlands, ephemeral, intermittent, and perennial drainages, and waterbodies, a plan must be approved by the BLM Authorized Officer with design features that demonstrate how actions would maintain or improve the functionality of the resource. The plan would address: 1) mitigation to reduce impacts to a level where the project is neutral or positive to the resource; 2) interim and final reclamation; and 3) monitoring. Following established protocols, the operator must conduct monitoring capable of detecting early signs of changing conditions.		
83.	**Allocation:** No similar allocation.	**Allocation:** Close riparian areas and wetlands (plus a 300-foot buffer) to mineral material disposal.	**Allocation:** Avoid mineral material disposal within 300 feet of riparian areas and wetlands, unless it is the only practical alternative and design features and BMPs can be implemented to avoid long-term disturbance.	**Allocation:** Close riparian areas and wetlands (plus a 300-foot buffer) to mineral material disposal.
84.	**Allocation:** No similar allocation.	**Allocation:** Manage riparian areas and wetlands as ROW exclusion areas, except for existing ROW authorizations.	**Allocation:** Manage riparian areas and wetlands as ROW avoidance areas. ROWs would be permitted with proper design and where allowing so would reduce impacts associated with an alignment that excludes the area. Fens are of particular concern for avoidance.	**Allocation:** Manage riparian areas and wetlands as ROW avoidance areas. ROWs may be permitted where no practical alternative exists and where design features and BMPs could be implemented to mitigate impacts and maintain riparian area and wetland functionality. Fens are of particular concern for avoidance.
85.	***Greater Sage-Grouse***			
86.	**Management Direction LG-1.12:** Where riparian and wetland areas are already meeting standards, they will be maintained in that condition or better. Where a site's capability is less than PFC, BLM will manage to achieve or move towards capability. Within PHMA and GHMA, manage wet meadows to maintain a component of perennial forbs with diverse species richness relative to site potential (such as reference state) to facilitate brood rearing.			
87.	**Management Direction LG-1.13:** In PHMA, 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 ecological site descriptions. Example: Within PHMA, 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).			
88.	**Management Direction LG-1.14:** Authorize new water development for diversion from spring or seep source only when PHMA will be maintained or benefit from the development. This includes developing new water sources for livestock as part of an Allotment Management Plan/Conservation Plan to improve GRSG habitat.			
89.	**Management Direction LG-1.15:** 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 PHMA. Make modifications where necessary, considering impacts on other water uses when such considerations are neutral or beneficial to GRSG.			
90.	***Greater Sage-Grouse (Treatments to Increase Forage for Livestock/Wild Ungulates)***			
91.	**Management Direction LG-1.16:** In PHMA, 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 Allotment Management Plan/Conservation Plan to improve GRSG habitat).			
92.	**Management Direction LG-1.17:** Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to PHMA to determine if they should be restored to sagebrush or habitat of higher quality for GRSG. If these seedings are part of an Allotment Management Plan/Conservation Plan or if they provide value in conserving or enhancing the rest of the PHMA, then no restoration will be necessary. Assess the compatibility of these seedings for GRSG habitat or as a component of a grazing system during the land health assessments.			
93.	***Greater Sage-Grouse (Structural Range Improvement and Livestock Management Tools)***			
94.	**Management Direction LG-1.18:** In PHMA, 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.			
95.	**Management Direction LG-1.19:** When developing or modifying water developments in PHMA, use applicable required design features (Appendix C of the 2015 Greater Sage-Grouse Approved RMP Amendment/Record of Decision[1] [BLM 2015a]) to mitigate potential impacts from West Nile virus.			
96.	**Management Direction LG-1.20:** In PHMA, evaluate existing structural range improvements and location of supplements (salt or protein blocks) during grazing lease renewal process to 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 PHMA based on proximity to lek, lek size, and topography. Monitor for, and treat invasive species associated with existing range improvements.			

[1] https://eplanning.blm.gov/eplanning-ui/project/36811/570

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
97.	**Vegetation Communities**			
98.	**Goals:** Uplands are in PFC for site-specific conditions of climate, soils, and parent material (Dakota Standard 1). Habitats are maintained and/or restored, where appropriate, for healthy, productive, and diverse populations of native plant and animal species (Dakota Standard 5). Manage the upland biotic community to optimize the following: community diversity, community structure, exotic plants, photosynthesis activity, plant status, seed production, recruitment, and nutrient cycle (Dakota Standard 1). Maintain, restore, or enhance vegetation community health, connectivity, resiliency, and diversity to provide a mix of successional stages that incorporate diverse structure and composition in the desired vegetation types. Promote recovery and restoration of sagebrush and grassland communities after wildfires. Prevent the introduction and spread of noxious weeds and invasive species through cooperative integrated pest management practices. Promote management focus on special status species plants, as determined by the Director for the BLM Montana/Dakotas State Office. Maintain or improve the ability of BLM-administered lands to reduce (sequester) atmospheric GHGs.			
99.	***Rangeland***			
100.	**Objective:** No similar objective.	**Objective:** Provide native plant communities that exist in a diversity of plant associations, including trees, shrubs, and understory vegetation, with sufficient diversity in structure, age class, and species composition, to support nutrient cycling and energy flows.	**Objective:** Provide plant communities that reflect the potential natural community or the desired plant community appropriate for the ecological site**.**	
101.	**Management Direction:** No similar management direction.	**Management Direction:** Use native species only, unless consistent with BLM policy on the use of nonnative species: a. Suitable native species are not available, b. The natural biological diversity of the proposed management area will not be diminished, c. Exotic and naturalized species can be confined within the proposed management area, d. Analysis of ecological site inventory information indicates that a site will not support reestablishment of a species that historically was part of the natural environment, and e. Resource management objectives cannot be met with native species. When planning restoration, take into consideration floral resources and host plants for pollinators and add those species to seed mixes as appropriate.		
102.	**Management Direction:** No similar management direction.	**Management Direction:** Allow hay only as a land treatment to benefit other resources and include design features that benefit pollinators (for example, minimum height and timing requirements; see **Appendix D**, Design Features and Best Management Practices).		
103.	**Objective:** No similar objective.	**Objective:** Identify and maintain or enhance habitats of conservation concern as designated by the North Dakota Natural Heritage Program (that is, woody draws, tall grass prairie, and riparian areas).		
104.	**Objective:** Protect or improve intact native prairies.			
105.	**Management Direction:** No similar management direction.	**Management Direction:** Manage tallgrass prairie to maintain or enhance habitat.		
106.	**Management Direction:** No similar management direction.	**Management Direction:** Inventory potential tallgrass prairie to confirm its presence and prioritize these areas for management.		
107.	**Allocation:** No similar allocation.	**TALLGRASS PRAIRIE** **Allocation:** NSO–New: Surface occupancy and use is prohibited in identified tallgrass prairie.		
108.	**Allocation:** No similar allocation.	**Allocation:** Close tallgrass prairie to mineral materials disposal.		
109.	**Allocation:** No similar allocation.	**Allocation:** Close tallgrass prairie to NEL minerals.	**Allocation:** No similar allocation.	**Allocation:** Close tallgrass prairie to NEL minerals.
110.	**Allocation:** No similar allocation.	**Allocation:** Manage tallgrass prairie as ROW exclusion.	**Allocation:** Manage tallgrass prairie as ROW avoidance; these areas may be available for ROWs with special design features (to be determined at the project level) to minimize disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage tallgrass prairie as ROW exclusion.
111.	**Objective:** Protect or improve intact native prairies.	**Objective:** Provide for commercial seed harvesting in all areas, except ACECs and occupied special status plant species habitat.	**Objective:** Provide for commercial seed harvesting in all areas.	**Objective:** Provide for commercial seed harvesting in all areas, except ACECs and occupied special status plant species habitat.
112.	**Management Direction:** No similar management direction.	**Management Direction:** Consider and prioritize vegetation to capture and store carbon, with consideration for resource objectives, by using Standards for Rangeland Health and conservation actions guidelines at the project planning and implementation level.	**Management Direction:** No similar management direction.	**Management Direction:** Consider and prioritize vegetation to capture and store carbon, with consideration for resource objectives, by using Standards for Rangeland Health and conservation actions guidelines at the project planning and implementation level.

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
113.	***Forested/Woodland***			
114.	**Objective:** No similar objective.	**Objective:** Maintain, enhance, or restore forest and woodland community health, composition, and diversity to a desired mosaic, considering factors such as density, basal area, canopy cover, age class, stand health, and understory species diversity.		
115.	**Management Direction:** No similar management direction.	**Management Direction:** Manage woody draw habitat on BLM-administered land. Inventory these areas to confirm woody draw presence and prioritize management for woody draws.		
116.	**Management Direction:** No similar management direction.	**Management Direction:** Monitor health indicators (such as disease and fungus infection) and inventory for insects.		
117.	**Management Direction:** No similar management direction.	**Management Direction:** Remove infected trees to reduce the spread of disease and insect infestation.		
118.	**Allocation:** No similar allocation.	**WOODY DRAWS** **Allocation:** NSO–New: Surface occupancy and use is prohibited within identified woody draws.	**WOODY DRAWS** **Allocation:** CSU–New: Surface occupancy and use within woody draws is subject to a plan approved by the BLM to maintain functionality of the habitat.	
119.	**Allocation:** No similar allocation.	**Allocation:** Manage woody draws as ROW exclusion areas.	**Allocation:** Manage woody draws as ROW avoidance areas; these areas may be available for ROWs with special design features (to be determined at the project level) to minimize disturbance (see **Appendix D**, Design Features and Best Management Practices).	
120.	***Noxious Weeds and Invasive Plants***			
121.	**Objective:** No similar objective.	**Objective:** Manage for healthy plant communities by reducing, preventing expansion of, or eliminating the occurrence of noxious and invasive species and undesirable nonnative species.		
122.	**Management Direction:** No similar management direction (for current management, see Schnell Activity Plan EA).	**Management Direction:** Prioritize the Schnell Recreation Area for treatment of noxious weeds and invasive plants, and further prioritize leafy spurge for control (less than 5 acres).		
123.	**Management Direction:** No similar management direction.	**Management Direction:** Conduct annual inventories, prioritizing the contiguous tracts of BLM-administered land.		
124.	**Objective:** No similar objective.	**Objective:** Control invasive and nonnative weed species and prevent the introduction of new invasive species, by implementing a comprehensive weed program, including coordination with key partners, prevention and early detection, education, inventory and monitoring, using principles of integrated pest management (IPM), and creating weed management areas (WMAs).		
125.	**Management Direction:** No similar management direction.	**Management Direction:** Using “Early Detection Rapid Response,” treatment areas would be prioritized in publicly accessible areas, riparian areas, emergency stabilization and burned area rehabilitation (ES&R) areas, and special status species habitat areas. The remaining BLM-administrated lands in the planning area would be the next priority.		
126.	**Management Direction:** No similar management direction.	**Management Direction:** Where and when appropriate, issue grazing leases with a term and condition requiring that the lessee enter into a cooperative range improvement agreement for control of noxious weeds on allotments that they lease.		
127.	**Management Direction:** No similar management direction.	**Management Direction:** Where appropriate, as a term of all authorizations, include an agreement for control of noxious weeds and a requirement to report to the BLM on infestations and acres and areas treated.		
128.	**Management Direction:** No similar management direction.	**Management Direction:** Enter into cooperative agreements with county partners to inventory and control for noxious, invasive, and nonnative species.		
129.	**Allocation:** No similar allocation.	**INVASIVE SPECIES AND NOXIOUS WEEDS** **Allocation:** CSU 12-53: Surface occupancy and use is subject to the following operating constraints: Noxious weed(s) has been identified within the boundaries of the lease parcel. If the operator(s) chooses to disrupt/build roads/build facilities on the parcel, then the operator(s) will be responsible for providing an Integrated Weed Management plan, and the operator also will be responsible for the cost of treatment and monitoring throughout the duration of the project.		
130.	***Greater Sage-Grouse***			
131.	**Objective VEG-1.1:** In all PHMA, the desired condition is to maintain a minimum of 70 percent of lands capable of producing sagebrush with 10 to 30 percent sagebrush canopy cover. The attributes necessary to sustain these habitats are described in Interpreting Indicators of Rangeland Health (BLM Tech Ref 1734-6).			
132.	**Management Direction VEG-1.1:** Remove conifers encroaching into sagebrush habitats. Prioritize treatments closest to occupied GRSG habitats and near occupied leks, and where juniper encroachment is phase 1 or phase 2. Use of site-specific analysis and principles like those included in RMRS-GTR-326: Using resistance and resilience concepts to reduce impacts of invasive annual grasses and altered fire regimes on the sagebrush ecosystem and GRSG: A strategic multi-scale approach (Chambers et al. 2014) and other ongoing modeling efforts to address conifer encroachment will help refine the location for specific priority areas to be treated.			
133.	**Management Direction VEG-1.2:** Consideration for other threatened, endangered or sensitive species will be evaluated in addition to GRSG when prioritizing restoration projects.			
134.	**Management Direction VEG-1.3:** 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 PHMA the highest restoration priority, along with other priority species habitat.			
135.	**Management Direction VEG-1.4:** In PHMA, 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, nonnative seeds may be used as long as they support GRSG habitat objectives.			
136.	**Management Direction VEG-1.5:** Design post restoration management to ensure long-term persistence in PHMA. 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.			

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
137.	**Management Direction VEG-1.6:** In PHMA, 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.			
138.	**Management Direction VEG-1.7:** In PHMA, restore native (or desirable) plants and create landscape patterns which most benefit GRSG, as well as other priority species.			
139.	**Management Direction VEG-1.8:** Make re-establishment of sagebrush cover and desirable understory plants (relative to ecological site potential) a high priority for restoration efforts in PHMA. Prioritize areas for juniper removal to benefit GRSG habitat.			
140.	**Management Direction VEG-1.9:** In PHMA 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.			
141.	**Terrestrial and Aquatic Wildlife Resources**			
142.	**Goals:** • Maintain or restore, where appropriate, for healthy, productive, and diverse populations of native plant and animal species (Dakota Standard 5). Manage prairie stream and river corridors compliance with federal and state laws and according to scientific principles, while conserving, maintaining, and enhancing habitat for healthy populations of terrestrial and aquatic species. Provide habitat and forage to support fish and wildlife with consideration of the North Dakota State Wildlife Action Plan. Prevent the introduction and spread of invasive species through cooperative agreements and management practices.			
143.	**Objective:** No similar objective.	**Objective:** • Minimize fragmentation of large, intact blocks of important wildlife habitat, particularly habitat areas for GRSG and grassland birds. • Maintain or enhance plant communities and habitat needed to maintain or restore fish, aquatic, or wildlife populations. • Provide sufficient habitat for native wildlife species to support viable native wildlife populations. • Continue to gather habitat data while concurrently monitoring human and natural disturbance dynamics to improve habitat management.		
144.	**Management Direction:** No similar objective.	**Management Direction:** Provide habitat improvement projects, where identified, to restore wildlife habitat and/or improve unsatisfactory or declining wildlife habitat, including Schnell Recreation Area. Habitat improvement projects may include, but would not be limited to, management actions such as grazing, fire, mowing, haying, chemical treatments, farming, and no-till grass seeding.		
145.	**Management Direction:** No similar management direction.	**Management Direction:** Allow predator control, subject to the stipulations outlined in the annual Animal Damage Control Memorandum of Understanding between the BLM and US Department of Agriculture (USDA)-Animal Plant Health Inspection Service.		
146.	**Management Direction:** No similar management direction.	**Management Direction:** Continue to gather habitat data while concurrently monitoring human and natural disturbance dynamics to improve habitat management.		
147.	**Management Direction:** Maintain or improve habitats for big game, especially pronghorn, elk, and bighorn sheep			
148.	**Management Direction:** Management activities will consider current management strategies outlined in North Dakota's State Wildlife Action Plan (NDGFD 2015).			Management activities will consider current management strategies outlined in North Dakota's State Wildlife Action Plan.
149.	**Management Direction:** No similar management direction.	**Management Direction:** Management activities will consider current guidance including Pollinator Friendly Best Management Practices for Federal Lands (see **Appendix D**).		
150.	**WATERFOWL NESTING HABITAT** **Allocation:** TL 13-15: No seismic exploration is allowed within 500 feet of waterfowl nesting habitat from March 1 through July 1 to protect nesting waterfowl.			
151.	**BIGHORN SHEEP LAMBING RANGE** **Allocation:** TL 13-18: No construction, seismic exploration, or other development is allowed in bighorn sheep lambing habitat during the following time period: April 1 to June 15.	**BIGHORN SHEEP CRUCIAL HABITAT** **Allocation:** NSO–New: Prohibit surface occupancy and use in known or proposed bighorn sheep crucial habitat.	**BIGHORN SHEEP CRUCIAL HABITAT** **Allocation:** TL–New: No construction, seismic exploration, or other development is allowed in known or proposed bighorn sheep crucial habitat from April 1 to July 15.	**BIGHORN SHEEP LAMBING RANGE** **Allocation:** TL 13-18: No construction, seismic exploration, or other development is allowed in bighorn sheep lambing habitat during the following time period: April 1 to June 15.
152.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within known or proposed bighorn sheep crucial habitat are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		**Management Direction:** Surface-disturbing activities within known or proposed bighorn sheep lambing habitat are subject to special stipulations/design features, to be determined at the project level, to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).
153.	**BIGHORN SHEEP WINTER RANGE** **Allocation:** TL 13-19: No construction, seismic exploration, or other development is allowed in bighorn sheep winter range during the following time period: December 1 to April 1.	**Allocation:** No similar allocation *(see Bighorn Sheep Crucial Habitat NSO)*.	**Allocation:** No similar allocation.	**BIGHORN SHEEP WINTER RANGE** **Allocation:** TL 13-19: No construction, seismic exploration, or other development is allowed in bighorn sheep winter range during the following time period: December 1 to April 1.

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
154.	**Management Direction:** No similar management direction.	**Management Direction:** Prohibit conversions from cattle to domestic sheep or goats in or within 15 miles of North Dakota Game and Fish Department current or proposed bighorn sheep range.	**Management Direction:** Prohibit conversions from cattle to domestic sheep or goats in or within 10 miles of North Dakota Game and Fish Department current or proposed bighorn sheep range.	**Management Direction:** Prohibit conversions from cattle to domestic sheep or goats in or within 15 miles of North Dakota Game and Fish Department current or proposed bighorn sheep range.
155.	**Management Direction:** No similar management direction.	**Management Direction:** Prohibit new grazing applications for domestic sheep or goats in or within 15 miles of North Dakota Game and Fish Department current or proposed bighorn sheep range.	**Management Direction:** Prohibit new grazing applications for domestic sheep or goats in or within 10 miles of North Dakota Game and Fish Department current or proposed bighorn sheep range.	**Management Direction:** Prohibit new grazing applications for domestic sheep or goats in or within 15 miles of North Dakota Game and Fish Department current or proposed bighorn sheep range.
156.	**Allocation:** No similar allocation.	**Allocation:** Manage known or proposed bighorn sheep crucial habitat as a ROW exclusion area.	**Allocation:** Manage proposed bighorn sheep crucial habitat as a ROW avoidance area; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage proposed bighorn sheep lambing habitat as a ROW avoidance area; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).
157.	**Allocation:** No similar allocation.	**Allocation:** Close known or proposed bighorn sheep crucial habitat to NEL mineral leasing.		**Allocation:** No similar allocation.
158.	**Allocation:** No similar allocation.	**Allocation:** Recommend known or proposed bighorn sheep crucial habitat for withdrawal from locatable mineral entry.	**Allocation:** No similar allocation.	
159.	**Allocation:** No similar allocation.	**Allocation:** Close known or proposed bighorn sheep crucial habitat to mineral materials disposal.		**Allocation:** No similar allocation.
160.	**ELK CALVING** **Allocation:** TL 13-22: No seismic exploration, construction, or other development is allowed on elk calving range during the following time period: June 1 to July 1.	**Allocation:** No similar allocation *(see Big Game Birthing and Foraging Areas* TL).		**Allocation:** No similar allocation *(see Big Game Birthing Areas* TL).
161.	**ELK WINTER RANGE** **Allocation:** TL 13-23: No construction, seismic exploration, or other development is allowed on elk winter range during the following time period: November 30 to May 1.	**Allocation:** No similar allocation *(see Big Game Birthing and Foraging Areas* TL).		**Allocation:** No similar allocation *(see Big Game Birthing Areas* TL).
162.	**Allocation:** No similar allocation.	**BIG GAME BIRTHING AND FORAGING AREAS** **Allocation:** TL–New: No surface use is allowed from April 1 through June 30 in big game birthing and foraging areas to protect mule deer, elk, and antelope from disturbance.		**BIG GAME BIRTHING AREAS** **Allocation:** TL-New: No surface use is allowed from April 1 through June 30 in big game birthing areas to protect mule deer, elk, and antelope from disturbance.
163.	**Allocation:** No similar allocation.	**Allocation:** Manage big game birthing and foraging areas for mule deer, elk, and antelope as ROW avoidance areas; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		**Allocation:** Manage big game birthing areas for mule deer, elk, and antelope as ROW avoidance areas; these areas may be available for ROWs with special stipulations/design features, to be determined at the project level, to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).
164.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within big game birthing and foraging areas are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		**Management Direction:** Surface-disturbing activities within big game birthing areas are subject to special stipulations/design features, to be determined at the project level, to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).
165.	**Allocation:** No similar allocation.	**PRAIRIE DOG HABITAT** **Allocation:** NSO 11-123: Surface occupancy and use is prohibited for oil and gas exploration and development within 0.25 miles of black-tailed prairie dog habitat. Prairie dog habitat is defined as the maximum extent of areas occupied by prairie dogs at any time during the last 10 years.	**BLACK-TAILED PRAIRIE DOGS** **Allocation:** CSU 12-29: Surface occupancy and use within occupied black-tailed prairie dog colonies would be allowed with design features that maintain the functionality of the habitat.	

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
166.	**Allocation:** No similar allocation.	**Allocation:** Manage occupied black-tailed prairie dog colonies as ROW avoidance areas; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		
167.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within occupied black-tailed prairie dog colonies are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		
168.	**PRAIRIE FALCON NESTS** **Allocation:** NSO 11-34: No surface occupancy or use is allowed within 0.50 miles of prairie falcon nests known to have been occupied at least once within the 7 previous years.	**Allocation:** No similar allocation *(see Other Raptor Nests NSO)*		
169.	**PRAIRIE FALCON NESTS** **Allocation:** TL 13-16: No surface use is allowed within 0.50 miles of occupied prairie falcon nests during the following time period: March 15 through July 15.	**Allocation:** No similar allocation *(see Other Raptor Nests NSO)*.		
170.	**Allocation:** No similar allocation *(see Prairie Falcon stipulations)*.	**OTHER RAPTOR NESTS** **Allocation:** NSO 11-73: Surface occupancy and use is prohibited within 0.25 miles of raptor nest sites active within the preceding 7 years.	**OTHER RAPTOR NESTS** **Allocation:** NSO 11-73: Surface occupancy and use is prohibited within 0.25 miles of raptor nest sites active within the preceding 7 years.	**OTHER RAPTOR NESTS** **Allocation:** NSO 11-73: Surface occupancy and use is prohibited within 0.25 miles of raptor nest sites active within the preceding 7 years.
171.	**Allocation:** No similar allocation *(see Prairie Falcon stipulations)*	**Allocation:** No similar allocation *(see Other Raptor Nests NSO)*	**ACTIVE RAPTOR NESTS** **Allocation:** TL 13-33: Surface use is prohibited within 0.50 miles of active raptor nest sites from March 1 through July 31.	
172.	**Allocation:** No similar allocation.	**Allocation:** Manage the area within 0.50 miles of raptor nest sites active within the preceding 7 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage the area within 0.25 miles of raptor nest sites active within the preceding 7 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage the area within 0.50 miles of raptor nest sites active within the preceding 7 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).
173.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 0.50 miles of raptor nest sites active within the preceding 7 years are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		
174.	**Allocation:** No similar allocation.	**SHARP-TAILED GROUSE LEKS** **Allocation:** NSO 11-158: Surface occupancy and use is prohibited within 0.25 miles of sharp-tailed grouse leks.	**Allocation:** No similar allocation.	
175.	**Allocation:** No similar allocation.	**SHARP-TAILED GROUSE AND GREATER PRAIRIE CHICKEN LEKS** **Allocation:** CSU 12-36: Oil and gas leasing within 2 miles of a lek will be subject to a plan approved by the BLM that provides adequate mitigation measures and conservation actions to protect breeding, nesting, and brood-rearing habitats and to limit disturbance in a manner that will support the long-term populations associated with the lek and surrounding habitat.		
176.	**Allocation:** No similar allocation.	**Allocation:** Manage the area within 2 miles of sharp-tailed grouse leks as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		
177.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 2 miles of sharp-tailed grouse leks are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		
178.	**Allocation:** No similar allocation.	**WILDLIFE MANAGEMENT AREAS** **Allocation:** NSO-New: Surface occupancy and use is prohibited within state Wildlife Management Areas.	**Allocation:** No similar allocation.	**WILDLIFE MANAGEMENT AREAS** **Allocation:** NSO-New: Surface occupancy and use is prohibited within state Wildlife Management Areas.

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
179.	**Special Status Species (Includes Vegetation, Terrestrial, and Aquatic)**			
180.	**Goals:** Conserve and recover special status plant species and the ecosystems on which they depend to prevent the need to list any of these species as threatened or endangered. Ensure BLM actions are not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat. Ensure the long-term and self-sustaining persistence of special status species in North Dakota. Protect/maintain populations of special status species by minimizing direct mortality and impacts on habitat. Maintain or improve specialized habitats on a local and landscape scale. Maintain or enhance areas of ecological importance for special status species. Manage specific environmental hazards, risks, and impacts in a manner compatible with special status species health.			
181.	***Common to All Special Status Species***			
182.	**Objective:** No similar objective.	**Objective:** Promote the conservation and recovery of BLM special status species and their habitats.		
183.	**Objective:** No similar objective.	**Objective:** Maintain special status species habitat and enhance other habitat, including connectivity habitat.		
184.	**Management Direction:** The Surface Management Agency is responsible for ensuring that the leased land is examined before any surface-disturbing activities begin; this is to determine the effects on any plant or animal species, listed or proposed for listing as endangered or threatened, or their habitats. The findings of this examination may result in some restrictions to the operator's plans or even disallow use and occupancy that would be in violation of the Endangered Species act of 1973 by detrimentally affecting endangered or threatened species or their habitats. The lessee/operator should, unless notified by the Authorized Officer of the SMA that the examination is not necessary, conduct the examination on the leased lands at lessee/operator's cost. This examination must be done by or under the supervision of a qualified resources specialist approved by the SMA. An acceptable report must be provided to the SMA, identifying the anticipated effects of a proposed action on endangered or threatened species or their habitats.	**Management Direction:** Require surveys for the presence of BLM sensitive species before authorizing surface-disturbing and disrupting activities. Authorize activities only if adverse effects on species and their habitat can be avoided and/or minimized.		
185.	**Management Direction:** Protect from adverse impacts those sites with rare plants and animal populations, exemplary natural communities, and areas designated under the State's natural area registry program.	**Management Direction:** Apply site-specific design features for BLM-authorized activities, such as those identified in Appendix D, Design Features and Best Management Practices, to protect threatened and endangered species, sensitive species, and migratory birds.		
186.	**Management Direction:** No similar management direction.	**Management Direction:** Develop partnerships to conserve key habitats through conservation easements.		
187.	**Management Direction:** No similar management direction.	**Management Direction:** Restore lands to build connectivity habitat.		
188.	**Management Direction:** No similar management direction.	**Management Direction:** Continue cooperative participation in recovery plans, management plans, and conservation strategies for special status species.		
189.	**Management Direction:** No similar management direction.	**Management Direction:** For monarch habitat restoration, ensure that milkweed species are available. If not, planting the following species is recommended: showy milkweed, common milkweed, plains milkweed, green comet milkweed, and whorled milkweed (see **Appendix D**, Design Features and Best Management Practices).		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
190.	**Allocation:** No similar allocation.	**THREATENED, ENDANGERED, OR OTHER SPECIAL STATUS SPECIES** **Allocation:** CSU 12-12: Surface occupancy or use is subject to the following special operating constraints: The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. The BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid a BLM-approved activity that will contribute to a need to list such a species or their habitat. The BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. The BLM will not approve any ground-disturbing activity that may affect any such species or requirements of the Endangered Species Act (ESA), as amended, 16 United States Code (USC) § et seq., including completion of any required procedure for conference or consultation.		
191.	***Special Status Vegetation***			
192.	**Objective:** No similar objective.	**Objective:** Maintain and enhance populations and habitats for BLM special status plant species.		
193.	**Management Direction:** Protect from adverse impacts those sites with rare plants and animal populations, exemplary natural communities, and areas designated under the State natural area registry program.	**Management Direction:** Prohibit surface disturbance within 0.50 miles of known special status plant species populations.	**Management Direction:** Prohibit surface disturbance within 0.25 miles of known special status plant species populations.	
194.	**Management Direction:** No similar management direction.	**Management Direction:** Emphasize inventory of potential and known special status plant habitat to better map and document the health of the populations, threats to habitat, and trends.		
195.	**Allocation:** No similar allocation.	**SPECIAL STATUS PLANT SPECIES** **Allocation:** NSO–New: Surface occupancy and use is prohibited within 0.50 miles of special status plants or habitat.	**SPECIAL STATUS PLANT SPECIES** **Allocation:** NSO–New: Surface occupancy and use is prohibited within 0.25 miles of special status plants or habitat.	**SPECIAL STATUS PLANT SPECIES** **Allocation:** NSO 11-24: No surface occupancy or use is allowed within 0.25 miles of special status plants or populations.
196.	**Allocation:** No similar allocation.	**SPECIAL STATUS PLANT SPECIES** **Allocation:** CSU 12-11: Surface occupancy and use is subject the following special operating constraint: A field inspection will be conducted for special status plant species by the lessee prior to any surface disturbance. A list of special status plant species and any known populations or suitable habitat will be provided to the lessee after issuance of the lease. Plant species on the list are subject to change over time, as new information becomes available. Plant inventories must be conducted at the time of year when the target species are most easily identifiable (for example, when flowering or fruiting). An acceptable report must be provided to the BLM documenting the presence or absence of special status plants in the area proposed for surface-disturbing activities. The findings of this report may result in restrictions to the operator's plans or may preclude use and occupancy.		
197.	**Allocation:** No similar allocation.	**Allocation:** Manage special status plant locations as ROW exclusion areas.	**Allocation:** Manage special status plant locations as ROW avoidance areas; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).	
198.	***Special Status Terrestrial Wildlife***			
199.	**GOLDEN EAGLE NESTS** ***Allocation*:** NSO 11-38: No surface occupancy or use is allowed within 0.50 miles of golden eagle nests known to have been occupied at least once within the 7 previous years.			
200.	**GOLDEN EAGLE NESTS** **Allocation:** TL 13-21: No surface use is allowed within 0.50 miles of occupied golden eagle nests from February 15 to July 15. This stipulation does not apply to the operation and maintenance of production facilities.	**Allocation:** No similar allocation.		
201.	**Allocation:** No similar allocation.	**Allocation:** Manage areas within 1 mile of golden eagle nest sites, active within the preceding 7 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage areas within 0.50 miles of golden eagle nest sites, active within the preceding 7 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).	
202.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 1 mile of golden eagle nest sites, active within the preceding 7 years are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		
203.	**FERRUGINOUS HAWK** **Allocation:** NSO 11-17: No surface occupancy or use is allowed within 0.50 miles of ferruginous hawk nest sites.	**Allocation:** No similar allocation.		
204.	**FERRUGINOUS HAWK NESTS** **Allocation:** TL 13-5: No surface use is allowed within 0.50 miles of occupied ferruginous hawk nests known to be occupied at least once within the 7 previous years between March 15 and July 15. No seismic exploration, construction, or other development would be allowed within 1.2 miles of occupied nests between March 15 and July 15.			

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
205.	**Allocation:** No similar allocation.	**Allocation:** Manage areas within 0.50 miles of ferruginous hawk nest sites active within the preceding 7 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).		
206.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 0.50 miles of ferruginous hawk nest sites active within the preceding 7 years are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		
207.	**Allocation:** No similar allocation.	**BALD EAGLES** **Allocation:** NSO–New: Surface occupancy and use is prohibited within 1 mile of bald eagle nest sites active within the preceding 5 years.	**BALD EAGLES** **Allocation:** NSO 11-74: Surface occupancy and use is prohibited within 0.50 miles of bald eagle nest sites active within the preceding 5 years.	
208.	**Allocation:** No similar allocation.	**Allocation:** Manage areas within 1 mile of bald eagle nest sites active within the preceding 5 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage areas within 0.50 miles of bald eagle nest sites active within the preceding 5 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage areas within 1 mile of bald eagle nest sites active within the preceding 5 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).
209.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 1 mile of bald eagle nest sites active within the preceding 5 years are subject to special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).		
210.	**Allocation:** No similar allocation.	**PEREGRINE FALCON NESTS** **Allocation:** NSO 11-122: Surface occupancy or use is prohibited within 1 mile of peregrine falcon nests active within the preceding 7 years.		
211.	**Allocation:** No similar allocation.	**Allocation:** Manage areas within 1 mile of peregrine falcon nest sites active within the preceding 7 years as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).		
212.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 1 mile of peregrine falcon nest sites active within the preceding 7 years are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		
213.	**Allocation:** No similar allocation.	**INTERIOR LEAST TERN ACTIVE NESTS** **Allocation:** NSO 11-153: Surface occupancy and use is prohibited within 0.25 miles of interior least tern active nests.		
214.	**Allocation:** No similar allocation.	**INTERIOR LEAST TERN ACTIVE NESTS** **Allocation:** CSU–New: Surface occupancy and use within 0.50 miles of interior least tern active nests is subject to a plan approved by the BLM to maintain the functionality of the habitat.	**Allocation:** No similar allocation.	**INTERIOR LEAST TERN ACTIVE NESTS** **Allocation:** CSU–New: Surface occupancy and use within 0.50 miles of interior least tern active nests is subject to a plan approved by the BLM to maintain the functionality of the habitat.
215.	**Allocation:** No similar allocation.	**Allocation:** Manage areas within 0.50 miles of interior least tern active nests as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage areas within 0.25 miles of interior least tern active nests as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage areas within 0.50 miles of interior least tern active nests as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).
216.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 0.50 miles of interior least tern active nests are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Management Direction:** Surface-disturbing activities within 0.25 miles of interior least tern active nests are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Management Direction:** Surface-disturbing activities within 0.50 miles of interior least tern active nests are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).
217.	**Allocation:** No similar allocation.	**PIPING PLOVER CRITICAL HABITAT** **Allocation:** NSO 11-156: Surface occupancy and use is prohibited in and within 0.25 miles of piping plover critical habitat.		
218.	**Allocation:** No similar allocation.	**PIPING PLOVER CRITICAL HABITAT** **Allocation:** CSU–New: Surface occupancy and use within 0.50 miles of piping plover critical habitat is subject to a plan approved by the BLM to maintain the functionality of the habitat.	**Allocation:** No similar allocation.	**PIPING PLOVER CRITICAL HABITAT** **Allocation:** CSU–New: Surface occupancy and use within 0.50 miles of piping plover critical habitat is subject to a plan approved by the BLM to maintain the functionality of the habitat.

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
219.	**Allocation:** No similar allocation.	**Allocation:** Manage areas within 0.50 miles of piping plover critical habitat as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage areas within 0.25 miles of piping plover critical habitat as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Allocation:** Manage areas within 0.50 miles of piping plover critical habitat as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).
220.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 0.50 miles of piping plover critical habitat are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Management Direction:** Surface-disturbing activities within 0.25 miles of piping plover critical habitat are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).	**Management Direction:** Surface-disturbing activities within 0.50 miles of piping plover critical habitat are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).
221.	**Allocation:** No similar allocation.	**Allocation:** Closed to nonenergy solid mineral leasing within 0.50 miles of piping plover critical habitat.	**Allocation:** No similar allocation *(subject to special stipulations/design features)*.	**Allocation:** Closed to nonenergy solid mineral leasing within 0.50 miles of piping plover critical habitat.
222.	**Allocation:** No similar allocation.	**Allocation:** Closed to mineral material disposal within 0.50 miles of piping plover critical habitat.	**Allocation:** No similar allocation *(subject to special stipulations/design features)*.	**Allocation:** Closed to mineral material disposal within 0.50 miles of piping plover critical habitat.
223.	**Allocation:** No similar allocation.	**DAKOTA SKIPPER HABITAT** **Allocation:** NSO–New: Surface occupancy and use is prohibited within Dakota skipper habitat and within 0.62 miles (1 kilometer).		**DAKOTA SKIPPER HABITAT** **Allocation:** NSO-New: Surface occupancy and use is prohibited within 500 meters of occupied Dakota skipper habitat.
224.	**Allocation:** No similar allocation.			**Allocation:** CSU-New: Surface occupancy and use within 0.62 miles (1 kilometer) of occupied Dakota skipper habitat is subject to a plan approved by the BLM to minimize disturbance.
225.	**Allocation:** No similar allocation.	**Allocation:** Manage within 0.62 miles (1 kilometer) of occupied Dakota skipper habitat as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize disturbance (see **Appendix D**, Design Features and Best Management Practices).		**Allocation:** Manage within 0.62 miles (1 kilometer) of occupied Dakota skipper habitat as ROW avoidance; these areas may be available for ROWs with special stipulations/design features, to be determined at the project level, to minimize disturbance (see **Appendix D**, Design Features and Best Management Practices).
226.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 0.62 miles (1 kilometer) of occupied Dakota skipper habitat are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		**Management Direction:** Surface-disturbing activities within 0.62 miles (1 kilometer) of occupied Dakota skipper habitat subject to special stipulations/design features, to be determined at the project level, to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).
227.	**Allocation:** No similar allocation.	**Allocation:** Closed to nonenergy solid mineral leasing in Dakota skipper habitat and within 0.62 miles (1 kilometer).	**Allocation:** No similar allocation *(subject to special stipulations/design features)*.	**Allocation:** Closed to nonenergy solid mineral leasing in occupied Dakota skipper habitat and within 0.62 miles (1 kilometer).
228.	**Allocation:** No similar allocation.	**Allocation:** Closed to mineral material disposal in Dakota skipper habitat and within 0.62 miles (1 kilometer).	**Allocation:** No similar allocation *(subject to special stipulations/design features)*.	**Allocation:** Closed to mineral material disposal in occupied Dakota skipper habitat and within 0.62 miles (1 kilometer).
229.	**Allocation:** No similar allocation.	**SPRAGUE'S PIPIT HABITAT** **Allocation:** TL–New: Surface use is prohibited from April 15 through July 15 in Sprague's pipit habitat. This stipulation does not apply to the operation and maintenance of production facilities.		
230.	**Allocation:** No similar allocation.	**Allocation:** Manage areas within 0.25 miles of Sprague's pipit habitat as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize nest disturbance (see **Appendix D**, Design Features and Best Management Practices).		
231.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 0.25 miles of Sprague's pipit habitat are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance (see **Appendix D**, Design Features and Best Management Practices).		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
232.	**Coal Stipulation:** About 178,125 acres will be subject to the special vegetation reclamation stipulation that an acreage equivalent to that disturbed by coal mining will be reclaimed to approximately its former condition. Performance standards for native grassland, woodland, and fish and wildlife habitat revegetation will be applied to these sites (Public Service Commission [PSC], State of North Dakota, Rules governing the Reclamation of Surface-mined Land, 1987: Sections 69-05.2-22-02, and 69-05.2-22-07).	**Coal Stipulation:** Stipulated methods of mining include reclamation of the disturbed essential habitat to a value that is equal to or greater than the time of disturbance. The reclamation will include a native seed mix and methods to be approved by the BLM at the time of the lease. Seed mixes will be specific to both ecological site descriptions and the resident species of fish, wildlife, or plant species being addressed. If conflicting habitat types are determined, the leasing NEPA document will address prioritization or other solutions for maintaining habitat in the site-specific area. There shall be no primary or secondary noxious weed seed in the seed mixture. Seed shall be tested, and the viability testing of seed shall be done in accordance with state law(s) and within 6 months prior to purchase. Commercial seed shall be either certified or registered seed. The seed mixture container shall be tagged in accordance with state law(s) and available for inspection by the BLM Authorized Officer. See **Appendix E** for reclamation standards.		
233.	***Greater Sage-Grouse***			
234.	**Goal SSS-1:** 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.			
235.	**Objective SSS-1.1:** Protect PHMA from anthropogenic disturbances that will reduce distribution or abundance of GRSG. Manage PHMA so that discrete anthropogenic disturbances cover less than 3 percent of the total GRSG habitat.			
236.	**Objective SSS-1.2:** Habitat Delineation: Delineate PHMA to encompass the 100 percent Breeding Bird Density map: 32,900 BLM surface acres (7 percent of total PHMA acres). Since mapping 75 percent of breeding bird density map misses the majority of GRSG habitat in North Dakota, 100 percent was used. See **Map 2-1** in **Appendix A**.			
237.	**Objective SSS-1.3:** Habitat Delineation: Delineate GHMA to encompass the remainder of the habitat: 80 BLM surface acres. See **Map 2-1** in **Appendix A**.			
238.	**Objective SSS-1.4:** These habitat objectives shown in **Table 2-3**, Habitat Objectives for GRSG (below) summarize the characteristics that research has found represent the seasonal habitat needs for GRSG. The specific seasonal components identified in **Table 2-3** were adjusted based on local science and monitoring data to define the range of characteristics used in this sub-region. Thus, the habitat objectives provide the broad vegetative conditions we strive to obtain across the landscape that indicate the seasonal habitats used by GRSG. These habitat indicators are consistent with the rangeland health indicators used by the BLM. The habitat objectives will be part of the GRSG habitat assessment to be used during land health evaluations (see Appendix D of the 2015 Greater Sage-Grouse Approved Resource Management Plan Amendment [RMPA]/ROD [BLM 2015a]). These habitat objectives are not obtainable on every acre within the designated GRSG habitat management areas. Therefore, the determination on whether the objectives have been met will be based on the specific site's ecological ability to meet the desired condition identified in **Table 2-3**. All BLM use authorizations will contain terms and conditions regarding the actions needed to meet or progress toward meeting the habitat objectives. If monitoring data show the habitat objectives have not been met nor progress being made towards meeting them, there will be an evaluation and a determination made as to the cause. If it is determined that the authorized use is a cause, the use will be adjusted by the response specified in the instrument that authorized the use.			
239.	**Management Direction SSS-1.1:** Protect PHMA from anthropogenic disturbances that will reduce distribution or abundance of GRSG. See Appendix E, Greater Sage-Grouse Disturbance Caps, of the 2015 Greater Sage-Grouse Approved RMPA/ROD (BLM 2015a). In undertaking BLM management directions, and consistent with valid and existing rights and applicable law in authorizing third-party actions, the BLM will apply the lek buffer-distances identified in the US Geological Survey Report Conservation Buffer Distance Estimates for Greater Sage-Grouse—A Review (Open File Report 2014-1239) in accordance with Appendix B, Applying Lek Buffer Distances When Approving Actions, of the 2015 Greater Sage-Grouse Approved RMPA/ROD (BLM 2015a).			
240.	**Management Direction SSS-1.2:** If the 3 percent anthropogenic disturbance cap is exceeded on lands (regardless of land ownership) within GRSG PHMA in any given BSU (see Figure 2-2, North Dakota and South Dakota GRSG Biologically Significant Unit and Priority Habitat Management Areas [Appendix A of BLM 2015a), then no further discrete anthropogenic disturbances (subject to applicable laws and regulations, such as the 1872 hard rock mining law, valid existing rights, etc.) will be permitted by BLM within GRSG PHMA in any given biologically significant unit until the disturbance has been reduced to less than the cap. (Biologically significant unit for this Approved RMPA is the summary of all the PHMA within a GRSG population as delineated in the Conservation Objectives Team [COT] report.)			
241.	**Management Direction SSS-1.3:** If the 3 percent anthropogenic disturbance cap is exceeded on lands (regardless of land ownership) or if anthropogenic disturbance and habitat loss associated with conversion to agricultural tillage or fire exceed 5 percent within a project analysis area in PHMA, then no further discrete anthropogenic disturbances (subject to applicable laws and regulations, such as the 1872 Mining Law, valid existing rights, etc.) will be permitted by BLM within PHMA in a project analysis area until the disturbance has been reduced to less than the cap.			
242.	**Management Direction SSS-1.4:** Subject to applicable laws and regulations and valid existing rights, if the average density of one energy and mining facility per 640 acres (the density cap) is exceeded on all lands (regardless of land ownership) in the PHMA within a proposed project analysis area, then no further disturbance from energy or mining facilities will be permitted by BLM: (1) until disturbance in the proposed project analysis area has been reduced to maintain the limit under the cap; or (2) unless the energy or mining facility is co-located into an existing disturbed area.			
243.	**Management Direction SSS-1.5:** Implement Regional Mitigation Strategy (Appendix F, Regional Mitigation Strategy, of the 2015 Greater Sage-Grouse Approved RMPA/ROD [BLM 2015a]).			
244.	***Special Status Aquatic Wildlife***			
245.	**Management Direction:** No similar management direction.	**Management Direction:** Through cooperative efforts with federal, state, or private interests (such as nongovernmental organizations), enhance or restore unsatisfactory or declining fish and aquatic habitat.		
246.	**Management Direction:** No similar management direction.	**Management Direction:** Through cooperative efforts with federal, state, or private interests, implement projects to protect special status species and their habitats.		
247.	**Management Direction:** No similar management direction.	**Management Direction:** Maintain or enhance plant communities needed to improve fish and aquatic habitat through riparian pastures, fencing, specialized grazing methods, low-tech process-based restoration, and other restoration measures.		
248.	**Allocation:** No similar allocation.	**PALLID STURGEON HABITAT** **Allocation:** NSO–New: Surface occupancy and use is prohibited within 0.50 miles of the ordinary high-water mark of identified pallid sturgeon habitat.		
249.	**Allocation:** No similar allocation.	**Allocation:** Manage areas within 0.50 miles of the ordinary high water mark of identified pallid sturgeon habitat as ROW avoidance; these areas may be available for ROWs with special stipulations/design features (to be determined at the project level) to minimize spawning disturbance (see **Appendix D**, Design Features and Best Management Practices).		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
250.	**Management Direction:** No similar management direction.	**Management Direction:** Surface-disturbing activities within 0.50 miles of the ordinary high water mark of identified pallid sturgeon streams are subject to special stipulations/design features (to be determined at the project level) to minimize habitat disturbance and maintain habitat functionality (see **Appendix D**, Design Features and Best Management Practices).		
251.	**Allocation:** No similar allocation.	**Allocation:** Closed to mineral material disposal within 0.50 miles of the ordinary high-water mark of identified pallid sturgeon habitat.	**Allocation:** No similar allocation *(subject to special stipulations/design features)*.	
252.	**Allocation:** No similar allocation.	**Allocation:** Closed to NEL mineral leasing within 0.50 miles of the ordinary high-water mark of identified pallid sturgeon habitat.	**Allocation:** No similar allocation *(subject to special stipulations/design features)*.	
253.	**Wildland Fire Ecology and Management**			
254.	**Goals:** Provide for firefighter and public safety by reducing hazardous fuel loads (risk) within the wildland-urban interface. Protect or sustain the ecological health and function of fire-adapted ecosystems; reduce the risk of high-severity wildfires to watersheds and ecosystems; and benefit, protect, maintain, sustain, and enhance natural and cultural resources. Place public and firefighter safety first in any wildfire management action. Manage wildfire (unplanned ignitions) for the protection of public health, safety, property, and resource values while implementing cost-containment strategies that result in minimum suppression costs. Use a naturally occurring event, such as a wildfire, to enhance vigor and vegetation production, reduce hazardous fuels, and maintain a desired mix of seral stages within the following communities: sagebrush, forest and grasslands, riparian areas and wetlands, and native species communities.			
255.	**Objective:** Allow fire to play a natural role in the ecology of vegetation communities on BLM-administered lands insofar as life, property, or private resources would not be threatened.	**Objective:** Having provided for firefighter and public safety, manage wildfires to protect property and meet resource objectives described in the *Vegetation Communities* section.		
256.	**Management Direction:** Control wildfires on BLM-administered lands.	**Management Direction:** Identify areas where fire or fuels mitigation as a resource benefit could achieve the resource management goals. When possible, allow fire to burn to strategic locations that minimize ground disturbance.		
257.	**Management Direction:** Establish cooperative agreements with county governments, where necessary for the control of fires on BLM-administered lands.	**Management Direction:** In partnership with local, state, and federal partners, build capacity within communities bordering federal lands to reduce risks and threats from wildfire.		
258.	**Management Direction:** Ensure that prescribed burn plans are reviewed by county governments, permittees, and adjacent landowners.	**Management Direction:** No similar management direction.		
259.	**Management Direction:** Prepare prescribed burn plans for vegetative manipulation, where appropriate.	**Management Direction:** Allow prescribed fire, pile burns, mechanical treatment, and chemical treatment to restore and maintain fire regimes and land health. Approved prescribed fire implementation plans would be used for any planned fire ignition. Continue to use prescribed fire in support of resource objectives.		
260.	**Management Direction:** No similar management direction.	**Management Direction:** Prioritize Schnell Recreation Area for fuels treatments.	**Management Direction:** No similar management direction.	**Management Direction:** Prioritize Schnell Recreation Area for fuels treatments.

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
261.	***Greater Sage-Grouse (Fuels Management)***			
262.	**Management Direction FIRE-1.1:** In PHMA, design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems. Do not reduce sagebrush canopy cover to less than 15 percent unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of PHMA 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. If prescribed fire is used in GRSG habitat, the NEPA analysis for the Burn Plan will address: ○ why alternative techniques were not selected as a viable options; ○ how GRSG goals and objectives will be met by its use; ○ how the COT report objectives will be addressed and met; ○ a risk assessment to address how potential threats to GRSG habitat will be minimized. Prescribed fire as a vegetation or fuels treatment shall only be considered after the NEPA analysis for the Burn Plan has addressed the four bullets outlined above. Prescribed fire can be used to meet specific fuels objectives that will protect GRSG habitat in PHMA (such as creation of fuel breaks that will disrupt the fuel continuity across the landscape in stands where annual invasive grasses are a minor component in the understory, burning slash piles from conifer reduction treatments, used as a component with other treatment methods to combat annual grasses and restore native plant communities). Prescribed fire in known winter range shall only be considered after the NEPA analysis for the Burn Plan has addressed the four bullets outlined above. Any prescribed fire in winter habitat will need to be designed to strategically reduce wildfire risk around and/or in the winter range and designed to protect winter range habitat quality. 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, nonnative seeds may be used as long as they meet GRSG habitat objectives. Design post fuels management projects to ensure 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.			
263.	**Management Direction FIRE-1.2:** Design fuels management projects in PHMA to strategically and effectively reduce wildfire threats in the greatest area.			
264.	**Management Direction FIRE-1.3:** In PHMA, during fuels management project design, consider the utility of using livestock to strategically reduce fine fuels, and implement grazing management that will accomplish this objective. Consult with ecologists to minimize impacts on native perennial grasses.			
265.	**Management Direction FIRE-1.4:** If prescribed fire is used, the Burn Plan will clearly indicate how COT objectives will be addressed and met, and why alternative techniques are not applicable. A fire risk assessment will be completed for implementation of prescribed fire used to meet the GRSG goals and objectives in PHMA (see Appendix H, GRSG Wildfire and Invasive Species Habitat Assessment, of BLM 2015a).			
266.	***Greater Sage-Grouse (Fire Operations)***			
267.	**Management Direction FIRE-1.5:** The protection of human life is the single, overriding priority. Setting priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources will be done based on the values to be protected, human health and safety, and the costs of protection**.** In PHMA, prioritize suppression, immediately after life and property, to conserve the habitat. See Appendix H of the 2015 Greater Sage-Grouse Approved RMPA/ROD (BLM 2015a), which will be completed to help further refine fire management actions once this plan is completed.			
268.	**Management Direction FIRE-1.6:** In GHMA, prioritize suppression where wildfires threaten PHMA.			
269.	**Management Direction FIRE-1.7:** Follow the most current BMPs/RDFs for fire and fuels (Appendix C, Required Design Features, of BLM 2015a).			
270.	***Greater Sage-Grouse (Emergency Stabilization and Rehabilitation)***			
271.	**Management Direction FIRE-1.8:** In PHMA, 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 PHMA 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, nonnative 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.			
272.	**Management Direction FIRE-1.9:** In PHMA, 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.			
273.	**Management Direction FIRE-1.10:** In PHMA, 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.			
274.	**Cultural Resources**			
275.	NDFO is committed to maintaining and strengthening government-to-government relationships with American Indian Tribes, and will employ Notification, Coordination, and Consultation efforts identified and outlined in H-1780-1, MS 1780, 36 CFR 800, and other pertinent rules and regulations that may be in effect at the time of project planning, in a way that acknowledges and supports Tribal sovereignty and self-determination. **Goals:** Identify, preserve, and protect significant cultural resources and ensure they are available for appropriate uses by present and future generations (FLPMA, Section 103l, 201(a) and (c); National Historic Preservation Act (NHPA), Section 110(a); Archaeological Resources Protection Act, Section 14(a)). Seek to reduce imminent threats and resolve potential conflicts from natural or human-caused deterioration, or potential conflict with other resource uses (FLPMA Section 103(c), NHPA, Section 106 and 110(a)(2)) by ensuring all authorizations for land use and resource use will comply with the NHPA Section 106. Consult with federally recognized Native American tribes to identify any of their cultural values or religious beliefs that may be affected by BLM authorizations or actions.			
276.	**Objective:** No similar objective.	**Objective:** Manage cultural resources, or areas where concentrations of cultural resources occur, based on the nature, significance, and use allocation of the cultural resource.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
277.	**Objective:** No similar objective.	**Objective:** Provide a basis for cultural resource use allocation		
278.	**Objective:** No similar objective.	**Objective:** Promote stewardship, conservation, appreciation, and public understanding of cultural resources through educational and public outreach programs in accordance with the BLM Heritage Education Program.		
279.	**Objective:** No similar objective.	**Objective:** Provide and promote research opportunities that would contribute to the understanding of human use and influence on the landscape.		
280.	**Objective:** No similar objective.	**Objective:** Maintain viewsheds of important cultural resources whose settings contribute significantly to their scientific, public, traditional, or conservation values.		
281.	**Management Direction:** No similar management direction.	**Management Direction:** Allocate and manage cultural properties to the following uses according to their nature and relative preservation value. Desired future conditions for each use allocation listed below are found in **Table 3-80**: **Scientific use—**This category applies to any cultural property determined to be available for consideration as the subject of scientific or historical study at the present time, using currently available research techniques. Study may include methods that would result in the property's physical alteration or destruction. This category applies almost entirely to prehistoric and historic archaeological properties, where the methods of scientific use are generally archaeological excavation, controlled surface collection, and/or controlled recordation. Recommendations to allocate individual properties to this use must be based on documentation of the kinds of data the property is thought to contain and the data's importance for pursuing specified research topics. Properties in this category need not be conserved in the face of a research or data recovery proposal that would make adequate and appropriate use of the property's research importance. **Public use—**This category may be applied to any cultural property found to be appropriate for use as an interpretive exhibit in place, or for related educational and recreational uses by members of the general public. The category may also be applied to buildings suitable for continued use or adaptive use, for example as staff housing or administrative facilities at a visitor contact or interpretive site. **Conservation for future use—**This category is reserved for any unusual cultural property which, because of scarcity, a research potential that surpasses the current state of the art, singular historic importance, cultural importance, architectural interest, or comparable reasons, is not currently available for consideration as the subject of scientific or historical study that would result in its physical alteration. A cultural property included in this category is deemed worthy of segregation from all other land or resource uses, including cultural resource uses that would threaten the maintenance of its present condition or setting, as pertinent, and would remain in this use category until specified provisions are met in the future. **Experimental use—**This category may be applied to a cultural property judged well-suited for controlled experimental study, to be conducted by the BLM or others concerned with the techniques of managing cultural properties, which may result in the property's alteration, including possible loss of integrity and/or destruction of physical elements. Committing cultural properties to experimental use must be justified in terms of the specific information that would be gained and how it would aid in the management of other cultural properties. Experimental study should aim toward understanding the kinds and rates of natural or human-caused deterioration, testing the effectiveness of protection measures, or developing new research or interpretation methods and similar kinds of practical management information. It should not be applied to cultural properties with strong research potential, traditional cultural importance, or good public use potential, if it would significantly diminish those uses. **Traditional use—**This category is to be applied to any cultural resource known to be perceived by a specified social and/or cultural group as important in maintaining the cultural identity, heritage, or well-being of the group. Cultural properties assigned to this category are to be managed in ways that recognize the importance ascribed to them and seek to accommodate their continuing traditional use. **Discharged from management—**This category is assigned to cultural properties that have no remaining identifiable use. Most often these are prehistoric and historic archaeological properties, such as small surface scatters of artifacts, whose limited research potential is effectively exhausted as soon as they have been documented. Also, more complex archaeological properties that have had their salient information collected and preserved through mitigation or research may be discharged from management, as should cultural properties destroyed by any natural event or human activity. Properties discharged from management remain in the inventory, but they are removed from further management attention and do not constrain other land uses. Particular classes of unrecorded cultural properties may be named and described in advance as dischargeable upon documentation, but specific cultural properties must be inspected in the field and recorded before they may be discharged from management.		
282.	**Allocation:** Under the multiple-use tradeoff, 3,961 acres of federal coal from two locations were eliminated from further consideration for coal leasing. The two areas eliminated from further consideration include the eligible Knife River Flint Quarries Historic District and Writing Rock State Historic Site.	**Allocation:** No similar allocation (these areas are unsuitable in Screen 2; see **Appendix F**, Coal Screening Process).		
283.	**Allocation:** No similar allocation.	**Allocation:** Manage the Knife River Indian Villages National Historic Site viewshed as unacceptable for further consideration for coal leasing (multiple-use screen 3).	**Allocation:** No similar allocation.	**Allocation:** Manage the Knife River Indian Villages National Historic Site viewshed as unacceptable for further consideration for coal leasing (multiple-use screen 3).

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
284.	**FORT UNION TRADING POST NATIONAL HISTORIC LANDMARK** **Allocation:** NSO 11-40: No surface occupancy or use is allowed in a visible area within a 3.5-mile radius of the Fort Union Trading Post National Historic Landmark.	**FORT UNION TRADING POST NATIONAL HISTORIC LANDMARK AND ADDITIONAL SITES** **Allocation:** NSO–New: Surface occupancy and use is prohibited within the visible areas in a 3-mile radius surrounding Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32DUx1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Fort Union Trading Post National Historic Landmark, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), Standing Rock State Historic Site (32RM32), and Cross Ranch Archaeological District.	**HISTORIC SITES** **Allocation:** CSU–New: Apply design criteria to mitigate visual impacts within 2 miles surrounding Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32DUx1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Fort Union Trading Post National Historic Landmark, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), Standing Rock State Historic Site (32RM32), and Cross Ranch Archaeological District.	**HISTORIC SITES** **Allocation:** CSU–New: Apply design criteria to mitigate visual impacts within 2 miles surrounding Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32DUx1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), Standing Rock State Historic Site (32RM32), and Cross Ranch Archaeological District.
285.	**FORT UNION TRADING POST NATIONAL HISTORIC LANDMARK** **Allocation:** NSO 11-40: No surface occupancy or use is allowed in a visible area within a 3.5-mile radius of the Fort Union Trading Post National Historic Landmark.	**Allocation:** No similar allocation.		**FORT UNION TRADING POST NATIONAL HISTORIC LANDMARK** **Allocation:** NSO 11-40: No surface occupancy or use is allowed in a visible area within a 3.5-mile radius of the Fort Union Trading Post National Historic Landmark.
286.	**Allocation:** No similar allocation.	**Allocation:** Close to mineral materials disposal and NEL mineral leasing the visible areas in a 3-mile radius surrounding Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32DUx1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Fort Union Trading Post National Historic Landmark, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), Standing Rock State Historic Site (32RM32), and Cross Ranch Archaeological District.	**Allocation:** No similar allocation.	
287.	**Allocation:** No similar allocation.	**Allocation:** NSO–New: At the Doaks Butte (32BO222) site, no surface occupancy or use is allowed within 300 feet of the site boundary.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
288.	**Allocation:** No similar allocation.	**Allocation:** Manage the Doaks Butte (32BO222) site to protect the site for further archaeological research. The site includes two distinct occupation clusters and appears to have been inhabited by bison hunters and gatherers who exploited local raw materials and imported higher-quality flint from the Lynch Knife River Flint Quarry District. • Manage as ROW exclusion within 300 feet of the site boundary • Apply NSO within 300 feet of the site boundary • Close to nonenergy solid mineral leasing within 300 feet of the site boundary • Recommend for withdrawal from locatable mineral entry (including 300 feet from the site boundary) • Close to mineral materials disposal within 300 feet of the site boundary	**Allocation:** Manage the Doaks Butte (32BO222) site to protect the site for further archaeological research. The site includes two distinct occupation clusters and appears to have been inhabited by bison hunters and gatherers who exploited local raw materials and imported higher-quality flint from the Lynch Knife River Flint Quarry District. • Manage as ROW exclusion within 300 feet of the site boundary • Apply NSO within 300 feet of the site boundary • Close to nonenergy solid mineral leasing within 300 feet of the site boundary • Close to mineral materials disposal within 300 feet of the site boundary	
289.	**Allocation:** No similar allocation.	**Significant Cultural Resources, National Register of Historic Places (NRHP)-Eligible Properties and Districts, and Traditional Cultural Properties (TCPs)** **Allocation:** NSO–New: Surface occupancy and use is prohibited within the boundaries of, and for a distance of 300 feet from, the boundaries of: • sites or areas designated or sites or areas that meet the criteria for allocation for designation for scientific use, conservation use, traditional use (socio-cultural use), public use, and experimental use, • the boundaries of sites or districts determined eligible for or included on the NRHP; and • the boundaries of traditional cultural properties, or sites or areas designated as such, or sites or areas that meet the criteria for allocation for designation for traditional use (socio-cultural use), or cultural properties determined to be of particular importance to Native American groups. Such properties include, but are not limited to, burial locations, pictograph and petroglyph sites, vision quest locations, plant-gathering locations, and areas considered sacred or used for religious purposes.	**Significant Cultural Resources, NRHP-Eligible Properties and Districts, and TCPs** **Allocation:** NSO–New: Surface occupancy and use is prohibited within the boundaries of, and for a distance of 100 feet from, the boundaries of: • sites or areas designated or sites or areas that meet the criteria for allocation for designation for scientific use, conservation use, traditional use (socio-cultural use), public use, and experimental use, • the boundaries of sites or districts determined eligible for or included on the NRHP; and • the boundaries of traditional cultural properties, or sites or areas designated as such, or sites or areas that meet the criteria for allocation for designation for traditional use (socio-cultural use), or cultural properties determined to be of particular importance to Native American groups. Such properties include, but are not limited to, burial locations, pictograph and petroglyph sites, vision quest locations, plant-gathering locations, and areas considered sacred or used for religious purposes.	
290.	**Paleontological Resources**			
291.	**Goal: Identify, preserve, and protect significant paleontological resources, and ensure they are available to present and future generations for appropriate uses, such as scientific studies and public education in accordance with the Paleontological Resources Preservation Act of 2009 (PRPA).**			
292.	**Objective:** No similar objective.	**Objective:** Protect major paleontological resources of scientific interest.		
293.	**Management Direction:** No similar management direction.	**Management Direction:** Designate the Mud Buttes ACEC to protect paleontological resources (see *ACECs* section).		
294.	**Management Direction:** Paleontological resources will be considered during preparation of all activity plans.	**Management Direction:** Same as Alternative A. Prioritize evaluation of those areas in potential fossil yield classification (PFYC) Class 3, 4, and 5.		
295.	**Allocation:** No similar allocation.	**PALEONTOLOGICAL RESOURCES** **Allocation:** NSO 11-85: Surface occupancy and use is prohibited in significant paleontological localities.		
296.	**Management Direction:** No similar management direction.	**Management Direction:** Promote the stewardship, conservation, and appreciation of paleontological resources through appropriate educational and public outreach programs.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
297.	**Visual Resources**			
298.	**Goals:** Manage BLM-administered lands for their scenic values, while providing for the overall multiple-use and quality of experience to visitors. Establish visual management objectives to minimize adverse impacts on the visual resources on the landscape. Maintain the overall integrity of visual resource management (VRM) classes, while allowing for modifications to landscapes in those classes, consistent with the established management objectives.			
299.	**Objective:** Maintain visual qualities wherever possible.	**Objective:** Manage visual resources for overall multiple use in accordance with VRM classification objectives (currently described in H-8410-1, BLM Visual Resource Inventory Handbook).		
300.	**Management Direction:** No similar management direction; all lands are unclassified.	**Management Direction:** Manage 0 acres as VRM Class I (**Map 2-2**)**.**	**Management Direction:** Manage 0 acres as VRM Class I (**Map 2-3**).	**Management Direction:** Manage 0 acres as VRM Class I (**Map 2-4**).
301.	**Management Direction:** No similar management direction; all lands are unclassified.	**Management Direction:** Manage 15,700 acres as VRM Class II, including the following areas (**Map 2-2**): • Schnell Ranch SRMA, East Zone • Lost Bridge BCA • Figure 4 BCA • Segment of the Little Missouri River determined suitable for inclusion in the NWSRS • Lewis and Clark National Historic Trail (NHT) management corridor of 0.50 miles from the high-water mark of the Missouri and Yellowstone Rivers, Lake Sakakawea, and Lake Oahe • Additional non-designated parcels	**Management Direction:** Manage 8,400 acres as VRM Class II, including the following areas (**Map 2-3**): • Lost Bridge BCA • Figure 4 BCA	**Management Direction:** Manage 13,900 acres as VRM Class II, including the following areas (**Map 2-4**): • Schnell Ranch SRMA, East Zone • Lost Bridge BCA • Figure 4 BCA
302.	**Management Direction:** No similar management direction; all lands are unclassified.	**Management Direction:** Manage 16,600 acres as VRM Class III, including the following areas (**Map 2-2**): • Schnell Ranch SRMA, West Zone • Additional non-designated parcels	**Management Direction:** Manage 12,300 acres as VRM Class III, including the following areas (**Map 2-3**): • Schnell Ranch SRMA (combined East and West Zones) • Lewis and Clark NHT management corridor of 0.50 miles from the high-water mark of the Missouri and Yellowstone Rivers, Lake Sakakawea, and Lake Oahe • Additional non-designated parcels	**Management Direction:** Manage 17,400 acres as VRM Class III, including the following areas (**Map 2-4**): • Schnell Ranch SRMA, West Zone • Lewis and Clark NHT management corridor of 0.50 miles from the high-water mark of the Missouri and Yellowstone Rivers, Lake Sakakawea, and Lake Oahe • Additional non-designated parcels
303.	**Management Direction:** No similar management direction; all lands are unclassified.	**Management Direction:** Manage 26,200 acres as VRM Class IV (**Map 2-2**).	**Management Direction:** Manage 37,800 acres as VRM Class IV (**Map 2-3**).	**Management Direction:** Manage 27,200 acres as VRM Class IV (**Map 2-4**).
304.	**Allocation:** Avoid ROWs on the areas with specific visual objectives (for example, adjacent to established parks and adjacent to the Little Missouri Scenic River), unless there is no reasonable alternative.	**Allocation:** Manage the following areas as ROW avoidance: • VRM Class II areas • Within 0.50 miles of the Little Missouri River	**Allocation:** Manage the following areas as ROW avoidance: • VRM Class II areas • Within 0.50 miles of the Little Missouri River	**Allocation:** Manage the following areas as ROW avoidance: • VRM Class II areas • Within 0.50 miles of the Little Missouri River
305.	**Management Direction:** (1) Ensure that the high visual qualities of NPS units are considered in cooperation with the NPS when a specific mineral lease or development action is proposed that potentially affects existing visual qualities. (2) Mitigate visual impacts from oil and gas development within a 3.5-mile radius of Fort Union Trading Post National Historic Landmark. If visual impacts cannot be adequately mitigated within the 3.5-mile radius, oil and gas development will not be permitted. (3) Consider measures to protect the visual resources of NPS units during coal activity planning.	**NATIONAL PARK SERVICE UNITS** **Management Direction:** To protect features critical to the visitor experience such as viewsheds, soundscapes, night skies, and air quality, require consultation with the NPS for the following activities within 3 miles surrounding NPS units (Theodore Roosevelt National Park, Knife River Indian Villages National Historic Site, Fort Union Trading Post National Historic Landmark, Lewis and Clark NHT management corridor, and North Country National Scenic Trail [NST] management corridor): • Fluid minerals leasing (CSU) • Mineral materials disposal • NEL mineral leasing • Locatable mineral entry • Realty actions	**NATIONAL PARK SERVICE UNITS** **Management Direction:** To protect features critical to the visitor experience such as viewsheds, soundscapes, night skies, and air quality, require consultation with the NPS for the following activities within 2 miles surrounding NPS units (Theodore Roosevelt National Park, Knife River Indian Villages National Historic Site, Fort Union Trading Post National Historic Landmark, Lewis and Clark NHT management corridor, and North Country NST management corridor): • Fluid minerals leasing (CSU) • Mineral materials disposal • NEL mineral leasing • Locatable mineral entry • Realty actions	**NATIONAL PARK SERVICE UNITS** **Management Direction:** To protect features critical to the visitor experience such as viewsheds, soundscapes, night skies, and air quality, require consultation with the NPS for the following activities within 3 miles surrounding NPS units (Theodore Roosevelt National Park, Knife River Indian Villages National Historic Site, Fort Union Trading Post National Historic Landmark, Lewis and Clark NHT management corridor, and North Country National Scenic Trail NST management corridor): • Fluid minerals leasing (CSU) • Mineral materials disposal • NEL mineral leasing • Locatable mineral entry • Realty actions

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
306.	**Management Direction:** Review, in cooperation with the NPS, federal coal tracts identified within the viewshed NPS units (36,225 acres) to determine mitigation measures necessary for protection of visual qualities of the NPS units.	**Management Direction:** Manage Knife River Indian Villages Historic Site viewshed as unacceptable for further consideration for coal leasing due to multiple-use values (Screen 3; **Map F-33** in **Appendix F**).	**Management Direction:** No similar management direction.	**Management Direction:** Manage Knife River Indian Villages Historic Site viewshed as unacceptable for further consideration for coal leasing due to multiple-use values (Screen 3; **Map F-33** in **Appendix F**).
307.	**Management Direction:** Monitor the following resource conditions: BLM-administered lands in relation to developments that may adversely affect recreational and visual resources.	**Management Direction:** No similar management direction.		
308.	**Management Direction:** Coordinate with other state and federal agencies regarding BLM operations that affect the landscape (for example, placement of signs, campgrounds, and less-developed recreational facilities).			
309.	**Objective:** No similar objective.	**Objective:** Manage permitted activities to reduce alteration of natural night sky light and maintain dark, clear skies for stargazing and other nighttime activities.		
310.	**Management Direction:** No similar management direction.	**Management Direction:** Prohibit structural lighting in excess of the minimum safety requirements.	**Management Direction:** Prevent or reduce effects from artificial lighting by using BMPs that reduce skyward projection of lighting, by minimizing illumination and off-site projection of lighting, and by designing required lighting to be directed downward.	**Management Direction:** Prohibit structural lighting in excess of the minimum safety requirements.
311.	**Lands and Realty**			
312.	**Goals:** Maintain the availability of BLM-administered land for authorized uses. Maintain the integrity of BLM-administered lands by resolving trespass. Accommodate ROW and other use demands, while minimizing adverse impacts on natural resources. Pursue landownership adjustments to improve resource management efficiency, maintain or improve public access, and to provide other public benefits as opportunities arise. Protect significant resources or government investments.			
313.	***Land Use Authorizations***			
314.	**Objective:** Pursue a long-term program of repositioning BLM-administered lands toward improved manageability and increased public benefit; accommodate ROW and other use demands while minimizing adverse impacts on natural resources.			
315.	**Objective:** Maintain the availability of BLM-administered land for authorized uses; accommodate ROW and other use demands while minimizing adverse impacts on natural resources.	**Objective:** Respond to public needs for use authorizations, such as ROWs, leases, and permits, while balancing for other resource uses and protection.		
316.	**Management Direction:** Analyze requests for land use authorizations and apply terms and conditions, design features, and other mitigation measures as appropriate. • Follow Avian Protection on Powerlines, State of the Art in 2006 (APLIC 2006) for all applicable land use authorizations.	**Management Direction:** Analyze requests for land use authorizations and apply mitigation measures as appropriate. Design land use authorizations and projects to incorporate the design features and BMPs in **Appendix D**, Design Features and Best Management Practices.		
317.	**Allocation:** No similar management direction.	**Allocation:** Do not issue land use authorizations for uses that involve disposal or storage of materials that will contaminate the land (for example, hazardous waste disposal sites, and landfills), except as provided for in regulations and in Recreation and Public Purposes (R&PP) Act leases.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
318.	**Allocation:** Manage the following areas as ROW exclusion (**Map 2-5**): • GRSG PHMA (solar and wind; see BLM 2015a)	**Allocation:** Manage the following areas as ROW exclusion (**Map 2-6**): • 36,000 acres as ROW exclusion for all ROWs (such as renewable, linear, aboveground, belowground, and site): ○ Sensitive soils ○ Slopes greater than 30 percent ○ Rock outcrops ○ Riparian areas and wetlands ○ Tallgrass prairie ○ Woody draws ○ Known or proposed bighorn sheep crucial habitat ○ Special status plant locations ○ Within 300 feet of the Doaks Butte (32BO222) site boundary ○ Schnell Ranch SRMA, East Zone ○ Mud Buttes ACEC • ROW exclusion for only solar and wind: ○ GRSG PHMA (see BLM 2015a) • 1,500 acres as ROW exclusion only for aboveground ROWs (allow belowground): ○ Schnell Ranch SRMA, West Zone ○ Segment of the Little Missouri River determined suitable for inclusion in the NWSRS	**Allocation:** Manage the following areas as ROW exclusion (**Map 2-7**): • Less than 10 acres as ROW exclusion for all ROWs (such as renewable, linear, aboveground, belowground, and site): ○ Within 300 feet of the Doaks Butte (32BO222) site boundary • ROW exclusion for only solar and wind: ○ GRSG PHMA (see BLM 2015a) • 2,000 acres as ROW exclusion only for aboveground ROWs (allow belowground): ○ Schnell Ranch SRMA (combined East and West Zones)	**Allocation:** Manage the following areas as ROW exclusion (**Map 2-8)**: • 2,700 acres as ROW exclusion for all ROWs (such as renewable, linear, aboveground, belowground, and site): ○ Tallgrass prairie ○ Within 300 feet of the Doaks Butte (32BO222) site boundary ○ Schnell Ranch SRMA, East Zone ○ Mud Buttes ACEC - exclusion area, except for existing ROW authorizations (new ROWs could be collocated in existing ROW authorizations) • ROW exclusion for only solar and wind: ○ GRSG PHMA (see BLM 2015a) • 1,500 acres as ROW exclusion only for aboveground ROWs (allow belowground): ○ Schnell Ranch SRMA, West Zone

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
319.	**Allocation:** Manage the following areas as ROW avoidance, outside of ROW exclusion (**Map 2-5**): • 35,700 acres as ROW avoidance for all ROWs (such as renewable, linear, aboveground, belowground, and site; these areas may overlap ROW exclusion areas): ○ Little Missouri River ○ GRSG GHMA (see BLM 2015a) ○ GRSG PHMA (high-voltage transmission lines, large pipelines, and minor ROWs; see BLM 2015a)	**Allocation:** Manage the following areas as ROW avoidance, outside of ROW exclusion (**Map 2-6**): • 21,600 acres as ROW avoidance for all ROWs (such as renewable, linear, aboveground, belowground, and site; these areas may overlap ROW exclusion areas): ○ In mule deer, elk, and antelope birthing and foraging areas ○ In occupied black-tailed prairie dog colonies ○ Within 0.50 miles of raptor nest sites active within the preceding 7 years ○ Within 2 miles of sharp-tailed grouse leks ○ Within 1 mile of golden eagle nest sites active within the preceding 7 years ○ Within 0.50 miles of ferruginous hawk nest sites active within the preceding 7 years ○ Within 1 mile of bald eagle nest sites active within the preceding 5 years ○ Within 1 mile of peregrine falcon nest sites active within the preceding 7 years ○ Within 0.50 miles of interior least tern active nests ○ Within 0.50 miles of piping plover critical habitat ○ Within 0.62 miles of Dakota skipper habitat ○ Within 0.25 miles of Sprague's pipit habitat ○ Within 0.50 miles of the water's edge of identified pallid sturgeon habitat ○ In GRSG GHMA (see BLM 2015a) ○ In GRSG PHMA (high-voltage transmission lines, large pipelines, and minor ROWs; see BLM 2015a) ○ In Lost Bridge BCA ○ In Figure 4 BCA ○ In VRM II areas ○ Within 0.50 miles of the Little Missouri River • 500 acres as ROW avoidance only for belowground ROWs (these areas may overlap ROW exclusion areas): ○ Schnell Ranch SRMA, West Zone	**Allocation:** Manage the following areas as ROW avoidance, outside of ROW exclusion (**Map 2-7**): • 57,400 acres as ROW avoidance for all ROWs (such as renewable, linear, aboveground, belowground, and site; these areas may overlap ROW exclusion areas): ○ On sensitive soils ○ On slopes greater than 30 percent ○ On rock outcrops ○ In riparian areas and wetlands ○ In tallgrass prairie ○ In woody draws ○ In proposed bighorn sheep crucial habitat ○ In mule deer, elk, and antelope birthing and foraging areas ○ In occupied black-tailed prairie dog colonies ○ Within 0.25 miles of raptor nest sites active within the preceding 7 years ○ Within 2 miles of sharp-tailed grouse leks ○ In special status plant locations ○ Within 0.50 miles of golden eagle nest sites active within the preceding 7 years ○ Within 0.50 miles of ferruginous hawk nest sites active within the preceding 7 years ○ Within 0.50 miles of bald eagle nest sites active within the preceding 5 years ○ Within 1 mile of peregrine falcon nest sites active within the preceding 7 years ○ Within 0.25 miles of interior least tern active nests ○ Within 0.25 miles of piping plover critical habitat ○ Within 0.62 miles of Dakota skipper habitat ○ Within 0.25 miles of Sprague's pipit habitat ○ Within 0.50 miles of the water's edge of identified pallid sturgeon habitat ○ In GRSG GHMA (see BLM 2015a) ○ In GRSG PHMA (high-voltage transmission lines, large pipelines, and minor ROWs; see BLM 2015a) ○ In Lost Bridge BCA ○ In Figure 4 BCA ○ In VRM II areas ○ Within 0.50 miles of the Little Missouri River ○ In Mud Buttes ACEC • 700 acres as ROW avoidance only for belowground ROWs (these areas may overlap ROW exclusion areas): ○ Schnell Ranch SRMA (combined East and West Zones)	**Allocation:** Manage the following areas as ROW avoidance, outside of ROW exclusion (**Map 2-8)**: • 54,600 acres as ROW avoidance for all ROWs (such as renewable, linear, aboveground, belowground, and site; these areas may overlap ROW exclusion areas): ○ On sensitive soils ○ On slopes greater than 30 percent ○ On rock outcrops ○ In riparian areas and wetlands ○ In woody draws ○ In proposed bighorn sheep lambing habitat ○ In mule deer, elk, and antelope birthing areas ○ In occupied black-tailed prairie dog colonies ○ Within 0.50 miles of raptor nest sites active within the preceding 7 years ○ Within 2 miles of sharp-tailed grouse leks ○ In special status plant locations ○ Within 0.50 mile of golden eagle nest sites active within the preceding 7 years ○ Within 0.50 miles of ferruginous hawk nest sites active within the preceding 7 years ○ Within 1 mile of bald eagle nest sites active within the preceding 5 years ○ Within 1 mile of peregrine falcon nest sites active within the preceding 7 years ○ Within 0.50 miles of interior least tern active nests ○ Within 0.50 miles of piping plover critical habitat ○ Within 0.62 miles of occupied Dakota skipper habitat ○ Within 0.25 miles of Sprague's pipit habitat ○ Within 0.50 miles of the water's edge of identified pallid sturgeon habitat ○ In GRSG GHMA (see BLM 2015a) ○ In GRSG PHMA (high-voltage transmission lines, large pipelines, and minor ROWs; see BLM 2015a) ○ In Lost Bridge BCA ○ In Figure 4 BCA ○ In VRM II areas ○ Within 0.50 miles of the Little Missouri River • 1,500 acres as ROW avoidance only for belowground ROWs (these areas may overlap ROW exclusion areas): ○ Schnell Ranch SRMA, West Zone
320.	**Management Direction:** No similar management direction.	**Management Direction:** Prioritize processing of ROW applications for infrastructure (for example, pipelines) that maximize the recovery and delivery of natural gas from well sites to meet the objectives of reducing lost production and minimizing air pollutant emissions from venting and flaring.		
321.	**Management Direction:** No similar management direction.	**Management Direction:** Where practicable, co-locate new ROWs, including those associated with valid existing rights, within or adjacent to existing ROWs or where it best minimizes effects. 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 authorize to the minimum standard necessary any new road constructed to an approved BLM standard.		
322.	**Objective:** Maintain the integrity of BLM-administered lands by resolving trespass.			

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
323.	**Management Direction:** Resolve unauthorized use of BLM-administered lands through termination; a cooperative agreement authorized by the Sikes Act; authorization by lease or permit; or issuance of a ROW, exchange, or sale. Priorities are: (a) cases of new unauthorized activities or uses where prompt action can minimize damage to public resources and associated costs, (b) cases where delay may be detrimental to authorized users, (c) cases involving special areas, sensitive ecosystems, and resources of national significance, (d) cases involving malicious or criminal activities, and (e) cases of unauthorized landfills and dumpsites where there is a potential for hazardous material/waste dumping.			
324.	***Greater Sage-Grouse***			
325.	**Management Direction LR-1.1:** PHMA will be managed as ROW avoidance area for major ROWs (high-voltage transmission lines (100 kilovolt [kV] and over) and large pipelines [24 inches in width and over]). See Figure 2-10a, North Dakota Major Rights-of-Way (Appendix A of the BLM 2015a). • Where new ROWs are required, co-locate new ROW within existing ROWs or where it best minimizes impacts on GRSG and GRSG habitat.			
326.	**Management Direction LR-1.2:** PHMA will be managed as ROW avoidance area for minor ROWs (including communication sites and towers). See Figure 2-10b, North Dakota Minor Rights-of-Way (Appendix A of BLM 2015a).			
327.	**Management Direction LR-1.3:** Make PHMA exclusion area for new ROW wind and solar energy authorizations. See Figure 2-8, North Dakota Wind, and Figure 2-9, North Dakota Solar (Appendix A of BLM 2015a).			
328.	**Management Direction LR-1.4:** When addressing ROW authorizations in PHMA identify and evaluate opportunities to remove, bury or modify existing power lines within PHMA.			
329.	**Management Direction LR-1.5:** In PHMA, 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.			
330.	**Management Direction LR-1.6:** GHMA will be managed as ROW avoidance area for high-voltage transmission lines (100kV and over) and large pipelines (24 inches in width and over).			
331.	**Management Direction LR-1.7:** Minor ROWs will be allowed in GHMA with appropriate mitigation and conservation measures identified within the terms of the authorization to minimize surface-disturbing and disruptive activities.			
332.	**Management Direction LR-1.8:** Make GHMA avoidance area for new wind and solar energy authorizations. See Figure 2-8 and Figure 2-9 (Appendix A of BLM 2015a).			
333.	**Management Direction LR-1.9:** Where new ROWs are necessary in GHMA, co-locate new ROWs within existing ROWs where possible.			
334.	**Management Direction LR-1.10:** PHMA will be avoidance areas for leases/land use authorizations, which can be for agricultural, occupancy, or filming. Leases/land use authorizations will be allowed in GHMA with appropriate mitigation and conservation measures identified within the terms of the authorization to minimize surface-disturbing and disruptive activities.			
335.	***Land Tenure***			
336.	**Objective:** Evaluate all exchange or acquisition proposals according to the criteria listed in the State Director's Guidance for Land Pattern Review and Land Adjustments and site-specific criteria.	**Objective:** Attain a BLM land use pattern that blends multiple resource values and brings about better manageability. Consistent with Secretarial Order (SO) 3373, ensure public access and recreation opportunities are important considerations for any land tenure adjustment. Manage lands returned to the BLM administration through R&PP patent or other patent reversions according to the land tenure categories and criteria established in row 337. See land tenure adjustment categories and criteria in **Appendix G**, Land Tenure Adjustment Categories.		
337.	**Management Direction:** Manage BLM-administered land according to its identified land tenure category (**Map 2-9**; see also **Appendix G,** Land Tenure and Adjustment Categories): • Category 1 (retention) or category 2 (available for disposal through methods other than sale): 47,600 acres: ○ Lands within the consolidation area for Lost Bridge and vicinity ○ Isolated parcels within the consolidation area for Lost Bridge and vicinity ○ GRSG PHMA and GHMA (see Greater Sage-Grouse Approved RMP Amendment, September 2015) • Category 3 (available for disposal through sale): 10,900 acres ○ All lands not identified as Category 1 or 2	**Management Direction:** Manage BLM-administered land according to its identified land tenure category (**Map 2-10**; see also **Appendix G**, Land Tenure and Adjustment Categories): • Category 1 (retention): 2,500 acres: ○ Special status species habitat (except Sage grouse habitat) ○ Mud Buttes ACEC ○ Lands acquired through the Land and Water Conservation Fund • Category 2 (General Retention/Limited Disposal; available for disposal through methods other than sale): 56,000 acres • Category 3 (available for disposal through sale): 0 acres	**Management Direction:** Manage BLM-administered land according to its identified land tenure category (**Map 2-11**; see also **Appendix G**, Land Tenure and Adjustment Categories): • Category 1 (retention): 1,000 acres: ○ Mud Buttes ACEC ○ Lands acquired through the Land and Water Conservation Fund • Category 2 (General Retention/Limited Disposal; available for disposal through methods other than sale): 56,700 acres ○ GRSG habitat (PHMA and GHMA) • Category 3 (available for disposal through sale): 800 acres ○ BLM-administered land found to not contain any sensitive biological, cultural, paleontological, or other sensitive resource, and is surrounded by private land with no legal access.	**Management Direction:** Manage BLM-administered land according to its identified land tenure category (**Map 2-12**; see also **Appendix G**, Land Tenure and Adjustment Categories): • Category 1 (retention): 1,000 acres: ○ Mud Buttes ACEC ○ Lands acquired through the Land and Water Conservation Fund • Category 2 (General Retention/Limited Disposal; available for disposal through methods other than sale): 57,400 acres • Category 3 (available for disposal through sale): 100 acres ○ BLM-administered parcels under 10 acres found to not contain any sensitive biological, cultural, paleontological, or other sensitive resource, and is surrounded by private land with no legal access.
338.	**Management Direction:** Address landownership concerns to assist in creating larger blocks of BLM-administered lands.	**Management Direction:** Acquire, through purchase, exchange, donation, revocation of another agency's withdrawal, administrative transfer from another agency, cooperative agreement, or other authority, and evaluated against the criteria in **Appendix G,** Land Tenure and Adjustment Categories to create contiguous blocks of BLM-administered lands to: • Enhance management of special status species • Enhance recreational opportunities and outcomes at Schnell Ranch SRMA • Improve legal public access to Category 1 and 2 lands and BCAs		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
339.	**Management Direction:** No similar management direction.	**Management Direction:** Manage newly acquired lands and minerals and cadastral survey land status corrections similar to adjacent BLM land management prescriptions and the following criteria: • Lands and minerals acquired within special management areas with specific Congressional mandates (such as NHT) will be managed in conformance with established guidelines for those areas. • Lands and minerals acquired adjacent to administratively designated management allocations (such as BCAs or SRMAs) will be managed the same as and become part of the adjacent allocation. • Lands acquired without special values or management goals will be managed in the same manner as comparable surrounding public lands. • To the extent possible, management direction would be extended to newly acquired lands through plan maintenance.		
340.	**Management Direction:** Use the following order of preference in adjusting the landownership pattern: (a) Exchange (including the mineral estate with the surface estate if the land does not contain known mineral deposits) for lands that would provide equal or greater public benefits (b) Transfer to other federal agencies better able to manage the land for public benefits (c) Dispose to state agencies or private groups better able to manage the land for public benefits (d) R&PP Act (e) Sales	**Management Direction:** No similar management direction (see **Appendix G**, Land Tenure and Adjustment Categories for landownership pattern adjustments)		
341.	**Allocation:** Use exchanges as the only means to adjust land patterns within the Big Gumbo or Lost Bridge consolidation areas or lands contiguous to tracts retained for manageable resource values.	**Allocation:** No similar allocation (see **Appendix G**, Land Tenure and Adjustment Categories for landownership pattern adjustments).		
342.	**Management Direction:** Evaluate lands for possible disposal or exchange giving high relative weight for retention to lands that have threatened or endangered species or habitats, contain high-quality riparian habitat, or contain plant and animal populations or exemplary natural communities of high interest to the state.	**Management Direction:** No similar management direction (see **Appendix G**, Land Tenure and Adjustment Categories for landownership pattern adjustments).		
343.	**Management Direction:** Evaluate lands for possible disposal giving moderate relative weight for retention to lands that have high-quality woody vegetation or native prairie that could be lost or serve as high-value habitat because of surrounding agriculturally disturbed lands.	**Management Direction:** No similar management direction (see **Appendix G**, Land Tenure and Adjustment Categories for landownership pattern adjustments).		
344.	**Management Direction:** Obtain/reserve conservation easements to preserve important resources determined to be in the public interest on public and private lands (for example, archaeological sites, historical sites, scenic areas, or habitat for wildlife species).			
345.	**Management Direction:** Complete title resolution cases.			
346.	**Allocation:** No similar management direction.	**Allocation:** No BLM lands in the North Dakota Field Office are suitable for Desert Land Entry or Indian Allotments.		
347.	***Greater Sage-Grouse***			
348.	**Management Direction LR-1.11:** Lands classified as PHMA and GHMA for GRSG will be retained in federal management unless: (1) the BLM can demonstrate that disposal of the lands will provide a net conservation gain to GRSG or (2) the BLM can demonstrate that the disposal of the lands will have no direct or indirect adverse impact on conservation of GRSG. See Figure 2-11, North Dakota Land Tenure (Appendix A of BLM 2015a).			
349.	**Management Direction LR-1.12:** PHMA will be a priority in consideration of land acquisitions. Consider GRSG for all land tenure actions.			
350.	***Withdrawals and Other Segregations***			
351.	**Objective:** No similar objective.	**Objective:** Utilize withdrawal actions with the least restrictive measures and minimum size necessary to accomplish the required purpose.		
352.	**Management Direction:** Review existing withdrawals for consistency with other relevant programs.	**Management Direction:** Review withdrawals 2 years prior to termination either to extend, modify, or revoke. If withdrawals are no longer needed, in whole or in part, for the intended purpose for which they were created, the withdrawal would be revoked or modified.		
353.	**Management Direction:** No similar management direction.	**Management Direction:** Under 43 CFR 2310, evaluate withdrawal proposals at the project level. Withdrawals must be consistent with maintaining and protecting BLM resource values (see **Appendix D**, Stipulations and Allocations Applicable to Fluid Minerals Leasing).		
354.	**Management Direction:** No similar management direction.	**Management Direction:** Consider withdrawal proposals that result in a transfer of jurisdiction to another federal agency on a case-by-case basis. Also consider other agency requests for new withdrawals, or modification, extension, or revocation of existing withdrawals.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
355.	**Management Direction:** No similar management direction.	**Management Direction:** Manage lands returned to BLM jurisdiction through withdrawal modification, revocation, or expiration according to adjacent management prescriptions and as described in current management.		
356.	**Management Direction:** No similar management direction.	**Management Direction:** Recommend 8,300 acres for withdrawal from locatable mineral entry: • Within known or proposed bighorn sheep crucial habitat • Within 300 feet of the Doaks Butte (32BO222) site boundary • In Mud Buttes ACEC • In Schnell Ranch SRMA (both East and West Zones)	**Management Direction:** No similar management direction.	**Management Direction:** Recommend 960 acres for withdrawal from locatable mineral entry: • In Mud Buttes ACEC
357.	***Greater Sage-Grouse***			
358.	**Management Direction LR-1.13:** Not withdrawn from minerals on BLM surface.			
359.	**Management Direction R-1.14:** In PHMA, 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.)			
360.	***Public Access***			
361.	**Objective:** Acquire and maintain access to BLM-administered lands to improve management efficiency and to facilitate multiple uses in coordination with other federal agencies, state and local governments, and private landowners.	**Objective:** Acquire and maintain access to BLM-administered lands to improve management efficiency in coordination with other federal agencies, state and local governments, and private landowners; or to improve public access for recreation.		
362.	**Management Direction:** No similar management direction.	**Management Direction:** Obtain legal public or administrative access over nonfederal lands, as appropriate, on a case-by-case basis as the need or as the opportunity arises and using criteria in **Appendix G**, Land Tenure Adjustment Categories, and direction in the *Land Tenure* section of this plan. Use all methods available to acquire access; easements or land exchange with willing parties is the preferred method of access acquisition.		
363.	**Management Direction:** Reserve access easements in patents, if needed, to ensure public access to other BLM-administered land.			
364.	**Management Direction:** Acquire access easements to Category 1 and 2 lands where legal/physical access does not exist, is lengthy or arduous, or a need has been demonstrated.			
365.	**Fluid Leasable Minerals**			
366.	**Goals:** Encourage development of the federal oil and gas resource while avoiding unnecessary impacts on other resources and land uses. Maintain the integrity of federal oil and gas reserves to facilitate efficient and reasonable development.			
367.	**Objective:** No similar objective.	**Objective:** Provide opportunities for exploring, leasing, and developing fluid mineral resources, while applying the appropriate lease stipulations and COA to mitigate environmental effects from development.		
368.	**Allocation:** Manage 0 acres as closed to fluid mineral leasing.	**Allocation:** Manage 213,100 acres as closed to fluid mineral leasing (**Map 2-13**) in: • State designated drinking water source protection zones • Low potential development areas	**Allocation:** Manage 0 acres as closed to fluid mineral leasing.	**Allocation:** Manage 213,100 acres as closed to fluid mineral leasing (**Map 2-14**) in: • State designated drinking water source protection zones (2,000 acres) • Low development potential areas. In low development potential areas leasing may only be authorized to prevent drainage of federal minerals or if the oil and gas development potential categories are revised based on new data or information such as offset well production or geophysical surveys.
369.	**Management Direction:** No similar management direction.	**Management Direction:** Apply design features for fluid mineral exploration and development (to be determined at the project level; see **Appendix D**, Design Features and Best Management Practices) and reclamation standards (**Appendix E**, Reclamation Standards).		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
370.	**Allocation:** Manage 202,600 acres open subject to NSO stipulations (**Map 2-15**): Within 200 feet of wetlands, lakes, and ponds Within the floodplain of the Yellowstone River Within the floodplain of the Missouri River Within 0.50 miles of prairie falcon nests known to have been occupied at least once within the 7 previous years Within GRSG PHMA Within 0.50 miles of golden eagle nests known to have been occupied at least once within the 7 previous years Within 0.50 miles of ferruginous hawk nest sites Within a visible area within a 3.5-mile radius of the Fort Union Trading Post National Historic Landmark	**Allocation:** Manage 180,200 acres open subject to NSO stipulations (**Map 2-16**): • Within 1 mile of the Lostwood Wilderness Class I Area • Within 1 mile of the Theodore Roosevelt National Park Class I Area • Badlands and rock outcrops • Perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas • Tallgrass prairie • Woody draws • Known or proposed bighorn sheep crucial habitats (as defined by NDGF) • Within 0.25 miles of black-tailed or white-tailed prairie dog habitat • Within 0.25 miles of raptor nest sites active within the preceding 7 years • Within 0.25 miles of sharp-tailed grouse leks • State Wildlife Management Areas • Within 0.50 miles of special status plants or habitat • GRSG PHMA (see BLM 2015a) • Within 0.50 miles of golden eagle nests known to have been occupied at least once within the 7 previous years • Within 1 mile of bald eagle nest sites active within the preceding 5 years • Within 1 mile of peregrine falcon nests active within the preceding 7 years • Within 0.25 miles of interior least tern active nests • Within 0.25 miles of piping plover critical habitat • Within 0.62 miles of Dakota skipper habitat • Within 0.50 miles of the water's edge of identified pallid sturgeon habitat • Within 3 miles of the visible area surrounding Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32Dux1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Fort Union Trading Post National Historic Landmark, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), and Cross Ranch Archaeological District	**Allocation:** Manage 250,100 acres open subject to NSO stipulations (**Map 2-17**): • Within 1 mile of the Lostwood Wilderness Class I Area • Within 1 mile of the Theodore Roosevelt National Park Class I Area • Badlands and rock outcrops • Municipal watersheds and drinking water source protection zones • Perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas • Tallgrass prairie • Within 0.25 miles of raptor nest sites active within the preceding 7 years • Within 0.25 miles of special status plants or habitat • GRSG PHMA (see BLM 2015a) • Within 0.50 miles of golden eagle nests known to have been occupied at least once within the 7 previous years • Within 0.50 miles of bald eagle nest sites active within the preceding 5 years • Within 1 mile of peregrine falcon nests active within the preceding 7 years • Within 0.25 miles of interior least tern active nests • Within 0.25 miles of piping plover critical habitat • Within 0.62 miles of Dakota skipper habitat • Within 0.50 miles of the water's edge of identified pallid sturgeon habitat • Within 300 feet of the Doaks Butte (32BO222) site boundary • Within 100 feet surrounding significant cultural resources, NRHP-eligible properties and districts, and TCPs • Paleontological resources of scientific interest • Significant paleontological localities • Lost Bridge BCA • Figure 4 BCA • Authorized federal coal leases • Mud Buttes ACEC • Within the Lewis and Clark NHT management corridor • Within the North Country NST management corridor	**Allocation:** Manage 130,000 acres open subject to NSO stipulations (**Map 2-18)**: • Within 1 mile of the Lostwood Wilderness Class I Area • Within 1 mile of the Theodore Roosevelt National Park Class I Area • Badlands and rock outcrops • Perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas • Tallgrass prairie • State Wildlife Management Areas • Within 0.25 miles of special status plants or populations • GRSG PHMA (see BLM 2015a) • Within 0.50 miles of golden eagle nests known to have been occupied at least once within the 7 previous years • Within 0.50 miles of bald eagle nest sites active within the preceding 5 years • Within 0.25 miles of raptor nest sites active within the preceding 7 years • Within 1 mile of peregrine falcon nests active within the preceding 7 years • Within 0.25 miles of interior least tern active nests • Within 0.25 miles of piping plover critical habitat • Within 500 meters of occupied Dakota skipper habitat • Within 0.50 miles of the water's edge of identified pallid sturgeon habitat • Within 300 feet of the Doaks Butte (32BO222) site boundary • Within a visible area within a 3.5-mile radius of the Fort Union Trading Post National Historic Landmark • Within 100 feet surrounding significant cultural resources, NRHP-eligible properties and districts, and TCPs • Significant paleontological localities • Lost Bridge BCA • Figure 4 BCA • Authorized federal coal leases • Mud Buttes ACEC • Within the Lewis and Clark NHT management corridor • Within the North Country NST management corridor • Within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
370. *(cont.)*	*(See above.)*	• Within 300 feet of the Doaks Butte (32BO222) site boundary • Within 300 feet surrounding significant cultural resources, NRHP-eligible properties and districts, and TCPs • Significant paleontological localities • Lost Bridge BCA • Figure 4 BCA • Authorized federal coal leases • Mud Buttes ACEC • Within 0.25 miles of the segment of the Little Missouri River determined suitable for inclusion in the NWSRS • Within the Lewis and Clark NHT management corridor • Within the North Country NST management corridor • Within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe	*(See above.)*	*(See above.)*

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
371.	**Allocation:** Manage 15,800 acres open subject to CSU stipulations (**Map 2-19**): • Riparian areas and wetlands; intermittent, ephemeral, or perennial streams; and rivers • GRSG GHMA (see BLM 2015a)	**Allocation:** Manage 211,000 acres open subject to CSU stipulations (**Map 2-20**): • Within 2 miles of the Lostwood Wilderness • Within 2 miles of Theodore Roosevelt National Park • Sensitive soils • Within 300 feet of riparian and/or wetland areas, and ephemeral, intermittent, and perennial drainages • Invasive species and noxious weeds • Threatened, endangered, or other special status species • Within 2 miles of sharp-tailed grouse lek sites • Within 2 miles of greater prairie chicken lek sites • In special status plant species habitat • In GRSG GHMA (see BLM 2015a) • Within 0.50 miles of interior least tern active nests • Within 0.50 miles of piping plover critical habitat • Within 3 miles surrounding NPS units (for example, Theodore Roosevelt National Park, Knife River Indian Villages National Historic Site, Fort Union Trading Post National Historic Landmark, Lewis and Clark NHT management corridor, and North Country NST management corridor)	**Allocation:** Manage 348,900 acres open subject to CSU stipulations (**Map 2-21**): • Within 2 miles of the Lostwood Wilderness • Within 2 miles of Theodore Roosevelt National Park • Sensitive soils • Within 300 feet of riparian and/or wetland areas, and ephemeral, intermittent, and perennial drainages • Woody draws • Invasive species and noxious weeds • Threatened, endangered, or other special status species • Within occupied black-tailed prairie dog colonies • Within 2 miles of sharp-tailed grouse lek sites • Within 2 miles of greater prairie chicken lek sites • In special status plant species habitat • In GRSG GHMA (see BLM 2015a) • Within 2 miles of the visible area surrounding Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32Dux1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Fort Union Trading Post National Historic Landmark, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), and Cross Ranch Archaeological District • Within 2 miles surrounding NPS units (for example, Theodore Roosevelt National Park, Knife River Indian Villages National Historic Site, Fort Union Trading Post National Historic Landmark, Lewis and Clark NHT management corridor, and North Country NST management corridor)	**Allocation:** Manage 213,100 acres open subject to CSU stipulations (**Map 2-22)**: • Within 2 miles of the Lostwood Wilderness • Within 2 miles of Theodore Roosevelt National Park • Sensitive soils • Within 300 feet of riparian areas, wetlands, ephemeral, intermittent, and perennial drainages, and waterbodies • Woody draws • Invasive species and noxious weeds • Threatened, endangered, or other special status species • Within occupied black-tailed prairie dog colonies • Within 2 miles of sharp-tailed grouse lek sites • Within 2 miles of greater prairie chicken lek sites • Within 0.62 miles of occupied Dakota skipper habitat • In special status plant species habitat • In GRSG GHMA (see BLM 2015a) • Within 0.50 miles of interior least tern active nests • Within 0.50 miles of piping plover critical habitat • Within 2 miles of the visible area surrounding Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32Dux1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), and Cross Ranch Archaeological District • Within 3 miles surrounding NPS units (for example, Theodore Roosevelt National Park, Knife River Indian Villages National Historic Site, Fort Union Trading Post National Historic Landmark, Lewis and Clark NHT management corridor, and North Country NST management corridor)
372.	**Allocation:** Manage 328,600 acres open subject to TL stipulations (**Map 2-23**): • Within 500 feet of waterfowl nesting habitat • In bighorn sheep lambing habitat • In bighorn sheep winter range • In elk calving range • In elk winter range • Within 0.50 miles of occupied prairie falcon nests • Within 0.50 miles of occupied golden eagle nests • Within 0.50 miles of occupied ferruginous hawk nests	**Allocation:** Manage 179,200 acres open subject to TL stipulations (**Map 2-24**): • Within 500 feet of waterfowl nesting habitat • Big game birthing and foraging areas (mule deer, elk, and antelope) • Within 0.50 miles of occupied ferruginous hawk nests • Sprague's pipit habitat	**Allocation:** Manage 337,100 acres open subject to TL stipulations (**Map 2-25**): • Within 500 feet of waterfowl nesting habitat • In known bighorn sheep or proposed sheep crucial habitat • Big game birthing and foraging areas (mule deer, elk, and antelope) • Within 0.50 miles of active raptor nest sites • Within 0.50 miles of occupied ferruginous hawk nests • In Sprague's pipit habitat	**Allocation:** Manage 183,000 acres open subject to TL stipulations (**Map 2-26)**: • Within 500 feet of waterfowl nesting habitat • In bighorn sheep lambing habitat • In bighorn sheep winter range • Big game birthing areas (mule deer, elk, and antelope) • Within 0.50 miles of active raptor nest sites • Within 0.50 miles of occupied ferruginous hawk nests • Sprague's pipit habitat

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
373.	**Allocation:** No similar allocation.	**COAL** **Allocation:** NSO 11-63: Prohibit surface occupancy and use in an authorized federal coal lease existing prior to the time the oil and gas lease was issued, in conformance with 43 CFR 3400.1.		
374.	**Allocation:** The following areas are unacceptable for further consideration for coal leasing (multiple-use screen 3): • Key oil and gas fields	**Allocation:** The following areas are unacceptable for further consideration for coal leasing (multiple-use screen 3): • Active oil and gas fields • Within 0.50 miles of existing wells		
375.	**Management Direction:** Review newly complete wells to determine feasibility of hook-up to a gas-gathering system if research, analyses, and monitoring indicate unacceptable air quality results from their flaring.			
376.	**Management Direction:** Require mitigating measures on oil and gas wells that cannot be included in a gas-gathering system and notify the North Dakota Department of Health.			
377.	***Greater Sage-Grouse***			
378.	**Objective MR-1.1:** Priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMA and GHMA. When analyzing leasing and authorizing development of fluid mineral resources, including geothermal, in PHMA and GHMA, and subject to applicable stipulations for the conservation of GRSG, priority will be given to development in nonhabitat areas first and then in the least suitable habitat for GRSG. The implementation of these priorities will be subject to valid existing rights and any applicable law or regulation, including, but not limited to, 30 USC 226(p) and 43 CFR, Part 3162.3-1(h). Where a proposed fluid mineral development project on an existing lease could adversely affect GRSG populations or habitat, the BLM will work with the lessees, operators, or other project proponents to avoid, minimize, and apply compensatory mitigation for adverse impacts to the extent compatible with lessees' rights to drill and produce fluid mineral resources. The BLM will work with the lessee, operator, or project proponent in developing an application for permit to drill for the lease to avoid and minimize impacts on GRSG or its habitat and will ensure that the best information about the GRSG and its habitat informs and helps to guide development of such federal leases.			
379.	***Greater Sage-Grouse (Unleased Federal Fluid Mineral Estate)***			
380.	**Management Direction MR-1.1:** Open to oil and gas leasing and development; however, surface occupancy and use will be prohibited within PHMA (NSO). Upon expiration or termination of existing leases, apply NSO. See Figure 2-4, North Dakota Fluid Minerals (Oil, Gas, and Geothermal) (Appendix A of BLM 2015a). No waivers or modifications to a fluid mineral lease no-surface-occupancy stipulation will be granted. The BLM Authorized Officer may grant an exception to a fluid mineral lease no-surface-occupancy stipulation only where the proposed action: i. Will not have direct, indirect, or cumulative effects on GRSG or its habitat; or, ii. Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel and will provide a clear conservation gain to GRSG. Exceptions based on conservation gain (ii) may only be considered in (a) PHMA of mixed ownership where federal minerals underlie less than fifty percent of the total surface, or (b) areas of the BLM-administered lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid Federal fluid mineral lease existing as of the date of this RMPA. Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such benefits will endure for the duration of the proposed action's impacts. Any exceptions to this lease stipulation may be approved by the BLM Authorized Officer only with the concurrence of the State Director. The BLM Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies (i) or (ii). Such finding shall initially be made by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception will not be granted. Approved exceptions will be made publicly available at least quarterly.			
381.	**Management Direction MR-1.2:** In GHMA, surface occupancy and use will be subject to special operating constraints (CSU) (Appendix G, Oil and Gas Stipulations, of BLM 2015a)			
382.	**Management Direction MR-1.3:** Allow geophysical exploration within PHMA to obtain exploratory information for areas outside of and adjacent to PHMA.			
383.	**Management Direction MR-1.4:** Allow geophysical operations by existing roads and trails, or helicopter-portable drilling methods, and in accordance with seasonal timing restrictions and/or other restrictions that may apply.			

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
384.	***Greater Sage-Grouse (Leased Federal Fluid Mineral Estate)***			
385.	**Management Direction MR-1.5:** During implementation level review and decisions, (such as approval of an application for permit to drill and Sundry Notice) and upon completion of the environmental record of review (43 CFR, Part 3162.5), include appropriate documentation of compliance with NEPA. In this process evaluate, among other things: (1) Whether the conservation measure is "reasonable" (43 CFR, Part 3101.1-2) with the valid existing rights; and (2) Whether the action is in conformance with the Approved RMPA. Conservation Measure #1: The following operating constraints will be applied to existing leases as COAs in PHMA and GHMA. Exceptions may be granted by the BLM Authorized Officer if an environmental review demonstrates that effects can 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 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. Manage water developments to reduce the spread of West Nile virus within GRSG habitat areas. c. Site and/or minimize linear ROW to reduce disturbance to sagebrush habitats. d. Maximize placement of new utility developments (power lines, pipelines, etc.) and transportation routes in existing ROWs. e. Power lines will be buried, eliminated, designed or sited in a manner which does not impact GRSG. f. Placement of other high-profile structures, exceeding 10 feet in height, will be eliminated, designed or sited in a manner which does not impact GRSG. g. Remote monitoring of production facilities must be utilized, and all permit applications must contain a plan to reduce the frequency of vehicle use. h. 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. i. Restore disturbed areas at final reclamation to pre-disturbance conditions or desired plant community. Utilize native grass species mix which includes sagebrush and forbs. j. Permanent (longer than 2 months) structures which create movement must be designed or sited to minimize impacts on GRSG. k. As reasonable (43 CFR, Part 3101.1-2), in consideration of valid existing rights, and to achieve a net conservation gain, the BLM will require compensatory mitigation when impacts cannot be adequately avoided and minimized, and residual impacts will result in habitat loss and degradation. Compensatory mitigation actions will align with the recommendations in the Regional Mitigation Strategy (see Appendix F of BLM 2015a), as appropriate. A priority may be given to compensatory mitigation actions in the same PHMA as is being impacted, unless a greater benefit can be achieved elsewhere. Compensatory mitigation will be considered when no feasible options remain to adequately avoid and minimize impacts within and immediately adjacent to the impacted site. Conservation Measure #2: Make applicable required design features (RDFs) (Appendix C of BLM 2015a) mandatory as COA within PHMA.			
386.	**Solid Leasable Minerals**			
387.	**Goal:** Provide opportunities for exploration and development of federal solid leasable minerals consistent with other resource goals.			
388.	**Management Direction:** No similar management direction.	**Management Direction:** Activities proposed in the following geologic formations or geologically downgradient from them will be required to test surface deposits for erionite minerals. If erionite is identified, the project will be subject to required design features and may be disapproved for public safety. • Arikaree Formation • Brule Formation • Chadron Formation		
389.	***Greater Sage-Grouse (Mineral Split Estate)***			
390.	**Management Direction MR-1.14:** Where the federal government owns the mineral estate in PHMA and GHMA, and the surface is in nonfederal ownership, apply the same stipulations, COAs, and/or conservation measures and RDFs applied if the mineral estate is developed on BLM-administered lands in that management area, to the maximum extent permissible under existing authorities, and in coordination with the landowner.			
391.	**Management Direction MR-1.15:** Where the federal government owns the surface and the mineral estate is in nonfederal ownership in PHMA and GHMA, apply appropriate surface use COAs, stipulations, and mineral RDFs through ROW grants or other surface management instruments, to the maximum extent permissible under existing authorities, in coordination with the mineral estate owner/lessee.			
392.	***Coal*** (see **Appendix F**, Coal Screening Process, for coal screen details, including resources identified for protection for multiple-use concerns)			
393.	**Objective:** Encourage orderly development of the federal coal resource while avoiding unnecessary impacts on other resources and land uses.			
394.	**Allocation:** Manage 573,900 acres as acceptable for further consideration for coal leasing and 435,800 acres as unacceptable for further consideration for coal leasing (**Maps 2-27**, **2-28**, **2-29**).	**Allocation:** **Alternative B (Preferred Alternative):** Manage 54,400 acres as acceptable for further consideration for coal leasing and 1,042,000 acres as unacceptable for further consideration for coal leasing (**Map 2-30**).	**Allocation:** **Alternative B.1:** Manage 16,300 acres as acceptable for further consideration for coal leasing and 1,080,100 acres as unacceptable for further consideration for coal leasing (**Map 2-31**).	**Allocation:** Manage 553,600 acres as acceptable for further consideration for coal leasing and 542,800 acres as unacceptable for further consideration for coal leasing (**Map 2-32**).	**Allocation:** Manage 58,600 acres as acceptable for further consideration for coal leasing and 1,037,800 acres as unacceptable for further consideration for coal leasing (**Map 2-33**).

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)		Alternative C	Alternative D (Proposed Plan)
395.	**Allocation:** Identify 1,009,700 acres as having coal potential.	**Allocation: Alternative B (Preferred Alternative):** Identify 1,096,400 acres as having coal potential (Screen 1; **Appendix F**, Coal Screening Process, **Map F-1**).	**Allocation: Alternative B.1:** Identify 1,096,400 acres as having coal potential (Screen 1; **Appendix F**, Coal Screening Process, **Map F-1**).	**Allocation:** Identify 1,096,400 acres as having coal potential (Screen 1; **Appendix F**, Coal Screening Process, **Map F-1**).	**Allocation:** Identify 1,096,400 acres as having coal potential (Screen 1; **Appendix F**, Coal Screening Process, **Map F-1**).
396.	**Allocation:** Manage 193,400 acres as unsuitable for all methods of coal mining. *Note: These acres may include lands that have exceptions.*	**Allocation: Alternative B (Preferred Alternative):** Manage 53,000 acres as unsuitable for all methods of coal mining, without exception (Screen 2; **Appendix F**, Coal Screening Process, **Map F-26**).	**Allocation: Alternative B.1:** Manage 53,000 acres as unsuitable for all methods of coal mining, without exception (Screen 2; **Appendix F**, Coal Screening Process, **Map F-26**).	**Allocation:** Manage 53,000 acres as unsuitable for all methods of coal mining, without exception (Screen 2; **Appendix F**, Coal Screening Process, **Map F-26**).	**Allocation:** Manage 53,000 acres as unsuitable for all methods of coal mining, without exception (Screen 2; **Appendix F**, Coal Screening Process, **Map F-26**).
397.	**Allocation:** No similar allocation; see totals in the row above.	**Allocation: Alternative B (Preferred Alternative):** Manage 294,400 acres as unsuitable for all or certain stipulated methods of coal mining, with exception/stipulation (Screen 2; **Appendix F**, Coal Screening Process, **Map F-26**).	**Allocation: Alternative B.1:** Manage 294,400 acres as unsuitable for all or certain stipulated methods of coal mining, with exception/stipulation (Screen 2; **Appendix F**, Coal Screening process, **Map F-26**).	**Allocation:** Manage 294,400 acres as unsuitable for all or certain stipulated methods of coal mining, with exception/stipulation (Screen 2; **Appendix F**, Coal Screening Process, **Map F-26**).	**Allocation:** Manage 294,400 acres as unsuitable for all or certain stipulated methods of coal mining, with exception/stipulation (Screen 2; **Appendix F**, Coal Screening Process, **Map F-26**).

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)		Alternative C	Alternative D (Proposed Plan)
398.	**Allocation:** Manage 154,600 acres as unacceptable for further consideration for leasing (Screen 3): • Slopes greater than 30 percent • Lynch Knife River Flint Quarry District • Writing Rock State Historic Site • Communities having 1980 population less than 500 persons • Communities having 1980 population equal to or greater than 500 persons • Residential subdivisions • Industrial concentrations • Minuteman missile silos • Minuteman communication cables • Electric transmissions lines equal to or greater than 230 kilovolts • Pipelines equal to or greater than 12 inches in diameter • Operating railroads • Agricultural experiment station • Wildlife threshold • Key oil and gas fields • City of Dickinson municipal watershed	**Allocation:** **Alternative B (Preferred Alternative):** Manage 1,037,800 acres as unacceptable for further consideration for coal leasing due to multiple-use values (Screen 3; **Appendix F**, Coal Screening Process, **Map F-33**): • The area outside 4 miles from existing coal mine permits as of September 9, 2022 • Slopes greater than 30 percent covering more than a 10-acre area • Knife River Indian Villages Historic Site viewshed • Schnell Ranch SRMA (both East and West Zones) • Lost Bridge BCA • Figure 4 BCA • Areas with leonardite potential • Active oil and gas fields • Within 0.50 miles of existing wells • Mud Buttes ACEC	**Allocation:** **Alternative B.1:** Manage 1,079,500 acres as unacceptable for further consideration for coal leasing due to multiple-use values (Screen 3; **Appendix F**, Coal Screening Process, **Map F-34**): • The areas outside the approved mine permit boundaries as of September 9, 2022 for each coal mine • Slopes greater than 30 percent covering more than a 10-acre area • Knife River Indian Villages Historic Site viewshed • Schnell Ranch SRMA (both East and West Zones) • Lost Bridge BCA • Figure 4 BCA • Areas with leonardite potential • Active oil and gas fields • Within 0.50 miles of existing wells • Mud Buttes ACEC	**Allocation:** Manage 410,800 acres as unacceptable for further consideration for leasing (Screen 3; **Appendix F**, Coal Screening Process, **Map F-35**): • Schnell Ranch SRMA (combined East and West Zones) • Lost Bridge BCA • Figure 4 BCA • Active oil and gas fields • Within 0.50 miles of existing wells • Mud Buttes ACEC	**Allocation:** Manage 1,037,800 acres as unacceptable for further consideration for coal leasing due to multiple-use values (Screen 3; **Appendix F**, Coal Screening Process, **Map F-33**): • The area outside 4 miles from existing coal mine permits as of September 9, 2022 • Slopes greater than 30 percent covering more than a 10-acre area • Knife River Indian Villages Historic Site viewshed • Schnell Ranch SRMA (both East and West Zones) • Lost Bridge BCA • Figure 4 BCA • Areas with leonardite potential • Active oil and gas fields • Within 0.50 miles of existing wells • Mud Buttes ACEC
399.	**Allocation:** Manage 87,800 acres as unacceptable for further consideration for leasing based on landowner input (Screen 4).	**Allocation:** Manage 121,500 acres as unacceptable for further consideration for coal leasing based on landowner input (Screen 4; **Appendix F**, Coal Screening Process, **Map F-36**).			**Allocation:** Manage 0 acres as unacceptable for further consideration for coal leasing based on landowner input (Screen 4; **Appendix F**, Coal Screening Process). Additional landowner consultation will occur at the time of leasing, surface owner agreement must be obtained in order to lease any lands in accordance with 30 USC 1304(c)..
400.	**Management Direction:** At the time an application for a new coal lease or lease modification is submitted to the BLM, the BLM will reassess whether the lease application area is unsuitable for all or certain coal mining methods pursuant to 43 CFR 3461.5.				
401.	***Greater Sage-Grouse (Coal)***				
402.	**Management Direction MR-1.6:** At the time an application for a new coal lease or lease modification is submitted to the BLM, the BLM will determine whether the lease application area is "unsuitable" for all or certain coal mining methods pursuant to 43 CFR, Part 3461.5. PHMA is essential habitat for maintaining GRSG for purposes of the suitability criteria set forth at 43 CFR, Part 3461.5(o)(1). See Figure 2-13, North Dakota Coal (Appendix A of BLM 2015a).				
403.	**Management Direction MR-1.7:** Sub-surface mines - Grant no new mining leases unless all surface disturbances (appurtenant facilities) are placed outside of PHMA.				
404.	**Management Direction MR-1.8:** In GHMA, 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).				

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
405.	***Nonenergy Solid Leasable Minerals (for example, phosphate)***			
406.	**Objective:** Maintain the availability of federally reserved nonenergy leasable minerals for authorized uses.			
407.	**Allocation:** Manage 318,100 acres of the federal mineral estate as open to NEL mineral leasing subject to standard lease terms and conditions (**Map 2-34**).	**Allocation:** Manage 279,600 acres of the federal mineral estate as open to NEL mineral leasing subject to standard lease terms and conditions (**Map 2-35**).	**Allocation:** Manage 302,900 acres of the federal mineral estate as open to NEL mineral leasing subject to standard lease terms and conditions (**Map 2-36**).	**Allocation:** Manage 294,700 acres of the federal mineral estate as open to NEL mineral leasing subject to standard lease terms and conditions (**Map 2-37)**.
408.	**Allocation:** Manage 44,500 acres as closed to nonenergy solid mineral leasing (**Map 2-34**): • GRSG PHMA (see Greater Sage-Grouse Approved RMP Amendment, September 2015)	**Allocation:** Manage 83,000 acres as closed to nonenergy solid mineral leasing (**Map 2-35**): • Tallgrass prairie • Known or proposed bighorn sheep crucial habitat • Within 0.50 miles of piping plover critical habitat • Within 0.62 miles of Dakota skipper habitat • Within 0.50 miles of the water's edge of identified pallid sturgeon habitat • GRSG PHMA (see BLM 2015a) • Within a 3-mile visibility radius of Fort Union Trading Post National Historic Landmark, Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32DUx1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Standing Rock State Historic Site (32RM32), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), and Cross Ranch Archaeological District • Within 300 feet of the Doaks Butte (32BO222) site boundary • Schnell Ranch SRMA (both East and West Zones) • Lost Bridge BCA • Figure 4 BCA • Mud Buttes ACEC • Within the Lewis and Clark NHT management corridor • Within the North Country NST management corridor	**Allocation:** Manage 59,700 acres as closed to nonenergy solid mineral leasing (**Map 2-36**): • Known or proposed bighorn sheep crucial habitat • GRSG PHMA (see BLM 2015a) • Within 300 feet of the Doaks Butte (32BO222) site boundary • Schnell Ranch SRMA (combined East and West Zones) • Lost Bridge BCA • Figure 4 BCA	**Allocation:** Manage 67,900 acres as closed to nonenergy solid mineral leasing (**Map 2-37)**: • Tallgrass prairie • Within 0.50 miles of piping plover critical habitat • Within 0.62 miles of occupied Dakota skipper habitat • GRSG PHMA (see BLM 2015a) • Within 300 feet of the Doaks Butte (32BO222) site boundary • Schnell Ranch SRMA (both East and West Zones) • Lost Bridge BCA • Figure 4 BCA • Mud Buttes ACEC
409.	**Allocation:** No similar allocation	**Allocation:** No similar allocation	**Allocation:** Manage 960 acres as open to NEL leasing subject to no surface disturbance stipulations: • Mud Buttes ACEC	**Allocation:** Manage 2,700 acres as open to NEL leasing subject to no surface disturbance stipulations: • Lewis and Clark NHT management corridor • North Country NST management corridor
410.	**Management Direction:** No similar management direction.	**Management Direction:** Apply design features (to be determined at the project level) and reclamation standards for nonenergy solid energy leasable mineral exploration and development (see **Appendix D**, Design Features and Best Management Practices, and **Appendix E**, Reclamation Standards). Resources not specifically addressed in allocations above or as design features would be handled at the project level with resource protections from other resource use allocations as guidance when impacts are similar.		
411.	***Greater Sage-Grouse (Nonenergy leasable minerals)***			
412.	**Management Direction MR-1.12:** Close PHMA to nonenergy leasable mineral leasing. See Figure 2-7, North Dakota Nonenergy Leasables (Appendix A of BLM 2015a). This includes not permitting any new leases to expand an existing mine.			
413.	**Management Direction MR-1.13:** For existing nonenergy leasable mineral leases in PHMA, follow the same RDFs applied to fluid minerals (Appendix C of BLM 2015a), when wells are used for solution mining.			

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
414.	**Locatable Minerals**			
415.	**Goal: Encourage and facilitate development of locatable minerals in the manner to prevent unnecessary or undue degradation. Provide land use opportunities contributing to economic benefits while protecting or minimizing adverse impacts on other resources.**			
416.	**Objective:** Maintain the availability of federally reserved locatable minerals for authorized uses.			
417.	**Allocation:** Open all the federally reserved locatable mineral deposits, excluding acquired minerals and minerals that are withdrawn to protect resource values and uses, to mineral entry (354,900 acres; **Map 2-38**).	**Allocation:** All the federally reserved locatable mineral deposits (excluding 7,700 acres subject to interminable "temporary" segregation from mineral entry, pending the issuance of an opening order [see row 418]), are open to mineral entry (354,900 acres; **Map 2-39**).		
418.	**Allocation:** The following areas are currently subject to interminable "temporary" segregation from mineral entry under the mining laws (land acquired by exchange, 7,700 acres; **Map 2-38**): • Lands formerly segregated under the R&PP Act • Lands acquired by exchange • Split-estate minerals created when the surface estate of those lands was conveyed	**Management Direction:** Recommend opening orders for the 7,700 acres not currently open for locatable mineral entry.		
419.	**Management Direction:** No similar management direction.	**Management Direction:** Recommend the following areas for withdrawal from locatable mineral entry (8,300 acres; **Map 2-39**): • Known or proposed bighorn sheep crucial habitat on BLM-administered surface • Within 300-feet of the Doaks Butte (32BO222) site boundary • Schnell Ranch SRMA (both East and West Zones) • Mud Buttes ACEC	**Management Direction:** No similar management direction.	**Management Direction**: Recommend the following areas for withdrawal from locatable mineral entry (960 acres): • Mud Buttes ACEC
420.	**Management Direction:** No similar management direction.	**Management Direction:** Apply design features (to be determined at the project level) and reclamation standards for locatable mineral exploration and development (see **Appendix D**, Design Features and Best Management Practices, and **Appendix E**, Reclamation Standards).		
421.	***Greater Sage-Grouse***			
422.	**Management Direction MR-1.9:** In PHMA, proposed actions under Plan of Operations and Notices will be analyzed on a case-by-case basis in cooperation with the State of North Dakota, and RDFs (Appendix C of BLM 2015a) will be applied to the extent consistent with applicable law. See Figure 2-5, North Dakota Locatable Minerals (Appendix A of BLM 2015a). Note: Locatable mineral exploration and development under the mining laws are not discretionary actions; however, Notices and Plan of Operation are reviewed to prevent unnecessary or undue degradation to resources.			
423.	**Mineral Materials**			
424.	**Goal: Provide for the extraction of mineral materials to meet public demand and local infrastructure needs, while minimizing adverse impacts on other resource values.**			
425.	**Objective:** Maintain the availability of federally reserved salable minerals for authorized uses.	**Objective:** Maintain the availability and access to federal minerals through sales, free-use permits, and community pits/common use areas.		
426.	**Allocation:** 318,100 acres are open to mineral materials disposal (**Map 2-42**).	**Allocation:** 156,100 acres are open to mineral materials disposal (**Map 2-43**).	**Allocation:** 302,900 acres are open to mineral materials disposal (**Map 2-44**).	**Allocation:** 163,700 acres are open to mineral materials disposal (**Map 2-45)**.

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
427.	**Allocation:** Manage 44,500 acres as closed to mineral materials disposal (**Map 2-42**): • GRSG PHMA (see Greater Sage-Grouse Approved RMP Amendment, September 2015)	**Allocation:** Manage 206,500 acres as closed to mineral materials disposal (**Map 2-43**): • Within 300 feet of riparian areas and wetlands • Tallgrass prairie • GRSG PHMA (see BLM 2015a) • Known or proposed bighorn sheep crucial habitat • Within 0.50 miles of piping plover critical habitat • Within 0.62 miles of Dakota skipper habitat • Within 0.50 miles of the water's edge of identified pallid sturgeon habitat • Within a 3-mile visibility radius of Fort Union Trading Post National Historic Landmark, Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32DUx1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Standing Rock State Historic Site (32RM32), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), and Cross Ranch Archaeological District • Within 300 feet of the Doaks Butte (32BO222) site boundary • Schnell Ranch SRMA (both East and West Zones) • Lost Bridge BCA • Figure 4 BCA • Mud Buttes ACEC • Segment of the Little Missouri River determined suitable for inclusion in the NWSRS • Within the Lewis and Clark NHT management corridor • Within the North Country NST management corridor	**Allocation:** Manage 59,700 acres as closed to mineral materials disposal (**Map 2-44**): • Within 300 feet of riparian areas and wetlands • Tallgrass prairie • GRSG PHMA (see BLM 2015a) • Known or proposed bighorn sheep crucial habitat • Within 300-feet of the Doaks Butte (32BO222) site boundary • Schnell Ranch SRMA (combined East and West Zones) • Lost Bridge BCA • Figure 4 BCA • Mud Buttes ACEC	**Allocation:** Manage 198,900 acres as closed to mineral materials disposal (**Map 2-45)**: • Within 300 feet of riparian areas and wetlands • Tallgrass prairie • GRSG PHMA (see BLM 2015a) • Within 0.50 miles of piping plover critical habitat • Within 0.62 miles of occupied Dakota skipper habitat • Within 300 feet of the Doaks Butte (32BO222) site boundary • Schnell Ranch SRMA (both East and West Zones) • Lost Bridge BCA • Figure 4 BCA • Mud Buttes ACEC • Within the Lewis and Clark NHT management corridor • Within the North Country NST management corridor
428.	**Management Direction:** No similar management direction.	**Management Direction:** Apply design features (to be determined at the project level) and reclamation standards for mineral material exploration and development (see **Appendix D**, Design Features and Best Management Practices, and **Appendix E**, Reclamation Standards). Resources not specifically addressed in allocations above or as design features would be handled at the project level with resource protections from other resource use allocations as guidance when impacts are similar.		
429.	**Management Direction:** No similar management direction.	**Management Direction:** All surface-disturbing activities are subject to required design features to reduce exposure and respiration of erionite minerals.		
430.	***Greater Sage-Grouse***			
431.	**Management Direction MR-1.10:** Close PHMA to mineral material sales. See Figure 2-6, North Dakota Salable Minerals (Mineral Materials) (Appendix A of BLM 2015a).			
432.	**Management Direction MR-1.11:** In PHMA, restore salable mineral pits no longer in use to meet GRSG habitat conservation objectives. Note: Although there are no authorized mineral pits in the planning area, any trespass pits found in the planning area will be subject to restoration.			

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
433.	**Recreation**			
434.	**Goals:** Manage recreation resources on BLM-administered lands to provide a diverse array of recreation opportunities while maintaining healthy BLM-administered land resources. Establish, manage, and maintain quality recreation sites and facilities, consistent with the recreational setting, to meet a broad range of public needs, subject to resource constraints. Emphasize and support cooperative relationships with other entities to improve public outreach and interpretation that promote stewardship and public health and safety. Manage recreation opportunities to provide a sustained flow of local economic benefits and to protect nonmarket economic values.			
435.	**Objective:** No similar objective.	**Objective:** • Visitor Services Resource Protection Objective: Increase awareness, understanding, and sense of stewardship in recreational activity participants so their conduct safeguards cultural and natural resources. • Visitor Health and Safety Objective: Ensure visitors are not exposed to unhealthy or unsafe human-created conditions (defined by a repeat or recurring incident in the same year, of the same type, in the same location, due to the same cause). • Use/User Conflict Objective: Achieve a minimum level of conflict between recreation participants and (1) other resource/resource uses sufficient to enable the achievement of identified land use plan goals, objectives, and management directions; (2) private landowners sufficient to curb illegal trespass and property damage; and (3) other recreation participants sufficient to maintain a diversity of recreational activity participation		
436.	**Management Direction:** Approve or deny use authorizations as requested by the public for all competitive recreational and commercial uses, and as required for private and group uses.	**Management Direction:** Issue special recreation permits (SRPs) as appropriate for commercial, competitive, special events, and/or organized group activities, subject to guidelines in BLM Handbook 2930, resource capabilities, social conflict concerns, professional qualifications, public safety, and public needs. Monitor changes in demand for permits and the resulting impacts and identify future thresholds that could lead to limits in the number of permits to minimize impacts on the resource, public safety, and overall visitor satisfaction. Review all SRP applications and renewals on a case-by-case basis and issue them as tools to achieve area-specific planning goals, objectives, and decisions.		
437.	**Management Direction:** Give budget priority to recreation management in the Big Gumbo area.	**Management Direction:** No similar management direction.		
438.	**Management Direction:** Sign sizeable blocks of BLM-administered land to identify public access.			
439.	**Management Direction:** Prepare activity plans for the development of recreational facilities, such as campgrounds, when necessary to meet public demand.			
440.	**Management Direction:** Acquire access easements where legal or physical access, or both, is lengthy or arduous and a need has been demonstrated.	**Management Direction:** See similar management directions in *Comprehensive Trails and Travel Management* and *Lands and Realty* sections.		
441.	**Management Direction:** Identify potential recreation opportunities on BLM-administered lands and protect those opportunities when feasible.	**Management Direction:** No similar management direction.		

442.	**Allocations:** No similar allocations.	**Allocations:** Manage the Schnell Ranch SRMA (2,000 acres) with two zones (**Map 2-46**):
		• East Zone (500 acres)
		  ○ ROW exclusion
		  ○ Realty: Acquire lands through exchange, purchase, or donation to enhance recreational opportunities and outcomes. Manage acquired lands within or adjacent to the SRMA as part of the SRMA.
		  ○ R&PP: Authorize targeted/prescribed grazing for resource benefit through an R&PP lease.
		  ○ VRM Class II
		  ○ Fluid minerals: No federal fluid minerals present
		  ○ Coal: Unacceptable for leasing (not within coal potential)
		  ○ Nonenergy solid leasable minerals: Closed
		  ○ Locatable minerals: Recommend for withdrawal from locatable mineral entry
			Allocations: Manage the Schnell Ranch SRMA (2,000 acres) (**Map 2-47**):
			  ○ ROW: Avoidance for new subsurface ROWs and exclusion for new surface ROWS
			  ○ Realty: Acquire lands through exchange, purchase, or donation to enhance recreational opportunities and outcomes. Manage acquired lands within or adjacent to the SRMA as part of the SRMA.
			  ○ R&PP: Authorize prescribed grazing under an R&PP lease or free-use grazing permit under 43 CFR 4100; targeted grazing to reduce wildfire risk authorized under 4190.1.
			  ○ VRM Class III
			  ○ Fluid minerals: No federal fluid minerals present
			  ○ Coal: Unacceptable for leasing (not within coal potential)
				Allocations: Manage the Schnell Ranch SRMA (2,000 acres) with two zones (**Map 2-48**):
				• East Zone (500 acres)
				  ○ ROW exclusion
				  ○ Realty: Acquire lands through exchange, purchase, or donation to enhance recreational opportunities and outcomes. Manage acquired lands within or adjacent to the SRMA as part of the SRMA.
				  ○ R&PP: Authorize targeted/prescribed grazing for resource benefit through an R&PP lease.
				  ○ VRM Class II
				  ○ Fluid minerals: No federal fluid minerals present
				  ○ Coal: Unacceptable for leasing (not within coal potential)
				  ○ Nonenergy solid leasable minerals: Closed
				  ○ Locatable minerals: Not recommend for withdrawal from locatable mineral entry

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
442 *(cont.)*	*(See above)*	○ Mineral materials: Closed ○ Facility development: Limited facilities; expand trail system to support visitation levels. ○ Camping restrictions: N/A (Standard restrictions) ○ Special Recreation Permits: Issue SRPs that are beneficial or neutral to SRMA objectives ○ Travel management: Closed ○ Livestock grazing: Unavailable for standard term livestock grazing leases. Prescribed grazing may be authorized through non-standard, free use, or temporary nonrenewable leasing for the benefit of other resources and not as a commodity use. ○ Forestry: Permit the collection of dead and downed wood where beneficial or neutral to SRMA objectives. • West Zone (1,500 acres) ○ ROW: Avoidance for new subsurface ROWs and exclusion for new surface ROWs ○ Realty: Acquire lands through exchange, purchase, or donation to enhance recreational opportunities and outcomes. Manage acquired lands within or adjacent to the SRMA as part of the SRMA. ○ R&PP: Authorize targeted/prescribed grazing for resource benefit through an R&PP lease. ○ VRM Class III ○ Fluid minerals: No federal fluid minerals present ○ Coal: Unacceptable for leasing (not within coal potential) ○ Nonenergy solid leasable minerals: Closed ○ Locatable minerals: Recommend for withdrawal from locatable mineral entry ○ Mineral materials: Closed ○ Facility development: Expand trail system and develop facilities (such as picnic shelters) to support visitation levels. ○ Camping restrictions: N/A (Standard restrictions) ○ Special Recreation Permits: Issue SRPs that are beneficial or neutral to SRMA objectives. ○ Travel management: Closed (except maintained campground road) ○ Livestock Grazing: Unavailable for standard term livestock grazing leases. Prescribed grazing may be authorized through non-standard, free use, or temporary nonrenewable leasing for the benefit of other resources and not as a commodity use. ○ Forestry: Permit the collection of dead and downed wood where beneficial or neutral to SRMA objectives. ○ See **Appendix H**, Recreation Management Areas, for details.	○ Nonenergy solid leasable minerals: Closed ○ Locatable minerals: Not recommend for withdrawal from locatable mineral entry ○ Mineral materials: Closed ○ Facility development: Limited facilities; expand trail system to support visitation levels. ○ Camping restrictions: N/A (Standard restrictions) ○ Special Recreation Permits: Issue SRPs that are beneficial or neutral to SRMA objectives ○ Travel management: Closed (except maintained campground road) ○ Livestock grazing: Unavailable for standard term livestock grazing leases. Prescribed grazing may be authorized through non-standard, free use, or temporary nonrenewable leasing for the benefit of other resources and not as a commodity use. ○ Forestry: Permit the collection of dead and downed wood where beneficial or neutral to SRMA objectives. ○ See **Appendix H**, Recreation Management Areas for details.	○ Mineral materials: Closed ○ Facility development: Limited facilities; expand trail system to support visitation levels. ○ Camping restrictions: N/A (Standard restrictions) ○ Special Recreation Permits: Issue SRPs that are beneficial or neutral to SRMA objectives ○ Travel management: Closed ○ Livestock grazing: Unavailable for standard term livestock grazing leases. Prescribed grazing may be authorized through non-standard, free use, or temporary nonrenewable leasing for the benefit of other resources and not as a commodity use. ○ Forestry: Permit the collection of dead and downed wood where beneficial or neutral to SRMA objectives. • West Zone (1,500 acres) ○ ROW: Avoidance for new subsurface ROWs and exclusion for new surface ROWs ○ Realty: Acquire lands through exchange, purchase, or donation to enhance recreational opportunities and outcomes. Manage acquired lands within or adjacent to the SRMA as part of the SRMA. ○ R&PP: Authorize targeted/prescribed grazing for resource benefit through an R&PP lease. ○ VRM Class III ○ Fluid minerals: No federal fluid minerals present ○ Coal: Unacceptable for leasing (not within coal potential) ○ Nonenergy solid leasable minerals: Closed ○ Locatable minerals: Not recommend for withdrawal from locatable mineral entry ○ Mineral materials: Closed ○ Facility development: Expand trail system and develop facilities (such as picnic shelters) to support visitation levels. ○ Camping restrictions: N/A (Standard restrictions) ○ Special Recreation Permits: Issue SRPs that are beneficial or neutral to SRMA objectives. ○ Travel management: Closed (except maintained campground road) ○ Livestock Grazing: Unavailable for standard term livestock grazing leases. Prescribed grazing may be authorized through non-standard, free use, or temporary nonrenewable leasing for the benefit of other resources and not as a commodity use. ○ Forestry: Permit the collection of dead and downed wood where beneficial or neutral to SRMA objectives. ○ See **Appendix H**, Recreation Management Areas, for details.

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
443.	**Allocations:** No similar allocations.	**Allocations:** Manage the following BCAs (**Map 2-46**) (see **Appendix H**, Recreation Management Areas for details): • Figure 4 (3,500 acres) ○ ROW: Avoidance for all ROWs ○ Realty: Improve public access and expand recreational opportunities by acquiring lands or access easements. Manage lands acquired adjacent to the BCA as part of the BCA. ○ VRM Class II ○ Fluid minerals: NSO (note: partially leased) ○ Coal: Unacceptable for leasing (not within coal potential) ○ Nonenergy solid leasable minerals: Closed ○ Locatable minerals: Not recommend for withdrawal from locatable mineral entry ○ Mineral materials: Closed ○ Expand trail system and develop facilities (such as picnic shelters) to support visitation levels ○ Camping Restrictions: N/A (Standard restrictions) ○ Special Recreation Permits: Issue SRPs that are beneficial or neutral to SRMA objectives. ○ Travel management: Limited to designated routes • Lost Bridge (8,900 acres) ○ ROW: Avoidance for all ROWs ○ Realty: Improve public access and expand recreational opportunities by acquiring lands or access easements. Manage lands acquired adjacent to the BCA as part of the BCA. ○ VRM Class II ○ Fluid minerals: NSO (note: partially leased) ○ Coal: Unacceptable for leasing (not within coal potential) ○ Nonenergy solid leasable minerals: Closed ○ Locatable minerals: Not recommend for withdrawal from locatable mineral entry ○ Mineral materials: Closed ○ Camping Restrictions: N/A (Standard restrictions) ○ Special Recreation Permits: Issue SRPs that are beneficial or neutral to SRMA objectives. ○ Travel management: Limited to designated routes	**Allocations:** Manage the following BCAs (**Map 2-47**) (see **Appendix H**, Recreation Management Areas for details): • Figure 4 (3,100 acres) ○ Same as Alternative B • Lost Bridge (5,300 acres) ○ Same as Alternative B	**Allocations:** Manage the following BCAs (**Map 2-48**) (see **Appendix H**, Recreation Management Areas for details): • Figure 4 (3,500 acres) ○ ROW: Avoidance for all ROWs ○ Realty: Improve public access and expand recreational opportunities by acquiring lands or access easements. Manage lands acquired adjacent to the BCA as part of the BCA. ○ VRM Class II ○ Fluid minerals: NSO (note: partially leased) ○ Coal: Unacceptable for leasing (not within coal potential) ○ Nonenergy solid leasable minerals: Closed ○ Locatable minerals: Not recommend for withdrawal from locatable mineral entry ○ Mineral materials: Closed ○ Expand trail system and develop facilities (such as picnic shelters) to support visitation levels ○ Camping Restrictions: N/A (Standard restrictions) ○ Special Recreation Permits: Issue SRPs that are beneficial or neutral to SRMA objectives. ○ Travel management: Limited to designated routes • Lost Bridge (8,900 acres) ○ ROW: Avoidance for all ROWs ○ Realty: Improve public access and expand recreational opportunities by acquiring lands or access easements. Manage lands acquired adjacent to the BCA as part of the BCA. ○ VRM Class II ○ Fluid minerals: NSO (note: partially leased) ○ Coal: Unacceptable for leasing (not within coal potential) ○ Nonenergy solid leasable minerals: Closed ○ Locatable minerals: Not recommend for withdrawal from locatable mineral entry ○ Mineral materials: Closed ○ Camping Restrictions: N/A (Standard restrictions) ○ Special Recreation Permits: Issue SRPs that are beneficial or neutral to SRMA objectives. ○ Travel management: Limited to designated routes
444.	***Greater Sage-Grouse***			
445.	**Management Direction REC-1.1:** Only allow SRPs that will have neutral or beneficial effects on PHMA.			
446.	**Management Direction REC-1.2:** In PHMA, do not construct new recreation facilities (such as campgrounds, trails, trailheads, and staging areas) unless the development will have a net conservation gain to GRSG habitat (such as concentrating recreation, diverting use away from important areas, etc.), or unless the development is required for visitor health and safety or resource protection.			
447.	**Comprehensive Trails and Travel Management**			
448.	**Goal: Manage access to balance public use, protect BLM-administered land resources, promote safety for all BLM-administered land users, and minimize conflicts among OHV users and other uses of BLM-administered lands.**			
449.	**Objective:** No similar objective.	**Objective:** Maintain and improve land health while promoting active travel management. Within each travel management area, designate a comprehensive travel management system that achieves resource objectives; provides appropriate, sustainable public and administrative access; communicates with the public about opportunities; and monitors the effects of use.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
450.	**Management Direction:** No similar management direction.	**Management Direction:** Establish the following travel management areas and priorities for travel management planning: • Big Gumbo • Lost Bridge • Remaining lands		
451.	**Allocation:** BLM-administered land is designated a limited area under BLM regulations 43 CFR 8342 and as defined under 43 CFR 8340.0-5(g) (**Map 2-49**). Of these acres, 29,800 acres have seasonal closures: • Big Gumbo Manage approximately 2,000 acres as closed: • Schnell Ranch (except maintained campground road)	**Allocation:** Allocate the decision area as follows for OHV travel (**Map 2-50**): Manage approximately 2,900 acres as closed • Schnell Ranch SRMA (both East and West Zones, except maintained campground road) • Mud Buttes ACEC Manage the remaining approximately 55,600 acres as limited to designated routes. Of these acres, 32,300 acres have seasonal closures: • Bowman County	**Allocation:** Allocate the decision area as follows for OHV travel (**Map 2-51**): Manage approximately 2,000 acres as closed: • Schnell Ranch SRMA (combined East and West Zones; except maintained campground road) Manage the remaining approximately 56,500 acres as limited to designated routes. Of these acres, 33,200 acres have seasonal closures: • Bowman County	**Allocation:** Allocate the decision area as follows for OHV travel (**Map 2-52)**: Manage approximately 2,900 acres as closed: • Schnell Ranch SRMA, both East and West Zones (except maintained campground road) • Mud Buttes ACEC except County Road (96th Street Southwest) Manage the remaining approximately 55,600 acres as limited to designated routes. Of these acres, 32,300 acres have seasonal closures: • Bowman County: In spring (March 1–June 1), unsurfaced routes (for example, two-track routes) are closed (except for administrative or authorized purposes) to protect against erosion.
452.	**Allocation:** Restrict motorized OHV use within the Big Gumbo area to maintained roads from March 1 through June 1.	**Allocation:** Between March 1 and June 1, restrict motorized travel to maintained roads in the Big Gumbo area. Allow exceptions for permitted and emergency uses.		
453.	**Allocation:** Limit motorized, wheeled, cross-country travel for the BLM to official administrative business, as outlined by an internal memorandum (see Appendix D of the Final Off-Highway Vehicle EIS and Proposed Plan Amendment for Montana, North Dakota and Portions of South Dakota [BLM 2001]).			
454.	**Management Direction:** Through subsequent site-specific planning, designate roads and trails for motorized use. With public involvement, the BLM will continue with ongoing travel management plans and develop new travel management plans (for example, landscape analysis, watershed plans, or activity plans) for geographical areas. Through site-specific planning, roads and trails will be inventoried, mapped, and analyzed to the degree necessary to evaluate and designate the roads and trails as open, seasonally open, or closed.	**Management Direction:** Emphasize management of the transportation system to reduce effects on natural resources from authorized roads, primitive roads, and trails. Consider, through travel management planning, closing and restoring unauthorized routes to prevent resource damage. Consider limitations, where necessary, to minimize short- and long-term impacts on wildlife habitats and populations.		
455.	**Allocation:** Permit motorized, wheeled, cross-country travel to a campsite within 300 feet of roads and trails. Site selection must be completed by nonmotorized means and accessed by the most direct route, causing the least damage. This exception does not apply where existing seasonal restrictions prohibit traveling off designated routes to a campsite. Existing local rules take precedence over this exception. This distance could be modified through subsequent site-specific planning.			
456.	**Allocation:** Require authorization from the local field manager for motorized, wheeled, cross-country travel for other government entities on official administrative business.			
457.	**Allocation:** Prohibit motorized, wheeled, cross-country travel for big game retrieval. The retrieval of a big game animal that is in possession (that is, tagged) is allowed on roads and trails unless currently restricted.			
458.	**Allocation:** Motorized, wheeled, cross-country travel for personal use permits, such as for firewood and Christmas tree cutting, could be allowed at the local level (BLM field office or field station) in specific areas identified for such use.			
459.	**Allocation:** Limit motorized, wheeled, cross-country travel for lessees and permittees to the administration of a federal lease or permit.			
460.	**Management Direction:** No similar management direction.	**Management Direction:** Obtain legal public or administrative access over nonfederal lands, as appropriate, on a case-by-case basis as the need or as the opportunity arises and using criteria and direction in the *Land Tenure* section. Methods used to acquire access include easements acquired through purchase, exchange, or donation; reciprocal ROWs; land exchanges; fee title purchase; cooperative agreements; reservations; permits; donations of fee land; covenant language in patents or deeds; and long-term land use agreements.		
461.	**Management Direction:** No similar management direction.	**Management Direction:** Where private landowners have demonstrated a willingness to provide public access across their lands, manage for public access from BLM-administered lands across such land in travel plans. Exceptions include routes that the BLM has proposed as closed or are known to be posted or otherwise closed to the public by private property owners. The BLM has no control over private roads traveling through private land onto BLM-administered lands. Access across private land is subject to change. Where public motorized access is contingent upon the governing consent of adjoining landowner(s), the BLM would exercise a reciprocal “All or None” road use policy. This means that as long as the public is allowed access to these roads, no changes in travel management would occur.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
462.	***Greater Sage-Grouse***			
463.	**Management Direction TTM-1.1:** In PHMA and GHMA, limit OHV 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 2-12, North Dakota Trails and Travel Management (Appendix A of BLM 2015a).			
464.	**Management Direction TTM-1.2:** In PHMA, travel management will evaluate the need for permanent, or seasonal, road or area closures where vehicle use is causing or will cause adverse effects upon habitat.			
465.	**Management Direction TTM-1.3:** In PHMA and GHMA, complete activity level travel plans within 5 years of the ROD. During activity level planning, where appropriate, designate routes in PHMA and GHMA with current administrative/agency purpose or need to administrative access only.			
466.	**Management Direction TTM-1.4:** In PHMA, limit route construction to realignments of existing designated routes if that realignment has a minimal impact on GRSG habitat, eliminates the need to construct a new road, or is necessary for motorist safety. Allow new routes/realignments in PHMA and GHMA during site-specific travel planning if it improves GRSG habitat and resource conditions.			
467.	**Management Direction TTM-1.5:** In PHMA, use existing routes, or realignments as described above to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing routes, then build any new route constructed to the absolute minimum standard necessary.			
468.	**Management Direction TTM-1.6:** In PHMA and GHMA, allow no upgrading of existing routes that will change route category (road, primitive road, or trail) or capacity unless the upgrading will have minimal impact on GRSG habitat, is necessary for motorist safety, or eliminates the need to construct a new road.			
469.	**Management Direction TTM-1.7:** When travel management plans are complete, conduct restoration of roads, primitive roads and trails in PHMA and GHMA.			
470.	**Management Direction TTM-1.8:** When reseeding roads, primitive roads and trails in PHMA and GHMA, use appropriate seed mixes and consider the use of transplanted sagebrush.			
471.	**Management Direction TTM-1.9:** In PHMA and GHMA, temporary closures will be considered in accordance with 43 CFR, subpart 8364 (Closures and Restrictions); 43 CFR, subpart 8351 (Designated National Area); 43 CFR, subpart 6302 (Use of Wilderness Areas, Prohibited Acts, and Penalties); 43 CFR, subpart 8341 (Conditions of Use). Temporary closure or restriction orders under these authorities are enacted at the discretion of the BLM Authorized Officer to resolve management conflicts and protect persons, property, and BLM-administered lands and resources. Where a BLM Authorized Officer determines that OHVs are causing or will cause considerable adverse effects upon soil, vegetation, wildlife, wildlife habitat, cultural resources, historical resources, threatened or endangered species, wilderness suitability, other authorized uses, or other resources, the affected areas shall be immediately closed to the type(s) of vehicle causing the adverse effect until the adverse effects are eliminated and measures implemented to prevent recurrence. (43 CFR, Part 8341.2) A closure or restriction order shall be considered only after other management strategies and alternatives have been explored. The duration of temporary closure or restriction orders shall be limited to 24 months or less; however, certain situations may require longer closures and/or iterative temporary closures. This may include closure of routes or areas.			
472.	**Livestock Grazing**			
473.	**Goals:** Manage for a sustainable level of livestock grazing while meeting or progressing toward the Dakotas Standards for Rangeland Health, recognizing the ecological benefits of moderate levels of large animal grazing in the Great Plains. Manage livestock grazing to provide economic opportunities in the planning area.			
474.	**Management Directions Common to All Alternatives:** Management common to all lands grazed by livestock: Continue to adhere to Guidelines for Livestock Grazing Management (BLM 1997, or current). Apply the management decisions to address livestock use in GRSG habitat as described in the North Dakota Field Office Greater Sage-Grouse Approved RMP Amendment (BLM 2015a). Complete assessments for rangeland health on a priority allotment basis with emphasis on allotments with significant acreage of BLM-administered land, threatened and endangered species, and resource problems or issues (for example, I and M category allotments). Work cooperatively on integrated ranch planning so that ranch operations with a combination of BLM/deeded/other leased lands can be properly planned and coordinated. Make temporary stocking rate adjustments in response to changing conditions (drought, fire, etc.) and desired vegetation response (for example, livestock use to modify vegetation). Unless specifically precluded on the lease, allow administrative use of motorized cross-country travel (including aircraft) to maintain or repair range improvements, treat or move livestock, spray weeds, monitor animal and range conditions, and complete other management tasks directly associated with livestock and range management. The BLM may restrict or prohibit administrative cross-country motorized travel in specific areas to protect resources, address safety issues, or limit other conflicts associated with cross-country travel. Make adjustments to livestock management practices or livestock numbers based on results of monitoring studies, rangeland health assessments, allotment evaluations, interdisciplinary review and consultation, and cooperation and coordination with the affected lessee. Identify additional site-specific mitigation and implement it through environmental review that is completed at the implementation phase (project level) when allotment management plans (AMPs) or grazing lease renewals occur. Install and maintain functional wildlife escape ramps on all water tanks on BLM-administered lands. Review allotment categorizations (improve, maintenance, and custodial) as circumstances change and new data become available. Categorizations may be changed consistent with BLM range management policy. Coordinate small parcel management with the private landowner's (lessee's) management.			
475.	**Objective:** No similar objective.	**Objective:** For allotments without approved specific management objectives and established grazing strategies, the utilization level as measured at the end of the grazing season will not exceed 50 percent on herbaceous forage plants on a pasture-wide basis or on selected key areas. Utilization will be monitored (within staffing capabilities and budget) to gauge the effectiveness of management. Allotments with approved management plans will establish allowable use levels for grazing allotments through specific management objectives during the allotment or lease renewal process.		
476.	**Objective:** No similar objective.	**Objective:** Where grazing is allowed, make forage allocations consistent with the potential of the ecological sites present taking into consideration the need to provide residual cover for wildlife, watershed and soil protection		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
477.	**Allocation:** Allow livestock grazing on all lands identified as suitable (approximately 58,500 acres). See **Map 2-53**.	**Allocation:** Manage 52,200 acres as available for livestock grazing (includes leased areas). The following areas would be unavailable for standard term livestock grazing leases (6,300 acres; **Map 2-54**): • Currently unleased parcels • Schnell Ranch SRMA (both East and West Zones) Prescribed grazing on these unavailable lands may be authorized, if needed, through nonstandard, free-use, or temporary, nonrenewable leases for the benefit of other resources.	**Allocation:** Manage 56,500 acres as available for livestock grazing (includes leased and unleased areas). The following areas would be unavailable for standard term livestock grazing leases (2,000 acres; **Map 2-55** and **Map 2-56**): • Schnell Ranch SRMA Prescribed grazing on these unavailable lands may be authorized, if needed, through nonstandard, free-use, or temporary, nonrenewable leases for the benefit of other resources and not as a commodity use.	
478.	**Allocation:** Make the amount of forage available for permitted use approximately 12,007 AUMs. Base the allocation of forage or changes to the allocation of forage to establish permitted use levels on the ecological site potential with consideration of wildlife and watershed needs. Keep permitted use levels on lands currently leased for grazing the same unless new information or changing conditions indicate that a change to permitted use levels is needed, based on information and through the coordination described under *Actions Common to All Alternatives*.	**Allocation:** Make the amount of forage available for standard term livestock grazing leases to the approximately 9,283 AUMs that are currently permitted on allotments leased for livestock grazing. Base the allocation of forage or changes to the allocation of forage to establish permitted use levels on the ecological site potential with consideration of wildlife and watershed needs. Keep current permitted use levels on lands currently leased for grazing the same unless new information or changing conditions indicate that a change to permitted use levels is needed, based on information and through the coordination described in *Actions Common to All Alternatives*. Any changes to permitted use levels would be subject to interdisciplinary and project-level environmental review.	**Allocation:** Make approximately 11,172 AUMs the amount of forage that could be available for permitted use on lands available for livestock grazing. Base the allocation of forage or changes to the allocation of forage to establish permitted use levels on the ecological site potential with consideration of wildlife and watershed needs. Keep current permitted use levels on lands currently leased for grazing the same unless new information or changing conditions indicate that a change to permitted use levels is needed, based on information and through the coordination described in *Actions Common to All Alternatives*. Any changes to permitted use levels would be subject to interdisciplinary and project-level environmental review.	
479.	**Management Direction:** Conduct monitoring to assess the actual use, utilization, climate, range condition, trend, and unauthorized use. Present livestock use levels would continue unless monitoring provides evidence for necessary adjustments.	**Management Direction:** Adjust livestock management if monitoring reveals a change in the allotment grazing capacity as a result of management changes applied. Adjust livestock management or permitted use levels based on rangeland health assessments, allotment evaluations, interdisciplinary review and consultation, and cooperation and coordination with the affected lessee and the interested public.	**Management Direction:** Adjust livestock management if monitoring reveals a significant change in the allotment grazing capacity as a result of management actions applied. Adjust livestock management or permitted use levels based on monitoring studies, rangeland health assessments, allotment evaluations, interdisciplinary review and consultation, and cooperation and coordination with the affected lessee and the interested public.	**Management Direction:** Adjust livestock management if monitoring reveals a change in the allotment grazing capacity as a result of management changes applied. Adjust livestock management or permitted use levels based on rangeland health assessments, allotment evaluations, interdisciplinary review and consultation, and cooperation and coordination with the affected lessee and the interested public.
480.	**Management Direction:** No similar management direction.	**Management Direction:** Consider changes to the season of use, distribution, intensity, type of livestock, and potential benefit of range improvements and other forms of mitigation, prior to implementing any decreases in permitted use levels. Periodically review the suitability of individual allotments. Change permitted use if reviews determine that acres suitable for grazing are different than previously determined.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
481.	**Management Direction:** Allowable utilization would not exceed 50 percent by weight.	**Management Direction:** Unless otherwise specified in the grazing plan or in the terms and conditions of the grazing lease, limit forage utilization limited to 50 percent. Forage utilization limits may be set at a value between 40 and 60 percent, based on site-specific conditions and management subject to project-level environmental review. *Adaptive Management* Threshold: Two consecutive years of exceeding utilization limit on a pasture basis. Base adjustments on monitoring. Response: Adjustments in livestock grazing management (livestock numbers and kind, season of use, rest, etc.) could occur with additional monitoring of soil and vegetation conditions or evaluation/determination of rangeland health.	**Management Direction:** Forage utilization limits on specific allotments may vary based on site-specific conditions and management subject to project-level environmental review. *Adaptive Management* Threshold: Two consecutive years of exceeding utilization limit on a pasture-wide basis. Base adjustments on monitoring. Response: Adjustments in livestock grazing management (livestock numbers and kind, seasons of use, rest, etc.) may occur with additional monitoring of soil and vegetation conditions or evaluation/determination of rangeland health.	**Management Direction:** No similar management direction.
482.	**Management Direction:** Implement grazing systems, where necessary, as determined from monitoring results. Manage C category allotments under deferred or seasonal systems. Coordinate small parcel management with the private landowner's (lessee's) management.	**Management Direction:** Implement grazing systems, where necessary, as determined from monitoring results with priority given to Improve and Maintain Priority Allotments and those allotments in GRSG habitat. Manage custodial allotments as part of a larger ranch operation unless conflicts occur, or rangeland health standards are not meet.		
483.	**Management Direction:** Fence water sources necessary for wildlife and adversely affected by uncontrolled livestock use. Gaps will be provided for livestock use. Avoid development of range improvements on erodible soils during April through June. Modify existing fences that adversely affect big game populations by restricting movements.	**Management Direction:** Limit trampling of water sources through implementation of Guidelines for Grazing Management. When new fences or reconstruction of existing fences are proposed, coordinate with affected lessees and landowners to construct fences that would effectively confine livestock, while allowing passage of wildlife through fences using specifications and methods described in the BLM Fencing Handbook H1741-1 and the Landowners Guide to Wildlife Friendly Fencing (USDA NRCS publication 2012). Follow migratory bird nesting date guidelines to limit impacts on migratory birds.		
484.	**Management Direction:** Make lands identified for disposal or exchange and not presently leased for grazing available for grazing using temporary, nonrenewable leases.	**Management Direction:** No similar management direction.		
485.	**Management Direction:** When grazing leases are issued or renewed, address potential impacts on special status plants through environmental review.	**Management Direction:** Manage livestock grazing in special status plant areas to improve habitat or population resiliency.	**Management Direction:** Same as Alternative A.	**Management Direction:** Manage livestock grazing in special status plant areas to improve habitat or population resiliency.
486.	**Management Direction:** Conduct land treatments where outlined in activity plans as necessary for effective range management.	**Management Direction:** Implement land treatments that involve chiseling, ripping, or other forms of soil penetration to improve rangeland health and not strictly to improve forage production.		**Management Direction:** Conduct land treatments where outlined in activity plans as necessary for effective range management.
487.	**Management Direction:** Continue grazing on the AMP allotments during the activity plan revision.	**Management Direction:** Review grazing plans and possibly modify them during the lease renewal process. Develop new grazing plans as needed.		
488.	**Management Direction:** No similar management direction.	**Management Direction:** Include protection of pollinator species in grazing management plans (see **Appendix D**, Design Features and Best Management Practices).		
489.	**Management Direction:** Renew existing leases on lands identified for disposal or retention for 2-year terms.	**Management Direction:** No similar management direction.		
490.	**Management Direction:** Develop water sources where needed (as indicated by monitoring) to improve livestock distribution and wildlife habitat. Avoid development of range improvements on erodible soils during April through June.	**Management Direction:** Develop range improvements, including water sources, to benefit multiple resources and not strictly for livestock management.	**Management Direction:** Develop range improvements, including water sources, that are neutral to or benefit multiple resources and for the benefit of livestock management.	**Management Direction:** Develop range improvements, including water sources, to benefit multiple resources and not strictly for livestock management.
491.	**Management Direction:** No similar management direction.	**Management Direction:** Give priority consideration to range improvement projects that benefit multiple resources and are multi-jurisdictional.		

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
492.	**Management Direction:** Control noxious weed infestations, where feasible, as determined by the extent of infestation, control on adjacent lands, and lessee cooperation. Consider using biological control methods, including livestock management, if proven to be effective (leafy spurge was identified as a primary concern in the 1984 North Dakota Grazing EIS).	**Management Direction:** When appropriate, issue grazing leases with a term and condition requiring that the lessee enter into a cooperative range improvement agreement for control of noxious weeds on allotments that they lease.		
493.	***Greater Sage-Grouse***			
494.	**Management Direction LG-1.1:** Grazing will be allowed on all lands identified as suitable (approximately 32,945 acres). See Figure 2-3, North Dakota Livestock Grazing (Appendix A of BLM 2015a).			
495.	**Management Direction LG-1.2:** Allocate up to an estimated 5,780 animal unit months (AUMs) on GRSG allotments to livestock in the long term (livestock use set at 25 percent of average annual forage production).			
496.	**Management Direction LG-1.3:** Within PHMA, incorporate GRSG habitat objectives and management considerations into all BLM grazing allotments through AMP or permit renewals. Develop standards with State of North Dakota and the US Fish and Wildlife Service (USFWS).			
497.	**Management Direction LG-1.4:** In PHMA, work cooperatively on integrated ranch planning within GRSG habitat so operations with deeded/BLM allotments can be planned as single units.			
498.	**Management Direction LG-1.5:** The BLM will prioritize (1) the review of grazing permits/leases, in particular to determine if modification is necessary prior to renewal, and (2) the processing of grazing permits/leases in PHMA. In setting workload priorities, precedence will be given to existing permits/leases in these areas not meeting Land Health Standards, with focus on those containing riparian areas, including wet meadows. The BLM may use other criteria for prioritization to respond to urgent natural resource concerns (such as fire) and legal obligations. The NEPA analysis for renewals and modifications of livestock grazing permits/leases that include lands within PHMA will include specific management thresholds, based on GRSG Habitat Objectives (**Table 2-3**), Habitat Objectives for GRSG and ecological site potential, and one or more defined responses that will allow the authorizing officer to make adjustments to livestock grazing that have already been subjected to NEPA analysis. Allotments within PHMA, focusing on those containing riparian areas, including wet meadows, will be prioritized for field checks to help ensure compliance with the terms and conditions of the grazing permits. Field checks can include monitoring for actual use, utilization, and use supervision.			
499.	**Management Direction LG-1.6:** In PHMA, 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 will be developed at the field office level in partnership with NDGRD and USFWS and incorporated into AMPs or livestock grazing permits as appropriate incorporating best available science.			
500.	**Management Direction LG-1.7:** At the time a permittee[2] or lessee voluntarily relinquishes a permit or lease, the BLM will consider whether the BLM-administered lands where that permitted use was authorized should remain available for livestock grazing or be used for other resource management objectives, such as reserve common allotments or fire breaks. This does not apply to or impact grazing preference transfers, which are addressed in 43 CFR 4110.2-3.			
501.	***Greater Sage-Grouse (Implementation Management Direction after Land Health Evaluations)***			
502.	**Management Direction LG-1.8:** Develop specific objectives to conserve, enhance or restore PHMA based on ecological site descriptions 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.			
503.	**Management Direction LG-1.9:** In PHMA, manage for vegetation composition and structure consistent with GRSG seasonal habitat objectives. Ecological site descriptions 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.			
504.	**Management Direction LG-1.10:** In PHMA, implement management directions (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 (such as cattle, sheep, horses, llamas, alpacas, and goats).			
505.	**Management Direction LG-1.11:** During drought periods, prioritize evaluating effects of the drought in PHMA relative to their needs for food and cover. Management will continue to be in accordance with the Montana-Dakotas Drought Policy (see Appendix H, Drought Policy, of BLM 2015a).			
506.	**Special Designations and Management Areas**			
507.	**Goal: Protect relevant and important values through ACEC designation and apply special management where standard or routine management is not adequate to protect the values from risks or threats of damage/degradation or to provide for public safety from natural hazards.**			
508.	***Areas of Critical Environmental Concern***			
509.	**Objective:** No similar objective.	**Objective:** Maintain, restore, or enhance relevant and important values identified for designated ACECs.		
510.	**Management Direction:** No similar management direction; no ACECs are designated.	**Management Direction:** Manage the following designated ACEC for the relevant and important value(s) identified (**Map 2-58**): • Mud Buttes (960 acres): geologic value of Cretaceous-Paleogene (K-Pg) boundary; rare fossils	**Management Direction:** Manage the following designated ACEC (**Map 2-59**) for the relevant and important value(s) identified: • Mud Buttes (960 acres): geologic value of K-Pg boundary; rare fossils	**Management Direction:** Manage the following designated ACEC for the relevant and important value(s) identified (**Map 2-60**): • Mud Buttes (960 acres): geologic value of Cretaceous-Paleogene (K-Pg) boundary; rare fossils

[2] The North Dakota BLM does not currently have any issued grazing permits, only leases.

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
511.	**Management Direction:** No similar management direction; no ACECs are designated.	**Allocations:** Manage Mud Buttes ACEC as follows: • ROW: Exclusion area, except for existing ROW authorizations (new ROWs could be collocated in these existing ROW authorizations) • Fluid minerals: NSO • Coal: Unacceptable for further consideration for leasing (Coal Screen 3) • Nonenergy solid leasable minerals: Closed • Locatable: Recommend for withdrawal from locatable mineral entry • Mineral materials: Closed to mineral materials disposal • Prohibit casual collection of invertebrate or plant fossils • OHV: Closed, except for administrative or permitted access	**Allocations:** Manage Mud Buttes ACEC as follows: • ROW: Avoidance area, except for existing ROW authorizations (new ROWs could be collocated in these existing ROW authorizations) • Fluid minerals: NSO • Coal: Unacceptable for further consideration for leasing (Coal Screen 3) • Nonenergy solid leasable minerals: No surface disturbance • Mineral materials: Closed to mineral materials disposal • Prohibit casual collection of invertebrate or plant fossils • OHV: Limited to designated routes	**Allocations:** Manage Mud Buttes ACEC as follows: • ROW: Exclusion area, except for existing ROW authorizations (new ROWs could be collocated in these existing ROW authorizations) • Fluid minerals: NSO • Coal: Unacceptable for further consideration for leasing (Coal Screen 3) • Nonenergy solid leasable minerals: Closed • Locatable: Recommend for withdrawal from locatable mineral entry • Mineral materials: Closed to mineral materials disposal • Prohibit casual collection of invertebrate or plant fossils • OHV: Closed, except County Road (96th Street Southwest) and except for administrative or permitted access
512.	**Management Direction:** No similar management direction.	**Management Direction:** Allow other surface-disturbing activities only where it can be demonstrated that activities would not impact relevant and important values.		
513.	**Management Direction:** No similar management direction.	**Management Direction:** Manage lands acquired within or adjacent to the Mud Buttes ACEC as part of the ACEC.		
514.	***Wild and Scenic Rivers***			
515.	**Goal:** Manage eligible rivers to protect and enhance the free-flowing condition, water quality, and outstandingly remarkable values (ORVs) until suitability can be determined through the land use planning process.	**Goal:** Manage suitable rivers to protect and enhance the free-flowing condition, water quality, and identified ORVs until Congress designates the river as a component of the NWSRS or releases the river for other uses.	**Goal:** No similar goal.	
516.	**Objective:** Preserve the tentative classification of each eligible segment pending suitability determination or congressional action.	**Objective:** Manage the level of development along suitable WSR segments in a manner that maintains the tentative classification of each suitable WSR segment. In addition, maintain the free-flowing condition, water quality, and ORVs associated with suitable segments.	**Objective:** No similar objective.	
517.	**Management Direction:** Manage 8.1 miles of the Little Missouri River as **eligible** for inclusion in the NWSRS (0.25-mile buffer; **Map 2-57**): • Tentative classification: scenic • ORV: Scenic	**Management Direction:** Determine 8.1 miles of the Little Missouri River **suitable** for inclusion in the NWSRS (0.25-mile buffer; **Map 2-58**): • Tentative classification: scenic • ORV: Scenic • Interim Protections: manage as VRM Class II, aboveground ROW exclusion (the Little Missouri River is an avoidance area for other types of ROWs; see *Visual Resources*), NSO for fluid minerals, closed to mineral materials disposal, and apply project design features for other surface-disturbing activities.	**Management Direction:** Determine 8.1 miles of the Little Missouri River **not suitable** for inclusion in the NWSRS, releasing it from management requirements for eligible rivers segments. • For protections to manage for ORVs see Row 520	
518.	**Management Direction:** Manage 3.4 miles of the Missouri River as **eligible** for inclusion in the NWSRS (0.25-mile buffer; **Map 2-57**): • Tentative classification: recreational • ORV: Fish populations (pallid sturgeon)	**Management Direction:** Determine 3.4 miles of the Missouri River **suitable** for inclusion in the NWSRS (0.25-mile buffer; **Map 2-58**): • Tentative classification: recreational • ORV: Fish populations (pallid sturgeon) • Interim Protections: See *Special Status Aquatic Wildlife* for Alternative B pallid sturgeon protections.	**Management Direction:** Determine 3.4 miles of the Missouri River **not suitable** for inclusion in the NWSRS, releasing it from management requirements for eligible rivers segments. • For protections to manage for ORVs see Row 520	

	Alternative A (No Action Alternative)	Alternative B (Preferred Alternative)	Alternative C	Alternative D (Proposed Plan)
519.	**Management Direction:** Manage 0.10 miles of the Yellowstone River as **eligible** for inclusion in the NWSRS (0.25-mile buffer; **Map 2-57**): • Tentative classification: recreational • ORV: Fish populations (pallid sturgeon)	**Management Direction:** Determine 0.10 miles of the Yellowstone River **suitable** for inclusion in the NWSRS (0.25-mile buffer; **Map 2-58**): • Tentative classification: recreational • ORV: Fish populations (pallid sturgeon) • Interim Protections: See *Special Status Aquatic Wildlife* for Alternative B pallid sturgeon protections	**Management Direction:** Determine 0.10 miles of the Yellowstone River **not suitable** for inclusion in the NWSRS, releasing it from management requirements for eligible rivers segments. • For protections to manage for ORVs see Row 520	
520.	**Management Direction:** Avoid or otherwise mitigate actions that potentially affect the present character of stream segments listed on the Nationwide Rivers Inventory.	**Management Direction:** Protections for pallid sturgeon habit including fluid mineral NSO, ROW avoidance, and special stipulations/design features for surface-disturbing activities within 0.50 miles of the water's edge of identified pallid sturgeon habitat would protect the ORV characteristics in the Missouri River and Yellowstone River segments (see *Special Status Aquatic Wildlife* section). Protections for visual characteristics including ROW avoidance within 0.50 miles of the Little Missouri River would provide protection for the ORV characteristics in the Little Missouri River segments (see *Visual Resources* section).		
521.	***National Scenic and Historic Trails***			
522.	**Goal:** Safeguard the nature and purposes; and conserve, protect, and restore the national trail resources, qualities, values, and associated settings and the primary use or uses.			
523.	**Objective:** No similar objective.	**Objective:** Manage BLM-administered lands and federal mineral estate within the national trail corridors established for the following trails: • Lewis and Clark NHT: the trail corridor extends for 0.50 miles from the high-water mark of the Missouri and Yellowstone Rivers, Lake Sakakawea, and Lake Oahe • North Country NST: the trail management corridor extends for 0.50 miles on either side of the existing trail		**Objective:** Manage BLM-administered lands and federal mineral estate within the national trail corridors established for the following trails: • Lewis and Clark NHT: the trail corridor extends for 0.50 miles from the high-water mark of the Missouri and Yellowstone Rivers, Lake Sakakawea, and Lake Oahe • North Country NST: the trail management corridor extends for 0.50 miles on either side of the existing trail
524.	**Allocation:** No similar management direction.	**Allocation:** Manage Lewis and Clark NHT management corridor: • VRM Class II • NSO • 3-mile visual CSU • See additional NPS CSU in *Visual Resources* • Closed to NEL minerals • Closed to mineral materials disposal	**Allocation:** Manage the Lewis and Clark NHT management corridor: • VRM Class III • NSO • 2-mile visual CSU • See additional NPS CSU in *Visual Resources*	**Allocation:** Manage Lewis and Clark NHT management corridor: • VRM Class III • NSO • 3-mile from trail corridor visual CSU • See additional NPS CSU in *Visual Resources* • NEL minerals: No surface disturbance • Closed to mineral materials disposal
525.	**Allocation:** No similar management direction.	**Allocation:** Manage North Country NST management corridor: • NSO • 3-mile visual CSU • See additional NPS CSU in *Visual Resources* • Closed to NEL minerals • Closed to mineral materials disposal	**Allocation:** Manage North Country NST management corridor: • NSO • 2-mile visual CSU • See additional NPS CSU in *Visual Resources*	**Allocation:** Manage North Country NST management corridor: • NSO • 3-mile from trail corridor visual CSU • See additional NPS CSU in *Visual Resources* • NEL minerals: No surface disturbance • Closed to mineral materials disposal
526.	**Socioeconomics and Environmental Justice**			
527.	**Goal:** Effectively utilize social science information in land use planning to understand and reconcile competing needs, interests, and values among communities with differing perspectives. Consider environmental justice, including, as appropriate, consideration of environmental justice issues facing minority populations, low-income populations, and Tribes living near public lands, or working with or using public land resources.			
528.	**Objective:** No similar objective.	**Objective:** Foster opportunities for eliminating, reducing, or compensating for adverse effects of a proposed action on environmental justice populations		
529.	**Management Direction:** No similar management direction.	**Management Direction:** Provide translation services as needed in accordance with EO 13166 Improving Access to Services for Persons with Limited English Proficiency.		
530.	**Management Direction:** No similar management direction.	**Management Direction:** Consider mitigation measures that can be identified at the programmatic stage. Invite ideas from members of the affected environmental justice population, who may be aware of mitigation options not considered. Promote *avoidance* as the preferred approach to mitigation, followed by *minimization*, and then *compensation* for remaining unavoidable impacts.		

The habitat objectives in **Table 2-3**, Habitat Objectives for GRSG, summarize the characteristics to describe the typical vegetation communities that sage-grouse select. While the habitat objectives are not attainable on every site or every acres within designated GRSG habitat management areas, the values reflect a range of habitat conditions that generally lead to greater survival of individuals within a population. The seasonal habitat descriptions in **Table 2-3** are not land health standards but measurable values that reflect ecological potential, and may be adjusted based on local factors influencing sage-grouse habitat selection. Habitat objectives should not be used singly to determine habitat suitability for sage-grouse, but rather used to demonstrate trends over time. For more information see "Habitat Objective and Desired Seasonal Habitat Conditions Plan Maintenance Action" available at: https://eplanning.blm.gov/eplanning-ui/project/36811/570.

Table 2-3
Habitat Objectives for GRSG

Attribute	Indicators	Desired Condition	Reference
BREEDING AND NESTING (Seasonal Use Period March 1 – June 15)			
Lek Security	Proximity of trees	0.388 miles avoidance of coniferous habitats	Doherty, K. E. 2008. Sage-grouse and Energy Development: Integrating Science with Conservation Planning to Reduce Impacts. (Doctoral dissertation, the University of (Montana) Missoula. Internet website: http://etd.lib.umt.edu/theses/available/etd-03262009-132629/unrestricted/doherty.pdf.
	Proximity of sagebrush to leks	Adjacent protective sagebrush cover within 328 feet (ft.) (100 meters [m]) of an occupied lek	Stiver, S. J., E. T. Rinkes, D. E. Naugle, P. D. Makela, D. A. Nance, and J. W. Karl, eds. 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado.
Cover	% of seasonal habitat meeting desired conditions	80% of the nesting habitat within 3.1 miles of GRSG leks meets the recommended vegetation characteristics, where appropriate (relative to ecological site potential, etc.)	Knick, S. T. and J. W. Connelly, 2011. Greater Sage-grouse, Ecology and Conservation of a Landscape Species and its Habitats. Studies in Avian Biology No. 38. A Publication of the Cooper Ornithological Society, University of California Press. Berkeley. Pp. 1–9. Stiver, S. J., E. T. Rinkes, D. E. Naugle, P. D. Makela, D. A. Nance, and J. W. Karl, eds. 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado.

Attribute	Indicators	Desired Condition	Reference
Cover *(continued)*	Sagebrush cover	≥5-25%	Herman—Brunson, K. M. 2007. Nesting and Brood-rearing success and habitat selection of Greater Sage-Grouse and associated survival of hens and broods at the edge of their historic distribution. Master's thesis, South Dakota State University, Brookings. Swanson, C. C. 2009. Ecology of Greater Sage-grouse in the Dakotas. Doctor of Philosophy, South Dakota State University, Brookings. Doherty, K. E., Naugle, D. E., Walker, B. L. 2010. Greater Sage-Grouse Nesting Habitat: The Importance of Managing at Multiple Scales. The Journal of Wildlife Management 74 (7):1544-1553. 2010.
	Sagebrush height	7-30 inches	Swanson, C. C. 2009. Ecology of Greater Sage-grouse in the Dakotas. Doctor of Philosophy, South Dakota State University, Brookings. Holloran, M. J., Heath, B. J., Lyon, A. G. 2005. Greater Sage-Grouse Nesting Habitat Selection and Success in Wyoming. Journal of Wildlife Management 69 (2):638-649. Herman—Brunson, K. M. 2007. Nesting and Brood-rearing success and habitat selection of Greater Sage-Grouse and associated survival of hens and broods at the edge of their historic distribution. Master's thesis, South Dakota State University, Brookings.
	Predominant sagebrush shape	Predominately spreading shape	Stiver, S. J., E. T. Rinkes, D. E. Naugle, P. D. Makela, D. A. Nance, and J. W. Karl, eds. 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado.
	Perennial grass cover	≥10% Not Continuous	Doherty, K. E., Beck, J. L., Naugle, D. E. 2011. Comparing Ecological Site Descriptions to Habitat Characteristics Influencing Greater Sage-Grouse Nest Site Occurrence and Success. Rangeland Ecol Management 64:344-341 1 July 2011 1 DOI:10.2111/REM-D-10-00120.1 Holloran, M. J., Heath, B. J., Lyon, A. G. 2005. "Greater Sage-Grouse Nesting Habitat Selection and Success in Wyoming." Journal of Wildlife Management 69 (2):638-649. 2005. Doherty, K. E., Naugle, D. E., Walker, B. L. 2010. "Greater Sage-Grouse Nesting Habitat: The Importance of Managing at Multiple Scales." The Journal of Wildlife Management 74 (7):1544-1553. 2010 Hagen, C. A., Connelly, J. W., Schroeder, M. A. 2007. A Meta-analysis of Greater Sage-grouse Centrocercus urophasianus Nesting and Brood-rearing Habitats. Wildlife Biology, 13 (sp1):42-50.

Attribute	Indicators	Desired Condition	Reference
Cover *(continued)*	Perennial grass and forb height	Adequate nest cover based on ecological site potential and seasonal precipitation; 4.4-11.3 inches[1]	K. E. Doherty, K. E. Naugle, J. D. Tack, B. L. Walker, J. M. Graham and J. L. Beck. Linking conservation actions to demography: grass height explains variation in greater sage-grouse nest survival. Wildlife Biology 20 (6):320-326. 2014.
	Perennial forb cover	≥5% Not Continuous	Doherty, K. E., Beck, J. L., Naugle, D. E. 2011. Comparing Ecological Site Descriptions to Habitat Characteristics Influencing Greater Sage-Grouse Nest Site Occurrence and Success. Rangeland Ecol Management 64:344-341 1 July 2011 1 DOI:10.2111/REM-D-10-00120.1 Holloran, M. J., Heath, B. J., Lyon, A. G. 2005. Greater Sage-Grouse Nesting Habitat Selection and Success in Wyoming. Journal of Wildlife Management 69 (2):638-649. Doherty, K. E., Naugle, D. E., Walker, B. L. 2010. Greater Sage-Grouse Nesting Habitat: The Importance of Managing at Multiple Scales. The Journal of Wildlife Management 74 (7):1544-1553. Hagen, C. A., Connelly, J. W., Schroeder, M. A. 2007. A Meta-analysis of Greater Sage-grouse Centrocercus urophasianus Nesting and Brood-rearing Habitats. Wildlife Biology, 13 (sp1):42-50.
BROOD-REARING/SUMMER (Seasonal Use Period June 16-October 31)			
Cover	% of seasonal habitat meeting desired condition	>40% of the brood-rearing/summer habitat meets recommended brood habitat characteristics where appropriate, relative to site potential and seasonal precipitation.	Stiver, S. J., E. T. Rinkes, D. E. Naugle, P. D. Makela, D. A. Nance, and J. W. Karl, eds. 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado.

Attribute	Indicators	Desired Condition	Reference
Cover *(continued)*	Sagebrush cover	≥5 %	Herman—Brunson, K. M. 2007. *Nesting and Brood-rearing success and habitat selection of Greater Sage-Grouse and associated survival of hens and broods at the edge of their historic distribution.* Master's thesis, South Dakota State University, Brookings. Swanson, C. C. 2009. *Ecology of Greater Sage-grouse in the Dakotas.* Doctor of Philosophy, South Dakota State University, Brookings. Doherty, K. E., Naugle, D. E., Walker, B. L. 2010. *Greater Sage-Grouse Nesting Habitat: The Importance of Managing at Multiple Scales.* The Journal of Wildlife Management 74 (7):1544-1553. Hagen, C. A., Connelly, J. W., Schroeder, M. A. 2007. *A Meta-analysis of Greater Sage-grouse Centrocercus urophasianus Nesting and Brood-rearing Habitats.* Wildlife Biology, 13 (sp1):42-50. Doherty, K. E., Beck, J. L., Naugle, D. E. 2011. *Comparing Ecological Site Descriptions to Habitat Characteristics Influencing Greater Sage-Grouse Nest Site Occurrence and Success.* Rangeland Ecol Management 64:344-341 1 July 2011 1 DOI:10.2111/REM-D-10-00120.1.
	Sagebrush height	7-30 inches	Herman—Brunson, K. M. 2007. *Nesting and Brood-rearing success and habitat selection of Greater Sage-Grouse and associated survival of hens and broods at the edge of their historic distribution.* Master's thesis, South Dakota State University, Brookings. Doherty, K. E., Beck, J. L., Naugle, D. E. 2011. *Comparing Ecological Site Descriptions to Habitat Characteristics Influencing Greater Sage-Grouse Nest Site Occurrence and Success.* Rangeland Ecol Management 64:344-341 1 July 2011 1 DOI:10.2111/REM-D-10-00120.1. Holloran, M. J., Heath, B. J., Lyon, A. G. 2005. *Greater Sage-Grouse Nesting Habitat Selection and Success in Wyoming.* Journal of Wildlife Management 69 (2):638-649. Schroeder et al. 1999. *Greater Sage-Grouse (Centrocercus urophasianus*) [Internet website], The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Accessed February 22, 2011. Available at: Birds of North America Online: http://bna.birds.cornell.edu/bna/species/425/articles/introduction

Attribute	Indicators	Desired Condition	Reference
Cover *(continued)*	Perennial grass and forbs	≥20% Forbs 6-16%	Doherty, K. E., Beck, J. L., Naugle, D. E. 2011. *Comparing Ecological Site Descriptions to Habitat Characteristics Influencing Greater Sage-Grouse Nest Site Occurrence and Success.* Rangeland Ecol Management 64:344-341 1 July 2011 1 DOI:10.2111/REM-D-10-00120.1. Holloran, M. J., Heath, B. J., Lyon, A. G. 2005. *Greater Sage-Grouse Nesting Habitat Selection and Success in Wyoming.* Journal of Wildlife Management 69 (2):638-649. Doherty, K. E., Naugle, D. E., Walker, B. L. 2010. *Greater Sage-Grouse Nesting Habitat: The Importance of Managing at Multiple Scales.* The Journal of Wildlife Management 74 (7):1544-1553. Herman—Brunson, K. M. 2007. *Nesting and Brood-rearing success and habitat selection of Greater Sage-Grouse and associated survival of hens and broods at the edge of their historic distribution.* Master's thesis, South Dakota State University, Brooking.
	Riparian areas/mesic meadows	Proper Functioning Condition	BLM, 1997c. *Record of Decision for Standards for Rangeland Health and Guidelines for Livestock Grazing Management Final Environmental Impact Statement for Montana and North and South Dakota.* August 7, 1997. BLM, Montana State Office. Billings. Prichard, D., F. Berg, S. Leonard, M. Manning, W. Hagenbuck, R. Krapf, C. Noble, J. Staats, and R. Leinard. 1999. *Riparian Area Management A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas (TR 1737-16).* Prepared for the United States Department of the Interior and the United States Department of Agriculture. BLM, National Applied Resource Sciences Center. Denver, Colorado. Dickard, M., M. Gonzalez, W. Elmore, S. Leonard, D. Smith, S. Smith, J. Staats, P. Summers, D. Weixelman, S. Wyman. 2015. Riparian area management: Proper functioning condition assessment for lotic areas. Technical Reference 1737-15. US Department of the Interior, Bureau of Land Management, National Operations Center, Denver, Colorado.
	Upland and riparian perennial forb availability	Preferred forbs are common with several preferred species present.	Stiver, S. J., E. T. Rinkes, D. E. Naugle, P. D. Makela, D. A. Nance, and J.W. Karl, eds. 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado. Doherty, K. E., Beck, J. L., Naugle, D. E. 2011. *Comparing Ecological Site Descriptions to Habitat Characteristics Influencing Greater Sage-Grouse Nest Site Occurrence and Success.* Rangeland Ecol Management 64:344-341 1 July 2011 1 DOI:10.2111/REM-D-10-00120.1.

Attribute	Indicators	Desired Condition	Reference
WINTER (Seasonal Use Period November 1-February 28)			
Cover and Food	% of seasonal habitat meeting desired conditions	>80% of wintering habitat meets winter habitat characteristics where appropriate (relative to ecological site, etc.).	Stiver, S. J., E. T. Rinkes, D. E. Naugle, P. D. Makela, D. A. Nance, and J. W. Karl, eds. 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado.
	Sagebrush cover above snow	≥10%	Schroeder et al. 1999. *Greater Sage-Grouse (Centrocercus urophasianus*) [Internet website], The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Accessed February 22, 2011. Internet website: *Birds of North America* Online: http://bna.birds.cornell.edu/bna/species/425/articles/introduction Swanson, C. C. 2009. *Ecology of Greater Sage-grouse in the Dakotas.* Doctor of Philosophy, South Dakota State University, Brookings.
	Sagebrush height above snow	≥ 6 inches	(Schroeder et al. 1999. *Greater Sage-Grouse (Centrocercus urophasianus*) [Internet website], The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Accessed February 22, 2011. Available at: Birds of North America Online: http://bna.birds.cornell.edu/bna/species/425/articles/introduction Doherty, K. E., Beck, J. L., Naugle, D. E. 2011. *Comparing Ecological Site Descriptions to Habitat Characteristics Influencing Greater Sage-Grouse Nest Site Occurrence and Success.* Rangeland Ecol Management 64:344-341 1 July 2011 1 DOI:10.2111/REM-D-10-00120.1. Swanson, C. C. 2009. *Ecology of Greater Sage-grouse in the Dakotas.* Doctor of Philosophy, South Dakota State University, Brookings.

[1]Specific height requirements needed to meet the objective will be set at the time of watershed assessments.

2.4 SUMMARY COMPARISON OF ENVIRONMENTAL CONSEQUENCES

Table 2-4 provides a comparison of the environmental impact analysis across all alternatives by resource.

Table 2-4
Summary Comparison of Environmental Consequences

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Resources			
Air Quality and Climate			
Federal oil and gas and development is not anticipated to contribute to exceedances of the national and state standards and deposition critical load thresholds, although elevated concentrations of 1-hour NO_2 and 24-hour PM_{10} could occur in the vicinity of well pads. Overall, cumulative air concentrations of all pollutants in North Dakota are below the air quality standards, except for PM_{10} and carbon monoxide; the modeled contributions to PM_{10} exceedances from BLM actions authorized under this RMP are less than 0.1 percent. Modeled visibility changes would be highest at Fort Berthold Indian Reservation, due primarily to sources not authorized under this RMP. Modeled concentrations of pollutants from coal mining activities are also below national and state standards, and modeled impacts on air quality related values are negligible. Strategies for reducing impacts on air quality would be applied including completion of all maintenance and operations established for managing air resources and requiring air pollution control devices or other mitigation, if air quality standards are being exceeded. Estimated annual average carbon dioxide equivalent emissions from federal activities would be 22.52 million metric tons per year, or 464.28 million metric tons over the life of the RMP (based on 100-year global warming potentials).	Alternative B (Preferred Alternative) includes more protection for air resources compared with Alternative A. Alternative B would include an NSO stipulation within 1 mile and a CSU stipulation within 2 miles of Class I Areas. Under the CSU, operators must submit an air analysis, including near field dispersion modeling, subject to BLM approval. Alternative B would also require a waste minimization plan with design features that minimize pollutants released from venting, flaring, and leaks during drilling, completion, and production operations, and would not consider further coal leasing outside 4 miles from existing coal mine permits as of September 9, 2022. Air quality impacts would be similar to Alternative A, with a 0.2 percent reduction in oil and gas-related emissions and similar coal-related emissions compared with that alternative. Estimated annual average carbon dioxide equivalent emissions would be similar to Alternative A. Alternative B.1 would further restrict areas acceptable for coal leasing to 16,400 acres, making it the lowest acceptable acres of all alternatives. Federal coal mining under Alternative B.1 would result in emissions of criteria air pollutants, hazardous air pollutants (HAPs), and GHGs at the same level as Alternative A and the other alternatives until 2026, after which the federal production would decline, resulting in lower federal emissions.	The NSO and CSU stipulations under Alternative C would be similar to Alternative B. For coal under Alternative C, it would be acceptable to consider further coal leasing beyond 4 miles from existing coal mine permits as of September 9, 2022. Air quality impacts would be the same as Alternative A. Estimated annual average carbon dioxide equivalent emissions would be the same as Alternative A.	Impacts to air quality, air quality related values, greenhouse gas emissions and associated climate change impacts would be the same as Alternative B.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Soil Resources			
Authorized activities such as prescribed fire treatments, livestock grazing, infrastructure associated with ROWs, and mineral development that remove vegetation, displace topsoil, and compact soils would decrease soil stability and water infiltration and increase soil erosion susceptibility of disturbed soils. These impacts would be greatest in areas of steep slopes, sensitive soils, or badlands. Surface operating standards and guidelines would be used to minimize erosion on steep slopes, while controlled surface use stipulations would avoid or minimize surface disturbance on sensitive soils. Areas that are open and subject only to standard terms and conditions (2,000 acres for material minerals and 31,400 acres for fluid minerals) would be at greatest risk of impact if they overlapped steep slopes, sensitive soils, or badlands. There would be no restrictions on development of steep slopes under Alternative A. Alternative A does not provide any specific protections for prime farmlands. If these areas are affected by any of the above-mentioned surface-disturbing activities, soil condition could worsen and make them unsuitable for growing agriculture products.	Alternative B (Preferred Alternative) prohibits surface occupancy on badlands and rock outcrops to prevent erosion. Alternative B also includes a CSU for sensitive soils to also address stability and erosion concerns. Impacts related to steep slopes, sensitive soils, and badlands would generally be reduced when compared with Alternative A because fewer acres of steep slopes, sensitive soils, and badlands would be in areas open for ROW authorization, mineral material disposal, or fluid minerals leasing, or would be open but with more soil protections. No acres of steep slopes would be open for ROW authorizations or open to fluid mineral leasing under standard terms and conditions, and more acres of steep slopes would be unacceptable for further consideration for coal leasing. More areas of sensitive soils open to fluid minerals leasing would be subject to a controlled surface use stipulation requiring approval of a reclamation plan that demonstrated that soil productivity would be maintained, and surface runoff and erosion would be controlled. In addition, over 48,000 acres of badlands would be in areas open to fluid mineral leasing under NSO stipulations that prohibited surface-disturbing activities in these areas. Under Alternative B.1, the smallest acreage of slopes greater than 30 percent (1,300) and sensitives soils (2,000 acres) would be in areas acceptable for further consideration for coal leasing, all of which are within the three coal-producing counties. No impacts to badlands and rock outcrops would occur from coal development. Impacts on prime farmlands would be negligible, as surface-disturbing activities occurring on these lands would be required to be reclaimed to pre-disturbance soil conditions.	The NSO and CSU stipulations applied under Alternative B would also be applied under Alternative C but would provide fewer acres of protections. Impacts related to steep slopes, sensitive soils, and badlands would generally be reduced when compared with Alternative A because fewer acres of steep slopes, sensitive soils, and badlands would be in areas open for ROW authorization, mineral material disposal, or fluid minerals leasing, or would be open but with more soil protections, though to a lesser degree than under Alternative B (for example, these areas would be ROW avoidance instead of exclusion). However, steep slopes would be acceptable for further consideration for coal leasing, unlike in Alternatives A and B. Based on the Coal RFD (BLM 2022b), this could impact 1,000 acres of steep slopes in the three-county area where coal development is expected to occur. Impacts on prime farmlands would be the same as described for Alternative B.	Impacts to sensitive soils, badlands, and rock outcrops are anticipated to be the same as Alternative B due to NSO and CSU stipulations. Impacts on sensitive soils from ROW authorizations are anticipated to be similar to Alternative B, although slightly more acres would be managed for ROW avoidance than exclusion. However, special stipulations and design features would be applied to these ROW avoidance areas to ensure resource protection. Additionally, a reclamation plan would be submitted to and approved by the Authorized Officer prior to granting a ROW. Under Alternative D, 1,300 acres of slopes greater than 30 percent and 2,000 acres of sensitive soils would be in areas acceptable for coal leasing, similar to Alternative B.1. All of these acres are within the three coal-producing counties. No impacts to badlands and rock outcrops would occur from coal development. Impacts on prime farmlands would be the same as described for Alternative B. .

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Water Resources			
Continuing surface disturbance from mineral development, livestock grazing, ROWs, and other activities would cause sediment input and turbidity, resulting in degradation of water quality, alteration and loss of floodplain function, and changes in natural drainage patterns. These activities also create the risk of chemical spills that could contaminate surface waters through runoff. Alternative A would have the largest mileage of streams open to locatable mineral entry (664 miles) or mineral material disposal (604 miles). NSO-11-33 would continue to prohibit surface occupancy and use for fluid mineral leases within 200 feet of wetlands, lakes, and ponds. Streams and other waterbodies within areas that are acceptable for further consideration for coal leasing would also be affected. Livestock grazing could continue to occur on 24 miles of streams, and ROWs could be sited on 18 miles of streams. No impacts on surface or groundwater quality would be expected from drilling and fracturing new fluid mineral wells due to differences in the depths of aquifers used for groundwater and the depths to the oil production formations. However, spills have the potential to occur and could impact surface or groundwater resources. An estimated 322 billion gallons of water would be required for drilling and fracturing new fluid mineral wells. Sustainable water availability from Lake Sakakawea pipeline projects to disperse the water, and the development of water depots across the area of development potential, decrease the potential for impacts on water quantity from drilling and fracturing new fluid mineral wells.	Under Alternative B (Preferred Alternative), impacts from surface-disturbing activities would generally be reduced compared with Alternative A because fewer areas of waterbodies and streams would be in areas open for mineral development, livestock grazing, or ROW authorization. While streams open to locatable mineral entry would be similar to that under Alternative A, Alternative B would have the smallest mileage of streams open to mineral materials disposal (2 miles). NSO-11-70 would prohibit surface occupancy and use for fluid mineral leases within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, and riparian areas, greatly reducing the potential for impacts on water resources compared with Alternative A. No surface disturbing activities would be allowed in certain areas to provide protections for state-designated drinking water source protection zones (see **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing for complete list). Making larger areas with streams, riparian areas, and wetlands unsuitable for coal mining and would provide increased protection for water resources compared with Alternative A. Livestock grazing would be allowed on 22 miles of streams, but no streams would be open to ROW authorization. Protections through NSO for fluid mineral development within 0.50 miles of the Missouri River, Lake Sakakawea, and Lake Oahe would be provided under Alternative B to protect drinking water sources. Estimated protections of surface and groundwater quality and water quantity would be greater than under Alternative A. Alternative B.1 would offer the most protection to water resources by reducing the areas acceptable for coal leasing to the smallest size of all alternatives. All the acceptable areas for both Alternatives B and B.1 are in the three coal-producing counties.	Impacts from surface-disturbing activities under Alternative C would generally be reduced compared with Alternative A because fewer areas of waterbodies and streams would be in areas open for mineral development, livestock grazing, or ROW authorization. The NSO and CSU stipulations applied under Alternative B would also be applied under Alternative C but would provide fewer acres of direct protections to waterbodies and streams. Streams open to locatable mineral entry would be the same as those under Alternative B. However, streams open to mineral materials disposal would be 556 miles. Like under Alternative B, NSO-11-70 would protect a variety of waterbodies from fluid mineral surface occupancy and use. Livestock grazing and ROW authorizations would have similar impacts to Alternative B. For fluid mineral leasing, Alternative C would provide greater protection of water resources than Alternative A through an NSO stipulation prohibiting surface occupancy and use in SWPAs. Estimated protections for surface and groundwater quality and water quantity would be greater than under Alternative A but less than Alternative B.	Under Alternative D, impacts on water resources are anticipated to be similar to Alternative B, including the smallest mileage of streams open to mineral materials disposal (2 miles). Additionally, NSO 11-70 would prohibit surface occupancy and use within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas, and a new CSU would limit development within 300 feet of riparian areas and/or wetlands and ephemeral, intermittent, and perennial drainages. These restrictions would greatly reduce the potential for impacts on water resources, compared with Alternative A. Fewer miles of intermittent and perennial streams would be located in areas that are acceptable to coal leasing, all of those miles are located in the three coal-producing counties with existing leases. Alternative D would reduce the overall acreage suitable for coal leasing, and thus, there is a corresponding reduction impacts on water resources.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Vegetation Communities			
The lack of comprehensive planning for vegetation, riparian and wetland areas, and special status plants would continue resulting in vegetation management that is applied on a case-by-case basis and may be inconsistently implemented. Prescribed fires would continue to be the primary fire and fuels management activity under Alternative A. Resource uses (such as livestock grazing, forestry, recreation, travel, lands and realty actions, and energy and minerals leasing and development) in the planning area under Alternative A are stressors that may cause vegetation removal, degradation, or fragmentation; an increase in noxious weeds and invasive plants; or riparian and wetland areas to move away from PFC. Locatable, fluid mineral, and mineral material development is expected to have minimal effects on vegetation because of low levels of projected development. Most tallgrass prairie, woody draw, and riparian and wetland vegetation would be managed as open to ROWs with no management actions directly protecting vegetation from ROW development. Most special status plant habitat would be incidentally protected through management for GRSG habitats due to the overlap of these areas. Coal development is the biggest threat to woody draws and tallgrass prairie, as these sensitive vegetation communities are found in central west North Dakota in coal potential areas. Coal development under Alternative A is subject to a special vegetation reclamation stipulation that an acreage equivalent to that disturbed by coal mining will be reclaimed to approximately its former condition, thus helping to reduce the potential for coal mining impacts on vegetation. All surface lands in the decision area would be suitable for livestock grazing. If overutilization were to occur, the BLM would adjust AUMs and implement additional measures.	Compared with Alternative A, Alternative B (Preferred Alternative) includes more protective vegetation-management measures and more stipulations and restrictions to reduce impacts from resource uses. For example, NSO and CSU stipulations would encompass all tallgrass prairie, woody draws (NSO), riparian and wetland vegetation (CSU), and potential special status plant habitat (NSO). Incidental protections from NSO stipulations for other resources would provide additional protections for vegetation, such as for riparian and wetland vegetation through prohibiting surface occupancy in floodplains or within 0.50 miles of certain waterbodies. Vegetation management under Alternative B includes an increased focus on management, inventories, and monitoring to attain land health and prioritizes the use of native species for restoration, which would affect vegetation in the long term through improved biodiversity, increased cover of native plant communities, reduced fragmentation, and restrictions on associated activities that could degrade native plant communities. Using a wider variety of fuel treatment methods would be more likely to restore and maintain fire regimes and land health, thereby protecting existing native vegetation. Protections for vegetation, including special status plant habitats, would be similar to those described for Alternative A, due to the overlap with GRSG habitats. Tallgrass prairie, woody draws, and special status plants would be further protected from ROW development because they would be managed as ROW exclusion areas. Management of riparian and wetland vegetation as ROW exclusion areas would prevent future impacts from ROW development in these areas as well. Management for other resources, including GRSG, would provide incidental protection to vegetation in some areas through ROW avoidance. Most vegetation resources analyzed would be unsuitable for coal development. Making larger areas of vegetation communities unsuitable for coal mining would provide increased protection for vegetation compared with Alternative A. The BLM would manage 11 percent fewer acres under Alternative B as available to livestock grazing compared with Alternative A, thereby providing a greater level of protections for vegetation. Alternative B.1 would offer the most protection to vegetation by reducing the areas acceptable for coal leasing to the smallest size of all alternatives. Vegetation in areas acceptable for coal leasing, for both Alternatives B and B.1 would be in the three coal-producing counties.	Impacts on vegetation from noxious weed and invasive plant management and wildland fire management would be the same as those described under Alternative B. Protections for vegetation, including special status plant habitats, would be similar to those described for Alternative A, due to the overlap with GRSG habitats. Impacts from ROW development would be reduced, but not always entirely prevented, for tallgrass prairie, woody draws, potential special status plant habitat, and riparian and wetland vegetation, which would be managed as ROW avoidance areas. In addition, most potential special status plant habitat would be managed as ROW exclusion for solar and wind only, thus preventing impacts from these types of development. Impacts from management of coal leasing would be the same as those under Alternative B. The BLM would manage 3 percent fewer acres under Alternative C as available to livestock grazing compared with Alternative A.	Impacts on vegetation from noxious weed, and invasive plant management, and wildland fire management would be the same as those described under Alternative B. Under Alternative D, more areas would be managed as ROW exclusion or avoidance compared to Alternative A, reducing the impacts on vegetation. However, riparian and wetland vegetation and woody draws would be managed as ROW avoidance areas, therefore, impacts to these areas are anticipated to be similar to Alternative C. While more acreage would be managed as ROW avoidance, specific stipulations and design features applied to these areas would minimize disturbance of vegetation communities. Impacts of livestock grazing on vegetation would be the same as under Alternative C.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Wildlife			
Under Alternative A, most wildlife habitats would be managed as open to most uses, such as ROWs, mineral development, and livestock grazing, though some wildlife, migratory birds, big game, and special status wildlife habitats would be incidentally protected where they overlap with protections for other resources, such as GRSG. Locatable, fluid mineral, and mineral material development is expected to have minimal effects on wildlife habitats and on vegetation because of low levels of projected development. Road and ROW construction would reduce habitat quality, cause habitat fragmentation, create increased likelihood for injury or mortality, interfere with ability to hear and avoid predators, or cause habitat avoidance and reliance on less ideal habitat, which could result in population declines for general wildlife, migratory birds, big game, and special status species.	Vegetation management under Alternative B (Preferred Alternative) includes an increased focus on management, inventories, and monitoring to attain land health, which would then support habitats for a variety of wildlife species throughout the decision area. NSO and CSU stipulations would provide direct protections for sharp-tailed grouse and greater prairie chicken leks. Incidental protections would also be provided for wildlife through stipulations for other resources, including through prohibiting surface occupancy in floodplains or within 0.50 miles of certain waterbodies. Impacts would be concentrated in tallgrass prairie (300 acres in the surface decision area) and woody draw habitats (6,100 acres in the surface decision area) and would primarily affect species that rely on these habitats, including special status wildlife. With 97 percent of the decision area managed as ROW exclusion, impacts from ROW development on general wildlife, migratory birds, big game, and special status species would be nearly eliminated. Impacts on some species habitats, such as sharp-tailed grouse leks, big game birthing and foraging areas, and a number of special status species habitats and migratory bird nests, would be reduced due to ROW avoidance management targeted at protecting those species. Most wildlife resources analyzed would be in habitats managed as unsuitable for coal development. Making larger areas of wildlife habitat unsuitable for coal mining would provide increased protection for wildlife compared with Alternative A. Alternative B.1 would offer the most protection to wildlife by reducing the areas acceptable for coal leasing to the smallest size of all alternatives. Wildlife habitat in areas acceptable for coal leasing, for both Alternatives B and B.1 would be in the three coal-producing counties.	Impacts on wildlife from vegetation management and wildland fire management under Alternative C would be the same as those described under Alternative B. Stipulations would be similar to those described for Alternative B, except that under Alternative C, the BLM would not apply a NSO stipulation near sharp-tailed grouse leks or within the North Dakota wildlife management areas, though some of these areas would receive incidental protection from stipulations to protect other resources. Alternative C would include more acres managed with NSO, CSU, and TL specifically to protect wildlife and their habitats (see **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing for complete list). Impacts of ROW management would be similar to those described for Alternative B, though with slightly greater impacts on general wildlife, migratory birds, big game, and special status species habitats because more areas would be managed as ROW avoidance instead of ROW exclusion. Impacts from management of coal leasing and comprehensive trails and travel management would be the same as those under Alternative B.	Impacts under Alternative D would be similar to Alternative B. The BLM would manage more acres as closed to fluid mineral exploration and development under Alternative D than under Alternative A, with more acres managed with NSO, CSU, and TL stipulations. This would result in less disturbance to areas than under Alternative A because there would be more restrictions in place to reduce impacts to wildlife. Most wildlife resources analyzed would be in habitats managed as unsuitable for coal development. Making larger areas of wildlife habitat unsuitable for coal mining would provide increased protection for wildlife compared with Alternative A. Additionally, under Alternative D, more areas managed as ROW exclusion and avoidance would reduce impacts on wildlife and their habitats, similar to Alternative B. Incidental protections for wildlife would be provided by stipulations for other resources as well, including the NSO stipulation that would prohibit fluid mineral development and associated surface disturbance within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Fish and Aquatic Species			
Under Alternative A, 18 miles of perennial, intermittent, and ephemeral streams, 8 miles of streams of fish-bearing streams, and 1,400 acres of pallid sturgeon range are open to ROWs; aquatic species inhabiting these areas would continue to be subject to habitat loss from soil compaction and vegetation loss as well as water quality degradation. Similarly, habitat and water quality degradation from surface disturbance for coal development would occur in areas of expected development containing aquatic and wetland-riparian areas. Alternative A includes an objective to improve riparian and wetland areas towards PFC or a higher ecological status, but it does not define any specific activities or management on how to achieve this. Site-specific objectives and management strategies for riparian and wetland areas would continue to be developed during the development and implementation of proposed actions and activity plans. Alternative A finds 5 miles of fish-bearing streams as eligible for inclusion in the NWSRS, with a tentative classification of recreational. Management would reduce the likelihood for impacts from surface-disturbing activities, which could have beneficial impacts by providing habitat connectivity and improved water quality for fish and aquatic species.	Managing more areas as ROW exclusion and avoidance under Alternative B (Preferred Alternative) would reduce the impacts on aquatic species and their habitats described under Alternative A. Specifically, fish-bearing streams; pallid sturgeon range; and perennial, intermittent, and ephemeral streams—and the aquatic species that inhabit these areas—would be incidentally protected from ROW development as a result of NSO and CSU stipulations for other resources. Under Alternative B, 4 miles of fish-bearing streams and intermittent, perennial, and ephemeral streams and 4 acres of pallid sturgeon range and waterbodies would be closed to fluid mineral development by discretionary or nondiscretionary decisions. Some aquatic species and habitats would be unsuitable for coal development, including pallid sturgeon habitat, and riparian areas and wetlands. 100 percent of fish-bearing streams under Alternative B, and 99.7 percent of fish-bearing streams (8 miles) under Alternative B.1 would be unacceptable for coal development. Impacts described for Alternative A on aquatic habitats could occur and would be similar for both Alternatives B and B.1. Management of water and riparian-wetland areas under Alternative B would have beneficial impacts on fish and aquatic species by helping improve habitat conditions, such as natural surface water flow regimes, water quality, water availability, floodwater retention, and drought resilience. Alternative B finds a total of 5 miles of fish-bearing streams as suitable for inclusion in the NWSRS, with a tentative classification of scenic. Impacts would be similar to those described under Alternative A but managing the streams with a scenic classification rather than recreational would likely increase the beneficial impacts. This is because surface-disturbing activities would likely be reduced to a greater extent.	Managing more areas as ROW exclusion or avoidance under Alternative C would reduce the impacts on aquatic species and their habitats described under Alternative A. Impacts from ROW development would be reduced, but not always entirely prevented, for fish-bearing streams, pallid sturgeon range, and intermittent, perennial, and ephemeral streams. Impacts from ROW development on aquatic species that inhabit these areas would be reduced, compared with Alternative A, but to a lesser extent than Alternative B, because more miles and acres would be managed as ROW avoidance rather than exclusion areas. Like Alternative B, some aquatic species and habitats would be unsuitable for coal development, including pallid sturgeon habitat, and riparian areas and wetlands. Impacts from water and riparian–wetland management would be similar to those described for Alternative B, but riparian and wetland areas may not be managed to meet objectives for water quantity, water quality, or aquatic species habitat, and aquatic species may not benefit from improved habitat conditions to the same extent as under Alternative B. Alternative C does not find any river segments suitable for inclusion in the NWSRS; there would be no impacts on fish and aquatic species from associated management.	Under Alternative D, impacts on fish and aquatic species would be similar to those described for Alternative B. Incidental protections provided from ROW avoidance and exclusion and closures to mineral resources would vary slightly compared to Alternative B.
Wildland Fire Ecology and Management			
Under Alternative A, the BLM would be able to use prescribed fire, along with other fire management tools, to reduce fuel loads across the decision area, which would help maintain desired vegetation conditions and influence fire regimes. All fire management techniques would need to be analyzed on a project-by-project basis, which could delay the timely implementation of fuels treatments and limit changes to fuel conditions.	Wildland fire management under Alternative B (Preferred Alternative) would include additional direction to use fire or fuels mitigation as a resource benefit and would include partnering with adjacent communities. Overall, this would improve the BLM's ability to change improve vegetation communities and reduce the risks and threats from wildfire. Prioritizing the Schnell Recreation Area for prescribed fire treatment would focus resources to manage fuel conditions in this area. This action would help reduce fuels and maintain the fire regime, which would be especially useful since areas popular for recreation are often sources of human-caused fire ignitions.	Impacts from wildland fire management, such as the expanded use of fuels management tools, would be the same as described for Alternative B. Under Alternative C, the BLM would not prioritize the Schnell Recreation Area for prescribed fire treatment, which would prevent a focus on changing fuel conditions in this area. Management of the Schnell Ranch SRMA, however, would allow targeted grazing to reduce wildfire risk, which could have similar impacts on fuel conditions compared to Alternative B.	Impacts under Alternative D would be the same as Alternative B.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Cultural Resources			
Current management practices under Alternative A would continue resulting in no specific additional impacts on cultural resources with proper avoidance, mitigation, Tribal consultation, and the adherence to applicable laws protecting cultural resources. Surface-disturbing activities and development for resource uses have changed, and would continue to change, the landscape, scenic quality, and setting in the decision area. Surface-disturbing activities, motorized vehicle use, theft and vandalism, and natural processes may adversely affect cultural resources across the decision area. Under Alternative A, all applicable NEPA and NRHP laws would be applied to surface-disturbing activities. Oil and gas production and coal mining activities tend to avoid impacts to historic properties. However, these activities may have adverse visual impacts on adjacent sacred areas and historic properties. These impacts could increase overtime as new plays are developed. Lynch Knife River Flint Quarry District and Writing Rock State Historic site (32DV4) would not be considered for coal leasing, preventing ground disturbing impacts to these sites. No surface occupancy or use is currently allowed in a visible area within a 3.5-mile radius of the Fort Union Trading Post National Historic Landmark.	Alternative B (Preferred Alternative) would provide more measures designed to protect the setting, feeling, and integrity of historic properties than Alternative A. Historic properties would be managed based on their nature, significance, and use allocation. The use allocations would provide several positive impacts to historic properties, including allowing for prioritization of protective measures and identification of special management measures. Surface occupancy and use would be prohibited within 300 feet from the boundaries of significant cultural resources, NRHP-eligible properties and districts, and the boundaries of TCPs under Alternative B. Lynch Knife River Flint Quarry District and Writing Rock State Historic site (32DV4) would not be considered for coal leasing, preventing ground disturbing impacts to these sites. No surface occupancy and use would be allowed within 3 miles of the visible area surrounding historic properties named in the RMP. Additionally, a 3-mile visible area surrounding these historic properties would be closed to mineral materials disposal. 218,700 acres of BLM-administered mineral estate would be closed to fluid mineral leasing. These constraints reduce the potential for effects on and immediately around historic properties. The total acreage of ground disturbance would remain relatively similar under Alternative B to the No Action Alternative; however, these buffers would ensure protection of the setting and integrity of historic properties. Oil and Gas development in North Dakota will not reach the density where wells could not be developed due to NSO during the lifespan of this RMP amendment. Projected surface disturbance from fluid leasable minerals under Alternative B mirrors Alternative A, assuming no previously unidentified historic properties (including TCPs) are identified. Alternative B includes more protective measures of listed and eligible NRHP sites, TCPs and sites that meet the criteria for designation for scientific use, conservation use, traditional use, public use, and experimental use than Alternative A. Alternative C also prohibits occupancy within 300 feet surrounding these sites. Doaks Butte (32BO222) would be protected and managed for further archaeological research. Alternative B would make 1,042,800 acres unacceptable for coal leasing, a substantial increase from those unacceptable under Alternative A and reducing the potential for incidental adverse impacts to historic properties. Impacts would be similar under Alternative B.1, however additional reduction of areas acceptable for coal leasing to the smallest size of all alternatives could further reduce impacts associated with coal. Impacts from mineral materials disposal are expected to be the same as those described in Alternative A.	Alternative C would incorporate more management direction designed to protect the setting, feeling, and integrity of historic properties than Alternative A. Surface occupancy and use would be prohibited within 100 feet from the boundaries of significant cultural resources, NRHP-eligible properties and districts, and the boundaries of TCPs under Alternative C, providing less area of direct protection than Alternative B. Lynch Knife River Flint Quarry District and Writing Rock State Historic site (32DV4) would not be considered for coal leasing, preventing ground disturbing impacts to these sites. Alternative C includes a CSU stipulation to apply design criteria and mitigation visual impacts within 2 miles of the historic properties named in the RMP. Doaks Butte (32BO222) would be protected and managed for further archaeological research. The Doaks Butte (32BO222) site and a 300-foot buffer surrounding the site boundary would be closed to mineral materials disposal. Furthermore, this alternative would establish a ROW exclusion and a NSO stipulation within 300 feet of the site boundary. Alternative C includes protective measures of listed and eligible NRHP sites, TCPs and sites that meet the criteria for designation for scientific use, conservation use, traditional use, public use, and experimental use, including establishing a 100-foot buffer around these sites where occupancy would be prohibited. The total acreage of ground disturbance would remain relatively similar under Alternative C to the No Action Alternative; however, these buffers would ensure protection of the setting and integrity of historic properties. Oil and Gas development in North Dakota will not reach the density where wells could not be developed due to NSO during the lifespan of this RMP amendment. Projected surface disturbance from fluid leasable minerals under Alternative C mirrors Alternative A, assuming no previously unidentified historic properties (including TCPs) are identified. Alternative C would make 549,000 acres unacceptable for coal leasing in the coal decision area, a slight increase over Alternative A. The increase would reduce the potential for adverse impacts to historic properties. The constraints in Alternative C provide more protection for historic properties than Alternative A.	Impacts on cultural resources would be similar to those described for Alternative B with the exceptions described below. Impacts from applying a CSU within 2 miles of cultural sites would be the same as described for Alternative C, with the exception of Fort Union Trading Post National Historic Landmark, which would remain NSO similar to Alternative A. Impacts from mineral materials and NEL mineral leasing management would be the same as described for Alternative C. Management of Doaks Butte would be the same as described under Alternative C. The same 100-foot NSO buffer for significant cultural resources, NRHP-eligible properties and districts, and TCPs as Alternative C would apply.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Paleontological Resources			
Current management practices under Alternative A would continue resulting in no specific additional impacts on paleontological resources with proper avoidance, mitigation, and adherence to applicable laws protecting these nonrenewable resources. The BLM manages fossils to promote their use in research, education, and recreation in accordance with the PRPA, Subtitle D of the Omnibus Public Land Management Act of 2009 (16 USC 470aaa through 470aaa-11), and the general guidance of FLPMA and NEPA. Management would include determination of resource values, mitigation, and law enforcement efforts to protect the resource, and, as applicable, identification of collecting opportunities or on-site interpretation for public enjoyment. Under Alternative A, the Mud Buttes ACEC would not be designated, resulting in continued casual collection of fossils. Unregulated removal of fossils could result in a direct loss of the resource and potential knowledge that could be gained from this important paleontological location. Furthermore, the entire area within and surrounding Mud Buttes would continue to be open to all forms of coal and mineral entry leasing and ROW locations. Paleontological resources are considered during environmental review of planning or projects, such as site-disturbing activities associated with ROWs or oil and gas operations. Potential impacts to paleontological resources are generally sufficiently mitigated in BMPs for avoidance and monitoring. Existing policy and consideration of paleontological resources general result in few adverse impacts to these resources.	Alternative B (Preferred Alternative) includes an objective to protect major paleontological resources of scientific interest as well as management direction to promote the stewardship, conservation, and appreciation of paleontological resources through education and public outreach. These would result in better management and protection of paleontological resources than under Alternative A. Alternative B also integrates consideration of paleontological resources during preparation of activity plans, resulting in less potential adverse impacts. Under Alternative B, the 960-acre potential Mud Buttes ACEC would be designated, which would prohibit the casual collection of fossils by the general public. The Mud Buttes ACEC would be recommended for withdrawal from locatable mineral entry, unacceptable for further consideration for coal leasing, closed to minerals materials, and open to fluid mineral leasing but subject to a NSO stipulation. This would protect sensitive resources from potential disturbance and damage but may create challenges for qualified paleontologists to access the area for research. Under Alternative B, 218,700 acres more BLM-administered federal mineral estate would be closed to fluid mineral leasing than under Alternative A, slightly reducing the potential for effects on paleontological resources resulting from discretionary actions. Alternative B would make 1,042,800 acres unacceptable for coal leasing in the coal decision area, a substantial increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This reduction in acreage of federal coal acceptable for coal mining would reduce the likelihood of incidental adverse and local impacts on paleontological resources. Impacts would be similar under Alternative B.1, however additional increase in area acceptable for coal leasing to 1,080,100 acres, the largest size of all alternatives could further reduce impacts associated with coal development.	The impacts of Alternative C are similar to those of Alternative B. Alternative C includes an objective and management direction in the RMP to protect and manage paleontological resources. The 960-acre potential Mud Buttes ACEC would be designated, which would prohibit the casual collection of fossils by the general public, providing additional protection to these resources. Under Alternative C, the same total acreage of federal mineral estate would be open to fluid mineral leasing as under Alternative A; therefore, impacts would be the same as under Alternative A. Alternative C would make 549,000 acres unacceptable for coal leasing in the coal decision area; this is an increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This decrease in acreage of federal coal acceptable for coal mining would decrease the likelihood of incidental adverse and local impacts on potential paleontological resources that could be discovered during coal mining and the associated development.	Impacts on paleontological resources would be similar to those described for Alternative B with some exceptions. Under Alternative D, more acres of BLM-administered federal mineral estate would be closed to fluid mineral leasing than under Alternative A. These constraints under Alternative D could slightly reduce the potential for effects on paleontological resources resulting from discretionary actions, compared with Alternative A. Alternative D would make 1,037,800 acres unacceptable for coal leasing in the coal decision area, a substantial increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This reduction in acreage of federal coal acceptable for coal mining would reduce the likelihood of incidental adverse and local impacts on paleontological resources that could be discovered during coal mining.
Visual Resources			
Under Alternative A, 17,700 acres would be managed in a manner that could allow activities that have an increased potential to change the scenic quality in areas with high value (VRI Class II) because these areas would be managed to allow moderate change to the characteristic landscape.	Alternative B (Preferred Alternative) would include a CSU within 3 miles of NPS units to directly protect features critical to the visitor experience. Under Alternative B, impacts on high value scenic areas would be the lowest of all alternatives, but visual quality could degrade on 4,200 acres of VRI Class II lands that would be managed as VRM Class III.	Alternative C would include a CSU within 2 miles of NPS units to directly protect features critical to the visitor experience. Under Alternative C, impacts on high value scenic areas would be reduced compared with Alternative A, but visual quality could degrade on 9,400 acres of VRI Class II lands that would be managed as VRM Class III.	There would be 13,900 acres managed as VRM Class II including Schnell Ranch SRMA, East Zone, Lost Bridge BCA, and Figure 4 BCA. Compared with Alternative A, there would be an increase of acres managed as VRM Class II under Alternative D, as there are 0 acres managed as VRM Class II under Alternative A.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Resource Uses			
Lands and Realty			
Under Alternative A, the BLM would identify 81 percent (47,600 acres) of the decision area for retention or retention-limited disposal; the remaining 19 percent (10,900 acres) would be available for disposal. The focus of land tenure decisions would be to create larger blocks of BLM-administered lands. Under Alternative A, there would be the most opportunities for new ROWs, including wind energy ROWs, on BLM-administered lands; this is because there would be the fewest ROW avoidance or exclusion areas of any alternative (zero percent of the decision area would be ROW exclusion, and 35,700 acres or 61 percent of the decision area would be avoidance for all ROWs except wind and solar). Excluding wind energy ROW development on 54 percent (32,900 acres) of the decision area would eliminate the potential for new wind-related ROWs in those areas. Under Alternative A, the BLM would acquire and maintain access to BLM-administered lands, such as through easements and in accordance with the North Dakota Section Line Law. This would improve management efficiency and facilitate multiple uses in coordination with other federal agencies, state and local governments, and private landowners.	Under Alternative B (Preferred Alternative), identifying 96 percent (56,000 acres) of the decision area for retention-limited disposal would result in the BLM largely maintaining the current landownership pattern while transferring select parcels out of federal ownership. No areas would be identified for disposal; this would lessen the potential for lands to be transferred out of federal ownership. There would be the least opportunities to accommodate demand for new ROWs, including wind energy ROWs, under Alternative B because it would designate the largest portions of the decision area (98 percent total) as ROW avoidance (21,600 acres) and exclusion (36,000 acres) areas. Excluding wind energy ROWs on all areas suitable for wind energy development would eliminate the possibility for new wind-related ROWs in those areas. Under Alternative B, obtaining public or administrative access over nonfederal lands using all methods available, including land exchange with willing parties, would improve access compared with Alternative A.	Impacts on land tenure under Alternative C would be the same as described under Alternative B. Under Alternative C 57,400 acres would be designated as ROW avoidance and 0 acres would be designated as ROW exclusion. This would result in reduced opportunities for new ROWs compared to Alternative A. Impacts on public or administrative access would be the same as those described under Alternative B.	The quantitative impacts on land tenure would be nearly the same as described under Alternative B. Managing special status species habitat as Category 2 (available for disposal through methods other than sale) under Alternative D would allow flexibility for the transfer or exchange of land when it will provide a net conservation gain. The 100 acres in Category 3 Disposal will allow flexibility for the transfer, exchange, or direct sale of a handful of small, scattered parcels without public access ranging in size from 0.1 acres to 10 acres. Impacts from ROW exclusion areas for Alternative D would be similar to those under Alternative C. Excluding new aboveground ROWs on 2,700 acres of the decision area would reduce the potential for those ROWs on more acres than under Alternative A. Compared to Alternative B, managing 33,000 more acres as ROW avoidance and 33,300 fewer acres as ROW exclusion under Alternative D would allow greater flexibility for ROWs and development where special stipulations and design features can maintain the functionality of habitat. Impacts on public or administrative access would be the same as those described under Alternative B.
Energy and Minerals			
Under Alternative A, approximately 72 acres of surface disturbance from fluid leasable mineral development is projected to occur on federal surface estate. This is because operators typically avoid locating wells and facilities on BLM-administered surface estate, if possible, instead locating surface development on private lands and developing federal mineral estate using horizontal drilling. Therefore, surface use, occupancy, and timing stipulations do not have a significant effect on the development of federal fluid leasable minerals in the planning area. An estimated 223,097,000 barrels of oil and 459,017,000 thousands of cubic feet (Mcf) of natural gas is projected to be produced from new federal mineral development in the planning area over the next 20 years under Alternative A. Managing coal leasing under the 1988 North Dakota RMP would result in a projected 120.11 million short tons of federal coal being produced from 2020 to 2040. Under Alternative A, 7,700 acres would remain subject to segregation from mineral entry under the mining laws (acquired lands without an opening order), which would reduce availability	Projected surface disturbance from fluid leasable minerals under Alternative B (Preferred Alternative) is essentially the same as under Alternative A. Closing 210,200 acres including all low development potential area to fluid mineral leasing under Alternative B would result in the reduction of the equivalent of approximately three producing federal wells over the next 20 years. Projected production of federal oil and gas over the next 20 years would be reduced by approximately 968,000 barrels of oil and 1,992,000 Mcf of natural gas compared with Alternative A. Under this alternative, if a new oil and gas play was discovered in the closed, low development potential area, an amendment to the RMP (including additional analysis) would be required before BLM minerals within the play could be developed. This would allow the BLM to consider alternatives for the most efficient and least impactful development. Under Alternative B, 8,300 acres would be recommended for withdrawal from locatable mineral entry, which if the recommendation were enacted, would reduce availability of these resources compared with Alternative A.	Projected surface disturbance and estimated oil and natural gas production from new federal from fluid leasable minerals under Alternative C is the same as under Alternative A. Under Alternative C the number of acres acceptable for future consideration of coal leasing would be similar to Alternative A, and a projected 120.11 million short tons of federal coal could be produced from 2020 to 2040. Under Alternative C, no areas would be recommended for withdrawal from locatable mineral entry, which would maintain similar availability of these resources compared with Alternative A. Under Alternative C opening orders would be recommended on the 7,700 acres of existing segregations from mineral entry under the mining laws, which would open these areas to locatable mineral entry upon issuance of a Public Land Order. Impacts on mineral material development would be the same as under Alternative A.	Projected surface disturbance and estimated oil and natural gas production from new federal fluid leasable mineral development under Alternative D is anticipated to be approximately the same as under Alternative B. Under Alternative D, 960 acres (Mud Buttes ACEC) would be recommended for withdrawal from locatable mineral entry, which if the recommendation were enacted, would reduce availability of locatable mineral resources compared with Alternative A. Under Alternative B opening orders would be recommended on the 7,700 acres of existing segregations from mineral entry under the mining laws, which would open these areas to locatable mineral entry upon issuance of a Public Land Order. There would be 163,700 acres open to mineral materials disposal under Alternative D, which is less than Alternative A. Impacts on mineral material development under Alternative D would be similar to Alternative because although the acreage

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
of these resources. However, there is no current locatable mineral activity in the decision area. Increased demand for sand and gravel for road and well pad construction is expected to result in the opening of new mineral materials pits and the expansion of existing pits where deposits of mineral materials are located within the vicinity of oil and gas development areas. The Mineral Materials RFD (BLM 2022c) prepared for the planning area estimates that approximately 40 acres a year of BLM-administered mineral materials would be developed; the management under this alternative would not prevent or impede that level of development. Under Alternative A, 44,500 acres would be closed to leasing of nonenergy leasable minerals. No development of nonenergy leasable minerals is anticipated.	Under Alternative B opening orders would be recommended on the 7,700 acres of existing segregations from mineral entry under the mining laws, which would open these areas to locatable mineral entry upon issuance of a Public Land Order. Impacts on mineral material development would be the same as under Alternative A. Under Alternative B, 83,000 acres would be closed to leasing of nonenergy leasable minerals. No development of nonenergy leasable minerals is anticipated, but if development were to occur the availability of nonenergy leasable minerals would be slightly reduced compared to Alternative A. Under Alternative B, 1,042,000 acres of federal mineral estate would be managed as unacceptable for coal leasing, and 54,400 acres would be managed as acceptable for coal leasing. This would result in the same projected production of federal coal as under Alternative A, with 120.11 million short tons produced from 2020 to 2040. All management under Alternative B.1 would be the same as under Alternative B, except for coal. Under Alternative B.1, 1,080,100 acres of federal mineral estate would be managed as unacceptable for coal leasing, and 16,300 acres would be managed as acceptable for coal leasing. This would result in a projected production of 92.04 million short tons of federal coal, a reduction of 28.07 million tons from Alternative A. It is expected that the reduction in federal coal production would be offset by an equivalent increase in nonfederal production so the total production of coal in North Dakota is not expected to be impacted.	Under Alternative C, 59,700 acres would be closed to leasing of nonenergy leasable minerals. No development of nonenergy leasable minerals is anticipated, but if development were to occur the availability of nonenergy leasable minerals would be slightly reduced compared to Alternative A.	available for mineral material disposal would be reduced, it would be sufficient to supply the expected need for mineral materials. Under Alternative D, 67,900 acres would be closed to leasing of nonenergy leasable minerals. No development of nonenergy leasable minerals is anticipated, but if development were to occur the availability of nonenergy leasable minerals would be reduced compared to Alternative A. Under Alternative D, 1,037,800 acres of federal mineral estate would be managed as unacceptable for coal leasing, and 58,600 acres would be managed as acceptable for future consideration for coal leasing. Under Alternative D, impacts related to coal leasing and production would be similar to Alternative B, however, approximately, 4,000 less acres would be unacceptable for coal leasing. Under Screen 4 (landowner consultation) Alternative D looked for trends or clusters of opposition to mining, rather than individual responses. Alternative D did not find significant opposition to mining and therefore did not identify lands as unavailable for further consideration for coal leasing under this screen. When a lease application is received, BLM would review surface owner qualification and agreement prior to issuing a lease. Under Alternative D, a projected 120.11 million short tons of federal coal could be produced from 2020 to 2040.
Recreation and Visitor Services			
Under Alternative A, the BLM would continue reviews of public use authorizations for all competitive recreational and commercial uses, and as required for private and group uses. These would result in no measurable changes to the recreational experience in the planning area. The BLM would continue to place signage for sizable blocks of BLM-administered land to identify public access and continue preparing activity plans for the development of recreational facilities, such as campgrounds, when necessary to meet public demand. Continuation of current management under Alternative A would result in no change to recreation and visitor services.	Alternative B (Preferred Alternative) would not allow surface occupancy and use in BCAs. Incidental protections would also be provided for recreation through NSO and CSU stipulations for other resources, including through prohibiting surface occupancy in floodplains or within 0.50 miles of certain waterbodies. Alternative B would designate the Schnell Ranch SRMA West and East Zones (2,000 acres) to maintain the recreation setting and provide enhanced recreation opportunities. Alternative B would also designate the Figure 4 BCA (3,500 acres) and the Lost Bridge BCA (8,900 acres) to maintain the quality of the recreation setting and associated experiences for backcountry users. Conducting habitat improvement projects, restoration of riparian and wetlands, and vegetation management via prescribed fire would enhance the landscapes in these areas and recreational experiences.	The NSO and CSU stipulations applied under Alternative B would also be applied under Alternative C but would provide fewer acres of protections. Under Alternative C, the Schnell Ranch SRMA (2,000 acres) would be designated to maintain the recreation setting and opportunities. The Figure 4 BCA and Lost Bridge BCA would also be designated however, their acreages would be smaller than under Alternative B (3,100 and 5,300 acres respectively). Similar to the Alternative B, the designation of these areas would have positive impacts on recreation by providing recreation opportunities as well as enhanced. Under Alternative C, some cultural properties may be allocated and managed for public use, providing additional recreation opportunities and beneficial impacts to recreation overall.	Impacts under Alternative D would be similar to those described for Alternative B, with the exception that the Schnell Ranch SRMA would not be recommended for withdrawal from locatable mineral entry.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Livestock Grazing			
Under Alternative A, all 58,500 surface acres within the decision area would be available for livestock grazing leases. Alternative A would result in grazing continuing at its current levels of approximately 9,283 AUMs under 10-year leases, and potentially an additional 2,717 AUMs available on all the unleased parcels. Under Alternative A, mineral exploration and development and ROW development could impact livestock due to disturbance and loss of forage. Currently, 25,500 acres are open to ROW development while 32,900 acres are ROW avoidance areas. Use of surface areas open to locatable minerals (50,600 acres), disposal of mineral materials (19,900 acres), and fluid mineral exploration and development with standard terms and conditions (2,000 acres) could impact livestock by introducing human-caused disturbance, as well as surface disturbances that remove forage and could introduce noxious and invasive weeds. These disturbances would be negligible in areas subject to NSO, CSU, and TL stipulations.	Alternative B (Preferred Alternative) would reduce the total acres available for leased livestock grazing by 11 percent to approximately 52,200 acres. Forage utilization would be limited to 50 percent on allotments without approved specific management objectives. Forage utilization on allotments with specific management objectives would vary between 40 and 60 percent based on site-specific conditions and environmental review. Alternative B would maintain the existing permitted AUMs at 9,283 AUMs. No unleased parcels would be available for term grazing leases. Figure 4 BCA and Lost Bridge BCA would be managed for recreational quality, potentially increasing the chance for human-livestock conflicts. However, proposed activities within those areas would likely enhance forage conditions. Under Alternative B, 30,700 acres available for grazing would be ROW exclusion areas and another 21,100 acres would be ROW avoidance areas. The increased in ROW exclusion and avoidance areas would offer additional protections to livestock and forage compared to Alternative A. Compared to Alternative A, surface areas open to locatable mineral entry (46,000 acres), disposal of mineral materials (4,000), and fluid mineral development with standard terms and conditions (0 acres) would be reduced, decreasing impacts to livestock and forage compared to Alternative A. Any remaining disturbances would be negligible in areas subject to NSO, CSU, and TL stipulations. Coal leasing would have negligible effects on livestock grazing under Alternatives B and B.1. Alternative B would adjust livestock grazing management strategies where necessary based on monitoring, with priority given to improving and maintaining allotments in GRSG habitat. This would result in a short-term reduction in the stocking rate of livestock but improve the overall long-term vegetation conditions.	Alternative C would reduce the total acres available for livestock grazing by 3 percent to approximately 52,200 acres. Allotments would have variable forage utilization limits based on site-specific conditions, subject to project-level review. Permitted use on term lease allotments would remain at 9,283 AUMs; nonstandard, free-use, or temporary, nonrenewable leases could provide up to an additional 2,886 AUMs of forage some years as prescriptive grazing is needed. Livestock grazing management may be adjusted with additional monitoring of soil and vegetation conditions or rangeland health. The impacts associated with Figure 4 BCA and Lost Bridge BCA are the same as Alternative B. Of the acres available for grazing under Alternative C, 1,100 acres would be open to ROW development, 0 acres would be ROW exclusion areas and 55,500 would be ROW avoidance areas. While the areas open to ROW development are greater than under Alternative B, the exclusion and avoidance areas should provide some protections to livestock and forage. Compared to Alternative A, surface areas available for grazing and open to locatable mineral entry (48,700 acres), disposal of mineral material (9,400 acres), and open to fluid mineral development with standard terms and conditions (100 acres) would be reduced, although not as much as under Alternative B. This would decrease impacts to livestock and forage compared to Alternative A. Any remaining disturbances would be negligible in areas subject to NSO, CSU, and TL stipulations.	Impacts under Alternative D would be similar to those described for Alternative B with the exception of the impacts described below. Impacts from managing 52,200 acres as available for livestock grazing and 2,000 acres as unavailable would be the same as described for Alternative C. Surface-disturbing activities, such as mineral exploration and development and ROW development, have the potential to directly disturb livestock and remove forage, as described under Alternative A. Of the acres available for grazing under Alternative C, 1,200 acres would be open for ROW development, 1,300 acres would be ROW exclusion areas, and 54,100 acres would be ROW avoidance areas. When compared with Alternative A, Alternative D would have approximately 21,600 fewer acres open to ROW authorization, and 1,300 more acres classified as ROW exclusion. These would offer additional protections to livestock and their forage, when compared with Alternative A. Compared to Alternative A, surface areas available for grazing and open to locatable mineral entry (47,800 acres), disposal of mineral material (5,400 acres), and open to fluid mineral development with standard terms and conditions (100 acres) would be reduced, although not as much as under Alternative B. When compared with Alternative A, impacts from mineral development under Alternative D would be slightly less. This is due to the reduction in acres available for fluid mineral leasing, NEL mineral leasing, locatable mineral entry, and mineral materials. Due to the small amount of BLM-administered surface land acceptable for coal (approximately 40 acres), coal leasing would have negligible effects on livestock grazing under Alternative D.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Special Designations			
Areas of Critical Environmental Concern			
Under Alternative A, the Mud Buttes ACEC would not be designated and the area would continue to be open to all forms of coal and mineral entry, oil and gas leasing and ROW location. These resource uses could impact important geologic and paleontological resources although impacts would be mitigated at the project level through the implementation of BMPs or stipulations.	Under Alternative B (Preferred Alternative), the 960-acre Mud Buttes ACEC would be designated as an ACEC. Surface occupancy and use within Mud Buttes ACEC would be prohibited. The casual collection of plant and invertebrate fossils would be prohibited, OHV use would be closed, except for administrative or permitted access, and the area would be recommended for withdrawal from locatable mineral entry. Mud Buttes ACEC would be unacceptable for further consideration for coal leasing under Alternatives B and B.1. It would also be managed as a ROW exclusion area, except for existing ROW authorizations. This designation as an ACEC with associated restrictions would protect important geologic and paleontological resources.	The impacts under Alternative C would be similar to those under Alternative B, except the ACEC would be managed as limited to existing routes for OHV use and managed as a ROW avoidance area, except for existing authorizations. Surface occupancy for fluid minerals within Mud Buttes ACEC would be prohibited. Impacts from OHV use would include the permanent loss of geologic or paleontological resources—and the scientific data it would provide—through damage or destruction caused by surface-disturbance on existing routes. Excessive erosion, especially from surface disturbance on exposed locations, would damage fossils at the surface.	The impacts under Alternative D would the same as the impacts under Alternative B.
Wild and Scenic Rivers			
Under Alternative A, the eligible portions of the Little Missouri, Missouri, and Yellowstone Rivers would continue to be managed to preserve the preliminary classification of each eligible segment by protecting its free-flowing condition, water quality, and ORVs, pending suitability determination or congressional action. Development of site-specific mitigation measures during implementation-level planning would occur to reduce the potential for adverse effects on stream segments listed on the Nationwide Rivers Inventory.	Under Alternative B (Preferred Alternative), the eligible portions of the Little Missouri, Missouri, and Yellowstone Rivers would be determined suitable for inclusion in the NWSRS. Under this alternative the BLM would apply interim protections until congressional action formally designates these areas as WSRs or releases them from the interim protections, which would help maintain scenic characteristics and important fish habitats. Under Alternative B, surface occupancy and use would not be allowed within 0.25 miles of the Little Missouri River segments suitable for inclusion in the NWSRS. Interim protections along all suitable segments would include management as VRM Class II, ROW exclusion, NSO for fluid minerals, and closed to mineral materials disposal, would be outside the coal potential areas (for Alternatives B and B.1), and would apply project design features for other surface-disturbing activities.	Under Alternative C, the eligible portions of the Little Missouri, Missouri, and Yellowstone Rivers would be determined to be not suitable for inclusion in the NWSRS. The NSO protection for the Little Missouri River under Alternative B would not apply under Alternative C. Under this alternative all river segments would be released from interim management protections and there would be the potential for impacts on the identified scenic values and fish populations as these areas would be more open to all forms of energy and mineral development. Impacts could include habitat degradation, potential spills, erosion, runoff, and modifications to the landscape affecting the scenic quality and fish ORVs.	The impacts under Alternative D would the same as the impacts under Alternative C as eligible portions of the Little Missouri, Missouri, and Yellowstone Rivers would not be suitable for inclusion in the NWSRS.
National Scenic and Historic Trails			
Under Alternative A, there would be no specific RMP direction to guide management of the designated trails; the only direction for BLM to follow is policy contained in BLM Manual 6280. The corridors for both the Lewis and Clark NHT and the North Country NST would continue to be vulnerable to direct and indirect impacts. **Common to All Alternatives:** Because the National System of Trails is unsuitable, without exception, in the planning area, the trails are unacceptable to further consideration for coal leasing. Federal lands with coal deposits that would be mined by underground mining methods would not be assessed as unsuitable where there would be no surface coal mining operations; however, they would require further NEPA analysis during site-specific planning to determine the extent of potential impacts on national trails.	Under Alternative B (Preferred Alternative), the BLM would manage an approximately 1-mile-wide trail management corridor for both the Lewis and Clark NHT and North Country NST. The Lewis and Clark NHT corridor would be managed as VRM Class II. Both national trails would have overlapping NSO and CSU stipulations for fluid minerals; the trail corridors would also be closed minerals materials. These corridors would reduce the potential for direct and indirect impacts to the trails and provide more long-term protections to the physical integrity and cultural landscapes associated with the trails.	Under Alternative C, impacts would be similar to those described under Alternative B for both national trails, except the Lewis and Clark NHT management corridor would be managed as VRM Class III. This could allow some modifications to the landscape that alter the trail corridor's scenic quality, but it would provide greater long-term protection against direct and indirect impacts, as compared with the undesignated VRM classification under Alternative A. Under Alternative C, BLM would consult with the NPS regarding proposed minerals materials, which would require further NEPA analysis during site-specific planning to determine the extent of potential impacts to the trails.	Impacts under Alternative D would be similar to those described for Alternative B. Alternative D includes some clarifications to improve implementation, such as clarifying that the CSU stipulation applies 3 miles from the trail management corridor, though these would not change the anticipated impacts. Management of National Scenic and Historic Trails as no surface disturbance for NEL minerals under Alternative D would have the same impacts as Alternative B under which National Scenic and Historic Trails would be closed to NEL; since impacts to the trails would occur from surface disturbance, managing as no surface disturbance would have essentially the same impacts as closure.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Social and Economic			
Social and Economic Conditions			
Alternative A would result in jobs from foreseeable fluid mineral development representing approximately 7 to 11 percent of total employment in the mining sector in the socioeconomic study area. Alternative A would result in effects on the economy from foreseeable fluid mineral production ranging from approximately $39 million to $135 million in direct labor income over the 20-year time frame from 2021 to 2040. Alternative A would result in jobs from foreseeable coal production representing approximately 3 to 4 percent of total employment in the mining sector within the socioeconomic study area over the 20-year time frame. Total direct labor income would range from approximately $59 million during the 5-year period from 2020 to 2025 to approximately $63 million during the period from 2026 to 2030. Competitive mineral materials permit sales could result in direct and indirect contributions to the regional economy. The level of contributions would be dependent on the current market value for the product sold and the quantity of sale granted in the permit, which would vary by location and based on market conditions. Federally permitted grazing would account for only about 0.6 percent of total grazing under Alternative A, resulting in minimal effects on local economies. Due to low visitation to BLM-administered lands, contributions to regional economies from visitor spending are low. The Schnell Recreation Area is the only established recreation area, and visitor fees collected from overnight visitations at Schnell Recreation Area totaled approximately $690 in fiscal year 2019. Overall, continuation of current management under Alternative A would result in no effects on local or regional economies. The potential for social impacts, including adverse effects on quality-of-life indicators due to oil and gas or coal development, would also occur depending upon location and level of development.	Economic impacts from fluid mineral development and production under Alternative B (Preferred Alternative)would be similar to those described under Alternative A. This alternative would result in a 0.3 percent decrease in direct employment over the 20-year time frame compared with Alternative A. Economic impacts from coal production and mineral materials authorizations under Alternative B and B.1 would be the same as those described under Alternative A. Effects on county-level revenues from grazing authorizations under Alternative B would be similar to those under Alternative A. Effects on revenues from recreation-related activities under Alternative B would be similar to those described above under Alternative A. Overall, managing the Schnell Ranch SRMA and the Figure 4 and Lost Bridge BCAs would result in no effects on local or regional economies. The potential for social impacts, including adverse effects on quality-of-life indicators due to oil and gas or coal development, would also occur depending upon location and level of development.	Economic impacts from fluid mineral development under Alternative C would be essentially the same as those described under Alternative A. Economic impacts from coal production and mineral materials authorizations under Alternative C would be the same as those described under Alternative A. Effects on county-level revenues from grazing authorizations under Alternative C would be the same as those described above under Alternative A. Effects on revenues from recreation-related activities under Alternative C would be similar to those under Alternative A. Overall, managing the Schnell Ranch SRMA and the Figure 4 and Lost Bridge BCAs would result in no effects on local or regional economies. The potential for social impacts, including adverse effects on quality-of-life indicators due to oil and gas or coal development, would also occur depending upon location and level of development.	Economic impacts from fluid mineral development, coal production, and mineral materials authorizations under Alternative D would be the same as those described under Alternative A. Effects on county-level revenues from grazing authorizations under Alternative D would be the same as those described under Alternative A. Effects on revenues from recreation-related activities under Alternative D would be similar to those described under Alternative A. Overall, managing the Schnell Ranch SRMA and the Figure 4 and Lost Bridge BCAs would result in no effects on local or regional economies. The potential for social impacts, including adverse effects on quality-of-life indicators due to oil and gas or coal development, would also occur depending upon location and level of development.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Environmental Justice			
The extent and severity of impacts on specific environmental justice populations would be identified when site-specific proposed actions are analyzed under NEPA and other authorities. Potential impacts that would disproportionately affect environmental justice populations in close proximity to coal or oil and gas development include those resulting from localized effects on local air quality, noise, vibration, and changes to the visual character of the landscape.	The reduction in area managed as acceptable for coal leasing under Alternative B would not reduce projected federal coal production so impacts on communities of environmental justice concern from coal development would be similar to Alternative A. The reduction in area managed as acceptable for coal leasing under Alternative B.1 would result in a reduced potential for adverse impacts on environmental justice communities from federal coal production. It is expected that the reduction in federal coal production would be offset by an equivalent increase in nonfederal production so the total production of coal in North Dakota is not expected to be impacted. As a result impacts on communities of environmental justice concern would be similar to Alternative A.	Impacts on communities of environmental justice concern would be similar to Alternative A.	The area managed as acceptable for coal leasing under Alternatives D would be similar to Alternative B, so impacts on communities of environmental justice concern from coal development would be similar to Alternative B. .
Tribal Interests			
Under Alternative A, protective measures, such as VRM classifications, special designations, and protections from surface-disturbing activities, act to protect cultural and sensitive resources and sites important to Tribes. Developing fluid minerals, coal, locatable minerals, mineral materials, transportation systems, transmission lines, communication sites, renewable energy resources, and other land use authorizations would continue and could disturb lands containing locations and landscapes significant to Tribes and affect the setting of these areas over a great distance and duration.	Alternative B (Preferred Alternative) would provide more protections to NRHP-listed and eligible resources, including TCPs, as well as sites that meet the criteria for allocation for designation for scientific, conservation, traditional, public, and experimental use. The impacts to those resources, some of which may be significant to Tribes, are detailed in the *Cultural Resources* section.	Compared with Alternative A, management direction under Alternative C would include more protective measures for NRHP-listed properties and other historic properties, including TCPs and sites that meet the criteria for allocation for designation for scientific use, conservation use, traditional use, public use, and experimental use. Management would be less protective of these resources than that under Alternative B.	Alternative D would have similar impacts as those described under Alternative B. Compared with Alternative A, management actions under Alternative D would include more protective measures for NRHP-listed properties and other historic properties, including TCPs and sites that meet the criteria for allocation for designation for scientific use, conservation use, traditional use, public use, and experimental use.

Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Public Health and Safety			
Persons residing in or near closed and NSO areas would be protected from some health and safety impacts, such as noise and light impacts from surface facilities, but would be exposed to other impacts. For instance, populations living or working near drilling and development could be exposed to hazardous materials or be affected by local air quality. Additionally, these populations could be exposed to increased noise, traffic, and other hazards resulting from an increased worker population. BMPs applied at the site-specific level as stipulations to future development under any alternative could mitigate some of these impacts on affected populations.	Impacts on populations near areas open to leasing would be similar to those described under Alternative A. However, Alternative B would seek to concentrate development in areas with existing development, which could have possible beneficial effects on quality of life from enhanced local air quality and reductions in noise and traffic outside of peak development areas. A slight reduction in production of oil and gas under this alternative would reduce public exposure to hazardous chemicals and air emissions. Compared with Alternative A, Alternative B would provide additional protections for public drinking water by closing state designated SWPAs to fluid mineral leasing, and prohibiting fluid mineral surface occupancy and use within 0.50 miles of the Missouri River. This would reduce the risk from sedimentation and potential spills from impacting water quality in this waterbody. Under Alternative B solid leasable mineral activities in or downgradient from geologic formations known to contain erionite will be required to test for the mineral, if found the project will be subject to required design features and may be disapproved for public safety. All mineral material surface-disturbing activities would be subject to required design features to reduce the risk of exposure and respiration of erionite minerals. These measures would reduce the risk of erionite disturbance and exposure which would reduce potential public health risks compared to Alternative A.	Fluid minerals management under Alternative C would open the same number of acres to fluid mineral leasing as Alternative A, but would apply NSO and CSU stipulations on more areas than Alternative A. This could offer populations in these areas protections from some impacts, however projected production would be the same as under Alternative A therefore, impacts on public health and safety under Alternative C would be approximately the same as under Alternative A. Under Alternative C, the same erionite management direction for solid leasable minerals and mineral materials would be applied as under Alternative B, therefore impacts on health and safety from erionite would be approximately the same as under Alternative B.	Impacts on public health and safety would be similar to Alternative B due to the similarity in management of fluid minerals management. Under Alternative D, the same erionite management direction for solid leasable minerals and mineral materials would be applied as under Alternative B, therefore impacts on health and safety from erionite would be approximately the same as under Alternative B.

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Chapter 3. Affected Environment and Environmental Consequences

3.1 INTRODUCTION

This chapter describes the affected environment for the resources that the RMP is likely to affect, and the environmental consequences of the alternatives being evaluated in this Proposed RMP/Final EIS. In 2020, as part of the planning process, the BLM released the AMS, which describes the baseline conditions in the planning area (BLM 2020b). Because the AMS describes the planning area in detail, this chapter incorporates the AMS by reference and includes new data or information obtained since the AMS was finalized. Each resource section also includes particular questions about how the alternatives would affect the resource (the BLM refers to these questions as "Issues").

Following the description of baseline conditions, the discussion of potential impacts under each resource provides the scientific and analytic basis for evaluating the potential impacts of each alternative described in **Chapter 2**. These plan-level decisions establish allocations that identify the uses that are allowed, restricted, or prohibited on BLM-administered lands and federal mineral estate. Due to the programmatic nature of the RMP alternatives, the timing and specific location of project-specific actions that could impact resource values are not defined. Additionally, the relationship between cause (future actions) and effect (impact on resources) is not always known or quantifiable. For these reasons, the analysis of alternatives contained in the sections below is both qualitative and quantitative. Each resource area includes a summary of impacts common to all alternatives, an analysis of impacts for each of the three alternatives, and a description of cumulative impacts.

The BLM manages public lands for multiple uses in accordance with FLPMA. The BLM makes land use decisions 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 the BLM meets its multiple-use mandate in land management actions, the alternatives' impacts 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 alternative.

Impacts for some resources or resource uses, such as recreation, could be confined to the BLM-administered surface estate. Other impacts, such as energy and minerals and requirements to protect special status species and cultural resources 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. However, the evaluations are confined to the actions that have direct, immediate, and more prominent effects. 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. **Section 1.4.2** in **Chapter 1** describes those resources that did not receive detailed analysis. In some instances, varying levels of management from different resource programs overlap. In

such instances, the stricter management prescriptions would apply. If such prescriptions were excepted, then the less strict management would prevail.

In most cases, data presented for surface use restrictions (for example, NSO, CSU, and TL, and ROW avoidance and ROW exclusion) overlap one another. In other words, both NSO and CSU stipulations could be applied to a given acreage to protect different resources. Throughout this chapter, these acreages were calculated independently of one another. If the NSO stipulation were to be excepted, modified, or waived, a CSU stipulation could still protect the area. Because of this, acres presented for surface use restrictions cannot be added together to get a total acreage. Along similar lines, because allocations occur in the same area for different resources, the impacts of various allocations noted in this chapter may be from either allocations designed to protect that resource or from allocations designed to protect other resources. In the latter instance, allocations for other resources may provide incidental protection to the resource discussed.

The acres related to mineral development (for example, stipulations for fluid mineral leasing, open and closed to mineral materials disposal, and acceptable or unacceptable for coal leasing) are for all federal minerals where the resource exists. For example, when disclosing impacts on sensitive soils from potential surface-disturbing activities associated with coal, the BLM considered sensitive soils across the coal federal mineral estate with identified coal potential, not just sensitive soils on BLM-administered surface lands.

A withdrawal of federal lands from the mining laws closes an area of BLM-administered land to the location of new mining claims. It helps to provide protections to areas of BLM-administered lands from locatable mineral mining (gold, silver, copper, nickel, and other precious metals). Mineral withdrawals are, however, subject to valid existing rights. Recommendations for withdrawal are a petition to the Secretary of Interior, however there is no obligation for the Secretary to consider or enact one. A separate action the Secretary of Interior and additional NEPA analysis is required before they can be enacted, so the withdrawal of areas recommended for withdrawal is not considered a reasonably foreseeable future action.

Section 3.1.1 presents analytical assumptions related to anticipated surface disturbance from fluid mineral development, coal development, mineral materials development, and ROW development. These levels of disturbance are expected under all the alternatives. The acres presented in the analysis are for the maximum allowable extent of the management actions in each alternative, though the anticipated levels are much lower.

Appendix D, Design Features and Best Management Practices, contains standard operating procedures that could be implemented under all the action alternatives. **Appendix I**, Approach to the Environmental Analysis, details the methods and assumptions for assessing impacts specific to each resource, including the indicators used for the analysis. **Appendix I** also outlines the general methodology used for analyzing direct, indirect, and cumulative impacts predicted to result from implementing the alternatives presented in **Chapter 2**. 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 they usually occur later in time or are removed in distance and are reasonably certain to occur.

Cumulative impacts are effects on the environment that result from the impact of implementing any one of the RMP alternatives in combination with other actions outside the scope of this RMP. Because the total effect of any single action cannot be determined by considering it in isolation, the BLM has determined the total effect by considering the likely result of that action in conjunction with many others. These assessments involve determinations that often are complex and, to some degree, subjective. **Appendix I**, Approach to the Environmental Analysis includes details on the cumulative effects area considered for each

resource and resource use and the list of relevant past, present, and reasonably foreseeable future actions that the BLM considered within the cumulative impact analysis.

RFDs for oil and gas, coal, and mineral materials provide estimates of the levels of mineral development that could occur within the planning area over a 20-year time frame (2020–2040; BLM 2022a, 2022b, and 2022c, respectively. The BLM used these development scenarios to help identify potential impacts on the resources associated with mineral development. General assumptions associated with the RFDs are included below.

Climate change is expected to affect the decision area through an increase in precipitation and high-intensity rain events, increasing temperatures, and increased wildfire risk (URS Corporation 2010; Skagen et al. 2016; NRCS 2000). Each resource, resource use, or special designation affected by climate change addresses the trends in the last paragraph of the *Affected Environment*. If climate change would affect the impact indicators for that resource or resource use, it is addressed in the *Cumulative Impacts* section of the *Environmental Consequences*.

3.1.1 Analytical Assumptions

The BLM made several assumptions to facilitate the analysis of potential effects. Below are general assumptions that apply to all resources. These assumptions set guidelines and provide reasonably foreseeable projected levels of development that would occur within the North Dakota 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 in **Chapter 2**. Specific resource assumptions are found in **Appendix I**, Approach to the Environmental Analysis:

- Acres are approximate projections for comparison and analytical purposes. Readers should not infer that they reflect exact calculations.
- Land allocations do not compel or authorize any ground-disturbing actions. Future actions and development proposals could be brought forward that will be subject to additional site-specific environmental study and permitting requirements.
- The discussion of effects is based on the best available data. Where data are limited, the BLM used knowledge of the planning area and professional judgment, based on observation and analysis of conditions and responses in similar areas.
- Design features (**Appendix D**, Design Features and Best Management Practices) will be applied, including those specific to GRSG, unless the BLM determines that site-specific conditions do not warrant application of a design feature.
- Surface-disturbing actions related to fluid mineral development will comply with Gold Book surface operating standards (and subsequent updates).
- The RFD for oil and gas (BLM 2022a) estimated that approximately 43,000 new production and support wells and 56,000 acres of new disturbance are expected across the planning area between 2020 and 2040.
- Surface disturbance from fluid mineral development of BLM-administered federal mineral estate is approximately 1,625 acres of surface estate (this includes BLM surface and split-estate) through 2040 (less than 1 percent of surface in the fluid mineral decision area). As a result of fluid mineral development, 72 acres of disturbance could occur on BLM-administered surface (less than 1 percent of BLM-administered surface in the decision area). Disturbance would be concentrated in the very high and high development potential areas.

- The land and federal mineral estate ownership pattern in North Dakota presents opportunities for fee-fee-federal fluid mineral development (development of federal mineral estate from a well on adjacent nonfederal surface estate that first enters nonfederal mineral estate; see **Section 2.2.1** in **Chapter 2**). In some cases, off-site surface impacts that cannot be regulated by the BLM may occur. This is because the BLM cannot apply stipulations to fee-fee-federal wells, unless there are other enforceable laws on nonfederal surface that operators have to follow, such as the ESA, the Clean Air Act, the Clean Water Act, and the NHPA. In other words, an operator developing a fee-fee-federal well would not be affected by the existence of NSO, CSU, or TL stipulations on overlying surface estate unless it is enforceable to comply with other federal laws. As a result, surface use, occupancy, and timing stipulations on BLM-administered surface often do not have a significant impact on the development of federal minerals in the planning area. The analysis presented covers the extent of a given resource, regardless of surface ownership.
- Lands recommended for withdrawal would require a separate action of the Secretary of the Interior or the US Congress to withdraw lands from locatable mineral entry.
- There is no reasonably foreseeable locatable mineral development. However, there has been past interest in uranium mining within the planning area, and rare earth minerals are also present. An analysis of the nature and type of locatable mineral development's effects, as well as a disclosure of the maximum allowable extent of development based on the management actions, is provided in case demand for locatable minerals occurs in the future.
- Surface disturbance from mineral materials development is approximately 40 acres of federal mineral estate annually and distributed throughout the planning area.
- There is no reasonably foreseeable NEL mineral development in the planning area at this time. Deposits of potash and helium have been identified in potentially commercially viable quantities but are not viable targets for development under current development technologies and commodity prices.
- There are three primary coal-producing counties in the planning area: Mercer, McLean, and Oliver. Surface disturbance in the three counties would be approximately 9,434 acres prior to 2040 due to the development of existing and pending federal coal leases under unconstrained conditions. Most of this disturbance would be on non-BLM surface estate. There is also an existing lease in Morton County; however, because Morton County is outside the RFD for coal development (BLM 2022b) and there is a small amount of BLM-administered land in the county (29,800 acres), it is not included in the analysis.
- Alternative B.1 is a sub-alternative to Alternative B that provides the same management opportunities and protections as found under Alternative B for all resources except coal. Under Alternative B.1, the coal screening criteria specific for Alternative B.1 (see **Appendix F**, Coal Screening Process) would be applied.
- The BLM used best available data at the time of application of coal screens for this effort. In accordance with 43 CFR 3461.2-1, the BLM could, based on additional site-specific surveys or changes in resource conditions, change the determination of Coal Screen 2 (unsuitability) of a given tract at the activity planning stage, without amending the decisions in this RMP. GIS data are not available for most screens in Alternative A.
- Impacts to private surface may occur even in areas where split estate federal coal is closed to leasing. While the BLM has the authority to manage the federal mineral estate which it administers, the agency does not manage the non-federal surface. The BLM decision would not preclude the authority of the

State of North Dakota and OSM to manage and permit support activities for surface coal mining and reclamation operations on adjacent lands on privately owned surface areas, pursuant to other laws and agreements.

- New transportation facilities will be properly designed to BLM minimum standards.
- The BLM anticipates approximately three to four new ROW authorizations accounting for approximately 41 acres of disturbance annually.[1] The BLM does not anticipate wind or solar development on BLM-administered lands.
- Recommendations for opening orders for acquired lands under existing segregations which are not currently open to locatable mineral entry would be acted upon.
- Management actions will not affect existing ROWs or other valid existing rights.

3.2 RESOURCES

3.2.1 Air Quality and Climate

Issues

- How would the proposed management actions affect air quality and air quality related values?
- How would the proposed management actions affect climate change and the emission of GHGs from BLM-managed activities?
- How would the RMP contribute to meeting policy goals and objectives for reducing GHGs?
- What would be the BLM's expected contribution to GHG emissions from fossil fuel development and other activities?

Affected Environment

Air Quality

The lack of large population centers results in considerably better air quality in North Dakota than in most other areas of the US (Sullivan 2016). Regional air quality is assessed by comparing the concentrations of air pollutants in the ambient atmosphere with national ambient air quality standards (NAAQS) for six criteria air pollutants. North Dakota annually reports ambient air quality concentrations from its network of 10 monitoring sites across the state. Monitoring data from each site showed concentrations below the North Dakota ambient air quality standards (NDAAQS) and NAAQS for all monitored criteria air pollutants; no lead monitoring was conducted. (DEQ 2023). All areas of the state have been designated as attainment/unclassifiable for the NAAQS (EPA 2024).

Major sources of air pollution in North Dakota are power plants, agricultural processing facilities, and infrastructure associated with the development and use of oil, gas, and coal (DEQ 2019). Emissions from power plants have steadily decreased over time by implementing emission control technologies and replacing aging coal-fired power plants with natural gas turbines and renewable energy technologies. Reported annual statewide power plant emissions of sulfur dioxide (SO_2) and nitrogen oxides (NOx)—two of the criteria pollutants regulated by the US Environmental Protection Agency (EPA)—decreased by approximately 68 percent and 38 percent, respectively, since 2010 (EPA 2020a).

Total (federal plus nonfederal) oil and gas emissions in the planning area generally increased between 2014 and 2018 due to large increases in oil production (17 percent), gas production (86 percent), and well counts (32 percent) occurring in the planning area. Nitrogen oxide is the only criteria pollutant for which estimated

[1] Averaged based on ROWs authorized between 2012 and 2021

emissions were lower in 2018 than in 2014; this is largely due to reductions in hydraulic fracturing and drill rig emissions, resulting from a 42 percent decrease in spud[2] count in 2018 relative to 2014 (Appendix B of BLM 2020). The active well count represents all wells operating in a given year; therefore, even though the spud count decreased from 2014 to 2018, the active well count increased.

Additional information is available in Section 2.1, Air Quality and Climate, of the AMS (BLM 2020b).

Air Quality Related Values

AQRVs are resources that may be adversely affected by changes in air quality; they are visibility, vegetation, soils, water, fish, wildlife, and other resources. These adverse effects result from visibility-reducing particles in the air and atmospheric deposition of acids and other pollutants onto these resources.

Visibility conditions are assessed using data from the Interagency Monitoring of Protected Visual Environments monitoring network. Annual trends in visibility on the 20 percent most impaired days and 20 percent clearest days have been measured in the Class I areas[3] since the early 2000s (see **Table 3-1**). Trends show considerable improvements in visibility on both the 20 percent most impaired days and the 20 percent clearest days at each monitoring location (Federal Land Manager Database 2022). The EPA reported the pollutants that contribute to visibility impairment in the Class I areas shown in **Map 3-1**, Class 1 Areas, in **Appendix A**; the most recent data are for 2014 through 2017. On the clearest days, sulfate, coarse particles, organic mass, and nitrate all contributed substantially to visibility impairment. On the most impaired days, nitrate and sulfate concentrations were much higher, compared with the clearest days, and were the largest contributors to visibility impairment (EPA 2019a).

Deposition is assessed using data from the National Trends Network of the National Atmospheric Deposition Program and the Clean Air Status and Trends Network. Total deposition of nitrogen is generally below or within the range of critical loads[4] for nitrogen deposition in North Dakota (EPA 2021c) with higher observed values in the central and eastern part of the state. In particular, there is elevated nitrogen deposition in Mercer and Oliver Counties near industrial facilities and several coal-fired power plants. The total deposition flux of sulfur is generally low across the planning area but is elevated in some central parts of the state (EPA 2020b). Additional information is available in Section 2.1, Air Quality and Climate, of the AMS (BLM 2020b).

In the analysis below, the maximum impacts on the NAAQS are assessed and reported for the air quality analysis area (see **Appendix I**, Approach to the Environmental Analysis) with emphasis on North Dakota. Additionally, the assessment considers potential impacts on lands in the analysis area with special air quality protections under federal law. These include national parks and wilderness areas designated as mandatory federal Class I areas under the Clean Air Act (CAA) and other areas redesignated as Class I at the request of a state or Indian Tribe. Tribal Class I areas are authorized in CAA Section 164(c) (EPA 2013). Federal Class I areas are listed in 40 CFR 81.400–81.437. Tribal Class I areas are listed by the NPS (NPS 2018).

Federal and Tribal Class I areas in the analysis area (Lostwood Wilderness, Theodore Roosevelt National Park [NP], Medicine Lake Wilderness, and Fort Peck Indian Reservation) are assessed in this analysis along with the Fort Berthold Indian Reservation. The Fort Berthold Indian Reservation is included because it has

[2]Spud is the process of beginning to drill a well in the oil and gas industry.
[3] Class 1 federal lands include areas such as national parks, national wilderness areas, and national monuments. These areas are granted special air quality protections under Section 162(a) of the federal Clean Air Act
[4] Critical loads represent the total level of deposition below which no harmful effects on an ecosystem are expected.

a federal implementation plan that regulates emissions from oil and gas production facilities on reservation lands (40 CFR 49.4161–49.4168). These areas are listed in **Table 3-1,** below, and Class I Areas are shown in **Map 3-1**, Class I Areas, in **Appendix A**.

Table 3-1
Federal Class I Areas and Other Areas of Interest Included in the Air Quality Analysis

Class I Area	State
Mandatory Federal Class I Areas	
Lostwood Wilderness	North Dakota
Theodore Roosevelt NP	North Dakota
Medicine Lake Wilderness	Montana
Tribal Class I Areas	
Fort Peck Indian Reservation	Montana
Other	
Fort Berthold Indian Reservation	North Dakota

Sources: 40 CFR 81; NPS 2018

Climate and Greenhouse Gases

North Dakota is in the Northern Great Plains, which is characterized by a strong east-to-west gradient of increasing elevation and decreasing precipitation (USGCRP 2018). It experiences wide seasonal and daily temperature extremes, frequent sunshine, low to moderate precipitation, and nearly continuous wind (Enz 2003). Average annual temperatures range from 37 degrees Fahrenheit (°F) in the north to 43°F in the south.

Annual precipitation ranges from less than 14 inches in the northwest to 22 inches in the southeast (NCEI 2017), with statewide annual totals varying from year to year. North Dakota receives less snowfall than other northern states, averaging 25 to 45 inches of snow annually. In the coldest months—November through February—precipitation averages only about 0.50 inches of water per month, which falls mostly as snow. The snowpack persists from December through March but averages only 9 to 15 inches (Enz 2003).

Changes in temperature, precipitation, and other climate variables that persist for decades or longer are referred to as climate change (IPCC 2014). The Intergovernmental Panel on Climate Change (IPCC; 2021) has concluded that it is unequivocal that human influence has warmed the atmosphere, ocean, and land and that human activities have caused GHG concentrations to increase since the mid-eighteenth century. The increase in well-mixed GHG concentrations has caused widespread changes in the earth's climate systems. These include, but are not limited to, successively warmer global surface temperature and increasing global average precipitation.

Evidence of observed changes in extremes, such as heat waves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened since the IPCC Fifth Assessment Report (IPCC 2014). The IPCC (2021) estimates that the likely range of the human-caused increase in global surface temperature between 1850-1900 and 2010-2019 was 1.4 to 2.3°F (0.8 to 1.3 degrees Celsius [°C]). The increase in well-mixed GHG concentrations was likely accountable for 1.8 to 3.6°F (1.0 to 2.0°C) of the increase in global surface temperature, while other human drivers contributed a cooling of 0.0 to 1.4°F (0.0 to 0.8°C) (IPCC 2021). Natural drivers and internal variability changed the global surface temperature by -0.2 to 0.2°F (-0.1 to +0.1°C) and -0.4 to +0.4°F (-0.2 to +0.2°C), respectively (IPCC 2021). Human-induced climate change has also increased the global average precipitation over land area since the mid-twentieth century and has shifted the mid-latitude storm tracks poleward in both

hemispheres. Under scenarios with increasing carbon dioxide (CO_2) emissions, the ocean and land carbon sinks are projected to be less effective at slowing the accumulation of CO_2 in the atmosphere (IPCC 2021). The IPCC AR6 estimates that global GHG emissions would need to be approximately 43 percent lower than 2019 emissions by 2030 in order to limit global warming to 1.5°C with no or limited overshoot.

Consistent with EO 14008, the US has established an economy-wide target of reducing its net GHG emissions (including anthropogenic and natural GHG emissions as well as GHG removals by sinks) by 50 percent to 52 percent below 2005 levels in 2030 in its Nationally Determined Contribution under the Paris Agreement (UNFCCC 2021). The net US emissions (including sinks) in 2005 were 6,635 million metric tons (MMT) CO_2e (UNFCCC 2021); therefore, the 2030 U.S. net emissions target is estimated to be between approximately 3,185 and 3,318 MMT CO_2e. UNFCCC (2021) indicates that the US is anticipated to have met and surpassed the 2020 target of 17 percent reduction in net economy-wide emissions below 2005 levels and is broadly on-track to meet the 2025 goal of 26 percent to 28 percent emissions reductions below 2005 levels. As part of its long-term strategy, the US has also set a goal of net-zero GHG emissions no later than 2050 (U.S. Department of State 2021).

Annual average temperatures have increased 0.26°F per decade in North Dakota over the last century, which is one of the largest increases in the continental US. Most of the state has warmed about 2°F in this time, though this warming trend has been concentrated in winter and spring (EPA 2016a). Over the past 130 years, winter temperatures have increased by 4.4°F per century; this is more than three times as much as the summer trend of 1.4°F per century during the same time period (NCEI 2017). While there has been an increase in demand for renewable energy, reducing fossil fuel projects can help achieve the 1.5 degree target temperature—as opposed to stopping new projects (Teske and Niklas 2021).

During the last 50 years, rainfall totals during the wettest 4 days of the year have increased by about 15 percent in the Great Plains (EPA 2016a). The frequency of heavy rainfall has also increased (NCEI 2017). As river flows, precipitation, and severe storms increase, the risk of flooding has also increased. For example, 2011 was one of the wettest years on record in North Dakota, with flooding throughout the state. In addition, river flows during the worst flood of each year in the Red River watershed have been increasing about 10 percent per decade since the 1920s (EPA 2016a). However, periods of drought are also common. From 2000 to 2022 some percentage of North Dakota has been classified as being in at least Moderate Drought 60.5 percent of the time (Drought.gov 2022).

The major sources of GHG emissions in North Dakota are power plants, agricultural processing facilities, and infrastructure associated with mineral development. In 2018, CO_2 emissions in North Dakota from fossil fuel consumption were 59 million metric tons, or approximately 1 percent of the total US energy-related CO_2 emissions (EIA 2021). Future changes in total US emissions would affect the estimated fraction of North Dakota's emissions accordingly. Emissions of GHGs from fossil fuel consumption in North Dakota increased 32 percent between 1990 and 2018, with emissions from the electric power sector comprising roughly half or more of the total CO_2 emissions throughout this period (EIA 2021).

The rapid expansion of oil and gas development in the Williston Basin has resulted in a corresponding increase in GHG emissions. A comparison of the estimated 2018 oil and gas emissions with 2014 emissions indicates that CO_2 emissions from oil and gas increased by approximately 14 percent in the planning area (Ramboll 2020). This is largely due to increases in oil and gas production and well count relative to 2014.

The impacts and trends associated with climate change on each resource are discussed in the relevant resource sections in **Chapter 3**. Additional information is available in Section 2.1, Air Quality and Climate, of the AMS (BLM 2020b).

Environmental Consequences

The BLM analyzed potential impacts on air quality from actions that could be authorized under this RMP through two types of assessments: a modeling assessment and an emissions assessment. The modeling assessment was performed prior to the availability of RFD activity data for the RMP alternatives; it applied estimates of circa 2028 activity for oil and gas development, coal mining and downstream combustion, and other sources. The emissions assessment analyzed oil and gas development, coal mining, and downstream emissions of criteria and hazardous air pollutants (HAPs) and GHGs from the specific RFD activity under each alternative to disclose the difference in potential impacts among alternatives.

The cumulative air concentration from all sources analyzed would not exceed national or state air quality standards except for isolated exceedances of particulate matter and carbon monoxide (CO) concentrations that are not caused by actions authorized under this RMP. For all alternatives analyzed, compliance with the air quality standards is expected to continue. New federal oil, gas, and coal mining emissions in North Dakota attributable to BLM authorized activities would not lead to exceedances in the analysis area, including at Class I areas and Indian reservations. The BLM anticipates elevated short-term concentrations of nitrogen dioxide (NO_2) near federal and nonfederal oil and gas production sites in the Williston Basin, compared with other parts of the planning area. However, cumulative concentrations would continue to be below the NO_2 air quality standards. Similarly, the BLM anticipates short-term concentrations of particulate matter smaller than 10 microns (PM_{10}) would be higher in the vicinity of federal and nonfederal coal development in Mercer, McLean, and Oliver Counties compared with locations that are farther away; however, cumulative concentrations would remain below the PM_{10} air quality standard. Under Alternative B.1—a sub-alternative under which expansion of federal coal mining is reduced—federal emissions of PM_{10} and other pollutants from coal mining would be reduced relative to the other alternatives starting in 2027.

The BLM has developed an adaptative management strategy for managing air resources under this RMP that includes lease stipulations, design features, BMPs, and other air resource management actions to minimize or reduce adverse impacts on air resources. Management actions that may reduce impacts on the higher short-term concentrations of NO_2 and PM_{10} described above include, but are not limited to:

- NSO for fluid minerals leasing allowed within 1 mile of the boundary of the Lostwood Wilderness or the Theodore Roosevelt National Park Class I Area. This would prevent emissions of NOx and PM_{10}, which would otherwise lead to NO_2 and PM_{10} impacts within these areas, respectively.
- CSU requirement that necessitates an air analysis, including near-field dispersion modeling, prior to surface use and occupancy within 2 miles of the same boundaries (of the Lostwood Wilderness or the Theodore Roosevelt National Park Class I Area) that demonstrates that the proposed exploration or development will not result in adverse impacts on air quality and will meet air quality goals, objectives, standards, and thresholds for the Class I areas. This includes the air standards for 1-hour NO_2 and 24-hour PM_{10}.
- CSU for fluids mineral leasing that requires an approved waste minimization plan that includes design features to minimize air pollutants released from venting, flaring, and leaks during drilling, completion, and production operations. This would reduce emissions of NOx from venting and flaring that would otherwise result in 1-hour NO_2 impacts.

- A lease notice (LN; LN-14-18) to inform the lessee/operator that additional air resources analyses may be required prior to project-specific approval to comply with NEPA, FLPMA, and other applicable laws and regulations. Analyses may include equipment and operations information, emission inventory development, dispersion modeling or photochemical grid modeling for air quality and/or air quality related value impact analysis, and/or emission control determinations. These analyses may result in the imposition of additional project-specific control measures to protect air resources. These control measures would potentially address, in part, NOx and PM_{10} emissions.
- Proponents of development projects that have potential to generate fugitive dust emissions may be required to submit a fugitive dust control plan and may be required to implement fugitive dust control measures, as determined on a case-by-case basis by the BLM. Implemented measures would reduce PM_{10} emissions.

The BLM would also support air resource monitoring to determine existing conditions, long-term trends, and the effectiveness of the air resource management strategies, and would work collaboratively with state, local and Tribal agencies, industry, and other stakeholders to gather, share, and analyze air quality monitoring data to achieve air quality goals and objectives.

The management actions described above would also typically apply to other criteria air pollutants and precursors, such as volatile organic compounds (VOC). Descriptions of all air resources management actions can be found in **Table 2-2** of **Chapter 2** and in **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing, **Appendix C**, Air Resources Management Plan, and **Appendix D**, Design Features and Best Management Practices.

Emissions from many existing sources, such as power plants, are decreasing due to more stringent federal emission standards or due to power plant retirements or fuel conversion. Cumulative nitrogen deposition is predicted to be higher than the critical load at Theodore Roosevelt NP and Fort Berthold Indian Reservation. This is largely due to natural and nonfederal human-caused sources with minimal contribution from BLM-authorized actions under this RMP. Sulfur deposition would be below the critical load everywhere in the analysis area.

New federal oil, gas, and coal would cause visibility impacts higher than 1 delta deciview[5] at the Fort Berthold Indian Reservation; the visibility thresholds are applicable to individual projects and not at the planning level. They are presented here for informational purposes only. The impact of ozone exposure on trees, plants and ecosystems is assessed here using a seasonal index known as the W126 index. Ozone damages plants and other vegetation by entering leaf openings and affecting plant tissue. The ozone impacts on vegetation from both cumulative sources and federally authorized sources are below the relevant W126 threshold of 7 parts per million (ppm)-hours.[6] Emissions due to BLM-authorized actions under the RMP are generally comparable across Alternatives A, B, C, and D (**Table 3-2**) with emissions slightly less (that is, less than 0.2 percent) under Alternatives B and D compared with Alternatives A and C.

[5] Deciviews are a unit of measurement of haze (referred to as the "haze index") derived from calculated light extinction. Delta deciviews is a metric used to represent the change in atmospheric light extinction due to emissions from a source or group of sources relative to background conditions. A threshold of 1.0 deciviews (approximately a 10 percent change in light extinction) is applied by federal land managers to identify individual sources that cause visibility impairment. More information on the haze index and how it was calculated is provided in Ramboll (2024).
[6] There is no official threshold set by EPA for the W126 index. The NPS recommendation of a 7,000 ppm-hours threshold for the "good condition benchmark" is used here (https://www.nps.gov/articles/analysis-methods2020.htm).

Table 3-2
Annual Emissions under Each Alternative

	New BLM Federal Oil and Gas Development	Total BLM Federal Oil and Gas Development	Total Federal Oil and Gas Development	Federal Coal Development	Other BLM Activities (Lands and Realty, Prescribed Fires, Livestock Grazing, and Mineral Materials)	Total
Alternative A						
CO (tons per year)	3,853	4,426	10,414	442	126	19,261
NOx (tons per year)	2,138	2,779	6,523	1,302	2	12,744
PM_{10} (tons per year)	49	60	140	3,727	34	4,010
$PM_{2.5}$ (tons per year)	46	57	133	398	14	648
SO_2 (tons per year)	700	899	2,104	46	1	3,750
VOC (tons per year)	10,389	12,541	29,364	149	30	52,473
HAPs (tons per year)	520	628	1,471	58	3	2,680
GHG (CO_2e) (metric tons per year)	1,740,232	2,270,788	5,319,390	106,702	27,544	9,464,656
Alternative B						
CO (tons per year)	3,840	4,415	10,402	442	126	19,225
NOx (tons per year)	2,131	2,772	6,516	1,302	2	12,723
PM_{10} (tons per year)	48	60	140	3,727	34	4,009
$PM_{2.5}$ (tons per year)	46	57	133	398	14	648
SO_2 (tons per year)	698	897	2,102	46	1	3,744
VOC (tons per year)	10,356	12,514	29,336	149	30	52,385
HAPs (tons per year)	519	627	1,469	58	3	2,676
GHG (CO_2e) (metric tons per year)	1,734,685	2,265,763	5,314,215	106,702	27,544	9,448,909
Alternative B.1						
CO (tons per year)	3,840	4,415	10,402	436	126	19,219
NOx (tons per year)	2,131	2,772	6,516	1,283	2	12,704
PM_{10} (tons per year)	48	60	140	3,674	34	3,956
$PM_{2.5}$ (tons per year)	46	57	133	393	14	643
SO_2 (tons per year)	698	897	2,102	45	1	3,743
VOC (tons per year)	10,356	12,514	29,336	147	30	52,383
HAPs (tons per year)	519	627	1,469	57	3	2,675
GHG (CO_2e) (metric tons per year)	1,734,685	2,265,763	5,314,215	105,190	27,544	9,447,397

	New BLM Federal Oil and Gas Development	Total BLM Federal Oil and Gas Development	Total Federal Oil and Gas Development	Federal Coal Development	Other BLM Activities (Lands and Realty, Prescribed Fires, Livestock Grazing, and Mineral Materials)	Total
Alternative C						
CO (tons per year)	3,853	4,426	10,414	442	126	19,261
NOx (tons per year)	2,138	2,779	6,523	1,302	2	12,744
PM_{10} (tons per year)	49	60	140	3,727	34	4,010
$PM_{2.5}$ (tons per year)	46	57	133	398	14	648
SO_2 (tons per year)	700	899	2,104	46	1	3,750
VOC (tons per year)	10,389	12,541	29,364	149	30	52,473
HAPs (tons per year)	520	628	1,471	58	3	2,680
GHG (CO_2e) (metric tons per year)	1,740,232	2,270,788	5,319,390	106,702	27,544	9,464,656
Alternative D						
CO (tons per year)	3,840	4,415	10,402	442	126	19,225
NOx (tons per year)	2,131	2,772	6,516	1,302	2	12,723
PM_{10} (tons per year)	48	60	140	3,727	34	4,009
SO_2 (tons per year)	698	897	2,102	46	1	3,744
VOC (tons per year)	10,356	12,514	29,336	149	30	52,385
HAPs (tons per year)	519	627	1,469	58	3	2,676
GHG (CO_2e) (metric tons per year)	1,734,685	2,265,763	5,314,215	106,702	27,544	9,448,909

Source: Ramboll 2024

$PM_{2.5}$ = particulate matter smaller than 2.5 microns; VOC = volatile organic compounds; HAPs = hazardous air pollutants' CO_2e = carbon dioxide equivalent

Emissions are based on peak year of production, which is 2040 for oil and gas based on new BLM federal oil and gas production (BLM 2022a); 2030 for federal coal development under Alternatives A, B, C, and D; and 2026 for federal coal development under Alternative B.1 (BLM 2022b).

100-year time horizon global warming potentials applied to calculate CO_2e: CO_2 = 1; methane (CH_4) = 29.8; nitrous oxide (N_2O) = 273 from the IPCC Fifth Assessment Report. Values based on 20-year global warming potentials are shown in Ramboll (2022).

Peak year refers to annual maximum new BLM federal production.

Note that this table does not list downstream emissions; those are discussed under each alternative.

Federal emissions under Alternative B.1 would be lower than Alternatives B and D in 2027 and after—and thus the lowest across all alternatives—due to the reduction in federal coal production resulting from restricting future leasing of federal coal to the mine permit boundaries as of September 9, 2022. Federal emissions of criteria and hazardous air pollutants and GHG from coal mining would be approximately 23 percent lower under Alternative B.1 than Alternatives B and D, which would result in a reduction in the total emissions from BLM-authorized activities. The total GHG emissions from BLM authorized activities would be approximately 9 percent lower under Alternative B.1 than Alternatives B and D, while the GHG emissions from all federal activities would be approximately 5 percent lower (see **Table 3-16** and **Table 3-17** for details). While the federal coal emissions would be the lowest under Alternative B.1, the total (federal plus nonfederal) emissions from coal would be the same under all alternatives as the BLM anticipates that the shortfall in federal coal production under Alternative B.1 would be made up by an increase in nonfederal coal production to ensure that contract requirements are met (BLM 2022b). Additionally, the reduction in federal coal could potentially result in additional emissions due to mine operators having to bypass and avoid federal coal tracts to reach nonfederal coal reserves. All federal emissions other than coal under Alternative B.1 would be the same as under Alternatives B and D. Details on sources and air quality impacts are provided below and in the Air Quality Technical Support Document (AQTSD; Ramboll 2024).

Impacts Common to All Alternatives

Air Quality

Oil and Gas Development

The oil and gas activity levels shown in **Table 3-3** and the corresponding emissions shown in **Table 3-4** were evaluated in the photochemical modeling. The modeled activity (and hence emissions) for future federal mineral estate development are conservative overestimates (compared with the oil and gas RFD for the alternatives; BLM 2022a). These were forecast for circa 2028 for use in photochemical modeling by

Table 3-3
Modeled Circa 2028 Oil and Gas Activity in North Dakota by Mineral Designation

	Mineral Designation				
Federal existing	**Federal new**	**Federal total**	**Tribal total**	**Nonfederal total**	**Total**
Oil production (million barrels per year)					
36	66	102	60	336	498
Gas production (billion cubic feet per year)					
71	162	233	140	766	1,139
Well count (number of wells)					
3,914	2,260	6,174	3,385	21,146	30,705
Spud count (number of spuds)					
—	251	251	162	791	1,204

Source: Ramboll 2024
Modeled federal estimates are conservative overestimates of anticipated future production from BLM-administered federal mineral estate within the planning area under the alternatives (see discussion in text).
Numbers may not add exactly because of rounding.
"Existing" refers to wells drilled prior to 2020. "New" refers to wells drilled from 2020 onward.

Table 3-4
Modeled Circa 2028 Oil and Gas Emissions by Mineral Designation in North Dakota

Criteria Air Pollutant Emissions (tons/year)						Total HAPs (tons/year)
NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	
Federal (excluding Tribal) new						
5,956	34,379	12,508	2,232	182	197	1,721
Tribal new						
3,786	21,650	7,789	1,430	115	124	1,095
Federal and Tribal new						
9,741	56,028	20,296	3,663	297	321	2,817
Federal (excluding Tribal) new plus existing						
11,236	57,204	18,970	4,169	318	342	2,833
Tribal new plus existing						
6,318	31,845	10,450	2,358	174	187	1,615
Federal and Tribal new plus existing						
17,554	89,049	29, 420	6,527	492	529	4,448
Nonfederal new plus existing						
37,180	183,513	59,257	13,706	992	1,062	9,228
Total new plus existing						
54,734	272,562	88,677	20,234	1,484	1,590	13,676

Source: Ramboll 2024
Modeled federal emission estimates are conservative overestimates of anticipated future BLM-related emissions under the alternatives (see discussion in text).
Numbers may not add exactly because of rounding.
"Existing" refers to wells drilled prior to 2020. "New" refers to wells drilled from 2020 onward.

the BLM prior to the availability of specific activity data for each RMP alternative. The 2028 Western Regional Air Partnership/Western Air Quality Study modeling database was the emissions basis, with updated oil and gas activity data that accounted for federal and nonfederal mineral ownership. Details are provided in the AQTSD (Ramboll 2024). Oil and gas activity levels and emissions applicable under each alternative are described under the corresponding alternative.

Table 3-5 presents the modeled contributions of new (that is, 2020 onward) federal oil and gas development in North Dakota to ambient air concentrations of selected criteria pollutants and AQRV contributions for acidic deposition, visibility change, and the ozone W126 index (ozone impacts on vegetation health) in the analysis area. Other pollutants are discussed in the AQTSD (Ramboll 2024). The table displays the peak modeled cumulative values (for reference), the percent contribution of new federal oil and gas development at the location and time period of the peak value, and the peak contribution anywhere of federal oil and gas. For the modeled activity levels, new federal oil and gas wells are expected to contribute between 0.0 percent and 11 percent by pollutant to the maximum cumulative value across North Dakota. The largest fraction would be for hourly NO_2 in the Williston Basin caused primarily by NOx emissions from drill rigs and off-road equipment. All five areas of interest, including the Class I areas, would experience some air quality impact from federal oil and gas development. When considering the four AQRVs, the Fort Berthold Indian Reservation is modeled to experience the highest impact across the five areas of interest.

The federal impacts presented are overestimates since they are based on specific activity levels (**Table 3-3**) that are higher than the projected future federal activity (see the discussion under each alternative below). As discussed under *Cumulative Impacts*, the cumulative air concentrations of all pollutants in North Dakota are below the air quality standards, except for PM_{10} and CO. The modeled contributions to PM_{10} |

Table 3-5
Modeled Air Concentrations and Air Quality Related Values due to Emissions from New Federal Oil and Gas Development in North Dakota

		North Dakota max.	Fort Berthold Indian Reservation max.	Fort Peck Indian Reservation max.	Lostwood Wilderness max.	Medicine Lake Wilderness max.	Theodore Roosevelt NP max.
8-hour Ozone (standard = 70 ppb)	Cumulative (ppb)	60.5	58.6	58.5	55.2	57	56.7
	Source contribution	4%	1%	0%	1%	0.0%	1%
	Peak source contribution (ppb)	2.6	1.6	0.0	0.6	0.0	1.2
1-hour NO_2 (standard = 100 ppb)	Cumulative (ppb)	50.3	50.3	7.9	10	7.3	15.8
	Source contribution	11%	11%	9%	7%	3%	16%
	Peak source contribution (ppb)	8.5	7.5	0.7	0.7	0.5	2.6
24-hour $PM_{2.5}$ (standard = 35 µg/m^3)	Cumulative (µg/m^3)	21.4	13.5	20.2	10.4	20.2	13.9
	Source contribution	0%	3%	0%	0%	0%	0%
	Peak source contribution (mg/m^3)	0.5	0.4	0.0	0.0	0.0	0.2
Annual $PM_{2.5}$ (standard = 9 µg/m^3)	Cumulative (µg/m^3)	10.9	5.0	5.4	4.1	4.9	10.9
	Source contribution	0%	2%	0%	0%	0%	0%
	Peak source contribution (mg/m^3)	0.1	0.1	0.0	0.0	0.0	0.0
24-hour PM_{10} (standard = 150 µg/m^3)	Cumulative (µg/m^3)	258.3	53.8	52.5	36.4	97.0	258.3
	Source contribution	0%	0.2%	0%	0%	0%	0%
	Peak source contribution (µg/m^3)	0.2	0.2	0.0	0.0	0.0	0.2
1-hour SO_2 (standard = 75 ppb)	Cumulative (ppb)	18.4	18.4	2.5	3.3	2.4	3.3
	Source contribution	10%	10%	0%	0%	4%	18%
	Peak source contribution (ppb)	1.9	1.9	0.2	0.0	0.2	0.6
3-hour SO_2 (standard = 0.5 ppm or 500 ppb)	Cumulative (ppb)	118.2	18.2	28.1	3.1	13.4	118.2
	Source contribution	0.1%	11%	0%	0%	0%	0.1%
	Peak source contribution (ppb)	2.3	2.0	0.1	0.0	0.2	0.5
AQRV: Nitrogen deposition (critical load = 5 to 12 kg N/ha)	Cumulative (kg N/ha-year)	8.2	7.0	5.2	4.8	5.2	5.7
	Source contribution	0%	1%	0%	0%	0%	0%
	Peak source contribution (kg N/ha-year)	0.0	0.1	0.0	0.0	0.0	0.0

		North Dakota max.	Fort Berthold Indian Reservation max.	Fort Peck Indian Reservation max.	Lostwood Wilderness max.	Medicine Lake Wilderness max.	Theodore Roosevelt NP max.
AQRV: Sulfur deposition (critical load = 5 kg S/ha)	Cumulative (kg S/ha-year)	2.9	2.8	0.6	0.9	0.6	0.8
	Source contribution	0.4%	7%	0%	0%	0%	0%
	Peak source contribution (kg S/ha-year)	0.0	0.2	0.0	0.0	0.0	0.0
AQRV: Visibility change	Peak source group contribution in delta deciviews and days > 1.0 in parentheses	—	2.5 (24)	0.7 (0)	1.0 (1)	0.7 (0)	1.0 (0)
AQRV: W126 (Good category = 7,000 ppb-hours)	Peak source group contribution (ppb-hours)	4,400	0.11	0.02	0.04	0.03	0.05

Source: Ramboll 2024
The modeled contribution of new federal oil and gas development is a conservative overestimate of actual impacts for reasons provided in the text.
ppb = parts per billion; µg/m3 = micrograms per cubic meter; ppm = parts per million; kg N/ha = kilograms of nitrogen per hectare; kg S/ha = kilograms of sulfur per hectare

exceedances from BLM actions authorized under this RMP are less than 0.1 percent. Additional information on the modeled impacts of federal oil and gas development in North Dakota, including the predicted spatial distribution of impacts, is provided in the AQTSD (Ramboll 2024).

The near-field air dispersion modeling and analysis performed for the Fort Berthold Indian Reservation Mitigated Programmatic EA (BIA 2017) for oil and gas development on trust lands and minerals are incorporated here by reference. The Fort Berthold Indian Reservation Mitigated Programmatic EA addressed anticipated oil and gas development on the reservation's trust minerals and trust surface. The analysis included in the Fort Berthold Indian Reservation Mitigated Programmatic EA evaluated a typical scenario of oil and gas drilling and well pad development for this region. The Fort Berthold Indian Reservation Mitigated Programmatic EA provides an analysis that is representative of the type of development that may be authorized under this RMP. Each drill site and well pad is unique in its configuration and location; every possible scenario cannot be analyzed at this planning stage. However, the BLM is including stipulations and design features for the protection of air resources in this RMP and may require operators to conduct near-field modeling prior to receiving approval for a permit to drill (see **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing).

Air modeling was performed in the Fort Berthold Indian Reservation Mitigated Programmatic EA with the EPA AERMOD model for emissions representative of construction, interim reclamation, well drilling and completion, oil and gas production at completed wells, and final reclamation (that is, well closure). Each of three modeling scenarios—a construction scenario (which considered fugitive dust and exhaust emissions from construction activities), a well drilling scenario (which considered exhaust emissions from a drill rig and boilers and associated engines and fugitive dust), and a well completion and hydraulic fracturing scenario (which considered exhaust emissions from completion engines and flaring and fugitive dust)—included a center well pad surrounded by four production well pads. The four production well pads were assumed to be operating concurrently and included emissions from drilling and completion engines, heaters, tanks, flares, and fugitive dust emissions from vehicle traffic on unpaved roads.

The predicted concentrations for all modeled contaminants were below the NAAQS and NDAAQS. However, the BLM recognizes that the peak cumulative modeled concentrations of 1-hour NO_2 and 24-hour PM_{10} were very close to the NAAQS. Any potential impact issues will be addressed through appropriate lease notices and stipulations and by potentially requiring near-field air modeling for proposed drilling projects, as noted above. The modeled acute HAP concentrations are well below the Reference Exposure Levels. Estimated chronic noncarcinogenic HAPs are below the Reference Exposure Levels. The estimated incremental cancer risks are well below a one per one million risk for the carcinogenic HAPs benzene and formaldehyde.

Additional information on the near-field modeling in the Fort Berthold Indian Reservation Mitigated Programmatic EA is provided in the AQTSD (Ramboll 2024).

BLM also examined the results of a cumulative HAPs modeling study for HAPs originating from oil and gas production in Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming (Ramboll 2023). The study conducted modeling to estimate the cumulative ambient air concentrations of six key HAPs in 2032. The results in **Table 3-6** below show the North Dakota emissions summaries from existing federal (prior to 2020), new federal (2020 onwards), and non-federal oil and gas development. Federal emissions include emissions from all federal minerals in North Dakota, not just the BLM-administered federal minerals.

Table 3-6
Hazardous Air Pollutant Emission Summaries for North Dakota by Mineral Designation

(Tons/Year)	Benzene	Ethylbenzene	Formaldehyde	Hexane	Toluene	Xylenes	Grand Total
North Dakota	**1,934**	**1,153**	**23,457**	**9,330**	**2,327**	**1,971**	**40,172**
Existing Federal	53	34	428	182	60	57	814
New Federal	117	50	1,322	479	122	99	2,190
Non-Federal	1,763	1,069	21,707	8,668	2,145	1,815	37,168

Source: Ramboll 2023

Coal Mining

The federal, nonfederal, and total coal production rates used in the circa 2028 photochemical modeling were 5.7, 22.8, and 28.5 million tons per year, respectively. The coal production projections used in the modeling were developed prior to the availability of the coal RFD data for each alternative in the RMP; they are discussed in the AQTSD (Section 3; Ramboll 2024).

The BLM prepared two coal RFD scenarios for federal and nonfederal coal development in the NDFO planning area from 2021 through 2040. One coal RFD scenario was developed for Alternatives A, B, C, and D using future coal production estimates provided by mine operators in the BLM coal decision area, remaining coal resource tonnage estimates from existing federal leases, and coal resource tonnage estimates from pending and possible future federal coal leasing actions (BLM 2022b). Then, the coal RFD scenario for Alternatives A, B, C, and D was updated for Alternative B.1, a sub-alternative under which expansion of federal coal mining is reduced by restricting future leasing of federal coal to within the mine permit boundaries as of September 9, 2022.

For Alternatives A, B, C, and D, the federal production rate used in the future year modeling analysis is 9 percent lower than the coal RFD developed for these alternatives for year 2028 (BLM 2022b). The modeled nonfederal production rate is 7 percent higher than the coal RFD for Alternatives A, B, C, and D (BLM 2022b). Thus, under Alternatives A, B, C, and D, modeled estimates of federal coal effects are slight (9 percent or less) underestimates, while the modeled estimates of nonfederal coal effects are slight (7 percent or less) overestimates.

Under Alternative B.1, federal coal mining is reduced by restricting future leasing of federal coal to within the mine permit boundaries as of September 9, 2022 at each mine. This reduces the federal coal production by approximately 28.1 million tons over the planning period (BLM 2022b). The federal production rate used in the future year modeling analysis is 2 percent lower than the coal RFD developed for Alternative B.1 for year 2028, while the modeled nonfederal production rate is 5 percent higher (BLM 2022b). Thus, under Alternative B.1, modeled estimates of federal coal effects are slight (2 percent or less) underestimates, while the modeled estimates of nonfederal coal effects are slight (5 percent or less) overestimates.

The BLM anticipates that the shortfall in federal coal production under Alternative B.1 would be made up by an increase in nonfederal coal production to ensure that contract requirements are met; therefore, the total (federal plus nonfederal) coal production through 2040 is the same under all alternatives. The modeled total (federal plus nonfederal) coal production is approximately 4 percent higher than the coal RFD for all alternatives in 2028. Thus, the modeled estimates of total coal impacts are also slight (4 percent) overestimates.

Federal and nonfederal criteria and HAP emissions were estimated for all active North Dakota coal mines (BNI Center, Coyote Creek, Falkirk, and Freedom) in circa 2028 (the photochemical modeling year) using the forecasted annual production and statewide emissions intensities (that is, metric ton of emissions per ton of coal). The intensities were developed using emissions inventories from previous NEPA assessments of coal mines in the planning area. The contributions of federal coal development in North Dakota to the modeled concentrations and AQRVs in the photochemical modeling are presented in **Table 3-7**.

Federal coal development generally has a very small impact except in the case of PM_{10}. For this pollutant, locations in the vicinity of the coal mines can have a high federal contribution of approximately 21 micrograms per cubic meter ($\mu g/m^3$) in Mercer County, or roughly 23 percent of the cumulative value. However, the cumulative value in Mercer County is well below (approximately 35 percent below) the NAAQS and NDAAQS. The predicted impact of federal coal mining on AQRVs in the Class I areas and Indian reservations is very small. Criteria and HAP and AQRVs are further discussed under the alternatives and in the AQTSD (Ramboll 2024).

Other BLM Activities

Emissions of criteria, HAPs, and GHGs (reported as carbon dioxide equivalents [CO_2e]) were estimated for other BLM-authorized activities (that is, other than oil and gas and coal mining) anticipated during the life of the plan. These include prescribed fires, livestock grazing, lands and realty ROWs, and other mineral material development (sand, gravel, and/or clinker)[7]. Prescribed fire emissions contribute nearly all of the VOC, CO, and SO_2 from the BLM-authorized activities listed above, along with 75 percent of the $PM_{2.5}$ emissions and 59 percent of NOx emissions. The development of mineral materials contributes 46 percent to PM_{10} emissions, while emissions from livestock grazing comprise over 90 percent of the estimated CO_2e from other BLM-authorized activities. In general, all these other BLM-authorized activities have a very small effect relative to the effects of federal oil and gas development.

Air Resources Implications for BLM Management

While no air quality thresholds are anticipated to be exceeded due to federal mineral development, the BLM recognizes concerns about local impacts due to oil and gas production, especially near sensitive areas such as Class I areas. As described above, the BLM has included management actions for the protection of air quality and AQRVs. Strategies (management actions) for reducing impacts on air quality are included in **Table 2-2** of **Chapter 2**, **Appendix B** (Stipulations and Allocations Applicable to Fluid Minerals Leasing), **Appendix C** (Air Resources Management Plan), and **Appendix D** (Design Features and Best Management Practices). These include CSU stipulations for fluid mineral leasing within 2 miles of the Theodore Roosevelt NP and Lostwood Wilderness, requiring additional modeling and analysis for certain projects, and CSU stipulations for venting and flaring gas.

[7] Clinker is a material formed when coal beds, ignited by lightning or wildfires bakes surrounding clays, shales, and sandstones into a brick-like mass. It is colloquially referred to as “scoria” in the planning area.

Table 3-7
Modeled Air Concentrations and Air Quality Related Values Due to Emissions from Federal Coal Development in North Dakota

		North Dakota max.	Fort Berthold Indian Reservation max.	Fort Peck Indian Reservation max.	Lostwood Wilderness max.	Medicine Lake Wilderness max.	Theodore Roosevelt NP max.
8-hour Ozone (standard = 70 ppb)	Cumulative (ppb)	60.5	58.6	58.5	55.2	57	56.7
	Federal Oil and Gas Percent Contribution	4%	1%	0%	1%	0.0%	1%
	Peak source contribution (ppb)	2.6	1.6	0.0	0.6	0.0	1.2
1-hour NO_2 (standard = 100 ppb)	Cumulative (ppb)	50.3	50.3	7.9	10	7.3	15.8
	Federal Oil and Gas Percent Contribution	11%	11%	9%	7%	3%	16%
	Peak source contribution (ppb)	8.5	7.5	0.7	0.7	0.5	2.6
24-hour $PM_{2.5}$ (standard = 35 $\mu g/m^3$)	Cumulative ($\mu g/m^3$)	21.4	13.5	20.2	10.4	20.2	13.9
	Federal Oil and Gas Percent Contribution	0%	3%	0%	0%	0%	0%
	Peak source contribution (mg/m^3)	0.5	0.4	0.0	0.0	0.0	0.2
Annual $PM_{2.5}$ (standard = 9 $\mu g/m^3$)	Cumulative ($\mu g/m^3$)	10.9	5.0	5.4	4.1	4.9	10.9
	Federal Oil and Gas Percent Contribution	0%	2%	0%	0%	0%	0%
	Peak source contribution (mg/m^3)	0.1	0.1	0.0	0.0	0.0	0.0
24-hour PM_{10} (standard = 150 $\mu g/m^3$)	Cumulative ($\mu g/m^3$)	258.3	53.8	52.5	36.4	97.0	258.3
	Federal Oil and Gas Percent Contribution	0%	0.2%	0%	0%	0%	0%
	Peak source contribution ($\mu g/m^3$)	0.2	0.2	0.0	0.0	0.0	0.2
1-hour SO_2 (standard = 75 ppb)	Cumulative (ppb)	18.4	18.4	2.5	3.3	2.4	3.3
	Federal Oil and Gas Percent Contribution	10%	10%	0%	0%	4%	18%
	Peak source contribution (ppb)	1.9	1.9	0.2	0.0	0.2	0.6
3-hour SO_2 (standard = 0.5 ppm or 500 ppb)	Cumulative (ppb)	118.2	18.2	28.1	3.1	13.4	118.2
	Federal Oil and Gas Percent Contribution	0.1%	11%	0%	0%	0%	0.1%
	Peak source contribution (ppb)	2.3	2.0	0.1	0.0	0.2	0.5

		North Dakota max.	Fort Berthold Indian Reservation max.	Fort Peck Indian Reservation max.	Lostwood Wilderness max.	Medicine Lake Wilderness max.	Theodore Roosevelt NP max.
AQRV: Nitrogen deposition (critical load = 5 to 12 kg N/ha)	Cumulative (kg N/ha-year)	8.2	7.0	5.2	4.8	5.2	5.7
	Federal Oil and Gas Percent Contribution	0%	1%	0%	0%	0%	0%
	Peak source contribution (kg N/ha-year)	0.0	0.1	0.0	0.0	0.0	0.0
AQRV: Sulfur deposition (critical load = 5 kg S/ha)	Cumulative (kg S/ha-year)	2.9	2.8	0.6	0.9	0.6	0.8
	Federal Oil and Gas Percent Contribution	0.4%	7%	0%	0%	0%	0%
	Peak source contribution (kg S/ha-year)	0.0	0.2	0.0	0.0	0.0	0.0
AQRV: Visibility change	Peak source group contribution in delta deciviews and days > 1.0 in parentheses	—	2.5 (24)	0.7 (0)	1.0 (1)	0.7 (0)	1.0 (0)
AQRV: W126 (Good category = 7,000 ppb-hours)	Peak source group contribution (ppb-hours)	4,400	0.11	0.02	0.04	0.03	0.05

Source: Ramboll 2024

ppb = parts per billion; µg/m3 = micrograms per cubic meter; ppm = parts per million; kg N/ha = kilograms of nitrogen per hectare; kg S/ha = kilograms of sulfur per hectare

Greenhouse Gases

Social Cost of Greenhouse Gas Emissions

The social cost of carbon dioxide (SC-CO_2), social cost of nitrous oxide (SC-N_2O), and social cost of methane (SC-CH_4)—together, the "social cost of greenhouse gases" (SC-GHG)—are estimates of the monetized damages associated with incremental increases in GHG emissions in a given year. Further, anthropogenic sources have been indicated as one of the main contributing factors to atmospheric methane (Hmiel et al. 2020).

On January 20, 2021, President Biden issued Executive Order 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis.[8] Section 1 of the executive order establishes an administration policy to, among other things, listen to the science; improve public health and protect our environment; ensure access to clean air and water; reduce GHG emissions; and bolster resilience to the impacts of climate change.[9] Section 2 of the executive order calls for federal agencies to review existing regulations and policies issued between January 20, 2017, and January 20, 2021, for consistency with the policy articulated in the executive order and to take appropriate action.

Consistent with Executive Order 13990, the Council on Environmental Quality (CEQ) rescinded its 2019 Draft NEPA Guidance on Considering Greenhouse Gas Emissions and has begun to review and update its Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews issued on August 5, 2016 (2016 GHG Guidance).[10] On January 9, 2023, CEQ issued their interim National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change (2023 GHG Guidance)[11], which builds upon and updates the 2016 GHG Guidance.

Regarding the use of SC-GHGs' other monetized costs and benefits, the 2016 and 2023 GHG Guidance both noted that NEPA does not require monetizing costs and benefits.[12] Both also noted that "the weighing of the merits and drawbacks of the various alternatives need not be displayed using a monetary cost-benefit analysis and should not be when there are important qualitative considerations."[13]

Section 5 of Executive Order 13990 emphasized how important it is for federal agencies to "capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account" and established an interagency working group (IWG) on the SC-GHG.[14] In February 2021, the IWG published Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990 (IWG 2021).[15] This is an interim report that updated previous guidance from 2016. It is BLM's policy to focus only on those social costs associated with federal decision-making.

[8] 86 *Federal Register* 7037 (January 25, 2021)
[9] 86 *Federal Register* 7037 (January 25, 2021), Section 1
[10] 86 *Federal Register* 10252 (February 19, 2021)
[11] 88 *Federal Register* 1196 (January 9, 2023)
[12] 2016 GHG Guidance, p. 32. Internet website: https://ceq.doe.gov/docs/ceq-regulations-and-guidance/nepa_final_ghg_guidance.pdf, 2023 GHG Guidance, 88 *Federal Register* 1202.
[13] 2016 GHG Guidance, p. 32. Internet website: https://ceq.doe.gov/docs/ceq-regulations-and-guidance/nepa_final_ghg_guidance.pdf, 2023 GHG Guidance, 88 *Federal Register* 1211.
[14] Executive Order 13990, Section 5
[15] https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

In accordance with this direction, this subsection provides estimates of the monetary value of changes in GHG emissions that could result from selecting each alternative. Such analysis should not be construed to mean a cost determination is necessary to address potential impacts of GHGs associated with specific alternatives. These numbers were monetized; however, they do not constitute a complete cost-benefit analysis, nor do the SC-GHG numbers present a direct comparison with other impacts analyzed in this document. The SC-GHG is provided only as a useful measure of the benefits of GHG emissions reductions to inform agency decision-making.

For federal agencies, the best currently available estimates of the SC-GHG are the interim estimates of the SC-CO_2, SC-CH_4, and SC-N_2O developed by the IWG (2021). The IWG's SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the models is the discount rate, which is used to estimate the present value of the stream of future damages associated with emissions in a particular year. A higher discount rate assumes that future benefits or costs are more heavily discounted than benefits or costs occurring in the present (that is, future benefits or costs are a less significant factor in present-day decisions). The current set of the SC-GHG's interim estimates has been developed using three different annual discount rates: 2.5 percent, 3 percent, and 5 percent (IWG 2021).

As expected with such a complex model, there are multiple sources of uncertainty inherent in the SC-GHG estimates. Some sources of uncertainty relate to the physical effects of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG 2021). To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

To further address uncertainty, the IWG recommends reporting four SC-GHG estimates in any analysis. Three of the SC-GHG estimates reflect the average damages from the multiple simulations at each of the three discount rates. The fourth value represents higher-than-expected economic impacts from climate change. Specifically, it represents the 95th percentile of damages estimated, applying a 3 percent annual discount rate for future economic effects. This is a low probability, but high damage scenario, representing an upper bound of damages within the 3 percent discount rate model. The estimates below follow the IWG recommendations.

The SC-GHGs associated with estimated emissions from future potential development under each alternative are reported in **Table 3-8** through **Table 3-12**. These estimates represent the present value (from the perspective of 2020) of future market and nonmarket costs associated with CO_2, CH_4, and N_2O emissions from oil and gas, coal, and other development and operations on BLM-administered land within the planning area, and potential end uses. Estimates are calculated based on IWG estimates of the social cost per metric ton of emissions for a given emissions year and BLM estimates of emissions in each year. Note that a recent study has concluded that anthropogenic CH_4 emissions may be underestimated (Hmiel et al. 2020). Based on experience with previous lease sales, the estimates assume development starts in 2021, and end-use emissions will complete in 2040.

Table 3-8
Present Value of SC-GHG Associated with Estimated Emissions from Downstream and Upstream BLM Oil and Gas (2020 Dollars) under Alternatives A and C

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO_2	$3,305,788,000	$12,663,700,000	$19,222,562,000	$38,374,956,000
CH_4	$175,384,000	$440,177,000	$591,932,000	$1,171,110,000
N_2O	$8,925,000	$31,374,000	$47,215,000	$83,186,000
Total	$3,490,097,000	$13,135,251,000	$19,861,709,000	$39,629,252,000

Source: calculated using social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative

Table 3-9
Present Value of SC-GHG Associated with Estimated Emissions from Downstream and Upstream BLM Oil and Gas (2020 Dollars) under Alternatives B, B.1, and D

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO_2	$3,301,748,000	$12,647,898,000	$19,198,477,000	$38,326,899,000
CH_4	$175,369,000	$440,139,000	$591,880,000	$1,171,009,000
N_2O	$8,915,000	$31,335,000	$47,155,000	$83,082,000
Total	$3,486,032,000	$13,119,372,000	$19,837,512,000	$39,580,990,000

Source: calculated using social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative

Table 3-10
Present Value of the SC-GHG Associated with Estimated Emissions from Other BLM Activities (2020 Dollars) under All Alternatives

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO_2	$529,000	$2,022,000	$3,068,000	$6,126,000
CH_4	$9,963,000	$25,002,000	$33,621,000	$66,519,000
N_2O	$128,000	$448,000	$673,000	$1,186,000
Total	$10,620,000	$27,472,000	$37,362,000	$ 73,831,000

Source: calculated using social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative

Table 3-11
Present Value of the SC-GHG Associated with Estimated Emissions from Mining, Transportation, and Combustion of Federal Coal (2020 Dollars) under Alternatives A, B, C, and D

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO_2	$2,045,840,000	$7,817,931,000	$11,861,280,000	$23,680,778,000
CH_4	$25,144,000	$63,128,000	$84,896,000	$167,959,000
N_2O	$13,653,000	$47,858,000	$71,979,000	$126,867,000
Total	$2,084,637,000	$7,928,917,000	$12,018,155,000	$23,975,604,000

Source: calculated using social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative

Table 3-12
Present Value of the SC-GHG Associated with Estimated Emissions from Mining, Transportation and Combustion of Federal Coal (2020 Dollars) under Alternative B.1

Emission	Average, 5%	Average, 3%	Average 2.5%	95th Percentile, 3%
CO_2	$1,630,828,000	$6,126,584,000	$9,262,334,000	$18,503,581,000
CH_4	$19,877,000	$48,765,000	$65,266,000	$129,521,000
N_2O	$10,863,000	$37,343,000	$55,919,000	$98,850,000
Total	$1,661,568,000	$6,212,692,000	$9,383,519,000	$18,731,952,000

Source: calculated using social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative

As shown in **Table 3-8** and **Table 3-9**, the present value (3 percent discount in 2020 dollars) of the SC-GHG for BLM oil and gas under all the alternatives is similar (approximately $13.1 billion). As shown for federal coal (which is all BLM-administered land) in **Table 3-11** and **Table 3-12**, the present value of the SC-GHG is $1.7 billon lower under Alternative B.1 than Alternatives A, B C, and D.

Other BLM Activities

GHG emissions from BLM-authorized activities other than oil and gas and coal mining (that is, prescribed fires, livestock grazing, lands and realty, ROWs, and mineral materials) were estimated using activity data from the BLM and emission factors from standard guidance documents and regulatory models (Ramboll 2024). These activities are expected to result in approximately 1.44 million metric tons CO_2e and 0.55 million metric tons CO_2e under all alternatives over the next 20 years based on the 20-year and 100-year AR6 GWPs, respectively. Emissions from livestock grazing comprise approximately 90 percent of the estimated CO_2e based on 100-year GWPs. Emissions by pollutant and emission-generating activity are provided in the AQTSD (Ramboll 2024).

Coal Transportation and Combustion

A listing of the end users and transportation modes of the lignite produced from active mines in the planning area is provided in the AQTSD (Ramboll 2024).

GHG emissions from transportation of coal from Freedom Mine to Leland Olds Station via diesel locomotive were estimated based on historical shipment amounts (that is, 3-year average from 2017 to 2019) from the Energy Information Administration (EIA; 2020), fuel efficiency and other locomotive data developed by Burlington Northern Santa Fe (2019), and emission factors from the EPA (2020d). A more detailed description is provided in the AQTSD (Ramboll 2024). Coal shipment amounts from Freedom Mine to Leland Olds in 2020–2021 were lower than those in 2017–2019, and thus emissions estimates presented below are likely conservatively high estimates of future emissions. Leland Olds Station is the only end user expected to burn the produced lignite during the next 20 years that is not part of a "mine-to-mouth" operation. All other end users are adjacent to the mine from which they receive coal. The annual transportation emissions are 1,361 and 1,355 metric tons CO_2e based on 20-year and 100-year AR6 GWPs, respectively. GHG emissions by pollutant are provided in the AQTSD (Ramboll 2024). Under Alternative B.1, the BLM estimates that Freedom Mine would run out of federal coal in 2035, and so there would be no federal transportation emissions after 2035 under that alternative.

Downstream coal combustion emissions were estimated using emission factors for CO_2, CH_4, and N_2O for the stationary combustion of lignite coal from the EPA (2022) and the projected federal and nonfederal coal production. Use of other emission factors or methods would vary the emission estimate. Actual coal production may vary from the RFD (BLM 2022b) and result in correspondingly higher or lower emissions. The emission factors used in the RMP were 1,389 kilograms per short ton, 156 grams per short ton, and 23 grams per short ton for CO_2, CH_4, and N_2O, respectively. CO_2e emissions were calculated using the 20-year and 100-year GWP provided for CH_4 and N_2O from the IPCC AR6. The average annual GHG emissions estimated for downstream coal combustion are 8.41 and 8.46 million metric tons CO_2e based on 20-year and 100-year AR6 GWPs, respectively. Annual GHG emissions by pollutant are provided in the AQTSD (Ramboll 2024).

Carbon Sequestration

Carbon sequestration is the process of capturing and storing atmospheric CO_2. Two major types of carbon sequestration include geologic sequestration, where CO_2 is stored deep underground in geologic formations,

and biologic sequestration, which is the storage of atmospheric carbon in vegetation, soils, and aquatic environments.[16] Carbon sequestration projects in North Dakota are currently active at or being designed and evaluated for the Milton R. Young Station, Coal Creek Station, Great Plains Synfuels Plant, Red Trail ethanol facility, and the Blue Flint ethanol facility. These projects are discussed below.

The DOE Carbon Storage Assurance Facility Enterprise (CarbonSAFE) Initiative[17] provides funding to identify and develop geologic storage sites for CO_2 emitted by industrial sources. The Energy & Environmental Research Center (EERC) at the University of North Dakota has been awarded funding through the initiative to assess and support the development of carbon sequestration projects in North Dakota (EERC 2023a) including Project Tundra and the Coal Creek Carbon Capture Site Characterization and Permitting project.

Project Tundra[18] is an initiative to implement carbon capture, utilization, and storage at Milton R. Young Station, which combusts lignite from BNI Center Mine, to capture 90 percent of the emitted CO_2 (approximately 4 million metric tons per year) and store it in geological formations approximately a mile underground. In 2023, the project was awarded 350 million in development funds from the U.S. Department of Energy (DOE) through the Infrastructure Investment and Jobs Act's Carbon Capture Demonstration Projects Program.[19] It is anticipated to begin construction in 2024 with commercial operations beginning in late 2028 (Minnkota Power Cooperative 2022). This project would reduce the net GHG emissions from downstream combustion of federal and nonfederal coal presented below for each alternative.

The Coal Creek Carbon Capture project aims to characterize and permit a geologic sequestration hub to store CO_2 from the Coal Creek Station power plant, which burns coal from Falkirk Mine. The proposed plant would reduce 95 percent of the CO_2 emissions from Coal Creek Station or approximately a 19 percent reduction in CO_2 emissions from stationary sources in North Dakota (DOE 2023). This project would reduce the net GHG emissions from downstream combustion of federal and nonfederal coal presented below for each alternative.

The Great Plains Synfuels Plant uses coal from Freedom Mine to produce synthetic natural gas, high-purity CO_2, and other byproducts (DEQ 2018). The produced CO_2 is piped to Canada where it is geologically sequestered as part of enhanced oil recovery operations. The project captures up to 3 million metric tons per year,[20] reducing the net GHG emissions from downstream combustion of federal and nonfederal coal presented below for each alternative.

The Red Trail Richardton Ethanol Broom Creek Storage Facility #1, located near Richardton, North Dakota, was formally approved as a CO_2 capture facility in October 2021. Commercial operation began in June 2022. It is the first fully operational commercial CO_2 capture and storage facility in North Dakota and injects 180,000 tons of CO_2 annually, which is 100 percent of the CO_2 produced at the adjacent ethanol plant. CO_2 is injected into the Broom Creek Formation directly below the facility, about 6,000 ft underground, and the project is expected to last for 20 years (EERC 2023b).

[16] https://www.usgs.gov/faqs/what-s-difference-between-geologic-and-biologic-carbon-sequestration?qt-news_science_products=0#qt-news_science_products
[17] CarbonSafe Initiative | netl.doe.gov
[18] https://www.projecttundrand.com/
[19] https://www.cramer.senate.gov/news/press-releases/sen-cramer-us-department-of-energy-awards-up-to-350-million-for-project-tundra
[20] https://www.dakotagas.com/about-us/CO2-capture-and-storage/index

A new CO_2 storage permit was approved in May 2023 for the Blue Flint Ethanol facility near Underwood, North Dakota. The facility emits an average of 200,000 metric tons of CO_2 per year. All CO_2 produced is expected to be captured and injected into the Broom Creek Formation, more than 4,500 ft below the facility over a 20-year period (NDDMR 2023; EERC 2022).

Alternative A

Air Quality

Projected oil and gas activity under Alternative A (No Action Alternative) is provided in **Table 3-13** for new BLM federal, total (new plus existing) BLM federal, total federal (that is, BLM federal plus non-BLM federal), and total (that is, summation of BLM federal, non-BLM federal, Tribal, and other private) oil and gas development; these are based on activity estimates (for example, federal oil production) discussed in the oil and gas RFD (BLM 2022a). Emissions of criteria and HAPs in the peak year of new BLM production and well count (year 2040; see BLM 2022a) are provided in **Table 3-14**. Emissions in other years would be lower.

Federal oil and gas production are much lower than the production used in modeling (**Table 3-3**). Thus, air quality impacts under Alternative A would be lower than those modeled, as discussed in *Impacts Common to All Alternatives* and in the AQTSD (Section 5; Ramboll 2024). Federal oil and gas development is not anticipated to contribute to exceedances of the NAAQS and NDAAQS and deposition critical load thresholds. However, elevated concentrations of 1-hour NO_2 and 24-hour PM_{10} could occur in the vicinity of well pads, as discussed in the photochemical and near-field analysis in the AQTSD (Ramboll 2024). As discussed above, the BLM has developed an adaptative management strategy for managing air resources under the RMP that includes lease stipulations, design features, BMPs, and other management actions to minimize or reduce adverse impacts on NO_2, PM_{10}, and other air pollutants (see **Table 2-2** of **Chapter 2**, **Appendix B** (Stipulations and Allocations Applicable to Fluid Minerals Leasing), **Appendix C** (Air Resources Management Plan), and **Appendix D** (Design Features and Best Management Practices).

Under Alternative A, the BLM projects that coal production in North Dakota will remain relatively steady through 2040 with federal production ranging from approximately 4.8 to 6.4 million tons per year and total (federal plus nonfederal) production ranging from 26.4 to 28.1 million tons per year. Over this 20-year period, the BLM estimates that approximately 120 million tons of federal coal and 420 million tons of nonfederal coal will be produced (BLM 2022b). Under this alternative, 573,900 acres and 435,800 acres would continue to be managed as acceptable and unacceptable for coal leasing, respectively (see **Table 2-1**).

The impacts discussed under *Impacts Common to all Alternatives*, as derived from the photochemical modeling, are generally representative of forecasted coal production in the planning area based on current information available to the BLM. However, since the federal coal RFD for Alternative A is roughly 9 percent higher than the federal coal production that was modeled, the air quality impacts due to federal coal would be correspondingly higher. However, the total (that is, federal plus nonfederal) coal production in the coal RFD is roughly 4 percent lower than the total coal production that was modeled (BLM 2022b). The modeled cumulative concentrations in areas where coal mining impacts occur are well below the NAAQS and NDAAQS, and modeled impacts on AQRVs are negligible. Therefore, it is anticipated that air quality in the planning area would continue to meet the air quality standards.

Table 3-13
Federal and Nonfederal Oil and Gas Activity in North Dakota under Each Alternative

	New[1] BLM Federal				Total BLM Federal				Total Federal[3]				Total[4]			
Year	Spud Count[5]	Active Well Count	Oil Production (Mbbl[2]/yr)	Gas Production (MMscf[2]/yr)	Spud Count[5]	Active Well Count	Oil Production (Mbbl[2]/yr)	Gas Production (MMscf[2]/yr)	Spud Count[5]	Active Well Count	Oil Production (Mbbl[2]/yr)	Gas Production (MMscf[2]/yr)	Spud Count[5]	Active Well Count	Oil Production (Mbbl[2]/yr)	Gas Production (MMscf[2]/yr)
Alternatives A and C																
Average (2020-2040)	60	525	15,378	31,640	60	1,062	22,574	46,445	140	2,471	52,500	108,018	2,050	36,710	780,327	1,605,504
Peak Year[6] (2040)	75	1,106	20,918	43,038	75	1,643	23,659	48,679	178	3,846	55,370	113,923	2,434	56,652	815,656	1,678,191
Total (2020-2040)	1,250	11,021	322,940	664,440	1,250	22,300	474,054	975,353	2,937	51,897	1,102,506	2,268,379	43,040	770,917	16,386,875	33,715,585
Alternatives B, B.1, and D																
Average (2020-2040)	59	523	15,332	31,545	59	1,060	22,543	46,382	140	2,470	52,470	107,955	2,049	36,709	780,297	1,605,441
Peak Year[6] (2040)	75	1,103	20,853	42,904	75	1,640	23,610	48,576	178	3,842	55,321	113,821	2,434	56,649	815,606	1,678,089
Total (2020-2040)	1,246	10,988	321,971	662,448	1,246	22,267	473,410	974,029	2,933	51,864	1,101,863	2,267,055	43,037	770,884	16,386,231	33,714,261

Source: Ramboll 2024

Numbers may not add exactly because of rounding.

[1] "New" activity here refers to wells drilled from 2020 onward.

[2] mbbl = thousand barrels (one barrel = 42 gallons); MMscf = million cubic feet

[3] Total federal refers to the summation of new and existing BLM and new and existing non-BLM federal

[4] Total refers to the summation of BLM federal, non-BLM federal, Tribal, and other private

[5] Spud count includes oil and gas drilling activity and support wells

[6] Peak year refers to annual maximum new BLM federal production

Table 3-14
Estimated Annual Emissions (tons per year) of Criteria and Hazardous Air Pollutants from Oil and Gas Development in 2040 (peak year of production) in North Dakota under Each Alternative

	Alternatives A and C				Alternatives B, B.1, and D			
Pollutant (tons)[4]	**New[1] BLM Federal**	**Total BLM Federal**	**Total Federal[2]**	**Total[3]**	**New[1] BLM Federal**	**Total BLM Federal**	**Total Federal[2]**	**Total[3]**
Nonpoint								
CO	3,763	4,325	10,177	146,544	3,751	4,314	10,165	146,532
NOx	2,005	2,629	6,171	89,734	1,998	2,623	6,165	89,727
PM_{10}	21	29	68	990	21	29	68	990
$PM_{2.5}$	21	29	68	990	21	29	68	990
SO_2	551	730	1,709	25,176	550	729	1,708	25,174
VOC	10,342	12,488	29,240	429,800	10,309	12,461	29,212	429,769
Total HAPs	514	621	1,454	21,379	513	620	1,452	21,377
Point								
CO	90	101	237	3,490	89	101	237	3,490
NOx	133	150	352	5,179	132	150	351	5,179
PM_{10}	27	31	72	1,062	27	31	72	1,062
$PM_{2.5}$	25	28	65	956	24	28	65	956
SO_2	149	169	394	5,809	149	168	394	5,809
VOC	47	53	124	1,825	47	53	124	1,825
Total HAPs	6	7	17	246	6	7	17	246
Total (Point + Nonpoint)								
CO	3,853	4,426	10,414	150,034	3,840	4,415	10,402	150,022
NOx	2,138	2,779	6,523	94,913	2,131	2,772	6,516	94,906
PM_{10}	49	60	140	2,052	48	60	140	2,052
$PM_{2.5}$	46	57	133	1,946	46	57	133	1,946
SO_2	700	899	2,104	30,984	698	897	2,102	30,983
VOC	10,389	12,541	29,364	431,624	10,356	12,514	29,336	431,594
Total HAPs	520	628	1,471	21,625	519	627	1,469	21,624

Source: Ramboll 2024
Numbers may not add exactly because of rounding.
[1] "New" activity here refers to wells drilled from 2020 onward.
[2] Total federal refers to the summation of new and existing BLM and new and existing non-BLM federal
[3] Total refers to BLM federal plus non-BLM federal plus Tribal plus other private
[4] Peak year refers to annual maximum new BLM federal production

Any coal development on the additional acres acceptable for coal leasing under Alternative A, although not currently anticipated, would result in correspondingly higher emissions of related air pollutants, including criteria and HAPs and GHGs, and may result in increased air quality impacts. Any potential development or leasing that would result in additional coal production beyond that analyzed in this air assessment (annual federal coal production ranging from 4.75 million tons to 6.35 million tons per year and 20-year total of approximately 120 million tons of federal coal) would require an additional analysis and disclosure under NEPA prior to authorization.

The indirect impacts from coal combustion at power plants and other coal-burning facilities, as well as oil refining/combustion and other human-caused sources, in North Dakota would largely follow the modeled impacts discussed under *Impacts Common to all Alternatives* and in the AQTSD (Ramboll 2024). This is because the photochemical modeling takes into account available information from the EPA and others on the likely future emissions from these sources.

Greenhouse Gases

Federal GHG emissions from oil and gas production, coal mining, other BLM-authorized activities, coal transportation and combustion, and oil and gas combustion emissions under Alternative A (No Action Alternative) are shown in **Table 3-15**. Emissions by pollutant (CO_2, CH_4, and N_2O) are provided in the AQTSD (Ramboll 2024) for each activity.

New BLM federal, total (new plus existing) BLM federal, total (new plus existing BLM, new plus existing non-BLM federal) federal, and total (BLM federal plus non-BLM federal plus Tribal plus other private) oil and gas production, midstream, and combustion GHG emissions were estimated using activity estimates (for example, federal oil and gas production) for Alternative A (BLM 2022a).

Federal and nonfederal GHG emissions from coal mining were estimated for each year of the coal RFD for Alternative A (BLM 2022b), which is the same as the coal RFD for Alternatives B, C, and D, using the forecasted annual production under each alternative and statewide emissions intensities (that is, metric ton of GHG per ton of coal). The intensities were developed using emissions inventories from previous NEPA assessments of coal mines in the planning area and include CO_2, CH_4, and N_2O from fuel use in nonroad equipment. Fugitive CH_4 emissions from coal over- and under-burden were also estimated using emission factors from the EPA (2022). Any development on the additional acres acceptable for coal leasing under Alternative A, although not currently anticipated, would result in correspondingly higher GHG emissions.

Emissions from other BLM-authorized activities are based on activity estimates that do not vary by alternative, and additional activity above these estimates would result in higher GHG emissions than shown in **Table 3-15**. The GHG emissions from these activities are discussed above in the *Impacts Common to All Alternatives* section.

Total BLM federal GHG emissions under Alternative A during the RMP are 462.62, 464.28, and 483.75 million metric tons CO_2e based on 100-year GWPs from the IPCC AR4, 100-year GWPs from the IPCC AR6, and the 20-year GWPs from IPCC AR6, respectively (**Table 3-15**). The average annual BLM federal CO_2e emissions under Alternative A based on the IPCC AR6 100-year GWPs is 22.52 million metric tons CO_2e per year, which is 2.451 percent of the total BLM emissions in 2020 of 918.6 million metric tons CO_2e (BLM 2021a), 0.343 percent of the total US emissions in 2019 of 6,558.3 million metric tons CO_2e (EPA 2021a), and 0.038 percent of the total global emissions in 2019 of 59,100 million metric tons CO_2e (UNEP 2020). With any future reductions in US emissions from other sources, the fraction of BLM

Table 3-15
GHG Emissions from Federal Activities under Alternative A

	Oil and Gas Prod. BLM	Oil and Gas Prod. Total Federal[4]	Oil and Gas Comb. BLM	Oil and Gas Comb. Total Federal	Federal Coal Mining	Federal Coal Transp. And Comb.	Other BLM Activities	Total BLM[6]	Total Federal
AR4 100-year GWP[1] CO_2e (million metric tons/year)									
Annual Average	1.67	3.88	12.24	28.47	0.10	8.41	0.024	22.44	40.88
Total[5]	35.00	81.55	257.11	597.97	1.90	168.14	0.471	462.62	850.04
AR6 100–year GWP[2] CO_2e (million metric tons/year)									
Annual Average	1.74	4.04	12.24	28.48	0.10	8.41	0.028	22.52	41.05
Total[5]	36.45	84.93	257.12	597.98	2.02	168.16	0.551	464.28	853.61
AR6 20–year GWP[3] CO_2e (million metric tons/year)									
Annual Average	2.49	5.80	12.27	28.53	0.16	8.46	0.072	23.45	43.02
Total[5]	52.32	121.90	257.60	599.10	3.26	169.15	1.436	483.75	894.81

Source: Ramboll 2024
Numbers may not add exactly due to rounding.
Prod. = Production; Comb. = Combustion; Transp. = Transportation
[1] 100-year time horizon global warming potentials (GWPs) applied are: CO_2 = 1; CH_4 = 25; N_2O = 298 from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4).
[2] 100-year time horizon global warming potentials (GWPs) applied are: CO_2 = 1; CH_4 = 29.8; N_2O = 273 from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6).
[3] 20-year time horizon global warming potentials (GWPs) applied are: CO_2 = 1; CH_4 = 82.5; N_2O = 273 from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6).
[4] Total federal oil and gas production refers to the summation of new and existing BLM federal and new and existing non-BLM federal
[5] Total is over 2020 to 2040 for oil and gas and 2021 to 2040 for coal consistent with the BLM RFDs (BLM 2022a and 2022b, respectively) and over 2021 to 2040 for other BLM activities
[6] Total BLM includes emissions from BLM oil and gas production, BLM oil and gas combustion, federal coal mining, federal coal combustion and transportation, and other BLM activities.

emissions will be higher than 0.343 percent of the total US emissions. These GHG emissions would contribute incrementally to global climate change. The annual GHG emissions under Alternative A represent a fraction of annual fossil fuel emissions projected by the BLM (2021) and would correspondingly contribute a fraction of the global average surface temperature increase of 0.0158ºC (0.028ºF) modeled by BLM (2021a) for all federal emissions from 2021 to 2050 (see *Cumulative Impacts* below).

Based on the EPA GHG equivalencies calculator,[21] the average annual BLM federal CO_2e emissions of 22.52 million metric tons CO_2e per year (based on AR6 100-year GWPs) under Alternative A is equivalent to the following:

- GHG emissions from 2,836,067 homes' energy use for 1 year
- GHG emissions from 124,321 railcars' worth of coal burned
- GHG emissions from 2,533,484,753 gallons of gasoline consumed
- GHG emissions avoided by 6,120 wind turbines running for a year
- Carbon sequestered by 26,645,142 acres of US forests in 1 year

[21] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Current evidence suggests that warming temperatures and increases in natural emissions due to climate change can result in higher concentrations of ground-level ozone (USGCRP 2018). North Dakota is projected to see an increase of approximately 1–3 ppb in summer season ozone concentrations by the end of the century under the high emission scenario, representative concentration pathway (RCP) 8.5 (USGCRP 2018). A higher concentration of ozone can lead to reduced visibility and many short- and long-term health impacts, putting children, people with asthma, and the elderly at risk for respiratory diseases (EPA 2021b).

Climate change can also increase the occurrence of wildfire activity, resulting in increasing ambient $PM_{2.5}$ concentrations. In the United States, wildfire is estimated to contribute approximately 25 percent of the annual total $PM_{2.5}$ concentration and over 70 percent on days exceeding the national $PM_{2.5}$ air quality standard (Burke et al. 2021; Liu et al. 2016). North Dakota is projected to see an increase in average and extreme temperatures, and a decrease in summer precipitation by the end of the century (USGCRP 2018). The combination of higher temperatures and less precipitation during summer months may lead to an increasing risk for wildfires (NCEI 2017).

Smoke from wildfires can travel long range, impacting the air quality of areas far from the fire source. Air quality in North Dakota is frequently impacted by wildfire activities in other regions, such as Canada and the state of Montana. The increase in wildfire activity within North Dakota and other regions is expected to result in a higher ambient $PM_{2.5}$ concentration in the state of North Dakota.

The IPCC (2021) notes that strong, rapid, and sustained reductions in CH_4 emissions would limit the warming effect resulting from declining aerosol pollution and would improve air quality.

Social Cost of Greenhouse Gases

Table 3-16 shows the total social costs from GHGs produced under Alternative A. Costs are measured as the present value (in 2020 dollars) of the total social cost for each GHG produced over the planning horizon (2021 to 2040). The total social costs were calculated by multiplying the annual emissions for CO_2, CH_4, and N_2O with the estimated costs for CO_2, CH_4, and N_2O, respectively, for each time point.

Table 3-16
Total Social Cost of GHGs from BLM Activities (Present Value in 2020 Dollars 3% discount rate) under Alternatives A and C

GHG Source	SC-CO_2	SC-CH_4	SC-N_2O	Total by Resource
BLM oil and gas	$12,663,700,000	$440,177,000	$31,374,000	$13,135,251,000
BLM coal	$7,817,931,000	$63,128,000	$47,858,000	$7,928,917,000
Other BLM activities	$2,022,000	$25,002,000	$448,000	$27,472,000
Total	$20,483,653,000	$528,307,000	$79,680,000	$21,091,640,000

Source: calculated using social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative

Alternative B

Air Quality

Projected oil and gas activity and emissions of criteria and HAPs during the peak year of new BLM production (2040) under Alternative B are provided in **Table 3-13** and **Table 3-14**. New BLM federal emissions in other years would be lower. Federal oil and gas production (and consequently emissions) are very similar to (approximately 0.1 percent lower than) Alternative A. Hence, impacts on air quality and AQRVs from federal oil and gas development under Alternative B are expected to be similar to the No Action Alternative. They are not anticipated to contribute to exceedances of the NAAQS and NDAAQS or deposition critical load thresholds. However, higher impacts (especially of NO_2 and PM_{10} concentrations)

would occur in the vicinity of well pads. These indicate the need for the BLM to continue to track ambient monitoring data and require additional mitigation measures or refined modeling, as needed, during well development (see **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing).

With respect to coal mining under Alternative B, all areas beyond 4 miles of coal mine plan boundaries as of September 9, 2022 and related infrastructure would be unacceptable for coal leasing. This would result in 54,400 acres acceptable for coal leasing and 1,042,000 acres unacceptable for coal leasing (see **Table 2-1**). Due to the checkerboard pattern created from federal coal avoidance under Alternative B, the potential additional surface disturbance and coal haul distances will cause additional cumulative air impacts. Potential additional impacts include fugitive dust, increases diesel usage, and increased cumulative GHG emissions. Emissions and air quality impacts of coal mining that are reasonably foreseeable (due to mining on approximately 9,434 acres in the state prior to 2040) under Alternative B would be similar to those under Alternative A. Thus, it is anticipated that under Alternative B, air quality in the planning area would continue to meet the air quality standards.

Any development on the additional acres acceptable for coal leasing, although not currently anticipated, would result in correspondingly higher cumulative emissions of related air pollutants, including criteria and HAPs and GHGs. It also may result in increased cumulative air quality impacts. Any potential development or leasing that would result in additional coal production beyond that analyzed in this air assessment (annual federal coal production ranging from 4.75 million tons to 6.35 million tons per year and a 20-year total of approximately 120 million tons of federal coal) would require an additional analysis and disclosure under NEPA prior to authorization.

Under Alternative B, air quality impacts due to coal combustion and oil and gas refining/combustion sources in North Dakota would be similar to those under Alternative A. This is because the amount of federal coal or oil and gas development does not vary much by alternative.

Alternative B.1

Alternative B.1 would restrict future leasing of federal coal to the mine permit boundaries as of September 9, 2022, resulting in 16,400 acres of BLM subsurface that is acceptable for coal leasing and 1,080,100 acres unacceptable for coal leasing—the lowest acceptable acres of all alternatives (**Table 2-1** in **Chapter 2**). Federal coal mining under Alternative B.1 would result in emissions of criteria air pollutants, HAPs, and GHGs at the same level as Alternative B and the other alternatives until 2026, after which the federal production would decline, resulting in lower federal emissions (BLM 2021a). While the federal coal emissions would be the lowest under Alternative B, the total (federal plus nonfederal) emissions from coal would be the same under all alternatives as the BLM anticipates that the shortfall in federal coal production under Alternative B.1 would be made up by an increase in nonfederal coal production (BLM 2022b). Additionally, restriction of federal coal could potentially result in additional emissions due to mine operators having to bypass federal coal tracts to reach nonfederal coal reserves. However, this increase in mining emissions due to bypass is expected to have relatively small impact on the total coal emissions as downstream combustion emissions comprise the majority of the total emissions from coal.

As previously discussed, the impacts in *Impacts Common to all Alternatives*, as derived from the photochemical modeling, are generally representative of forecasted coal production in the planning area based on current information available to the BLM. However, because the federal coal RFD under Alternative B.1 is roughly 2 percent higher than the federal coal production that was modeled, the air quality impacts due to federal coal would be correspondingly higher. However, as with the other alternatives, the

total (that is, federal plus nonfederal) coal production in the coal RFD (BLM 2022b) is roughly 4 percent lower than the total coal production that was modeled. The modeled cumulative concentrations in areas where coal mining impacts occur are well below the NAAQS and NDAAQS, and modeled impacts on AQRVs are negligible. Therefore, it is anticipated that air quality in the planning area would continue to meet the air quality standards. Additionally, federal production would be approximately 7 percent lower under Alternative B.1 than the other alternatives from 2027 to 2034, 63 percent lower in 2035, and 70 percent lower from 2036 to 2040; therefore, federal coal mining emissions and impacts would be correspondingly lower in those years.

Additionally, the BLM anticipates that leased federal coal, including the portions of the pending leases inside the mine permit boundaries, would be exhausted at Falkirk Mine in 2027 and at Freedom Mine in 2035 under Alternative B.1. Therefore, federal coal mining emissions would cease at those mines after those years, and the impacts of federal coal emissions would be less than those characterized above and in Section 6.2.1 of the AQTSD (Ramboll 2024), particularly in the areas around those mines.

Greenhouse Gases

Federal GHG emissions from oil and gas production, coal mining, other BLM-authorized activities, coal transportation and combustion, and oil and gas combustion emissions under Alternative B are shown in **Table 3-17**. Emissions by pollutant (CO_2, CH_4, and N_2O) are provided in the AQTSD (Ramboll 2024) for each activity.

Federal and nonfederal oil and gas production, midstream, and combustion GHG emissions were estimated using activity estimates (for example, federal oil and gas production) for Alternative B (BLM 2022a). Emissions from coal mining and combustion are for the coal RFD that is representative of production across Alternatives A, B, C, and D based on information currently available to the BLM (BLM 2022b). Under Alternative B, all areas beyond 4 miles of existing mines and related infrastructure would be unacceptable for coal leasing. This would result in 54,400 acres acceptable for coal leasing, which is approximately 9.5 percent of the acceptable acres under Alternative A. Any development on the additional acres acceptable for coal leasing under Alternative B, although not currently anticipated, would result in correspondingly higher cumulative GHG emissions than shown in **Table 3-17**. Development of acres beyond the RFD would require supplemental NEPA analysis.

Emissions from other BLM-authorized activities are based on activity estimates that do not vary by alternative. The GHG emissions from these activities are discussed above in the *Impacts Common to All Alternatives* section. Any additional transportation GHG emissions that results from mining non-federal coal to avoid federal coal would have a minor effect on the overall GHG emissions.

Total BLM federal GHG emissions under Alternative B over the next 20 years are 462.27, 463.93, and 483.40 million metric tons CO_2e based on 100-year GWPs from IPCC AR4, 100-year GWPs from IPCC AR6, and the 20-year GWPs from IPCC AR6, respectively (**Table 3-17**).

Under Alternative B, the average annual federal CO_2e emissions rate, based on AR6 100-year GWPs, is 22.50 million metric tons CO_2e per year. This is 2.449 percent of the total BLM emissions in 2020 of 918.6 million metric tons CO_2e (BLM 2021a), 0.343 percent of the total US emissions in 2019 of 6,558.3 million metric tons CO_2e (EPA 2021a), and 0.038 percent of the total global emissions in 2019 of 59,100 million metric tons CO_2e (UNEP 2020). As US emissions decrease due to reductions in other sources, the fraction of BLM emissions will be higher than 0.343 percent of the total US emissions. These GHG emissions would

Table 3-17
GHG Emissions from Federal Activities under Alternative B

	Oil and Gas Prod. BLM	Oil and Gas Prod. Total Federal[4]	Oil and Gas Comb. BLM	Oil and Gas Comb. Total Federal	Federal Coal Mining	Federal Coal Transp. and Comb.	Other BLM Activities	Total BLM[6]	Total Federal
AR4 100-year GWP[1] CO_2e (million metric tons/year)									
Annual Average	1.67	3.88	12.23	28.46	0.10	8.41	0.024	22.42	40.87
Total[5]	34.99	81.55	256.77	597.62	1.90	168.14	0.471	462.27	849.68
AR6 100–year GWP[2] CO_2e (million metric tons/year)									
Annual Average	1.73	4.04	12.23	28.46	0.10	8.41	0.028	22.50	41.04
Total[5]	36.43	84.90	256.77	597.63	2.02	168.16	0.551	463.93	853.26
AR6 20–year GWP[3] CO_2e (million metric tons/year)									
Annual Average	2.49	5.80	12.25	28.51	0.16	8.46	0.072	23.43	43.01
Total[5]	52.30	121.86	257.25	598.75	3.26	169.16	1.436	483.40	894.45

Source: Ramboll 2024
Numbers may not add exactly due to rounding.
Prod. = Production; Comb. = Combustion; Transp. = Transportation
[1] 100-year time horizon global warming potentials (GWPs) applied are: CO_2 = 1; CH_4 = 25; N_2O = 298 from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4)
[2] 100-year time horizon global warming potentials (GWPs) applied are: CO_2 = 1; CH_4 = 29.8; N_2O = 273 from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6)
[3] 20-year time horizon global warming potentials (GWPs) applied are: CO_2 = 1; CH_4 = 82.5; N_2O = 273 from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6)
[4] Total federal oil and gas production refers to the summation of new and existing BLM and new and existing non-BLM federal
[5] Total is over 2020 to 2040 for oil and gas and 2021 to 2040 for coal consistent with the BLM RFD (BLM 2022a, 2022b, respectively) and over 2021 to 2040 for other BLM activities
[6] Total BLM includes emissions from BLM oil and gas production, BLM oil and gas combustion, federal coal mining, federal coal combustion and transportation, and other BLM activities

contribute incrementally to global climate change. The annual GHG emissions under Alternative B represent a small fraction of annual fossil fuel emissions projected by the BLM (2021a) and would correspondingly contribute a fraction of the global average surface temperature increase of 0.0158ºC (0.028ºF) modeled by BLM (2021) for all federal emissions (see *Cumulative Impacts* below).

Based on the EPA GHG equivalencies calculator, the average annual BLM federal CO_2e emissions of 22.50 million metric tons CO_2e per year (based on AR6 100-year GWPs) under Alternative B is equivalent to the following:

- GHG emissions from 2,833,955 homes' energy use for 1 year
- GHG emissions from 124,228 railcars' worth of coal burned
- GHG emissions from 2,531,598,402 gallons of gasoline consumed
- GHG emissions avoided by 6,115 wind turbines running for 1 year
- Carbon sequestered by 26,625,303 acres of US forests in 1 year

Under Alternative B, impacts on air quality from climate change would be similar to those described under Alternative A. The impacts from climate change would affect air quality regardless of the differences in BLM-authorized activity under the different alternatives. Therefore, Alternative B would not lessen the impacts on air quality from climate change.

Alternative B.1

Federal GHG emissions from oil and gas production, coal mining, other BLM-authorized activities, coal transportation and combustion, and oil and gas combustion emissions under Alternative B.1 are shown in **Table 3-18**. Emissions by pollutant (CO_2, CH_4, and N_2O) are provided in the AQTSD (Ramboll 2024) for each activity.

Table 3-18
GHG Emissions from Federal Activities under Alternative B.1

	Oil and Gas Prod. BLM	Oil and Gas Prod. Total Federal[4]	Oil and Gas Comb. BLM	Oil and Gas Comb. Total Federal	Federal Coal Mining	Federal Coal Transp. and Comb.	Other BLM Activities	Total BLM[6]	Total Federal
AR4 100-year GWP[1] CO_2e (million metric tons/year)									
Annual Average	1.67	3.88	12.23	28.46	0.07	6.44	0.024	20.43	38.88
Total[5]	34.99	81.55	256.77	597.62	1.46	128.88	0.471	422.58	810.00
AR6 100–year GWP[2] CO_2e (million metric tons/year)									
Annual Average	1.73	4.04	12.23	28.46	0.08	6.44	0.028	20.51	39.05
Total[5]	36.43	84.90	256.77	597.63	1.55	128.89	0.551	424.20	813.54
AR6 20–year GWP[3] CO_2e (million metric tons/year)									
Annual Average	2.49	5.80	12.25	28.51	0.13	6.48	0.072	21.42	41.00
Total[5]	52.30	121.86	257.25	598.75	2.50	129.65	1.436	443.15	854.23

Source: Ramboll 2024
Numbers may not add exactly due to rounding.
Prod. = Production; Comb. = Combustion; Transp. = Transportation
[1] 100-year time horizon global warming potentials (GWPs) applied are: CO_2 = 1; CH_4 = 25; N_2O = 298 from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4)
[2] 100-year time horizon global warming potentials (GWPs) applied are: CO_2 = 1; CH_4 = 29.8; N_2O = 273 from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6)
[3] 20-year time horizon global warming potentials (GWPs) applied are: CO_2 = 1; CH_4 = 82.5; N_2O = 273 from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6)
[4] Total federal oil and gas production refers to the summation of new and existing BLM and new and existing non-BLM federal
[5] Total is over 2020 to 2040 for oil and gas and 2021 to 2040 for coal consistent with the BLM RFD (BLM 2022a, 2022b) and over 2021 to 2040 for other BLM activities
[6] Total BLM includes emissions from BLM oil and gas production, BLM oil and gas combustion, federal coal mining, federal coal combustion and transportation, and other BLM activities

As discussed previously, Alternative B.1 would restrict future federal coal leasing to the mine permit boundaries as of September 9, 2022. This would result in 17,668 acres acceptable for coal leasing, which is approximately 2.9 percent of the acceptable acres under Alternative A. The BLM (2022b) estimates that federal coal production would be reduced by approximately 28.1 million tons over the planning period under Alternative B.1 due to limiting pending federal leasing actions at Falkirk and Freedom mines to the mine permit boundaries as of September 9, 2022 (BLM 2022b). Federal and nonfederal coal production under Alternative B.1 would remain the same as the other alternatives until 2026. Then, federal coal production would be reduced by approximately 0.4 million tons per year between 2027 and 2034, 3.8 million tons per year in 2035, and 4.1 million tons per year from 2036 to 2040 due to federal coal tracts within Falkirk and Freedom mines, including the portions of the pending leases inside the mine permit boundaries as of September 9, 2022, being exhausted (BLM 2022b). Across the planning period, the reduction in federal coal production under Alternative B.1 would result in approximately a 23 percent

reduction in the GHG emissions from federal coal mining and downstream combustion relative to the other alternatives (based on 100-year AR6 GWPs). The BLM anticipates that total (federal plus nonfederal) coal production will be the same under all alternatives due to nonfederal production making up the shortfall in federal coal production under Alternative B.1 (BLM 2022b). The bypass of federal coal to reach nonfederal coal reserves could potentially result in additional indirect emissions. However, this increase in mining emissions due to bypass is expected to have relatively small impact on the total coal emissions as GHG emissions from coal mining constitute a small percentage (approximately 1 percent) of the total coal emissions, which are dominated by downstream combustion.

The GHG emissions from all other BLM-authorized activities would be the same as those presented for Alternative B, above.

Total BLM GHG emissions under Alternative B.1 over the next 20 years are 422.58, 424.20, and 443.15 million metric tons CO_2e based on 100-year GWPs from the IPCC AR4, 100-year GWPs from the IPCC AR6, and the 20-year GWPs from IPCC AR6, respectively (**Table 3-18**). These emissions are approximately 8.6 percent lower than the total BLM GHG emissions under Alternatives A, B, C, and D due to the reduction in federal coal mining (based on 100-year AR6 GWP).

Under Alternative B.1, the average annual federal CO_2e emissions rate, based on AR6 100-year GWPs, is 20.51 million metric tons CO_2e per year. This is 2.233 percent of the total BLM emissions in 2020 of 918.6 million metric tons CO_2e (BLM 2021a), 0.313 percent of the total US emissions in 2019 of 6,558.3 million metric tons CO_2e (EPA 2021a), and 0.035 percent of the total global emissions in 2019 of 59,100 million metric tons CO_2e (UNEP 2020). As US emissions decrease due to reductions in other sources, the fraction of BLM emissions will be higher than 0.313 percent of the total US emissions. These GHG emissions would contribute incrementally to global climate change. The annual GHG emissions under Alternative B.1 represent a small fraction of annual fossil fuel emissions projected by the BLM (2021) and would correspondingly contribute a fraction of the global average surface temperature increase of 0.0158ºC (0.028ºF) modeled by BLM (2021) for all federal emissions (see *Cumulative Impacts*, below).

Based on the EPA GHG equivalencies calculator, the average annual BLM federal CO_2e emissions of 20.51 million metric tons CO_2e per year (based on AR6 100-year GWPs) under Alternative B.1 is equivalent to the following:

- GHG emissions from 2,583,732 homes' energy use for 1 year
- GHG emissions from 113,259 railcars' worth of coal burned
- GHG emissions from 2,014,915,422 gallons of gasoline consumed
- GHG emissions avoided by 5,575 wind turbines running for 1 year
- Carbon sequestered by 24,274,437 acres of US forests in 1 year

Social Cost of Greenhouse Gases

Alternative B

For the time frames examined, Alternative B would result in a lower total SC-GHG of approximately $15.88 million than Alternative A (see **Table 3-19**). **This is due to the lower estimated level of emissions under Alternative B.**

Table 3-19
Total Social Cost of GHGs (Present Value in 2020 Dollars, 3 percent discount rate) under Alternative B

GHG Source	SC-CO_2	SC-CH_4	SC-N_2O	Total by Resource
BLM oil and gas	$12,647,898,000	$440,139,000	$31,335,000	$13,119,372,000
BLM coal	$7,817,931,000	$63,128,000	$47,858,000	$7,928,917,000
Other BLM activities	$2,022,000	$25,002,000	$448,000	$27,472,000
Total	$20,467,851,000	$528,269,000	$79,641,000	$21,075,761,000

Source: calculated using social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative

Table 3-19 shows the total social costs from GHGs produced under Alternative B. Costs are measured as the present value (in 2020 dollars) of the total social cost for each GHG produced over the planning horizon. The total social costs were calculated by multiplying the annual emissions for CO_2, CH_4, and N_2O with the estimated costs for CO_2, CH_4, and N_2O, respectively, for each time point.

Alternative B.1

For the time frames examined, Alternative B.1 would result in a lower total SC-GHG of about $1.73 billion than Alternative A (see **Table 3-19**). This is due to the lower estimated level of emissions from federal coal under Alternative B.1.

Table 3-20 shows the total social costs from GHGs produced under Alternative B.1. Costs are measured as the present value (in 2020 dollars) of the total social cost for each GHG produced over the planning horizon. The total social costs were calculated by multiplying the annual emissions for CO_2, CH_4, and N_2O with the estimated costs for CO_2, CH_4, and N_2O, respectively, for each time point.

Table 3-20
Total Social Cost of GHGs (Present Value in 2020 Dollars, 3 percent discount rate) under Alternative B.1

GHG Source	SC-CO_2	SC-CH_4	SC-N_2O	Total by Resource
BLM oil and gas	$12,647,898,000	$440,139,000	$31,335,000	$13,119,372,000
BLM coal	$6,126,584,000	$48,765,000	$37,343,000	$6,212,692,000
Other BLM activities	$2,022,000	$25,002,000	$448,000	$27,472,000
Total	$18,776,504,000	$513,906,000	$69,126,000	$19,359,536,000

Source: calculated using social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative

Alternative C

Air Quality

Alternative C is projected to have approximately the same level of federal oil and gas development (**Table 3-13**) as Alternative A. This is because both alternatives do not close any fluid mineral estate to leasing. Hence, emissions and air quality impacts from federal oil and gas production would be similar between the two alternatives. Federal oil and gas development under Alternative C is not anticipated to contribute to exceedances of the NAAQS and NDAAQS or deposition critical load thresholds. However, higher impacts (especially of NO_2 and PM_{10} concentrations) would occur in the vicinity of well pads. However, as discussed previously, the BLM has developed an adaptative management strategy for managing air resources under the NDFO RMP that includes lease stipulations, design features, BMPs, and other management actions to minimize or reduce adverse impacts on NO_2, PM_{10}, and other air pollutants (see **Table 2-2** in **Chapter 2**, **Appendix B**, Stipulations and Allocations Applicable to Fluid Mineral Leasing,

Appendix C, Air Resources Management Plan, and **Appendix D**, Design Features and Best Management Practices).

With respect to coal mining under Alternative C, 553,600 acres would be managed as acceptable for coal leasing, and 542,800 acres would be managed as unacceptable (see **Table 2-1**). Under Alternative C, air quality impacts of coal mining that is reasonably foreseeable (due to mining on approximately 9,434 acres in the state prior to 2040) would be similar to those under Alternative A. This is because the reasonably foreseeable acres of coal mining are identical across Alternatives A, B, C, and D. Any development on the additional acres acceptable for coal leasing, although not currently anticipated, would result in correspondingly higher emissions of related air pollutants, including GHGs, and may result in increased air quality impacts. Any potential development or leasing that would result in additional coal production beyond that analyzed in this air assessment (annual federal coal production ranging from 4.75 million tons to 6.35 million tons per year and a 20-year total of approximately 120 million tons of federal coal) would require an additional analysis and disclosure under NEPA prior to authorization.

Under Alternative C, air quality impacts due to coal and oil and gas combustion sources in North Dakota would be similar to those under Alternative A. This is because the amount of federal coal or oil and gas development does not vary much by alternative.

Greenhouse Gases

The estimated GHG emissions under Alternative C are the same as those estimated under Alternative A (**Table 3-15**). Under Alternative C, 553,600 acres would be acceptable for coal leasing. There would be 542,800 acres unacceptable for coal leasing, which is approximately 25 percent more than Alternative A. Any development on the additional acres acceptable for coal leasing under Alternative C, although not currently anticipated, would result in correspondingly higher GHG emissions than those shown in **Table 3-15**.

Under Alternative C, impacts on air quality from climate change would be similar to those described under Alternative A, Alternative B, and Alternative D.

Social Cost of Greenhouse Gases

SC-GHG calculations for Alternative C are the same as those under Alternative A. This is due to the same level of predicted GHG emissions (see **Table 3-16**).

Alternative D

Air Quality

Impacts to air quality and air quality related values under Alternative D would be the same as discussed under Alternative B because there are no differences in management measures relevant to air quality between the two alternatives.

Greenhouse Gases

Under Alternative D, greenhouse gas emissions and associated climate change impacts would be the same as discussed under Alternative B because there are no differences in relevant management measures that would affect greenhouse gas emissions between the two alternatives.

Social Cost of Greenhouse Gases

Social cost of greenhouse gases calculations for Alternative D are the same as those under Alternative A. This is due to the same level of predicted GHG emissions (see **Table 3-15**).

Cumulative Impacts

Air Quality

The impact analysis area for cumulative effects for air quality is the analysis area presented in Figure 2.5-1 of the AQTSD (Ramboll 2024). Cumulative air quality impacts were modeled using the Comprehensive Air Quality Model with Extensions (CAMx) photochemical model, as discussed above. This model accounts for emissions from both federal activities and other cumulative sources.

Table 3-21 summarizes the modeled cumulative criteria pollutant impacts from the projected emissions. Cumulative impacts in the planning area are predicted to be below the NAAQS and NDAAQS for ozone, NO_2, $PM_{2.5}$, and SO_2. Cumulative impacts for PM_{10} exceed the NAAQS at one of the five areas of interest (Theodore Roosevelt NP). Here, 97 percent of the cumulative concentration is due to the modeled natural source group that includes fires, biogenic emissions, windblown dust, and lightning NOx, while the new federal oil and gas and federal coal development contribute less than 0.1 percent. Modeled exceedances of the CO NAAQS occur in the same location as the PM_{10} exceedance; thus, they are suspected to also be caused by the modeled natural source group, although source apportionment results are not available for CO. Modeled exceedances of $PM_{2.5}$ and PM_{10} that occur outside North Dakota are primarily due to either natural sources or human-caused sources other than those authorized under this RMP.

Table 3-21
Summary of Cumulative Impacts of All Sources on Air Quality in North Dakota

Alternative A	Alternatives B and B.1	Alternative C	Alternative D
Ozone			
Cumulative concentrations below 8-hour NAAQS and NDAAQS	Same as Alternative A	Same as Alternative A	Same as Alternative A
Nitrogen Oxides			
Cumulative concentrations below 1-hour and annual NAAQS and NDAAQS	Same as Alternative A	Same as Alternative A	Same as Alternative A
$PM_{2.5}$			
Cumulative concentrations below daily and annual NAAQS and NDAAQS	Same as Alternative A	Same as Alternative A	Same as Alternative A
PM_{10}			
Cumulative concentrations exceed daily NAAQS and NDAAQS at one location in North Dakota (maximum 258 µg/m^3 in Theodore Roosevelt NP vs. 150 µg/m^3 standard). Exceedances in North Dakota are not due to actions authorized under this RMP; rather, they are due to the natural source group.	Same as Alternative A	Same as Alternative A	Same as Alternative A
SO_2			
Cumulative concentrations below 1-hour and 3-hour NAAQS and NDAAQS	Same as Alternative A	Same as Alternative A	Same as Alternative A

Alternative A	Alternatives B and B.1	Alternative C	Alternative D
CO			
Cumulative concentrations exceed 1-hour and 8-hour NAAQS and NDAAQS at one location in North Dakota (maximum 39.5 and 38.3 ppm in Theodore Roosevelt NP vs. standard of 35 ppm and 9 ppm, respectively). Because the exceedance occurs at the same location as the PM_{10} exceedance, which is due to the natural source group, the CO exceedance is believed to be due to the natural source group.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Nitrogen Deposition			
Nitrogen deposition exceeds the critical load for herb/shrub (5 kg N/ha) at Theodore Roosevelt NP and Fort Berthold Indian Reservation. Exceedances in North Dakota are not due to actions authorized under this RMP.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Sulfur Deposition			
Sulfur deposition does not exceed the critical load.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Visibility			
Visibility change is higher than 1.0 delta deciview all days of the year.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Ozone W126			
Vegetation health condition (due to ozone) is expected to be in the “good” category in North Dakota.	Same as Alternative A	Same as Alternative A	Same as Alternative A

Modeled cumulative nitrogen deposition is below the lowest critical load (5 kg N/ha-year for herb/shrubs [EPA 2021c]) except at Theodore Roosevelt NP and Fort Berthold Indian Reservation. Federal contributions are minimal at these locations. Sulfur deposition is below the critical load of 5 kg S/ha-year in all of North Dakota. Cumulative visibility impacts are higher than 1 delta deciview every day of the year; this threshold is meant for assessment of project impacts and not planning-level analysis. The comparison provided is for informational purposes only. The vegetation health metric (ozone W126 index) due to all sources combined is less than 4.4 ppm-hours anywhere in the analysis area and is within the NPS “good” category threshold of 7 ppm-hours.

The BLM anticipates cumulative air quality impacts under Alternatives B, B.1, C, and D to be similar to those under Alternative A (**Table 3-21**).

Additional information on the cumulative impacts is presented in the AQTSD (Ramboll 2024).

Greenhouse Gases

BLM-authorized activities under the RMP, including, but not limited to, the production, transportation, and downstream combustion of coal, oil, and gas, would result in the emission of GHGs that would contribute to global warming and the climate change impacts discussed above. The estimated emissions from BLM-authorized activities under each alternative are provided in the sections above. The BLM has implemented

BMPs, stipulations, and management actions to reduce GHG emissions and to mitigate impacts from authorized activities (see **Chapter 2**, **Appendix B** [Stipulations and Allocations Applicable to Fluid Minerals Leasing], **Appendix C** [Air Resources Management Plan], **Appendix D** [Design Features and Best Management Practices], and the AQTSD [Ramboll 2024]). While BLM management decisions in this RMP and associated activities may not significantly contribute GHG emissions relative to global emissions, implementation of management decisions could exacerbate local climate change impacts in some cases. For example, activities that disrupt soil may exacerbate soil erosion already worsened by increased periods of drought and heavier rainfall.

Major non-BLM sources of GHG emissions in the planning area include power plants, agricultural processing facilities, and infrastructure associated with mineral development. Emissions reported by the EPA for large emitters of GHGs (greater than 25,000 tons/year) in North Dakota in 2018 are provided in Table 2-3 of the AMS (BLM 2020b). The total GHG emissions reported by the EPA for major sources in North Dakota in 2018 were approximately 40.3 million metric tons CO_2e (based on 100-year GWPs from the IPCC Fourth Assessment Report) with over 75 percent coming from the power plant sector. Regardless of management on federal lands, the potential for increased development on nonfederal lands may negate any anticipated reductions in GHG emissions on federal lands.

The BLM's 2021 Annual Greenhouse Gas Emissions and Climate Trends Specialist Report (herein referred to as the BLM Specialist Report; BLM 2021) provides an estimate of GHG emissions attributable to onshore federal mineral estate development across the US as well as a discussion of climate change science and predicted impacts. It estimates that 918.6 million metric tons of CO_2e were produced from the development, processing, transportation, and end use of fossil fuels on federal mineral estate in fiscal year 2020 with 5.5 percent, 10.4 percent, and 84.1 percent from development, processing and transportation, and end use, respectively. The report states that these GHG emissions comprised 14 percent of the US total GHG emissions (that is, 6,558.3 million metric tons [EPA 2021]) and 1.6 percent of the global total GHG emissions (that is, 59,100 million metric tons [UNEP 2020]) in 2019 (BLM 2021a).

The BLM Specialist Report notes that the US Geological Survey (2018) estimated that sequestration on federal lands offset approximately 15 percent of CO emissions resulting from the extraction and end-use combustion emissions of fossil fuels on federal lands. Additionally, some geologic sequestration projects are being planned in North Dakota, including Project Tundra at Milton R. Young Station and the redevelopment of Great Plains Synfuel Plant into a blue hydrogen production facility (see *Carbon Sequestration*, above). These and other future sequestration projects would reduce the net GHG emissions from downstream use of federal and nonfederal minerals in the planning area if they are fully approved and constructed.

The 30-year cumulative estimate for federal onshore fossil fuel mineral emissions of GHGs from 2021 to 2050 is approximately 25,665.43 million metric tons of CO_2e (BLM 2021a). This is based on the 2021 EIA Annual Energy Outlook reference case projection. Using the Model for the Assessment of Greenhouse Gas Induced Climate Change (MAGICC), the BLM estimated that these onshore federal fossil fuel emissions from 2021 to 2050 would raise average global surface temperatures by approximately 0.0158ºC (0.028ºF under the RCP 2.6 scenario of IPCC AR5. The RCP 2.6 scenario was chosen by BLM (2021) because the "federal emissions would have the largest signal (that is, percent) relative to other scenarios, each of which have far greater emissions."

Cumulative Social Cost of Greenhouse Gases

BLM assists Tribes, the US Forest Service, Bureau of Indian Affairs, and other federal agencies with some aspects of oil and gas development. BLM also calculated the social cost of GHG emissions of downstream and upstream oil and gas on all federally administered and Tribal lands in the planning area (**Table 3-22** to **Table 3-24**).

Table 3-22
Present Value of SC-GHG Associated with Estimated Emissions from Downstream and Upstream Federal Oil and Gas (2020 Dollars) under Alternatives A and C

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO_2	$7,852,410,000	$30,031,512,000	$45,571,882,000	$90,977,891,000
CH_4	$408,484,000	$1,025,216,000	$1,378,667,000	$2,727,630,000
N_2O	$20,764,000	$72,999,000	$109,858,000	$193,553,000
Total	$8,281,658,000	$31,129,726,000	$47,060,407,000	$93,899,073,000

Source: Estimates based on social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative.

Table 3-23
Present Value of SC-GHG Associated with Estimated Emissions from Downstream and Upstream Federal Oil and Gas (2020 Dollars) under Alternatives B, B.1, and D

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO_2	$7,684,302,000	$29,439,695,000	$44,688,212,000	$89,212,917,000
CH_4	$408,460,000	$1,025,154,000	$1,378,584,000	$2,727,465,000
N_2O	$20,753,000	$72,960,000	$109,799,000	$193,448,000
Total	$8,113,515,000	$30,537,808,000	$46,176,594,000	$92,133,830,000

Source: Estimates based on social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative.

Table 3-24
Present Value of SC-GHG Associated with Estimated Emissions from Downstream and Upstream Tribal Oil and Gas (2020 Dollars) under All Alternatives

Emission	Average, 5%	Average, 3%	Average, 2.5%	95th Percentile, 3%
CO_2	$8,984,912,000	$34,418,161,000	$52,243,921,000	$104,297,332,000
CH_4	$476,882,000	$1,196,873,000	$1,609,503,000	$3,184,330,000
N_2O	$24,253,000	$85,249,000	$128,290,000	$226,032,000
Total	$9,486,047,000	$35,700,283,000	$53,981,714,000	$107,707,694,000

Source: Estimates based on social cost per ton from IWG 2021 and BLM's estimates of emissions under each alternative.

3.2.2 Soil Resources

Issues

- How would the alternatives reduce or prevent sedimentation, erosion, and soil degradation resulting from surface-disturbing activities?
- How would land management actions affect areas of sensitive or fragile soils?
- How would land management actions affect soil quality?

Affected Environment

Soils are a living system that is linked to nutrient and hydrologic cycles and other ecological processes. The distribution and occurrence of soils depend on several factors, including the interaction of relief (slope and slope length), soil parent material (geology), living organisms, climate, and time. These variables influence the creation of complex and diverse soils, as well as their weathering processes. Detailed soils information is available from the Soil Survey Geographic database (NRCS 2021a) for the individual soil surveys in the planning area.

Soils in the planning area range from nearly level to gently rolling soils, including loams, clay loams, sandy loams, and loams with sandy and gravelly substrata. Also present in western North Dakota are alkali soils, steeply sloping soils with thin surface layers, hilly and steep lands, and steep slopes (North Dakota Agricultural Experiment Station 1961). Additional information is available in Section 2.2, Soil Resources, of the AMS (BLM 2020b).

Wind and water erosion are the main natural factors contributing to soil degradation in the planning area. Mineral development, livestock grazing, and invasive vegetation are the main human-related factors contributing to soil degradation in the planning area. Disturbed areas are more susceptible to erosion because of the decrease in vegetation and the disruption to the soils.

Slopes

Slope is used to determine where areas are more vulnerable to erosion. In general, runoff generation and soil erosion typically increase as the percent slope increases. Slope influences the lateral movement of water in soil, which can result in runoff and soil erosion. If disturbed, areas with steep slopes larger than 10 acres can lead to an increase in sedimentation, a loss of soil nutrients, and decreasing productivity. South-facing slopes are more vulnerable to high evaporation rates and generally have more shallow soils than north-facing slopes (Pellant et al. 2020). These slopes are easily eroded and cannot be reclaimed without significant effort. When disturbed, erosion from these slopes can lead to an increase in sedimentation, a loss of soil nutrients, and a decrease in soil productivity. Soil productivity is the capacity of a soil for producing plants (Weil and Brady 2019). **Table 3-25** shows the acres of steep slopes in each of the decision areas (also see **Map 3-2**, Slopes Greater than 30 Percent, in **Appendix A**).

Table 3-25
Steep Slopes (Greater than 30 Percent) in the Decision Areas

Decision Area	Acres	Percentage of Decision Area
BLM-administered surface	7,200	12.3
BLM-administered subsurface, fluid mineral	29,000	5.9
BLM-administered subsurface, coal, coal potential	27,700	0.7
BLM-administered subsurface, mineral materials disposal, and locatable minerals	15,200	4.2

Source: BLM GIS 2021

Sensitive Soils

The Natural Resources Conservation Service (NRCS) and BLM have created the Reclamation Suitability Soil Interpretation using the National Soil Information System. The reclamation suitability is based on classifications of the following soil characteristics (Campbell 2019):

- Available water capacity within 40 inches of the surface

- Electrical conductivity maximum within 7 inches of the surface
- Sodium adsorption ratio maximum within 7 inches of the surface
- Mean annual precipitation
- Depth-to-root-restricting feature
- Water erosion hazard index
- Wind erodibility index

Available water capacity is the fraction of water stored in soils that can be used by plants (NRCS 2021a). When the soil moisture content is low, the water available to plants decreases (Weil and Brady 2019).

Soils within the electrical conductivity and sodium adsorption ratio maximum are considered saline soils (NRCS 2014). These soils create alkaline and dry conditions that are unsuitable for most plants that are not salt tolerant.

Soils that receive less mean annual precipitation are likely dry soils that are more vulnerable to wind erosion (Zobeck and Van Pelt 2014). Soils that receive more annual precipitation are more vulnerable to water erosion from the impact force of raindrops or from water pooling and runoff (Auerswald 2008).

Vegetation root growth can be restricted when bedrock, hard clay, or an abrupt change in the soil's particle size occurs at a certain depth within the soil profile; these are referred to as restrictive features. The NRCS defines moderately deep root-restricting features between 20 and 39 inches, shallow root-restricting features between 11 and 19 inches, and very shallow root-restricting features between 0 and 10 inches (NRCS 2017). For soils with shallower root-restricting features, root growth is restricted.

The water erosion hazard index is a numerical value that indicates soil susceptibility to sheet and rill erosion by water. It is based on the percentage of sand, silt, and organic matter; the arrangement of soil aggregates; and the time it takes water to flow through the soil profile (NRCS 2021a). Water erosion is also influenced by the slope, vegetation cover, and compaction. Reduced vegetation cover decreases the soil stability and increases the runoff potential (Weil and Brady 2019). Compaction occurs when force is applied to the surface of a soil that pushes soil particles together and decreases the available space for air and water in the soil (NRCS 2001a). Soils with mixed particle sizes are most prone to compaction, due to the ability for smaller particles to be forced between the larger ones (NRCS 2001a). Compaction can restrict water infiltration and vegetation root growth in soils and increase the water erosion hazard.

The wind erodibility index is a numerical value that indicates soil susceptibility to wind erosion. There is a close correlation between wind erosion and soil texture (the amount of sand, silt, and clay in the soil), the size and stability of soil aggregates, the rock fragment content, and the organic matter content (NRCS 2021a). Generally, loosely packed sand particles are the most susceptible to wind erosion (Zobeck and Van Pelt 2014). Soils low in rock fragments and organic matter, which both act as stabilizers in the soil, are also more susceptible to wind erosion.

Soils that are limited by one or more of the above soil characteristics are considered sensitive soils (see **Map 3-3**, Sensitive Soils, in **Appendix A**). These characteristics make them more susceptible to surface disturbance and reduced soil productivity. **Table 3-26** shows the acres of sensitive soils in each decision area.

Table 3-26
Sensitive Soils in the Decision Areas

Decision Area	Acres	Percentage of Decision Area
BLM-administered surface	33,300	57.9
BLM-administered subsurface, fluid mineral	187,200	38.3
BLM-administered subsurface, coal, coal potential	239,900	21.9
BLM-administered subsurface, mineral materials disposal, and locatable minerals	106,100	29.3

Source: BLM GIS 2021

Badlands and Rock Outcrops

Badlands are a unique geologic landform in North Dakota that are composed of limestone, sandstone, and shale sedimentary rocks (NPS 2020). They formed over millions of years by deposition of these rock materials and have been weathered over time by water. The rocks that were not completely eroded are still standing in pillar-like canyon formations with steep slopes. The remaining rocks are still vulnerable to erosion; it is estimated that they erode at a rate of 1 inch per year, which is a rapid rate for rocks (NPS 2020).

Rock outcrops are rock formations that are exposed on the land surface. In North Dakota, these formations can be irreversibly damaged if they are allowed to be destroyed (BLM 2020b). The Mud Buttes ACEC contains sensitive fossil and geologic formations that would be vulnerable to disturbance. See **Section 3.4.1** for a detailed analysis of the Mud Buttes ACEC.

Table 3-27 shows the acres of badlands and rock outcrops in each decision area.

Table 3-27
Badlands and Rock Outcrops in the Decision Areas

Decision Area	Acres	Percentage of Decision Area
Badlands		
BLM-administered surface	16,600	28.4
BLM-administered subsurface, fluid mineral	48,100	9.8
BLM-administered subsurface, coal, coal potential	8,600	0.8
BLM-administered subsurface, mineral materials disposal, and locatable minerals	28,900	8.0
Rock Outcrops		
BLM-administered surface	0	0
BLM-administered subsurface, fluid mineral	100	<1
BLM-administered subsurface, coal, coal potential	0	0
BLM-administered subsurface, mineral materials disposal, and locatable minerals	100	<1

Source: BLM GIS 2021

Prime Farmland

The NRCS maintains a map of farmland classifications of soils that have desirable, unique physical and chemical characteristics for producing food, feed, forage, fiber, oilseed crops, or other valuable agricultural products. Explanations of the exact criteria for prime farmland, unique farmland, and farmland of statewide or local importance can be viewed on the NRCS Soil Data Access website (NRCS 2021b). Soil quality,

which is a broad term that relates to the functioning of the biological, chemical, and physical properties of soils, is an important part of farmland classifications (Weil and Brady 2019). Soil quality is maintained if these properties, which include, but are not limited to, organic matter content, nutrient cycling, soil stability, and water infiltration rates, are all favorable for a given soil (Weil and Brady 2019).

Climate Change

Extreme precipitation events are expected to become more frequent and more intense this century (URS Corporation 2010). Water infiltration into soil is most effective when low-intensity rainfall accumulates over multiple hours or days (Weil and Brady 2019). Intense rain that falls in a short period (within a few hours) has little time to percolate in the soil. Instead, it pools at the soil surface (Weil and Brady 2019). As a result, water erosion caused by detachment and transport of the pooled soil water becomes more common. Sensitive soils, especially those that are vulnerable to changes in mean precipitation; soils on steep slopes; badlands; and rock outcrops are more susceptible to water erosion as the effects of climate change persist or worsen in this century. The annual median runoff is expected to decrease in the western portion and increase in the northwestern portion of North Dakota from 2041 to 2060 (URS Corporation 2010). Therefore, water erosion and sedimentation (the accumulation of sediment resulting from water erosion and runoff) will be more persistent in the northwestern portion of the state.

An increased frequency and severity of wildfires would result in more burned soils that can become hydrophobic, meaning the soil particles repel water (NRCS 2000). Water erosion occurs when high-intensity rainfall, reduced water infiltration, and runoff from flooding remove the topsoil (NRCS 2001b).

A decreased soil moisture content could become more common if drought conditions worsen; drought currently occurs during summer months (BLM 2020b). This, combined with higher temperatures, would increase the frequency and severity of wildfires in this century (URS Corporation 2010). Burned soils can become hydrophobic, and little to no water can infiltrate into the soil (NRCS 2000).

As temperatures increase this century, water evaporation could be greater than precipitation, especially during the summer when precipitation is expected to decrease from the average (URS Corporation 2010). This would reduce soil moisture and increase the potential for salt accumulation in soils.

Environmental Consequences

Impacts Common to All Alternatives

Surface-disturbing activities, such as prescribed fire treatments, livestock grazing, infrastructure associated with ROWs, and mineral development, that remove vegetation, displace topsoil, and compact soils would decrease the soil stability and water infiltration; this, in turn would increase the soil erosion susceptibility of these soils.

Prescribed fire management would be the same under all alternatives. Prescribed fire burns the topsoil and removes the vegetation cover in the short term, though not as severely as a wildfire. This is because wildfires are less controllable and are more widespread than localized prescribed fire treatments. Soils could become temporarily hydrophobic in response to burning, and water infiltration into the soil would decrease (NRCS 2000). This would increase the potential for runoff and the water erosion hazard potential for sensitive soils, especially if precipitation events occur following a soil burning (NRCS 2000). In the short term, some soil nutrients would be lost, while nutrient levels, soil pH, and organic matter would increase after exposure to fire over the long term (Rau et al. 2008). If soils are already alkaline, the increased pH from burning could increase saline conditions for some sensitive soils. In the long term, prescribed fire that reduces fuel loading

would reduce the potential for severe wildfires and reduce the potential for more severe soil burning and vegetation loss that contributes to erosion susceptibility. Localized pile burning would have similar impacts, except that pile burning would have more severe burning effects on sensitive soils; these effects would be comparable with those caused by the severity of a wildfire. Prescribed fire management does not change between alternatives, so these impacts on soils would be the same under all alternatives.

Across all BLM-administered surface, the mineral materials RFD estimates 40 acres of disturbance annually caused by the development of federal mineral materials (BLM 2022c). Some of this disturbance could be on steep slopes, sensitive soils, badlands and rock outcrops, and prime farmlands. However, operators generally avoid steep slopes, badlands, and rock outcrops, if possible, because of the cost of developing on such areas.

The effects from fluid mineral development would result from exploration and development, which require the construction of roads, pipelines, pads, and facilities. This would involve vegetation clearing, which could increase soil erosion and compaction. Additionally, fluid mineral leasing stipulations would not preclude developing areas already leased. In these areas, surface-disturbing activities that could affect soils would occur if leases were developed. The oil and gas RFD estimates that approximately 72 acres of BLM-administered surface would be disturbed by oil and gas development, with not much impact expected on soil resources under all alternatives (BLM 2022a). Similarly, while much of the federal mineral estate is available for locatable mineral development, such development is not reasonably foreseeable. Therefore, no impacts are expected under any of the alternatives. Soils underlying oil and gas developments or soils in contact with petroleum-contaminated water, either from surface water infiltration or groundwater movement, could be contaminated with petroleum products (mainly in the form of hydrocarbons). The transport and fate of hydrocarbons in soil would be dependent on the chemical structure and solubility of the pollutant; atmospheric temperature and climate conditions; and site-specific soil factors including soil texture, porosity, organic matter content, rate of water movement in the soil, and soil pH (Balseiro-Romero 2018 and Wang et al. 2021). The potential effects of hydrocarbon contamination are analyzed in detail under **Section 3.5.4**, Public Health and Safety.

Similarly, while much of the federal mineral estate is available for locatable mineral development, such development is not reasonably foreseeable. Therefore, no impacts are expected under any of the alternatives. However, an analysis of potential impacts from locatable mineral development is provided in case demand for locatable minerals occurs in the future. If development were proposed in open areas, locatable mineral development would still be allowed, but the regulations require any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations requires site-specific analysis under NEPA when the impacts on soils will be revisited.

Stipulations for fluid mineral leasing (**Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing) and design features and BMPs (including those that require project-specific mitigation measures, where warranted) for authorized land uses or activities (**Appendix D**, Design Features and Best Management Practices) would likely reduce the effects on soil resources associated with activities such as road, pipeline, or power line construction; mineral development; range improvements; and recreation. Stipulations, design features and BMPs, and mitigation measures would reduce the likelihood of a loss of ground cover or soil mixing, compaction, or removal; exposure of the soil resource to accelerated wind and water erosion; and the irretrievable loss of topsoil and nutrients and soil productivity. Requiring a reclamation plan (**Appendix E**, Reclamation Standards) for all surface-disturbing activities across all alternatives would stabilize disturbed areas in the short term and landscapes in the long term. This would

reduce the potential effects from the loss of vegetation cover, erosion, and sedimentation and the proliferation of noxious or invasive weeds. In addition, any petroleum-contaminated soils would be separated, treated, and removed according to the oil and gas reclamation practices and standards described in **Appendix E**.

In most cases, soils on steep slopes, sensitive soils, and badlands and rock outcrops would be indirectly protected by stipulations for other resources that incidentally overlap these areas.

Alternative A

Impacts on Steep Slopes

Under Alternative A, 7,200 acres (100 percent) of steep slopes occur on lands suitable for livestock grazing. Cattle tend to graze on slopes below 40 percent and those that are closer to water sources (Patton 1971), whereas sheep and goats prefer to graze on steeper slopes in upland areas (Walker et al. 2006). Livestock can compact soils, remove topsoil when they skid downslope, and create indentations where soils are pushed up higher than the surrounding area, where water pooling may occur (Belsky and Blumenthal 1997; Sheath and Carlson 1998). In all cases, these impacts would increase the erosion susceptibility on steep slopes. Although there are steep slopes included in the suitable acres calculations, livestock spend short amounts of time grazing on steep slopes.

Under Alternative A, 6,100 acres (84.7 percent) of steep slopes occur in areas open to ROW authorization. Compared with ROW avoidance areas, these areas would have the most potential for surface disturbance on BLM-administered surface land. The remainder of steep slopes (1,100 acres) would be managed as ROW avoidance areas, which would reduce the potential for impacts, though they could still occur.

Alternative A does not include designated recreation management areas. Recreation would continue at Schnell Ranch Recreation Area but without a special designation. These activities, such as hiking, bicycling, horseback riding, and dispersed camping, would remove vegetation and erode trails, which would increase the erosion potential on steep slopes.

Mineral development activities, such as drilling, heavy vehicle operations, and excavating, penetrate topsoil and mix surface and subsurface soil horizons. These activities break apart soil aggregates and degrade the soil structure so that soil particles are free to move and be eroded by wind or water. Soils on steep slopes would be especially vulnerable to downward movement by runoff. The BLM would continue to follow surface-operating standards and guidelines for oil and gas development (BLM 2007) to minimize erosion on steep slopes.

For areas with mineral materials under Alternative A, 1,000 acres (6.6 percent) of steep slopes occur in areas closed to disposal, and 14,200 acres (93.4 percent) of steep slopes occur in areas open to disposal. The mineral materials RFD estimates that 40 acres of disturbance would occur annually (BLM 2022c). Without restrictions under Alternative A, some of this disturbance could occur on steep slopes.

For locatable minerals, 400 acres (2.6 percent) of steep slopes occur in areas that are not open to locatable mineral entry (existing segregation), and 14,700 acres (96.7 percent of steep slopes) occur in areas that are open to mineral entry. Soils on steep slopes in areas open to mineral entry would have a greater potential for disturbance that leads to erosion.

In the fluid leasable minerals decision area, 27,000 acres (93.1 percent of steep slopes) are open to leasing subject to stipulations, 10,300 acres are subject to NSO stipulations, 500 acres are subject to CSU

stipulations, and 25,800 are subject to TL stipulations. The NSO stipulations could protect steep slopes by preventing surface disturbance. CSU stipulations may or may not protect steep slopes, depending on the requirements of the CSU. TLs could result in some protections if the limitation happened to coincide with dry or wet times of the year; limiting surface disturbance during these conditions would reduce wind or water erosion of disturbed soils. Under Alternative A, 2,000 acres (7.4 percent of steep slopes) occur in areas open and subject to standard terms and conditions (STC). These areas would be the most vulnerable to erosion because no stipulations would provide incidental protection to steep slopes. **Table 3-28** shows the acreages of steep slopes and the fluid mineral leasing allocations as percentages of the fluid mineral decision area.

Under Alternative A, detailed mapping of areas unacceptable for future coal leasing is not available so it is not known exactly how many acres of steep slopes are in areas unacceptable for future coal leasing. There are approximately 1,300 acres of steep slopes in the three coal development counties and it is possible that some surface disturbance from coal mining could occur on steep slopes under Alternative A.

Table 3-28
Steep Slopes (Greater than 30 Percent) and Fluid Mineral Leasing Allocations under Alternative A

Decision Area	Acres	Percentage of Decision Area
Steep Slopes on BLM-administered subsurface, fluid mineral	29,000	5.9
Closed to fluid mineral leasing[1]	0	0
Open to fluid mineral leasing, subject to STC[1]	2,000	0.4
Open to fluid mineral leasing with mapped stipulation(s)[2]	27,000	5.5
Open to fluid mineral leasing, subject to NSO[1]	10,300	2.1
Open to fluid mineral leasing, subject to CSU[1]	500	0.1
Open to fluid mineral leasing, subject to TL[1]	25,800	5.3

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect the soil resource
[2] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Under Alternative A, 1,018 acres of steep slopes occur in areas that would be closed to leasing of NEL minerals. No NEL mineral development is anticipated, but if any were to occur, this would preclude erosion from surface disturbance in these areas.

Impacts on Sensitive Soils

Under Alternative A, 33,300 acres (100 percent) of sensitive soils occur on lands suitable for livestock grazing. As described above, livestock prefer to graze closer to water sources, meaning more moist soils. Wet soils are more susceptible to compaction by cattle hooves, and previously grazed sites have higher compaction than ungrazed sites (Tate et al. 2004). The BLM would follow the standards and guidelines for rangeland health administration under 43 CFR 4180, subparts e and f, to maintain soil productivity.

Recreation impacts on sensitive soils in the Schnell Ranch Recreation Area would be similar to those described for steep slopes.

Under Alternative A, 19,700 acres (59.2 percent) of sensitive soils occur in areas open to ROW authorization, and 13,600 acres (40.8 percent) occur in ROW avoidance areas. In both areas, sensitive soils would be vulnerable to surface disturbance.

Vehicles can compact soils and leave behind ruts that collect water; the soils underneath can be eroded when the water runs off. Reduced infiltration from compaction would also cause water pooling and increase the potential for water erosion. Under Alternative A, OHV use is limited on 22,160 acres in the Big Gumbo area to periods of the year generally characterized by dry and stable soils (June 2 through February 28). This would provide protection for sensitive soils because it would limit surface disturbance on wet soils that are most vulnerable to compaction and water erosion.

For areas with mineral materials under Alternative A, 18,900 acres (17.8 percent of sensitive soils) occur in areas closed to mineral materials disposal, and 87,200 acres (82.2 percent of sensitive soils) occur in areas that are open. Mineral materials disturbance is estimated at 40 acres annually.

For areas with locatable minerals, 5,300 acres (5 percent of sensitive soils) occur in areas that are not open to locatable mineral entry (existing segregation), and 100,800 acres (95 percent of sensitive soils) occur in areas that are open to mineral entry. Sensitive soils in areas open to mineral entry would have a greater potential for disturbance that leads to erosion. However,

In the fluid leasable minerals decision area, 155,800 acres of sensitive soils occur in areas open to leasing with mapped stipulations (which can overlap). Within that category, 75,600 acres (40.4 percent of sensitive soils) occur in areas open to leasing with NSO stipulations, and 5,400 acres (2.9 percent of sensitive soils) occur in areas open to leasing with CSU stipulations. These stipulations would offer incidental protection to sensitive soils by requiring avoidance of disturbance in NSO areas; CSUs may or may not protect sensitive soils depending on the requirements of the CSU. Under this alternative, 128,300 acres of sensitive soils would be open to fluid mineral leasing in areas subject to TLs. These TLs exist for the protection of other resources but could result in protections if the limitation happened to coincide with dry or wet times of the year. Limiting surface disturbance during these conditions would reduce wind or water erosion of disturbed soils. Zero acres are closed to fluid mineral leasing under Alternative A. Under this alternative, 31,400 acres (41.5 percent of sensitive soils) occur in areas that are open and subject to STC. The areas open and subject to STC are the most vulnerable to erosion or damage of sensitive soils because no stipulations that could reduce soil disturbance would be applied in these areas. **Table 3-29** shows the acreages of sensitive soils and the fluid mineral leasing allocations as percentages of the decision area.

Table 3-29
Sensitive Soils and Fluid Mineral Leasing Allocations, Alternative A

Decision Area	Acres	Percentage of Decision Area
Sensitive Soils on BLM-administered subsurface, fluid mineral	187,200	38.3
Closed to fluid mineral leasing[1]	0	0
Open to fluid mineral leasing, subject to STC[1]	31,400	6.4
Open to fluid mineral leasing with mapped stipulation(s)[2]	155,800	31.8
Open to fluid mineral leasing, subject to NSO[1]	75,600	15.5
Open to fluid mineral leasing, subject to CSU[1]	5,400	1.1
Open to fluid mineral leasing, subject to TL[1]	128,300	26.2

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect the soil resources
[2] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Under Alternative A, detailed mapping of areas unacceptable for future coal leasing is not available so it is not known exactly how many acres of sensitive soils are in areas unacceptable for future coal leasing. An

estimated 25,400 acres of sensitive soils are located in the three coal county area, some disturbance of sensitive soils due to coal development could occur under Alternative A.

Under Alternative A, 18,908 acres of sensitive soils occur in areas that would be closed to leasing of NEL minerals. No NEL mineral development is anticipated, but if any were to occur, the closure of these areas would preclude erosion from surface disturbance in these areas.

Impacts on Badlands and Rock Outcrops

Under Alternative A, 16,600 acres (100 percent) of badlands occur on lands suitable for livestock grazing. Similar to steep slopes, livestock grazing makes these areas more vulnerable to erosion. This is because livestock grazing physically alters sediments on these features so that they are looser and easily detached from the landforms. Although there are badlands included in the suitable acres calculations, badlands produce limited amounts of forage; therefore, livestock grazing on badlands is not expected.

Recreation and fuels management impacts on badlands and rock outcrops are similar to those described for steep slopes.

Under Alternative A, 12,700 acres (76.5 percent) of badlands occur in areas open to ROW authorizations, which have the most potential for surface disturbance. For badlands in ROW avoidance areas (3,900 acres, or 23.5 percent of badlands in the BLM-administered surface decision area), there would be increased potential for surface disturbance and subsequent erosion.

For badlands areas with BLM-administered mineral materials under Alternative A, 3,900 acres (13.5 percent of badlands) occur in areas closed to disposal, and 25,200 acres (86.5 percent) of badlands occur in areas that are open mineral material disposal. Mineral materials disturbance in the entire decision area is estimated at 40 acres annually.

For badlands areas with BLM-administered locatable minerals, 500 acres (1.7 percent of badlands) occur in areas not open to locatable mineral entry (existing segregation), and 28,500 acres (97.9 percent of badlands) occur in areas that are available.

In the fluid leasable minerals decision area, 47,200 acres (98.1 percent of badlands) and 100 acres (100 percent of material beneath rock outcrops) occur in areas open to leasing, subject to stipulations. Of these, 17,900 acres (37.1 percent of badlands) would be open subject to NSO stipulations, 1,200 acres (2.5 percent of badlands) would be open subject to CSU stipulations, and 45,800 acres (95.0 percent of badlands) and 100 acres of rock outcrops (100 percent of material beneath rock outcrops) would be open subject to TL stipulations. NSO stipulations would offer incidental protection to badlands by requiring avoidance of these areas. CSU stipulations may or may not protect badlands depending on the requirements of the CSU. TLs could result in some protections to badlands if the limitation happened to coincide with dry or wet times of the year; limiting surface disturbance during these conditions would reduce wind or water erosion of disturbed soils. TLs are unlikely to offer any protections to rock outcrops. Approximately 1,000 acres (2.1 percent of badlands) occur in areas that are open and subject to STC. These areas are the most vulnerable to erosion or other resource damage because they are not managed with stipulations to avoid or minimize surface disturbance. **Table 3-30** shows the acreages of badlands and the fluid mineral leasing allocations as percentages of the decision area.

Table 3-30
Badlands[1] and Fluid Mineral Leasing Allocations, Alternative A

Decision Area	Acres	Percentage of Decision Area
Badlands on BLM-administered subsurface, fluid mineral	48,200	9.8
Closed to fluid mineral leasing[2]	0	0
Open to fluid mineral leasing, subject to STC[2]	1,000	0.2
Open to fluid mineral leasing with mapped stipulation(s)[3]	47,200	9.6
Open to fluid mineral leasing, subject to NSO[2]	17,900	3.7
Open to fluid mineral leasing, subject to CSU[2]	1,200	0.2
Open to fluid mineral leasing, subject to TL[2]	45,800	9.3

Source: BLM GIS 2021
[1] Impacts on rock outcrops would be negligible because there are only 100 acres in the fluid mineral decision area
[2] Acreages are incidental and not designed to directly protect the soil resources
[3] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Under Alternative A detailed mapping of areas unacceptable for future coal leasing is not available, but there are no badlands located in the three coal development counties so no impacts on badlands from federal coal development are expected.

Under Alternative A, 3,862 acres of badlands occur in areas that would be closed to leasing of NEL minerals. Additionally, 25,060 acres of badlands and 147 acres of rock outcrop would be open to NEL leasing. No NEL mineral development is anticipated to occur in acres open to leasing.

Impacts on Prime Farmland

Alternative A would not provide any specific protections for prime farmlands. If these areas are affected by any of the above-mentioned surface-disturbing activities, the soil condition could worsen and make them unsuitable for growing agriculture products.

Alternative B

Impacts on Steep Slopes

Under Alternative B, 400 acres (5.6 percent) of steep slopes occur in areas unavailable for standard term livestock grazing leases. Alternative B would not provide direct protections from livestock grazing on steep slopes; however, these areas would be incidentally protected from livestock grazing impacts. For steep slopes in areas available for livestock grazing (6,800 acres, 94.4 percent of steep slopes in the BLM-administered surface decision area), the impacts from livestock grazing would be the same as those described under Alternative A.

Vegetation cover is an essential soil stabilizer for soils on steep slopes. Chemical treatments and mechanical treatments for fuels management that remove vegetation would increase the soil erosion susceptibility of these soils.

Under Alternative B no steep slopes would occur in areas open for ROW authorizations, compared with 6,100 acres under Alternative A. Steep slopes would be managed as ROW exclusion areas under Alternative B. This would decrease the potential for surface disturbance and erosion for soils on steep slopes, compared with Alternative A.

For areas with mineral materials, under Alternative B, 10,100 acres (66.4 percent of steep slopes) would be in areas closed to disposal, and 5,100 acres (33.6 percent of steep slopes) would occur in open areas. Impacts on steep slopes would be similar to those described under Alternative A. However, they would be less severe than under Alternative A because 9,100 fewer acres of steep slopes would be in areas open to disposal.

For areas with locatable minerals, 2,200 acres of steep slopes would occur in areas recommended for withdrawal from locatable mineral entry, and 15,200 acres (100 percent of steep slopes) would occur in areas open to locatable mineral entry (13,000 acres if the 2,200-acre recommendation for withdrawals is enacted). This would increase the potential surface disturbance on 500 more acres than under Alternative A.

Under Alternative B, 27,200 acres (93.1 percent of steep slopes) would occur in areas open to fluid mineral leasing, subject to incidental stipulations. Of these, with the possibility of overlap in some areas, 24,100 acres (82.4 percent of steep slopes) would occur in areas with NSO stipulations, 27,100 acres (97.8 percent of steep slopes) with CSU stipulations, and 24,400 acres (89.6 percent of steep slopes) with TL stipulations. Under this Alternative 1,700 acres of steep slopes would be closed to fluid mineral leasing. The closure of 1,700 acres along with 13,800 more acres of NSO stipulations under Alternative B would provide more protection to steep slopes compared to Alternative A. The increase of 26,600 acres of incidental CSU stipulations may or may not provide more protection to steep slopes than Alternative A, depending on the requirements of the CSU. No acres would occur in areas open and subject to STC, which would lessen the potential for the impacts described under Alternative A. TLs are reduced by 1,400 acres compared to Alternative A. These TLs exist for the protection of other resources but might result in some protections if the limitation happened to coincide with dry or wet times of the year because limiting surface disturbance during these conditions would reduce wind or water erosion of disturbed soils. **Table 3-31** shows the acreages of steep slopes and the fluid mineral leasing allocations as percentages of the fluid mineral decision area.

Table 3-31
Steep Slopes (Greater than 30 Percent) and Fluid Mineral Leasing Allocations, Alternative B

Decision Area	Acres	Percentage of Decision Area
Steep Slopes on BLM-administered subsurface, fluid mineral	29,000	5.9
Closed to fluid mineral leasing[1]	1,700	0.4
Open to fluid mineral leasing, subject to STC[1]	0	0
Open to fluid mineral leasing with mapped stipulation(s)[2]	27,200	5.5
Open to fluid mineral leasing, subject to NSO[1]	24,100	4.9
Open to fluid mineral leasing, subject to CSU[1]	27,100	5.5
Open to fluid mineral leasing, subject to TL[1]	24,400	4.9

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect the soil resource
[2] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Under Alternative B, a multiple-use screen for coal for slopes greater than 30 percent and covering more than 10 acres would be applied. Therefore, 27,700 acres of slopes greater than 30 percent in the coal decision area would be unacceptable for further consideration for leasing. This means that steep slopes that

are not in connective areas greater than 10 acres could also be impacted. However, all 1,300 acres of slopes greater than 30 percent in the coal-producing counties are larger than 10 acres and thus would be unacceptable for further consideration for leasing. Under Alternative B.1, the same slopes greater than 30 percent and covering more than 10 acres multiple-use screen from Alternative B would be applied, in addition to a multiple-use screen limiting future federal coal leasing to the permit boundaries as of September 9, 2022 for each coal mine. All 27,700 acres of slopes greater than 30 percent in the coal decision area are outside the mine permit boundaries and therefore would be unacceptable for further consideration for leasing

Under Alternative B, 8,300 acres of steep slopes occur in areas that would be closed to leasing of NEL minerals. Additionally, 6,871 acres of steep slopes in the areas would remain open to leasing of NEL minerals. No NEL mineral development is anticipated to occur in acres open to leasing.

Impacts on Sensitive Soils

Under Alternative B, 3,700 acres (11.1 percent) of sensitive soils occur in areas unavailable for standard term livestock grazing leases. This means livestock grazing would not affect sensitive soils in these areas. For sensitive soils in areas available for livestock grazing (29,500 acres, 88.6 percent of sensitive soils in the BLM-administered surface decision area), the impacts from livestock grazing would be the same as those described under Alternative A.

Mechanical treatments and chemical treatments for fuels management would remove the vegetation cover that promotes soil stability. This would reduce the soil resistance to degradation and erosion, especially for sensitive soils that are already vulnerable to erosion. Burning impacts from prescribed fire treatments would be the same as described under *Impacts Common to All Alternatives.* Localized pile burning would have similar impacts, except that pile burning would have more severe burning effects on sensitive soils; these effects would be comparable with those caused by the severity of a wildfire. In the long term, fuel treatments would likely reduce the severity of fires, which would reduce the potential for severe soil burning and create more resistant and resilient vegetation communities that provide soil stability and reduce erosion. Using more treatment tools under Alternative B would increase the potential for these long-term effects, compared with Alternative A.

Sensitive soils (11,600 acres, 34.8 percent of sensitive soils in the BLM-administered surface decision area) in the Figure 4 and Lost Bridge BCAs would be vulnerable to surface disturbance from fuels management treatments, such as prescribed fire, pile burns, and mechanical treatments, as described above. There are also sensitive soils (1,300 acres, 3.9 percent of the sensitive soils in the BLM-administered surface decision area) in the Schnell Ranch SRMA, which would be prioritized for prescribed fire treatment. In addition to the effects from prescribed fire described above, sensitive soils would be compacted or eroded by recreation activities such as hiking, horseback riding, bicycling, and dispersed camping, in addition to existing and proposed trail use.

In spring (March 1 through June 1), the BLM would close unsurfaced routes, except for administrative or authorized purposes, in Bowman County to minimize surface disturbance on soils. Compared with Alternative A, this would protect more soils on BLM-administered surface land from compaction and erosion related to OHV surface disturbance. However, wet soils are usually present during fall and winter; therefore, Alternative B would not provide complete protection from OHV impacts.

Compared with Alternative A, under Alternative B, 33,300 more acres (100 percent) of sensitive soils would occur in ROW exclusion areas, and no acres would be open to ROW authorization. This would decrease the potential for surface disturbance and erosion on sensitive soils from ROWs.

Under Alternative B, 64,400 acres (60.7 percent of sensitive soils) in federal mineral materials estate would occur in areas closed to disposal, and 41,700 acres (39.3 percent of sensitive soils) would occur in open areas. Impacts on sensitive soils would be similar to those described under Alternative A. However, the impacts would be less severe than under Alternative A because 45,500 fewer acres of sensitive soils would be in areas open to mineral materials disposal.

Under Alternative B, 106,100 acres (94 percent of sensitive soils) would occur in areas open to locatable mineral entry and 7,200 acres (6.4 percent of sensitive soils) would occur in areas recommended for withdrawal from locatable mineral entry. The withdrawal areas would be less susceptible to surface disturbance and reduced soil productivity from locatable mineral development, if the recommendation for withdrawal was enacted.

In the fluid leasable minerals decision area, 143,200 acres of sensitive soils would occur in areas open to leasing with mapped stipulations, which can overlap. Within the mapped stipulation category, 106,000 acres (56.6 percent of sensitive soils) would be open to leasing with NSO stipulations, including all sensitive soils within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe. This is 30,400 more acres than under Alternative A, or a 38.9 percent increase of areas that would have greater incidental protection for sensitive soils through avoidance of surface disturbance. Under Alternative B, 143,200 acres (76.5 percent of sensitive soils) would be open to fluid mineral leasing, subject to CSU 12-24. This is 137,800 more acres of sensitive soils than the areas with CSU stipulations under Alternative A. Stipulation CSU 12-24 would protect sensitive soils in these areas by requiring approval of a reclamation plan prior to disturbance on sensitive soils. The plan must include reasons for not relocating to an area without sensitive soils. It also must demonstrate that soil productivity will be maintained, and surface runoff and erosion will be controlled. Under Alternative B, 102,500 acres (54.8 percent of sensitive soils) would be open to fluid mineral leasing in areas subject to TLs, a 20.1 percent decrease (25,800 fewer acres) compared with Alternative A. These TLs exist for the protection of other resources but could result in incidental protections to sensitive soils if the limitation happened to coincide with dry or wet times of the year because limiting surface disturbance during these conditions would reduce wind or water erosion of disturbed soils. Zero acres of sensitive soils would be open to fluid mineral leasing under STC, and 44,000 acres would be closed to fluid mineral leasing. With more acres closed to fluid mineral leasing, more acres with NSO stipulations, the application of a CSU stipulation that provides direct protection to sensitive soils, and fewer acres open under STC, Alternative B provides more protection to sensitive soils compared with Alternative A. **Table 3-32** shows the acreages of sensitive soils and the fluid mineral leasing allocations as percentages of the decision area.

For areas in the coal decision area, approximately 11,800 acres (5 percent of sensitive soils) would be acceptable for further consideration for coal leasing. Sensitive soils that overlap the acceptable areas would be vulnerable to erosion from surface disturbance. All the acceptable areas are within the three coal-producing counties.

Under Alternative B.1, 2,000 acres of sensitive soils would occur in the area acceptable for further consideration for coal leasing. All the acceptable areas are within the three coal-producing counties.

Table 3-32
Sensitive Soils and Fluid Mineral Leasing Allocations, Alternative B

Decision Area	Acres	Percentage of Decision Area
Sensitive Soils on BLM-administered subsurface, fluid mineral	187,200	38.2
Closed to fluid mineral leasing[1]	44,000	9.0
Open to fluid mineral leasing, subject to STC[1]	0	0
Open to fluid mineral leasing with mapped stipulation(s)[3]	143,200	29.3
Open to fluid mineral leasing, subject to NSO[1]	106,000	21.7
Open to fluid mineral leasing, subject to CSU[2]	143,200	29.3
Open to fluid mineral leasing, subject to TL[1]	102,500	20.9

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect the soil resources
[2] Indicates the allocation is designed to directly protect the soil resources
[3] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Under Alternative B, 43,906 acres of sensitive soils occur in areas that would be closed to leasing of NEL minerals. Additionally, 62,227 acres of sensitive soils in the areas would remain open to leasing of NEL minerals. No NEL mineral development is anticipated to occur in acres open to leasing.

Impacts on Badlands and Rock Outcrops

Under Alternative B, 500 acres (3 percent of badlands) occur in areas that would be unavailable for standard term livestock grazing leases. This means livestock grazing would not affect badlands in this area. For badlands in areas available for livestock grazing (16,100 acres, 97 percent of badlands in the BLM-administered surface decision area), the impacts from livestock grazing would be the same as those described under Alternative A.

Fuels treatments that remove vegetation on badlands would make these features more susceptible to slipping and erosion. Under Alternative B, 9,800 acres (59 percent of badlands) would occur in BCAs, which would be vulnerable to erosion from fuels treatments. These areas would also benefit in the long term from reduced fuel loads, which would likely reduce wildfire severity.

Compared with Alternative A, under Alternative B 16,600 more acres of badlands would occur in ROW exclusion areas, and no acres would occur in areas open to ROW authorization. This would decrease the potential for surface disturbance and erosion on badlands from ROWs.

For badlands in areas with mineral materials, 19,400 acres (67.1 percent of badlands) would be occur in areas closed to disposal, and 9,700 acres (32.9 percent of badlands) would occur in open areas. Impacts on badlands would be similar to those described under Alternative A. However, they would be less severe because 15,500 fewer acres would occur in areas open to mineral materials disposal.

For locatable minerals, 29,100 acres (100 percent of badlands) would occur in areas open to mineral entry. Impacts on badlands would be similar to those described under Alternative A.

Under Alternative B, 2,700 acres (5.6 percent of badlands) would be closed to fluid mineral leasing, and 45,500 acres (94.4 percent of badlands) would be in areas open to fluid mineral leasing with mapped stipulations, which can overlap. In this category, 45,500 acres (1.5 times larger or 27,600 more acres compared with Alternative A) would be subject to NSO 11-69 which prohibits surface occupancy and use on badlands and rock outcrops. This means that surface-disturbing impacts would be precluded in areas

with these features. In addition, 45,500 acres of badlands would be subject to CSUs, and 43,000 acres of badlands would be subject to TLs. This would not change the size of the area subject to TLs, but would be an increase in area subject to CSUs. Incidental protections of badlands could increase compared with Alternative A, depending on the requirements of the CSU. Alternative B would have 2,700 more acres of badlands in areas closed to leasing, and 1,000 fewer acres open to fluid mineral leasing subject to STC, compared with Alternative A. All 100 acres (100 percent) of rock outcrops would be open to leasing subject to NSO 11-69, and incidental CSU and TL stipulations. NSO 11-69 would provide direct protection by prohibiting surface occupancy and use on rock outcrops, incidental CSU stipulations may or may not provide protection to rock outcrops depending on the requirements of the CSU, incidental TL stipulations would be unlikely to provide protection from damage to rock outcrops. Compared with Alternative A, Alternative B would reduce surface disturbance and potential soil erosion on badlands and reduce potential damage to rock outcrops. **Table 3-33** shows the acreages of badlands and the fluid mineral leasing allocations as percentages of the fluid mineral decision area.

Table 3-33
Badlands[1] and Fluid Mineral Leasing Allocations, Alternative B

Decision Area	Acres	Percentage of Decision Area
Badlands on BLM-administered subsurface, fluid mineral	48,100	9.8
Closed to fluid mineral leasing[2]	2,700	0.6
Open to fluid mineral leasing, subject to STC[2]	0	0
Open to fluid mineral leasing with mapped stipulation(s)[4]	45,500	9.3
Open to fluid mineral leasing, subject to NSO[3]	45,500	9.3
Open to fluid mineral leasing, subject to CSU[2]	45,500	9.3
Open to fluid mineral leasing, subject to TL[2]	43,000	8.8

Source: BLM GIS 2021
[1] Impacts on rock outcrops would be negligible because there are only 100 acres in the fluid mineral decision area
[2] Acreages are incidental and not designed to directly protect the soil resources
[3] Indicates the allocation is designed to directly protect the soil resources
[4] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Under Alternative B, 8,600 acres (100 percent of badlands and rock outcrops in the BLM-administered subsurface coal potential decision area) occur in areas unacceptable for further consideration for coal leasing. Additionally, no badlands or rock outcrops occur in the three coal producing counties. These impacts would be the same under Alternative B.1.

Under Alternative B, 16,298 acres of badlands and 147 acres of rock outcrops occur in areas that would be closed to leasing of NEL minerals. Additionally, 12,625 acres of badlands in the areas would remain open to leasing of NEL minerals. No NEL mineral development is anticipated to occur in acres open to leasing.

Impacts on Prime Farmland

Under Alternative B, the BLM would require that surface-disturbing activities occurring on prime farmland be reclaimed to pre-disturbance soil conditions. This means that the long-term impacts on prime farmlands from the surface-disturbing activities mentioned above would be negligible.

Alternative C

Impacts on Steep Slopes

Under Alternative C, 6,800 acres (94.4 percent of steep slopes) occur in areas that would be available for livestock grazing, in addition to 400 acres (5.6 percent of steep slopes) in areas available that are currently unleased. No acres would be managed as unavailable for standard term livestock grazing leases. Impacts on soils on steep slopes would be the same as described under Alternative A.

Impacts on soils on steep slopes from wildfire and fuels management would be the same as those described under Alternative B.

Under Alternative C, as under Alternative A, no steep slopes would be exclusion areas for ROWs, though no steep slopes would be open to ROW authorizations (compared with 6,100 acres of steep slopes open to ROW authorizations under Alternative A). All steep slopes (7,200 acres) would be ROW avoidance. This would decrease the potential for surface disturbance and erosion of soils on steep slopes.

For areas with mineral materials under Alternative C, 5,800 acres (38.2 percent of steep slopes) would be in areas closed to disposal, and 9,300 acres (61.2 percent of steep slopes) would be in open areas. Impacts would be similar to those described under Alternative A. However, they would be less severe because 4,900 fewer acres would be in areas open to disposal than under Alternative A.

For areas with locatable minerals, 15,200 acres (100 percent of steep slopes) would be in areas open for entry. Impacts on sensitive soils would be similar to those described under Alternative A. However, they would be more severe than they would be under Alternative A because 400 more acres of sensitive soils would be in areas open to locatable mineral entry.

Under Alternative C, 28,900 acres (100 percent of steep slopes) would be in areas open to leasing, subject to mapped stipulations. These mapped stipulations, which can overlap, include 23,300 acres (80.3 percent of steep slopes) that would be subject to NSO stipulations, 28,800 acres (99.3 percent of steep slopes) subject to CSU stipulations, and 26,300 acres subject to TL stipulations. The NSO stipulations would help to avoid surface disturbance on steep slopes and provide protections from erosion. Controlled surface use stipulations under this alternative may or may not provide protection to steep slopes than depending on the requirements of the CSU. Under Alternative C, 13,000 more acres (an area 1.3 times larger than under Alternative A) of steep slopes would be subject to NSO and 28,300 more acres (an area 56.6 times larger than under Alternative A) would be subject to CSU stipulations. No acres would be in areas open and subject to STC, which would lessen the surface-disturbing impacts described under Alternative A. **Table 3-34** shows the acreages of steep slopes and the fluid mineral leasing allocations as percentages of the fluid mineral decision area.

Under Alternative C, there would be no multiple-use screen applied to slopes greater than 30 percent and covering more than 10 acres. While no screen specific to slopes would be applied, of the 27,700 acres of slopes greater than 30 percent covering more than 10 acres in the coal decision area, 23,000 acres (83 percent of steep slopes) would be unacceptable for further consideration for leasing. This is due to the applicability of the coal unsuitability criteria (Coal Screen 2) or application of other multiple-use criteria (Coal Screen 3). After application of the screening criteria 4,800 acres (17 percent of steep slopes) would remain acceptable for further consideration for leasing. Within the coal-producing counties where coal development is reasonably foreseeable, 1,000 acres (3.5 percent of steep slopes) would be acceptable for further consideration for coal leasing, and 300 acres (1 percent of steep slopes) would be unacceptable for consideration for coal leasing. Impacts would most likely be limited to the coal-producing counties.

Table 3-34
Steep Slopes (Greater than 30 Percent) and Fluid Mineral Leasing Allocations, Alternative C

Decision Area	Acres	Percentage of Decision Area
Steep Slopes on BLM-administered subsurface, fluid mineral	29,000	5.9
Closed to fluid mineral leasing[1]	0	0
Open to fluid mineral leasing, subject to STC[1]	0	0
Open to fluid mineral leasing with mapped stipulation(s)[2]	28,900	5.9
Open to fluid mineral leasing, subject to NSO[1]	23,300	4.8
Open to fluid mineral leasing, subject to CSU[1]	28,800	5.9
Open to fluid mineral leasing, subject to TL[1]	26,300	5.4

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect the soil resource
[2] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Under Alternative C, 5,823 acres of steep slopes occur in areas that would be closed to leasing of NEL minerals. Additionally, 9,348 acres of steep slopes in the areas would remain open to leasing of NEL minerals. No NEL mineral development is anticipated to occur in acres open to leasing.

Impacts on Sensitive Soils

Under Alternative C, 1,300 acres (3.9 percent) of sensitive soils occur in areas that would be unavailable for standard term livestock grazing leases. Similar to Alternative B, sensitive soils in areas unavailable to livestock grazing would not be affected. In addition, 2,400 acres (7.2 percent) of sensitive soils occurring in currently unleased areas would be available for livestock grazing. This means these areas, including those currently available for grazing (29,500 acres, 88.6 percent of sensitive soils in the BLM-administered surface decision area), would have the potential for the livestock grazing impacts on sensitive soils described under Alternative A.

Impacts on sensitive soils from wildfire and fuels management would be the same as those described under Alternative B. Surface disturbance from fuels treatments under Alternative C would affect 7,700 acres (23.3 percent of sensitive soils) in BCAs. Similar to Alternative B, these areas would expect to have less fuel loads and, therefore, less-severe wildfires over the life of the plan. This would minimize the severity of soil burning. Impacts on sensitive soils in the Schnell Ranch SRMA would be the same as described under Alternative B.

Under Alternative C, no sensitive soils would be open to ROW authorizations (compared with 19,700 acres open to ROW authorizations under Alternative A). All sensitive soils would be avoidance areas for ROWs, and a small portion (1,300 acres, 3.9 percent of sensitive soils) would be exclusion areas for above-ground ROWs. This would decrease the potential for surface disturbance and erosion on sensitive soils.

Impacts on sensitive soils from OHV use would be the same as those described under Alternative B.

Under Alternative C, 32,300 acres (30.4 percent of sensitive soils) in mineral materials areas would be in areas closed to disposal, and 73,800 acres (69.6 percent of sensitive soils) would be in areas that are open. Impacts would be similar to those described under Alternative A. However, they would be less severe than under Alternative A because 13,400 fewer acres would be in areas open to mineral materials disposal.

Under Alternative C, 106,100 acres (100 percent of sensitive soils) would be open to locatable mineral entry. Impacts on sensitive soils occurring in areas with locatable minerals would be similar to those described under Alternative A.

In the fluid leasable minerals decision area, 187,200 acres (100 percent of sensitive soils) would occur in areas open to leasing with mapped stipulations. These stipulations, which can overlap, include 114,100 acres (61.1 percent of sensitive soils) that would be open to leasing, subject to NSO stipulations, 187,200 acres (100 percent of sensitive soils) subject to CSU stipulations, and 133,700 acres (71.4 percent of sensitive soils) subject to TL stipulations. This is 38,500 more acres (a 51.3 percent increase over Alternative A) of area that would be subject to NSO stipulations, and 181,800 more acres (an area 33.6 times larger than in Alternative A) that would be subject to CSU stipulations. CSU 12-24 would be applied under this alternative and would protect sensitive soils by requiring approval of a reclamation plan prior to disturbance on sensitive soils. The plan must include reasons for not relocating activities to an area without sensitive soils. It also must demonstrate that soil productivity will be maintained, and surface runoff and erosion will be controlled. Larger NSO and CSU areas than under Alternative A could provide greater incidental protection for sensitive soils through avoidance or surface disturbance minimization. Under Alternative C, 5,400 more acres of sensitive soils than Alternative A would be open to fluid mineral leasing, subject to TLs which would offer some protections to sensitive soils if the limitation happened to coincide with dry or wet times of the year; limiting surface disturbance during these conditions would reduce wind or water erosion of disturbed soils. Zero acres would be open to fluid mineral leasing, subject to STC, providing more protection to sensitive soils compared with Alternative A. **Table 3-35** shows the acreages of sensitive soils and the fluid mineral leasing allocations as percentages of the fluid mineral decision area.

For areas in the coal decision area, approximately 553,600 acres would be acceptable for further consideration for coal leasing. Sensitive soils that overlap with this area (107,800 acres, 19.7 percent of sensitive soils) would be vulnerable to erosion from surface disturbance. Of the sensitive soils in the acceptable areas, 21,500 acres (74.5 percent of sensitive soils) are in the three coal-producing counties.

Under Alternative C, 32,312 (30.4 percent) acres of sensitive soils occur in areas that would be closed to leasing of NEL minerals. Additionally, 73,821 (60.6 percent) acres of sensitive soils in the areas would remain open to leasing of NEL minerals. No NEL mineral development is anticipated to occur in acres open to leasing.

Table 3-35
Sensitive Soils and Fluid Mineral Leasing Allocations, Alternative C

Decision Area	Acres	Percentage of Decision Area
Sensitive Soils on BLM-administered subsurface, fluid mineral	187,200	38.3
Closed to fluid mineral leasing[1]	0	0
Open to fluid mineral leasing, subject to STC[1]	0	0
Open to fluid mineral leasing with mapped stipulation(s)[3]	187,200	38.3
Open to fluid mineral leasing, subject to NSO[1]	114,100	23.4
Open to fluid mineral leasing, subject to CSU[2]	187,200	38.3
Open to fluid mineral leasing, subject to TL[1]	133,700	27.3

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect the soil resources
[2] Indicates the allocation is designed to directly protect the soil resources
[3] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Impacts on Badlands and Rock Outcrops

Impacts on badlands and rock outcrops from livestock grazing would be the same as those described under Alternative B.

Impacts on soils on badlands from wildfire and fuels management would be the same as those described under Alternative B. Fewer acres (3,100 acres) would be designated for BCA management, so surface disturbance from fuel treatments would be slightly less than for Alternative B.

Under Alternative C, no badlands would occur in areas open to ROW authorization; all badlands would be managed as ROW avoidance areas. This would decrease the potential for surface disturbance and erosion for soils on badlands compared with Alternative A.

Under Alternative C, 13,100 acres (45.3 percent) of badlands in mineral materials areas would be in areas closed to disposal, and 16,000 acres (54.7 percent of badlands) would be in areas that are open. Impacts would be similar to those described under Alternative A. However, they would be less severe than under Alternative A because 9,200 fewer acres would be in areas open to mineral materials disposal.

For badlands in areas with locatable minerals, 29,100 acres (100 percent of badlands) would be in areas open to entry. Compared with Alternative A, this would expose more badlands to surface disturbance and erosion loss.

Under Alternative C, 48,100 acres (100 percent of badlands) would be in areas open to fluid mineral leasing with mapped stipulations. These stipulations, which overlap, include 48,100 acres (100 percent of badlands) that would be open to fluid mineral leasing subject to NSO 11-69 which prohibits surface occupancy and use on badlands and rock outcrops, and the same acreage that would be subject to incidental CSU stipulations, as well as 46,200 acres (96.0 percent of badlands) that would be subject to TLs. NSO would protect badlands by preventing surface disturbance. CSU stipulations may or may not protect sensitive soils depending on the requirements of the CSU. Compared to Alternative A, Alternative C would provide an additional 32,200 acres with NSO stipulations and an additional 49,300 acres with CSU stipulations. No areas would be open to fluid mineral leasing, subject to STC under Alternative C, which would offer more protection to badlands, compared with Alternative A. The same acres of material underneath rock outcrops (100 acres, 100 percent of material underneath rock outcrops) as Alternative B would be in areas that are open to fluid mineral leasing with NSO 11-69 applied, and incidental CSU and TL stipulations. Impacts on rock outcrops in the fluid leasable minerals decision area would be the same as those described under Alternative B for each category of mapped stipulations. **Table 3-36** shows the acreages of badlands and the fluid mineral leasing allocations as percentages of the fluid mineral decision area.

Badlands and rock outcrops that occur in areas acceptable for further consideration for coal leasing (2,500 acres, 29.1 percent of the badlands and rock outcrops in the BLM-administered subsurface coal decision area) would be vulnerable to erosion from surface disturbance. However, these acres are outside the three coal-producing counties, so no impacts are expected.

Under Alternative C, 13,056 acres of badlands occur in areas that would be closed to leasing of NEL minerals. Additionally, 15,866 acres of badlands and 147 acres of rock outcrop areas would remain open to leasing of NEL minerals. No NEL mineral development is anticipated to occur in acres open to leasing.

Table 3-36
Badlands[1] and Fluid Mineral Leasing Allocations, Alternative C

Decision Area	Acres	Percentage of Decision Area
Badlands on BLM-administered subsurface, fluid mineral	48,100	9.8
Closed to fluid mineral leasing[2]	0	0
Open to fluid mineral leasing, subject to STC[2]	0	0
Open to fluid mineral leasing with mapped stipulation(s)[4]	48,100	9.8
Open to fluid mineral leasing, subject to NSO[3]	48,100	9.8
Open to fluid mineral leasing, subject to CSU[2]	48,100	9.8
Open to fluid mineral leasing, subject to TL[2]	46,200	9.4

Source: BLM GIS 2021
[1] Impacts on rock outcrops would be negligible because there are only 100 acres in the fluid mineral decision area
[2] Acreages are incidental and not designed to directly protect the soil resources
[3] Indicates the allocation is designed to directly protect the soil resources
[4] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Impacts on Prime Farmland

Impacts would be the same as those described under Alternative B.

Alternative D

Impacts on Steep Slopes

Impacts on soils on steep slopes from wildfire and fuels management and lands and realty management would be the same as those described under Alternative B. Impacts on soils on steep slopes from livestock grazing management would be the same as those described under Alternative C.

For areas with mineral materials, under Alternative D, 8,500 acres (56 percent of steep slopes) would be in areas closed to disposal, and 6,700 acres (44 percent of steep slopes) would occur in open areas. Impacts on steep slopes would be similar to those described under Alternative A. However, they would be less severe than under Alternative A because 7,500 fewer acres of steep slopes would be in areas open to disposal.

For areas with locatable minerals, 100 acres of steep slopes would occur in areas recommended for withdrawal from locatable mineral entry, and 15,100 acres (99 percent of steep slopes) would occur in areas open to locatable mineral entry. This would increase the potential surface disturbance on 400 more acres than under Alternative A.

Under Alternative D, 27,200 acres (94 percent of steep slopes) would occur in areas open to fluid mineral leasing, subject to mapped stipulations. Of these, with the possibility of overlap in some areas, 20,600 acres (71 percent of steep slopes) would occur in areas with NSO stipulations, 27,100 acres (93 percent of steep slopes) with CSU stipulations, and 25,000 (86 percent of steep slopes) with TL stipulations.

Under this alternative, 1,700 acres of steep slopes would be closed to fluid mineral leasing. The closure of 1,700 acres along with 10,300 more acres of NSO stipulations under Alternative D would provide more protection to steep slopes compared to Alternative A. The increase of 26,600 acres of incidental CSU stipulations may or may not provide more protection to steep slopes than Alternative A, depending on the requirements of the CSU. No acres would occur in areas open and subject to STC, which would lessen the potential for the impacts described under Alternative A. Areas open with TLs are reduced by 800 acres compared to Alternative A. These TLs exist

for the protection of other resources but might result in some protections if the limitation happened to coincide with dry or wet times of the year because limiting surface disturbance during these conditions would reduce wind or water erosion of disturbed soils. **Table 3-37** shows the acreages of steep slopes and the fluid mineral leasing allocations as percentages of the fluid mineral decision area.

Table 3-37
Steep Slopes (Greater than 30 Percent) and Fluid Mineral Leasing Allocations, Alternative D

Decision Area	Acres	Percentage of Decision Area
Steep Slopes on BLM-administered subsurface, fluid mineral	29,000	5.9
Closed to fluid mineral leasing[1]	1,700	0.3
Open to fluid mineral leasing, subject to STC[1]	0	0
Open to fluid mineral leasing with mapped stipulation(s)[2]	27,200	5.6
Open to fluid mineral leasing, subject to NSO[1]	20,600	4.2
Open to fluid mineral leasing, subject to CSU[1]	27,100	5.5
Open to fluid mineral leasing, subject to TL[1]	25,000	5.1

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect the soil resource
[2] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Under Alternative D, a multiple-use screen for coal for slopes greater than 30 percent and covering more than 10 acres would be applied. Therefore, 23,000 acres of slopes greater than 30 percent in the coal decision area would be unacceptable for further consideration for leasing. However, steep slopes that are not in connective areas greater than 10 acres could also be impacted. Impacts could occur on steep slopes if these areas are carried under future permits, due to split mineral estate. All 1,300 acres of slopes greater than 30 percent in the coal-producing counties would be unacceptable for further consideration for leasing.

Under Alternative D, 5,375 acres of steep slopes occur in areas that would be closed to leasing of NEL minerals. Additionally, 9,796 acres of steep slopes in the areas would remain open to leasing of NEL minerals. No NEL mineral development is anticipated to occur in acres open to leasing.

Impacts on Sensitive Soils

Impacts on sensitive soils from wildfire and fuels management, lands and realty management, and travel management would be the same as those described under Alternative B. Impacts on sensitive soils from livestock grazing management would be the same as those described under Alternative C.

Under Alternative D, 59,700 acres (56 percent of sensitive soils) in mineral materials areas would be in areas closed to disposal, and 46,400 acres (44 percent of sensitive soils) would be in areas that are open. Impacts would be similar to those described under Alternative A. However, they would be less severe than under Alternative A because 40,800 fewer acres would be in areas open to mineral materials disposal.

Under Alternative D, 105,200 acres (99 percent of sensitive soils) would be open to locatable mineral entry. Impacts on sensitive soils occurring in areas with locatable minerals would be similar to those described under Alternative A; however, Alternative D would have 4,400 more acres open to locatable mineral entry.

In the fluid leasable minerals decision area, 143,200 acres (76 percent of sensitive soils) would occur in areas open to leasing with mapped stipulations. Theses stipulations, which can overlap, include 82,700

acres (44 percent of sensitive soils) that would be open to leasing, subject to NSO stipulations, 143,200 acres (76 percent of sensitive soils) subject to CSU stipulations, and 105,600 (56 percent of sensitive soils) subject to TL stipulations. This is 7,100 more acres (a 9 percent increase over Alternative A) that would be subject to NSO stipulations, and 137,800 more acres (an area 26 times larger than in Alternative A) that would be subject to CSU stipulations. CSU 12-24 would be applied under this alternative and would protect sensitive soils by requiring approval of a reclamation plan prior to disturbance on sensitive soils. The plan must include reasons for not relocating activities to an area without sensitive soils. It also must demonstrate that soil productivity will be maintained, and surface runoff and erosion will be controlled. Larger NSO and CSU areas than under Alternative A could provide greater incidental protection for sensitive soils through avoidance or surface disturbance minimization. Under Alternative D, 22,700 fewer acres of sensitive soils than Alternative A would be open to fluid mineral leasing, subject to TLs which would fewer some protections to sensitive soils if the limitation happened to coincide with dry or wet times of the year; limiting surface disturbance during these conditions would reduce wind or water erosion of disturbed soils. Zero acres would be open to fluid mineral leasing, subject to STC, providing more protection to sensitive soils compared with Alternative A. **Table 3-38** shows the acreages of sensitive soils and the fluid mineral leasing allocations as percentages of the fluid mineral decision area.

Table 3-38
Sensitive Soils and Fluid Mineral Leasing Allocations, Alternative D

Decision Area	Acres	Percentage of Decision Area
Sensitive Soils on BLM-administered subsurface, fluid mineral	187,200	38.3
Closed to fluid mineral leasing[1]	44,000	9.0
Open to fluid mineral leasing, subject to STC[1]	0	
Open to fluid mineral leasing with mapped stipulation(s)[3]	143,200	29.3
Open to fluid mineral leasing, subject to NSO[1]	82,700	18.3
Open to fluid mineral leasing, subject to CSU[2]	143,200	29.3
Open to fluid mineral leasing, subject to TL[1]	105,600	21.6

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect the soil resources
[2] Indicates the allocation is designed to directly protect the soil resources
[3] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

For areas in the coal decision area, approximately 12,500 acres would be acceptable for further consideration for coal leasing. Sensitive soils that overlap the acceptable areas would be vulnerable to erosion from surface disturbance. All the acceptable areas are within the three coal-producing counties.

Under Alternative D, 34,311 acres of sensitive soils occur in areas that would be closed to leasing of NEL minerals. Additionally, 71,822 acres of sensitive soils in the areas would remain open to leasing of NEL minerals. No NEL mineral development is anticipated to occur in acres open to leasing.

Impacts on Badlands and Rock Outcrops

Impacts on badlands and rock outcrops from livestock grazing management and fuels treatments under Alternative D would be the same as those described under Alternative A.

Compared with Alternative A, under Alternative D 400 more acres of badlands would occur in ROW exclusion areas, and no acres would occur in areas open to ROW authorization. This would decrease the potential for surface disturbance and erosion on badlands.

For badlands in areas with mineral material decision area, 16,700 acres (57 percent of badlands with BLM-administered mineral materials) would occur in areas closed to mineral material disposal. Impacts on badlands would be similar to those described under Alternative A. However, they would be less severe because 12,900 fewer acres of badlands would be open to mineral materials disposal.

For locatable minerals, 28,600 acres (100 percent of badlands with BLM-administered locatable mineral estate) would occur in areas open to mineral entry. Impacts on badlands would be similar to those described under Alternative A.

Under Alternative D, 2,700 acres (5.6 percent of badlands) would be closed to fluid mineral leasing, and 45,500 acres (94.4 percent of badlands) would be in areas open to fluid mineral leasing with mapped stipulations, which can overlap. In this category, 45,500 acres (27,600 more acres compared with Alternative A) would be subject to NSO 11-69 which prohibits surface occupancy and use on badlands and rock outcrops. This means that surface-disturbing impacts would be precluded in areas with these features. In addition, 45,500 acres of badlands would be subject to CSUs, and 43,800 acres of badlands would be subject to TLs. This would slightly decrease the size of the area subject to TLs, but would be a large increase in area subject to CSUs when compared to Alternative A. Incidental protections of badlands could increase compared with Alternative A, depending on the requirements of the CSU. Alternative D would have 2,700 more acres of badlands in areas closed to leasing, and 1,000 fewer acres open to fluid mineral leasing subject to STC, compared with Alternative A. All 100 acres (100 percent) of rock outcrops would be open to leasing subject to NSO 11-69, and incidental CSU and TL stipulations. NSO 11-69 would provide direct protection by prohibiting surface occupancy and use on rock outcrops, incidental CSU stipulations may or may not provide protection to rock outcrops depending on the requirements of the CSU, incidental TL stipulations would be unlikely to provide protection from damage to rock outcrops. Compared with Alternative A, Alternative D would reduce surface disturbance and potential soil erosion on badlands and reduce potential damage to rock outcrops. **Table 3-39** shows the acreages of badlands and the fluid mineral leasing allocations as percentages of the fluid mineral decision area.

Table 3-39
Badlands[1] and Fluid Mineral Leasing Allocations, Alternative D

Decision Area	Acres	Percentage of Decision Area
Badlands on BLM-administered subsurface, fluid mineral	48,200	9.9
Closed to fluid mineral leasing[2]	2,700	0.6
Open to fluid mineral leasing, subject to STC[2]	0	0
Open to fluid mineral leasing with mapped stipulation(s)[4]	45,500	9.3
Open to fluid mineral leasing, subject to NSO[3]	45,500	9.3
Open to fluid mineral leasing, subject to CSU[2]	45,500	9.3
Open to fluid mineral leasing, subject to TL[2]	43,800	9.0

Source: BLM GIS 2021
[1] Impacts on rock outcrops would be negligible because there are only 100 acres in the fluid mineral decision area
[2] Acreages are incidental and not designed to directly protect the soil resources
[3] Indicates the allocation is designed to directly protect the soil resources
[4] Stipulations overlap in some areas so the total of the separate stipulations may be greater than the total for this category

Under Alternative D, 8,600 acres (100 percent of badlands and rock outcrops in the BLM-administered subsurface coal potential decision area) occur in areas unacceptable for further consideration for coal leasing. Additionally, no badlands or rock outcrops occur in the three coal producing counties.

Under Alternative D, 11,648 acres of badlands occur in areas that would be closed to leasing of NEL minerals. Additionally, 17,275 acres of badlands and 147 acres of rock outcrop areas would remain open to leasing of NEL minerals. No NEL mineral development is anticipated to occur in acres open to leasing.

Impacts on Prime Farmland

Impacts under Alternative D would be the same as those described under Alternative B.

Cumulative Impacts

The cumulative impacts analysis area for sensitive soils, soils on steep slopes, badlands, and rock outcrops is restricted to the planning area. Cumulative impacts could also occur for subsurface soils where drilling occurs. Vegetation treatments to reduce hazardous fuels would continue through the life of the RMP and would likely increase if drought conditions persist. Prescribed fire and wildfire temporarily remove vegetation and can increase soil erosion.

Wildfires would continue to bring the risk of burning hot enough to kill soil organisms and root systems. This would result in long-term effects of diminished plant recruitment and growth rates and could result in soil erosion if rain were to fall shortly after the fire. The use of vehicles and heavy equipment to suppress wildfires can disturb the soil surface, concentrate surface runoff, and increase soil erosion.

Livestock grazing is expected to continue through the life of the RMP. This would contribute to vegetation removal and lead to increased soil erosion. Continued management to meet the Dakotas' standards and guidelines for rangeland health would continue to prevent undue degradation on BLM-administered soil resources from livestock grazing.

Soils throughout the planning area would continue to be at risk from surface-disturbing development, including infrastructure, recreational and residential developments, ROWs, renewable energy projects, agricultural land conversion, and other mineral or energy projects. While BLM management decisions in this document and associated activities may not significantly contribute GHG emissions relative to global emissions, implementation of management decisions could exacerbate local climate change impacts in some cases. For example, activities that disrupt soil may exacerbate soil erosion already worsened by increased periods of drought and heavier rainfall.

Soils may be contaminated from hazardous materials spills, which are noted in **Appendix I, Table I-1**. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

While climatic changes would continue to impact soil resources, no additional impacts resulting from this plan are anticipated to alter the anticipated soil degradation trajectory (for example, soil erosion), erratic precipitation events, and impacts on sensitive soils, as described under **Section 3.2.2**, *Affected Environment*. The BLM would design projects to minimize soil loss and would not authorize surface-disturbing activities in areas where erosion cannot be effectively controlled or mitigated. The BLM would also reclaim disturbed soils according to the reclamation standards in **Appendix E**.

The oil and gas RFD (BLM 2022a) estimates that 43,000 oil and gas production and support wells could be drilled in the planning area from 2020 through 2040, with an estimated surface disturbance of 56,000 acres. The coal RFD (BLM 2022b) estimates that coal development would disturb 9,434 acres (or 7,766

acres under Alternative B.1) from existing and pending leases through the end of 2040. The mineral materials RFD (BLM 2022c) estimates that mineral materials development would disturb 40 acres per year. Minerals management under Alternative A, combined with past, present, and reasonably foreseeable actions, would continue to have a slightly larger impact on soils in the planning area compared with Alternatives B, C, and D. Since the fluid mineral decision area and the coal decision area comprise approximately 10 percent of the planning area, impacts on soils in the cumulative impacts analysis area would be largely influenced by management on non-BLM-administered lands.

Cumulative impacts from mineral development would be reduced under Alternatives B and D due to the increased closures and stipulations that would be applied to protect soils. Cumulative impacts from mineral development under Alternative C would be slightly greater than those described for Alternatives B and D, because fewer acres would be closed or managed with stipulations.

3.2.3 Water Resources

Issues

- How would management actions affect water quality and quantity in the planning area?
- How would the alternatives ensure water quality standards in the planning area are met?
- How would management actions affect the health of springs, seeps, and intermittent streams?
- How would surface-disturbing activities such as energy and mineral development under the alternatives affect surface water, groundwater, and wetland and riparian function?

Affected Environment

Surface water features in the planning area flow ultimately into either the Missouri River in the western and central portions of North Dakota or the Hudson Bay in eastern North Dakota. Major rivers include the Missouri, Yellowstone, Little Missouri, Knife, Heart, James, Red, Souris, Sheyenne, and Cannonball Rivers (see **Map 3-4**, Major Rivers and Waterbodies, in **Appendix A**). The Missouri is the largest river in North Dakota and accounts for 80 percent of the total mean streamflow in the state. The flow in all streams varies seasonally, with the greatest runoff in early spring. There are more perennial streams in eastern North Dakota due to greater rainfall combined with snowmelt. North Dakota has approximately 89,494 miles of rivers and streams, including 5,900 miles of perennial streams. North Dakota contains 1,797,800 acres of waterbodies, including 807,000 acres of perennial lakes and 317,000 acres of reservoirs.

Ephemeral streams also occur and provide ecological and hydrological functions, such as moving water, nutrients, and sediment throughout the watershed; providing hydrological connections; dissipating stream energy; providing groundwater recharge and discharge; and providing wildlife habitat (Levick et al. 2008).

Medium, high, and very high fluid mineral development potential occurs primarily in the western portion of North Dakota. This is where the vast majority of oil and gas development would occur during the next 20 years (BLM 2022a).

The primary surface water features in the decision area are the Missouri River, which generally flows east and then gradually turns and flows south, with the Yellowstone and Little Missouri Rivers entering from the south. Lake Sakakawea is the third-largest manmade reservoir in the country and is located along the Missouri River within the area of likely development (Horner et al. 2016). A hilly, upland area (the prairie pothole region) located north of Lake Sakakawea includes a nonintegrated drainage pattern that is characterized by many small lakes and wetlands with few streams flowing through (Thamke et al. 2014). This disconnected system does not typically contribute streamflow to a major river system (Bartos et al.

2022). **Table 3-40** includes perennial and intermittent streams, lakes or ponds, and reservoirs within the fluid mineral decision area.

Table 3-40
Water Resources Within the Fluid Mineral Decision Area

Water Resource	Amount
Perennial Streams	100 miles
Intermittent Streams	1,200 miles
Lakes or Ponds	8,900 acres
Reservoirs	1,800 acres

Source: BLM GIS 2021

Groundwater is more evenly distributed throughout the state than surface water. The principal aquifers are regionally extensive and are typically deeper bedrock systems (see **Map 3-5**, Principal Aquifers, in **Appendix A**). The three uppermost principal aquifer systems in the oil and gas development potential area are the glacial, lower Tertiary, and upper Cretaceous aquifer systems (Bartos et al. 2022). These aquifers are as deep as 3,000 feet at the center of the basin and overlie shale that serves as a barrier to underlying saline aquifers (Thamke et al. 2018). Water from these three aquifers is relatively fresh and potable (Thamke et al. 2014). The aquifers are primarily recharged from precipitation and infiltration from streams and reservoirs (Thamke et al. 2018).

The surficial aquifer system contains productive buried sand and gravel aquifers that are the source of water for thousands of shallow wells that yield smaller quantities of water. These aquifers are characterized by disconnected local flow systems (Thamke et al. 2014) and generally are not large enough for commercial uses, but they are adequate for domestic and livestock uses and cheaper to drill than the principal aquifers. Most of surficial aquifers have excellent water quality and are extremely important locally, but are more sensitive to overuse, climate change, and contamination. Groundwater is virtually the sole source of all water used by farm families and residents of small communities that have no public water distribution system (NDDOH 2018). Over the oil and gas development potential area, there are 120,100 acres of surficial aquifers (see **Map 3-6**, Surficial Aquifers, in **Appendix A**; BLM GIS 2021).

Surface water and groundwater in the planning area are used for irrigation, municipalities, industry, water depots (includes hydraulic fracturing), and rural purposes (Dieter et al. 2018). Water is primarily used for irrigation, livestock use, thermoelectric power,[22] and the public supply (Dieter et al. 2018). The oil and gas development potential area is primarily rural; residents rely on a mixture of surface and groundwater for domestic use depending on the county (EPA 2016b). During 2020, hydraulic fracturing accounted for 4.3 percent of consumptive water use in North Dakota (NDWR 2022).

Industry uses a significant amount of water, mostly for oil and gas hydraulic fracturing and dust suppression. Historically, groundwater from the glacial, upper Tertiary, and lower Cretaceous aquifer systems supplied a majority of water needed for oil and gas development in the area, but concerns over limited groundwater supplies led to limits on the number of groundwater withdrawal permits issued (NDSWC 2010). Much of the water used for hydraulic fracturing is sourced from public or private water distribution sites, known as water depots, and trucked to the well site. These depots can source their water from groundwater or surface water; however, the only reliable source of surface water in the area is the Missouri River System including Lake Sakakawea. Apart from the Missouri River System, regional surface

[22] Electric power generated from burning fossil fuel-coal or oil, or indirectly through devices like steam turbines.

waters including smaller streams do not provide a consistent supply of water due to seasonal stream flow variations (EPA 2016b; Horner et al. 2016).

During early development of the Bakken and Three Forks Formations (2006-2010), the availability of water was a key concern due to the limited number of water depots. These concerns have abated somewhat due to the development of water supply pipelines in western North Dakota. Three major pipeline projects were built to provide water for municipal and domestic use, but the extra pipeline capacity has provided a water supply resource for the oil and gas industry. In addition, the number of water depots in the area expanding rapidly from 2006 to 2014 providing a network of water sources to reduce transport distances and costs (Kurz et al. 2016).

When oil production first began in the Bakken and Three Forks Formations, groundwater from the glacial, lower Tertiary, and upper Cretaceous aquifers supplied the bulk of water needed for development. However, concerns over limited groundwater supplies led to limits on the number of new groundwater withdrawal permits starting around 2010 (NDSWC 2010). Many farms, ranches, and some communities in western North Dakota rely on these wells particularly in remote areas; maintaining flow for users is a concern for the state (NDSWC 2010).

In 2011, North Dakota authorized the Western Area Water Supply Project, which uses Missouri River water to help meet water demands in the area including for municipal use and oil and gas development. After much discussion, the US Army Corps of Engineers made water available from Lake Sakakawea for municipal and industrial water demands including approximately 8.8 billion gallons of water annually for oil and gas operations. For context, annual water use for hydraulic fracturing in all North Dakota counties combined was approximately 2.2 billion gallons per year in 2011 and 2012 (EPA 2016b). The Western Area Water Supply Project will serve up to 160,000 residents upon completion. Two other water pipelines were developed in the oil and gas development potential area, the Southwest Pipeline Project which serves 56,000 people, and the Northwest Area Water Supply Project, which will serve 81,000 people. These two water pipelines provide additional water sources for oil and gas development in the area (Kurz et al. 2016).

As per North Dakota's permitting process outlined in N.D.C.C. Chapter 61-04, permitted water users are annually allocated a specific volume of water from a specific source, such as an aquifer or surface water source. Users are allowed to use up to the permitted amount, but no more. Metering and periodic monitoring are conducted for all industrial water uses. In the case of water use related to hydraulic fracturing, a process has been developed to provide more frequent measurements for monitoring and metering through onsite remote telemetry. When water use exceeds what has been permitted or conditions of the water permits have been violated, the state of North Dakota has the authority to assess fines and penalties in order to discourage such actions in the future. Further, if a user exceeds their allocated amount in a given year, the amount of overage is subtracted from their available amount the following year.

Nonpoint source pollution—siltation and sedimentation—are the primary causes of aquatic life use impairment. Another main source of pollution is fecal coliforms, including *Escherichia coli* (*E. coli*). Water temperatures in the planning area are increasing due to the loss of riparian vegetation. For lakes and reservoirs, one of the primary causes of aquatic life impairment is low dissolved oxygen in the water column (NDDOH 2018). In areas of medium, high, or very high development potential, there are 34 miles of streams listed as 303(d) impaired waters (BLM GIS 2021).

As described in **Section 3.2.1**, above, and Section 2.1 of the AMS (BLM 2020b), climate change has caused an increase in temperatures, precipitation, and the risk of flooding. Also, wildfires are projected to increase

in midsummer through early fall. High interannual variability in water availability may lead to an increase in droughts (USGCRP 2018).

Climate models predict a long-term increase in temperature and precipitation. Temperature is one of the primary causes of stream impairment. Higher temperatures combined with an expected increase in the occurrence and severity of wildfires, the effects of drought, and the removal of vegetation from surface-disturbing activities, could raise stream temperatures and alter their physical characteristics. In addition, a decrease is anticipated in the snowpack, which provides water to perennial streams and to intermittent streams in spring and summer. This, combined with rising temperatures, could affect water availability during warmer months when water demand is highest. An increase in precipitation during these months may somewhat mitigate these issues by contributing to a short-term increase in streamflow. However, increased flooding and changes in streamflow may destabilize streambanks, cause erosion, and reduce the ability to filter nutrients, pollutants, and sediments.

Additional information is available in Section 2.3, Water Resources, of the AMS (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

The allocation of lands open to fluid mineral development or offering the parcels for lease would have no direct impact on surface or groundwater resources. Any potential effects on water from the sale of lease parcels would occur at the time the leases are developed (at the application for permit to drill [APD] stage) and could be both short and long term. These effects would be addressed on a site-specific basis in subsequent analyses.

Effects from fluid mineral development would result from exploration and development, requiring the construction of roads, pipelines, pads, and facilities. Water resources could be affected by the removal of vegetation, soil compaction, and soil disturbance, which result in accelerated erosion, increased overland flow, decreased infiltration, increased water temperature, channelization, and water quality degradation associated with increased sedimentation, turbidity, nutrients, metals, and other pollutants. The magnitude of these impacts would depend largely on the specific activity, season, proximity to waterbodies, location in the watershed, density of development, hydrogeologic characteristics of the affected area, effectiveness of mitigation, time until reclamation success, and characteristics of any hydrologically connected aquifers.

Adherence to applicable regulations (that is, 43 CFR 3171, 43 CFR 3172, and 43 CFR 3177) and stipulations regarding steep slopes, erosive soils, streams, waterbodies, floodplains, and wetlands would all minimize impacts that could be associated with future development. Stipulations for fluid mineral leasing (**Appendix B**), design features and BMPs (**Appendix D**), and any project-specific mitigation measures for surface-disturbing activities would likely reduce the effects on water resources associated with authorized land uses or activities such as oil pad, road, pipeline, and power line construction; mineral development; range improvements; and recreation. Design features, BMPs, and mitigation measures would reduce the likelihood of the removal of essential soil-stabilizing agents, erosion and sedimentation, and contamination from spills and hazardous waste.

While the acres available for mineral materials disposal and fluid mineral leasing (and applicable stipulations) vary by alternative, the reasonably foreseeable surface disturbance under all alternatives would be not be expected to degrade water resources from sediment runoff (see **Section 3.1.1**). Similarly, while much of the federal mineral estate is available for locatable mineral development and NEL mineral development, such development is not reasonably foreseeable. Therefore, no impacts are expected under

any of the alternatives. If development were to occur, it could result in slight impacts on water quality from sediment related to soil disturbance, or water quantity from use for in-situ recovery systems. Any development proposal on federal minerals would require project-specific NEPA analysis and will operate according to all rules and regulations stipulated by federal and state agencies.

Mitigating resource impacts so that they result in slight short-term impacts and little to no long-term impacts is the BLM's objective while permitting a project. Therefore, requiring a reclamation plan (see **Appendix E**, Reclamation Standards) for all surface-disturbing activities across all alternatives would stabilize disturbed areas in the short term and stabilize landscapes in the long term. This would reduce potential effects on water resources from erosion and sedimentation.

Managing BLM-administered lands to prevent contamination with hazardous substances would reduce the risk of spills and contamination into waterways associated with hazardous waste disposal or landfill facilities.

The BLM would continue to develop site-specific objectives and management strategies for riparian areas and wetlands during the development and implementation of proposed actions and activity plans. These objectives and strategies, such as establishing parameters for the location and timing of surface disturbances, would minimize opportunities for degrading riparian areas and wetlands.

Impacts from Hydraulic Fracturing

The use of horizontal drilling technology and hydraulic fracturing for well stimulation is estimated to occur as part of the oil and gas development in the planning area; an estimated 322 billion gallons of water would be required for drilling and fracturing new wells under all alternatives over the next 20 years (BLM 2022a). Based on the oil and gas RFD, the probable fluid mineral development scenario for the planning area is the continued use of horizontal, unconventional wells primarily into the Bakken and Three Forks Formations. This has been the predominant development scenario for the last 10 years and will likely continue if oil prices rise (BLM 2022a). The Bakken and Three Forks Formations are all greater than 8,000 feet deep, while all the water wells used for consumptive use are shallower than 2,000 feet deep. The shale that underlies the aquifers provides an impermeable layer that separates the aquifers from the Bakken and Three Forks Formations (Thamke et al. 2018). Between the water wells and oil-producing horizons are layers of Cretaceous sands that are often used for saltwater disposal wells. While there is sufficient vertical separation between existing groundwater wells and horizontal wells to make vertical fracture growth between the two zones highly unlikely, the higher permeability sands between the two zones makes the vertical propagation of hydraulic fluid past this zone even less likely.

Contamination of groundwater aquifers could occur through faulty casing installations. Both the state of North Dakota and the BLM include requirements for casing, tubing, and cementing (ND Administrative Code 43-02-03 and BLM Onshore Orders [43 CFR 3160]). In addition, the BLM issued a regulatory rule focused on hydraulic fracturing that works in tandem with existing BLM programs to assess the casing of wells, monitor the casings of wells, and take corrective actions when needed (43 CFR 3162.3-3(a)). The NDFO protects groundwater resources through stipulations and site-specific condition of approvals for drilling, completions, and fluids management that greatly reduce the potential for contamination of groundwater aquifers.

Due to the distance between the groundwater aquifers used for water in the area, the impermeable shale layer between the aquifers and Bakken and Three Forks Formations, and the regulations and monitoring

programs in place for the state of North Dakota and the BLM, no effects are anticipated on groundwater quality under all alternatives from drilling and completion of wells.

As described above, an estimated 322 billion gallons of water would be required for drilling and fracturing new wells under all alternatives (BLM 2022a). Additional water would be required for maintenance of the wells since wells in the Bakken Formation require more maintenance water than other shale fields (Horner et al. 2016). In the Bakken and Three Forks Formations, the majority of water comes from fresh surface or groundwater; no saline water sources were used (EPA 2015).

The most reliable source of surface water in the area of likely development is the Missouri River System including Lake Sakakawea. When development first started in the region, withdrawals from Lake Sakakawea were limited by the US Army Corps of Engineers. In 2012, the US Army Corps of Engineers released water from Lake Sakakawea for municipal and industrial water demands including approximately 8.8 billion gallons of water annually for the oil and gas industry, which appears to be adequate to meet water demands of hydraulic fracturing in the region (EPA 2016b). However, water is typically transported by truck from the water depots to the well sites, so operators tend to acquire water from nearby sources when possible.

In 2022, the highest water use counties for oil and gas development were Williams, Mountrail, Dunn, and McKenzie Counties, which accounted for 94 percent of industrial/water depot use in western North Dakota. Industrial/water depot use made up the highest proportion of use in Dunn (83.7 percent of all use), Mountrail (83.2 percent), Golden Valley (45.0 percent), and Williams Counties (31.4 percent) (NDWR 2023). Hydraulic fracturing accounted for more than 10 percent of total water use for these counties in 2010 with Mountrail and Dunn Counties showing the highest percentages (36 and 29 percent, respectively; EPA 2016b).

Over the life of the RMP, North Dakota will continue to permit water to develop water permits as state law dictates. The BLM follows North Dakota regulations on water quality, as well as water rights and water use. Wells located away from Lake Sakakawea may rely on local water sources including surficial aquifers and surface water features, which are more susceptible to drought and seasonal availability. North Dakota's Department of Water Resources permits water to allow for the development of industrial uses without compromising domestic or municipal water supplies.

For the oil and gas development potential area, the potential for impacts on water quantity appears to be low. This is due to sustainable water availability from Lake Sakakawea, pipeline projects constructed in the last eight years that will continue to expand, and development of water depots across the majority of the area of development (EPA 2016b).

Impacts from Disposing of Produced Water

Wastewater production per well in the Bakken Formation has increased over time and includes more water than other shale plays in the United States and tends to be among the most saline. Wastewater is primarily disposed through deep-well injection. This involves pumping the wastewater back underground into depleted oil formations or deep saline water reservoirs. As of 2016, more than 400 saltwater disposal wells were operating in North Dakota (Horner et al. 2016).

Due to the wastewater’s very high salinity, no wastewater is recycled during normal operations and is not likely to occur during the next 20 years. Any recycling effort would be energy intensive and expensive opposed to the relative cost effectiveness of deep-well injection (Horner et al. 2016). In addition, there are

readily available freshwater supplies for use during hydraulic fracturing, so recycled water would not be an economically viable option (Kurz et al. 2016).

Operators typically transport the wastewater to injection well sites. There is the risk of accidental spills during this operation either at the well or injection site or during transport by either truck or pipeline. Pipeline leaks or truck accidents have resulted in wastewater spills that could impact surface water bodies or shallow aquifers including drinking water sources (Shrestha et al. 2016).

As opposed to other oil and gas fields, induced seismicity is not a concern in the planning area. Current science indicates that earthquakes originate from faults in deeper and older formations than the injection wells used in the planning area. In addition, the state of North Dakota has implemented rules to help ensure that fluids are not injected near known or suspected faults, that wells are properly constructed to prevent the migration of fluids, and that seismic monitoring would occur at particular sites, if necessary (Kurz et al. 2016).

Alternative A

Potential impacts associated with current management practices and activities from all forms of mineral leasing and development include sediment input and turbidity, resulting in the degradation of water quality, the alteration and loss of floodplain function, and changes in natural drainage patterns. NSO, CSU, and TL stipulations would also provide protections by minimizing surface disturbance; however, impacts on surface water and groundwater resources could occur from underground activities.

Potential energy and mineral development impacts are related to the construction of, excavation of, and repeated access to roads and developed areas, which result in soil erosion and transport. Also, impacts are related to the potential release of chemical pollutants into area ponds, streams, tributaries, or unconfined aquifers. When drainage patterns are altered, the runoff critical to recharging and sustaining the locally important aquifers; springs, seeps, and fens; wetlands; and associated riparian habitats is redirected elsewhere. As a result, these sensitive areas can be dewatered, and the water table can be lowered, thereby compromising vegetation health and vigor, while also degrading the proper function and conditions of the watershed (see **Section 3.2.4**, Vegetation Communities).

Similarly, there are potential impacts from transportation, ROWs, recreation, and livestock grazing. Travel across land results in vegetation loss and soil compaction, which can lead to soil erosion and increased sediment flow into waterways. Travel by vehicle also increases the presence of petroleum-using vehicles and equipment on the land, which increases the likelihood of chemical spills that could contaminate surface waters through runoff. Management approaches that designate travel on specified routes can result in more predictable, localized, and manageable impacts. Selectively locating, changing, and eliminating travel routes travel routes away from water resources can minimize the extent of these effects.

Most recreation on BLM-administered lands is dispersed and associated with hunting. It includes walking and vehicle use (limited to existing roads and trails). Recreational use of this type results in minor amounts of vegetation loss, soil compaction, and soil erosion, which could incidentally impact water resources by increasing the sediment load and possible chemical contamination. Management approaches that direct recreation to specific areas and avoid dispersed recreation can result in more predictable, localized, and manageable impacts.

Lands and realty management decisions affect where ground-disturbing activities can and cannot occur. ROW exclusion and avoidance areas may limit the amount of human-made runoff of soils into waterways

within those areas if best management practices are not used. ROW exclusion and avoidance areas also reduce the likelihood of chemical spills onto the ground from product, fracturing fluid, or produced water pipelines, which can then sink into the earth and contaminate groundwater. However, in the event of a spill or release of hydraulic fracturing chemicals or fluids, lessees and operators are obligated by the standard terms of the ROW grant to report, respond to, and mitigate the spill or release. ROW exclusion areas can protect water resources from impacts associated with surface disturbance such as sediment flow into nearby waterways, but they may also hinder development of critical infrastructure projects, such as water pipelines, in the state.

Activities that improve surface water resources are primarily defined as enhancing or restoring degraded surface water quality or avoiding surface disturbance near areas with degraded surface water quality. Road maintenance that includes installing stormwater controls and replacing improperly sized and designed culverts benefits the surface water resources. Changing livestock grazing patterns in riparian areas and modifying recreation uses in sensitive watersheds further benefit the surface water quality and geomorphic function of streams.

Under Alternative A, there would be no change to the potential for impacts on water resources resulting from locatable mineral development, mineral materials disposal, fluid mineral development, NEL leasing, livestock grazing, recreation, ROWs, or ACECs. The location of selected sensitive water resources (SWPAs; waterbodies; intermittent, perennial, and ephemeral streams; and 303(d)-listed impaired streams[23] and water wells) were intersected with the location of current and proposed BLM management activities to compare alternatives; however, the selected sensitive water resources do not account for the full range of impacts on water resources that may occur.

The ongoing development of coal is anticipated to continue. The list of acceptable and unacceptable areas for further consideration for coal leasing in the 1988 RMP are listed in **Table 2-2** in **Chapter 2**. Where there is overlap with acceptable to coal leasing areas, the potential impacts on water resources would be related to the construction of, excavation of, and repeated access to mining areas, roads, and developed areas, which result in soil erosion and transport. Also, impacts would be related to the potential release of chemical pollutants into area ponds, streams, tributaries, and/or unconfined aquifers.

There are 417 North Dakota designated SWPAs totaling 366,200 acres in the planning area. Within these SWPAs, 2,100 acres of BLM-administered mineral estate would remain open for locatable mineral entry and mineral materials disposal. Within the SWPAs, 500 acres of lands are available for livestock grazing and open to ROWs.

The subsurface decision area for locatable minerals and mineral materials totals 362,600 acres. Within these lands, 318,100 acres would remain open to mineral materials disposal; these include 10,200 acres where waterbodies are present. Of the subsurface decision area for locatable minerals and mineral materials, 44,500 acres would remain closed to mineral materials disposal, including 200 acres where waterbodies are present. Intermittent, perennial, and ephemeral streams present within the open mineral materials disposal area total 604 river or stream miles. There are 223 miles of streams in areas closed to mineral materials disposal. Locatable mineral entry would remain open on 354,900 acres, which would include 806 miles of streams and 8,900 acres where waterbodies are present. A total of 7,700 acres throughout the decision area would remain not open to locatable mineral entry because they are existing segregations without a valid

[23] Waters are assessed as impaired when an applicable water quality standard is not being attained. The state of North Dakota is required to identified impaired waters every 2 years.

opening order; this includes 21 miles of streams and 1,300 acres of waterbodies. Lands open to NEL mineral leasing contain 604 miles of streams and 10,000 acres of waterbodies; 223 miles of streams and 200 acres of waterbodies would remain closed to NEL mineral leasing.

Under Alternative A, 492,000 acres would remain open to fluid mineral leasing. Intermittent, perennial, and ephemeral streams present within these areas would continue to be subject to NSO, CSU, TL stipulations that are incidental protections from NSO-11-33. This stipulation would continue to prohibit surface occupancy and use within 200 feet of wetlands, lakes, and ponds. See **Table 3-41**.

Table 3-41
Water Resources and Fluid Mineral Leasing Allocations under Alternative A

Stipulation	Miles
Intermittent streams, BLM-administered subsurface, fluid mineral[2]	1,238
Closed to fluid mineral leasing[1]	0
Open to fluid mineral leasing, subject to NSO[1]	1,230
Open to fluid mineral leasing, subject to CSU[1]	1,238
Open to fluid mineral leasing, subject to TL[1]	654
Perennial streams, BLM-administered subsurface, fluid mineral[2]	71
Closed to fluid mineral leasing[1]	0
Open to fluid mineral leasing, subject to NSO[1]	71
Open to fluid mineral leasing, subject to CSU	71
Open to fluid mineral leasing, subject to TL[1]	20

Source: BLM GIS 2021
[1] Mileages are incidental and not designed to directly protect the water resource, except for the NSO stipulations for floodplains of the Yellowstone and Missouri Rivers which are designed to directly protect the water resource.
[2] Stipulations overlap in some areas so total miles of stipulations, if added together, may be greater than stream miles

Livestock grazing would continue to be available on 58,500 acres, which include 237 miles of streams and 400 acres of waterbodies. ROW avoidance areas would continue on 175 stream miles, and 62 miles would be in areas that would continue to be open to ROW authorization.

Lands containing 28 river miles of 303(d)-listed impaired streams would continue to be open to disposal of mineral materials and 2 river miles of 303(d)-listed impaired streams would continue to be open to locatable mineral entry. Livestock grazing would continue on lands that include 2 miles of 303(d)-listed impaired streams.

There are 223 water wells in areas open to locatable mineral entry, and 8 wells in areas not open to locatable mineral entry (acquired minerals). Mineral materials disposal would remain available in areas where there are 230 water wells. NEL mineral leasing would be open where there are 228 water wells and closed where there is 1 water well. Less than 10 wells are in areas where livestock grazing is available and ROW avoidance and exclusions are present. Recreation areas are not applicable to Alternative A, and ACECs and fluid mineral leasing allocations do not overlap water wells (BLM GIS 2021).

Alternative B

The nature and type of potential impacts under Alternative B would be similar to those described under Alternative A. For fluid mineral leasing, Alternative B would provide greater protection for water resources and SWPAs through NSO and CSU restrictions for fluid minerals throughout the decision area for waterbodies, wetlands, floodplains, riparian areas, and streams, with few exceptions. Under Alternative B, water resources that occur in low development potential areas and the eastern portion of the planning area

would be further protected through closures prohibiting speculative leasing. These restrictions and other allocations under Alternative B would provide greater protection for water resources than Alternative A. However, the same amount of surface disturbance is predicted under both alternatives.

The subsurface decision area for fluid minerals includes lands containing intermittent, perennial, and ephemeral streams. Under Alternative B, 368 stream miles and 8,158 acres of waterbodies would be closed to fluid mineral development, compared with no streams or acreages closed under Alternative A. NSO 11-70 would prohibit surface occupancy and use within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas, and a new CSU would limit development within 300 feet of riparian areas and/or wetlands and ephemeral, intermittent, and perennial drainages (see **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing). These restrictions would greatly reduce the potential for impacts on water resources, compared with Alternative A. NSO stipulations are proposed on lands that include 941 stream miles and 2,675 acres of waterbodies, and CSU stipulations are proposed on lands that include 941 stream miles and 2,652 acres of waterbodies; TL stipulations are proposed on 557 miles and 2,169 acres of waterbodies. Waivers, exceptions, and modifications are available under the NSO and CSU stipulations, which could allow for development in and around streams with restrictions on development. The protection provided to streams from TL stipulations are incidental, as TL stipulations are primarily implemented to protect wildlife resources.

In addition, Alternative B includes an NSO stipulation that would prohibit fluid mineral development and associated surface disturbance within 0.50 miles of the Missouri River, Lake Sakakawea, and Lake Oahe for source water protection. This would provide additional protection from erosion and sedimentation and potential spills that could impact the water quality of these sources of public drinking water.

The potential impacts on water resources related to the ongoing development of coal include soil erosion and transport caused by the excavation of coal, and the construction of and repeated access to roads and developed areas. Also, impacts would be related to the potential release of chemical pollutants into area ponds, streams, tributaries, or unconfined aquifers. Coal Screen 2 unsuitability, criterion 15, riparian areas and wetlands, would provide some protection to intermittent and perennial streams. Coal Screen 2 unsuitability, criteria 16, 17, and 19 also would provide protections for water resources (see **Table F-1**, Screen 2 Results, in **Appendix F**, Coal Screening Process). This includes approximately 35,000 acres that would be considered unsuitable for coal mining for 100-year floodplains, municipal watersheds, and alluvial valley floors. While streams are generally unsuitable for coal mining, under some limited conditions they could be acceptable for leasing. One hundred and seventy-seven miles of intermittent and perennial streams would be in areas that are acceptable for coal leasing under Alternative B; 176 of those miles are located in the three coal-producing counties with existing leases. Within the three-county area, 233 miles of streams and 600 acres of waterbodies would be unacceptable for coal leasing. Alternative B would greatly reduce the overall acreage suitable for coal leasing, compared with Alternative A, with a reduction of 519,500 acres and a corresponding reduction in water resources impacts. Further, the bypass of federal coal to reach nonfederal coal reserves could potentially result in effects on water resources on nonfederal lands; depending on the water resources present, impacts may be greater than if the federal lands were developed.

Under Alternative B.1, 47 miles of intermittent and perennial streams and 100 acres of waterbodies would be in areas acceptable for coal leasing. All the acceptable areas are within the coal-producing counties.

Within SWPAs, Alternative B would close 2,500 acres to fluid mineral development. Stipulation NSO 11-70 would prohibit surface occupancy and use for fluid minerals within perennial or intermittent streams,

lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas, and a CSU not included under Alternative A would limit surface occupancy and use for fluid minerals within 300 feet of riparian areas and/or wetlands and ephemeral, intermittent, and perennial drainages. See **Table 3-42**.

Table 3-42
Water Resources and Fluid Mineral Leasing Allocations under Alternative B

Stipulation	Miles
Intermittent streams, BLM-administered subsurface, fluid mineral[3]	889
Closed to fluid mineral leasing[1]	349
Open to fluid mineral leasing, subject to NSO[2]	889
Open to fluid mineral leasing, subject to CSU[2]	889
Open to fluid mineral leasing, subject to TL[2]	525
Open to fluid mineral leasing, subject to STC	0
Perennial streams, BLM-administered subsurface, fluid mineral[3]	51
Closed to fluid mineral leasing[1]	20
Open to fluid mineral leasing, subject to NSO[2]	51
Open to fluid mineral leasing, subject to CSU[2]	51
Open to fluid mineral leasing, subject to TL[2]	33
Open to fluid mineral leasing, subject to STC	0

Source: BLM GIS 2021
[1] Mileages are incidental and not designed to directly protect the water resource.
[2] Provides direct protection for intermittent and perennial streams.
[3] Stipulations overlap in some areas so total miles of stipulations if added together may be greater than stream miles

Mineral materials disposal would be open on land containing 600 acres within SWPAs, and 1,500 acres within SWPAs would be closed to mineral materials disposal. All 2,100 acres of BLM-administered locatable minerals within SWPAs would be open to entry. NEL mineral leasing would be open on 954 acres and closed on 1,173 acres of SWPAs. Within SWPAs, 500 acres would be unavailable for livestock grazing, and 500 acres would be managed as ROW exclusion areas. ACECs do not overlap with SWPAs.

Potential impacts from locatable mineral entry and development and recreation on SWPAs would be the same as those described under Alternative A. Alternative B would greatly reduce the potential for impacts on water resources from fluid mineral leasing, mineral materials disposal, and livestock grazing through restrictions on surface-disturbing uses.

Within the decision area for locatable minerals, 10,200 acres of waterbodies and 827 miles of streams would be in areas open to locatable mineral entry, and 0 acres of waterbodies and 28 miles of streams would be recommended for withdrawal from locatable mineral entry. Potential impacts from locatable mineral entry and development on intermittent, perennial, and ephemeral streams would be similar to those described under Alternative A, with slightly more river miles open to entry. Mineral materials would be closed to disposal on lands that contain 10,100 acres of waterbodies and open on lands that contain 100 acres of waterbodies. Intermittent, perennial, and ephemeral streams present within areas open mineral materials disposal area would total only 2 stream miles, and 825 miles of streams would be closed to mineral material disposal. The reduction of 9,900 acres of waterbodies open to mineral material disposal, compared with Alternative A, is likely to result in a reduction in impacts from mineral material extraction on these features. Lands that would be open to NEL mineral leasing contain 518 miles of streams and 8,500 acres of waterbodies; 308 miles of streams and 1,800 acres of waterbodies would be closed to NEL mineral leasing.

Lands suitable for livestock grazing include 218 miles of streams and 100 acres of waterbodies; 19 miles of streams and 200 acres of waterbodies would be unavailable for standard term livestock grazing leases.

ROW avoidance areas include approximately 7 miles of streams, and ROW exclusion areas include approximately 229 stream miles and 300 acres of waterbodies. SRMAs and BCAs overlap with 45 miles of streams and 11 acres of waterbodies. ACECs overlap 4 miles of streams, but do not overlap any waterbodies.

A total of 28 miles of 303(d)-listed impaired streams that are open to mineral materials disposal under Alternative A would be closed under Alternative B. This would reduce the potential impacts on impaired streams' water quality. However, these areas would be open to locatable mineral entry and NEL development, which could cause slight impacts as described under *Impacts Common to All Alternatives* if they were developed.

There are 231 water wells in areas that would be open to locatable mineral entry. Mineral materials would be open to disposal in areas where there are 138 water wells and closed in areas where there are 93 wells. Less than 10 wells are in areas that would be available to livestock grazing and managed as ROW avoidance and exclusion areas. One well is within a BCA, and ACECs and fluid mineral leasing stipulations do not overlap water wells (BLM GIS 2021). The level of potential impacts on water wells from locatable mineral entry would be similar to the level under Alternative A, while the potential impacts from mineral materials disposal would be reduced.

Alternative C

The nature and type of potential impacts under Alternative C would be similar to those under Alternative A. For fluid mineral leasing, Alternative C would provide greater protection of water resources through an NSO stipulation prohibiting surface occupancy and use in SWPAs. Likewise, there would be NSO and CSU restrictions for fluid minerals throughout the decision area for waterbodies, wetlands, floodplains, riparian areas, and streams, with few exceptions. These restrictions and other allocations under Alternative C would provide greater protection of water resources than Alternative A.

The ongoing development of coal is anticipated to continue. The potential impacts on water resources would be related to the construction of, excavation of, and repeated access to roads, mining areas, and developed areas, which results in soil erosion and transport. Also, impacts would be related to the potential release of chemical pollutants into area ponds, streams, tributaries, or unconfined aquifers. Coal Screen 2 unsuitability criteria 15, 16, 17, 18, and 19 would provide protections of water resources (see **Table F-1**, Screen 2 Results, in **Appendix F**, Coal Screening Process).

There would be 1,562 miles of intermittent and perennial streams that would still be acceptable for coal development under Alternative C. Of those streams, 351 miles are in the three coal-producing counties with existing leases. There would be 2,700 acres of waterbodies that would be acceptable for coal development under Alternative C. Of those waterbodies, 700 acres are in the three-county coal-producing area. Within the coal three-county area, 58 miles of streams and 200 acres of waterbodies would be unacceptable for coal leasing. Alternative C includes the same 35,000 acres of lands considered unsuitable for coal development due to the presence of 100-year floodplains, municipal watersheds, and alluvial valley floors as described for Alternative B.

Surface occupancy in SWPAs would be prohibited under stipulation NSO 11-71. Like Alternative A, 2,100 acres of SWPAs would be open to locatable mineral entry, NEL mineral leasing, and mineral materials disposal. Within SWPAs, 500 acres would be available for livestock grazing, and 500 acres would be managed as ROW avoidance areas. A total of 100 acres of SPWAs within the three-county coal-producing area would be acceptable for coal leasing. ACECs and recreation areas do not overlap with SWPAs.

Potential impacts from locatable mineral entry and development, mineral materials disposal, and livestock grazing on SWPAs would be the same as those under Alternative A. Alternative C would reduce potential impacts from ROW authorizations through avoidance restrictions on surface-disturbing uses. No difference in potential impacts on SWPAs would occur for ACECs or recreation.

Within the subsurface decision area for locatable minerals, 827 miles of streams and 10,200 acres of waterbodies would be open to locatable mineral entry. Within the subsurface decision area for mineral materials, mineral materials would be open to disposal on lands that contain 10,000 acres of waterbodies and closed on lands that contain 200 acres of waterbodies. Intermittent, perennial, and ephemeral streams present within the area that would be open to mineral materials disposal total 556 stream miles, and 270 stream miles are in areas that would be closed to disposal of mineral materials. Lands that would be open to NEL mineral leasing contain 556 miles of streams and 10,000 acres of waterbodies; 270 miles of streams and 200 acres of waterbodies would be closed to NEL mineral leasing.

Potential impacts from locatable mineral entry and development on intermittent, perennial, and ephemeral streams would be the similar to those under Alternative A, with slightly more river miles open to entry.

The subsurface decision area for fluid minerals includes lands containing intermittent, perennial, and ephemeral streams. Stipulation NSO 11-70 would prohibit surface occupancy and use within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas, and a CSU not included under Alternative A would limit surface occupancy and use for fluid minerals within 300 feet of riparian areas and/or wetlands and ephemeral, intermittent, and perennial drainages. These restrictions would greatly reduce the potential for impacts on water resources, compared with Alternative A. Under Alternative C, fluid mineral stipulations for lands that include streams include NSO stipulations on 1,309 stream miles and 10,833 acres of waterbodies, CSU stipulations on 1,309 stream miles and 10,735 acres of waterbodies, and TL stipulations on 764 stream miles and 10,099 acres of waterbodies. Waivers, exceptions, and modifications are available under the NSO and CSU restrictions, which could allow development, with restrictions, in and around streams. The protection provided to streams from TL stipulations are incidental, as TL stipulations are implemented to protect wildlife resources. See **Table 3-43**.

Table 3-43
Water Resources and Fluid Mineral Leasing Allocations under Alternative C

Stipulation	Miles
Intermittent streams, BLM-administered subsurface, fluid mineral[3]	1,238
Closed to fluid mineral leasing[1]	0
Open to fluid mineral leasing, subject to NSO[2]	1,238
Open to fluid mineral leasing, subject to CSU[2]	1,238
Open to fluid mineral leasing, subject to TL[2]	722
Open to fluid mineral leasing, subject to STC	0
Perennial streams, BLM-administered subsurface, fluid mineral[3]	71
Closed to fluid mineral leasing[1]	0
Open to fluid mineral leasing, subject to NSO[2]	71
Open to fluid mineral leasing, subject to CSU[2]	71
Open to fluid mineral leasing, subject to TL[2]	42
Open to fluid mineral leasing, subject to STC	0

Source: BLM GIS 2021
[1] Mileages are incidental and not designed to directly protect the water resource
[2] An NSO directly protects perennial and intermittent streams
[3] Stipulations overlap in some areas so total miles of stipulations if added together may be greater than stream miles

Lands available for livestock grazing include 227 miles of streams. ROW avoidance areas include 236 miles of streams. ACECs include 4 miles of streams. Recreation allocations include 23 miles of streams in a BCA and 10 miles of streams in an SRMA.

Lands open to locatable mineral entry include 28 miles of 303(d)-listed impaired streams, the same as under Alternative A. Under Alternative C, 27 miles of 303(d)-listed streams would be open to mineral materials disposal. Two miles of 303(d)-listed streams would be in ROW avoidance areas. CSU stipulations would be applied on lands containing 45 miles of 303(d)-listed streams. Lands open to NEL mineral leasing would contain 27 miles of 303(d)-listed streams.

There would be 231 water wells in areas open for locatable mineral entry. Mineral materials disposal would remain open in areas where there are 229 water wells. Potential impacts would be the same as those under Alternative A. Seven wells are in areas where livestock grazing would be available, and seven wells are in ROW avoidance areas. ACECs and fluid mineral leasing stipulations do not overlap water wells. No groundwater wells are in areas acceptable to coal leasing within the three coal-producing county area. Two wells are in areas closed to NEL mineral leasing, and 227 wells are in areas open to NEL mineral leasing; however, no NEL mineral development is expected.

Alternative D

Impacts under Alternative D would be similar to those described under Alternative B with the exception of the impacts described below. Impacts on 303(d)-listed impaired streams would be the same as described for Alternative B. Impacts from livestock grazing management would be the same as those described under Alternative C. Under Alternative D, 2,500 acres of state-designated drinking water source protection zones would be managed as closed to fluid mineral leasing. These restrictions and other allocations under Alternative D would provide greater protection for water resources than Alternative A.

The subsurface decision area for fluid minerals includes lands containing intermittent, perennial, and ephemeral streams. Under Alternative D, 368 stream miles and 8,158 acres of waterbodies would be closed to fluid mineral development, compared with no streams or acreages closed under Alternative A. NSO 11-70 would prohibit surface occupancy and use within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas, and a new CSU would limit development within 300 feet of riparian areas and/or wetlands and ephemeral, intermittent, and perennial drainages (see **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing). These restrictions would greatly reduce the potential for impacts on water resources, compared with Alternative A. NSO stipulations are proposed on lands that include 941 stream miles and 2,675 acres of waterbodies, and CSU stipulations are proposed on lands that include 941 stream miles and 2,675 acres of waterbodies; TL stipulations are proposed on 571 miles and 2,176 acres of waterbodies. Waivers, exceptions, and modifications are available under the NSO and CSU stipulations, which could allow for development in and around streams with restrictions on development. The protection provided to streams from TL stipulations are incidental, as TL stipulations are primarily implemented to protect wildlife resources.

Under Alternative D, 190 miles of intermittent and perennial streams would be in areas that are acceptable for coal leasing; all of those miles are located in the three coal-producing counties with existing leases. Within the three-county area, 305 miles of streams and 600 acres of waterbodies would be unacceptable for coal leasing. Alternative D would greatly reduce the overall acreage suitable for coal leasing, compared with Alternative A, with a reduction of 515,300 acres acceptable for coal leasing and a corresponding reduction in water resources impacts.

Within SWPAs, Alternative D would close 2,500 acres to fluid mineral development. Stipulation NSO 11-70 would prohibit surface occupancy and use for fluid minerals within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas, and a CSU not included under Alternative A would limit surface occupancy and use for fluid minerals within 300 feet of riparian areas and/or wetlands and ephemeral, intermittent, and perennial drainages. See **Table 3-44**.

Table 3-44
Water Resources and Fluid Mineral Leasing Allocations under Alternative D

Stipulation	Miles
Intermittent streams, BLM-administered subsurface, fluid mineral[3]	889
Closed to fluid mineral leasing[1]	349
Open to fluid mineral leasing, subject to NSO[2]	889
Open to fluid mineral leasing, subject to CSU[2]	889
Open to fluid mineral leasing, subject to TL[2]	538
Open to fluid mineral leasing, subject to STC	0
Open to fluid mineral leasing, subject to mapped stipulations	889
Perennial streams, BLM-administered subsurface, fluid mineral[3]	51
Closed to fluid mineral leasing[1]	20
Open to fluid mineral leasing, subject to NSO[2]	51
Open to fluid mineral leasing, subject to CSU[2]	51
Open to fluid mineral leasing, subject to TL[2]	33
Open to fluid mineral leasing, subject to STC	0
Open to fluid mineral leasing, subject to mapped stipulations	51

Source: BLM GIS 2021
[1] Mileages are incidental and not designed to directly protect the water resource.
[2] Provides direct protection for intermittent and perennial streams.
[3] Stipulations overlap in some areas so total miles of stipulations if added together may be greater than stream miles

Mineral materials disposal would be open on land containing 700 acres within SWPAs, and 1,400 acres within SWPAs would be closed to mineral materials disposal. All 2,100 acres of BLM-administered locatable minerals within SWPAs would be open to entry. NEL mineral leasing would be open on 1,488 acres and closed on 639 acres of SWPAs.

Within the decision area for locatable minerals, 10,200 acres of waterbodies and 823 miles of streams would be in areas open to locatable mineral entry, and 0 acres of waterbodies and 4 miles of streams would be recommended for withdrawal from locatable mineral entry. Potential impacts from locatable mineral entry and development on intermittent, perennial, and ephemeral streams would be similar to those described under Alternative A or B, with slightly more river miles open to entry. Mineral materials would be closed to disposal on lands that contain 10,100 acres of waterbodies and open on lands that contain 100 acres of waterbodies. Intermittent, perennial, and ephemeral streams present within areas open mineral materials disposal area would total only 2 stream miles, and 825 miles of streams would be closed to mineral material disposal. The reduction of 10,000 acres of waterbodies open to mineral material disposal, compared with Alternative A, is likely to result in a reduction in impacts from mineral material extraction on these features. Lands that would be open to NEL mineral leasing contain 568 miles of streams and 8,500 acres of waterbodies; 259 miles of streams and 1,700 acres of waterbodies would be closed to NEL mineral leasing.

Cumulative Impacts

The cumulative impacts analysis area for water resources is the planning area, but cumulative actions can impact groundwater aquifers and surface water that passes through or extends beyond the planning area.

Past and ongoing impacts on water resources in the planning area include diversions and pumping for irrigation, municipal and household water supply, industrial uses, hydraulic fracturing, dust suppression, and livestock use. Water quality is affected by nonpoint source pollution like siltation, and sedimentation associated with road construction, industrial development, urbanization, mining, energy development, and population increases.

The effects of climate change contribute to impacts on water supply, the timing of surface water availability, and water quality, as described in **Section 3.2.3**, *Affected Environment*. However, no additional climatic impacts on water resources are anticipated. Also, existing climatic impacts are not expected to accelerate as a result of actions proposed under this plan. Proposed BLM actions, including source water protection, buffers, conservation measures, and support for water development, would help maintain the water supply and quality. However, other BLM management decisions in this document and associated activities may impact climate change in some cases due to impacts the BLM's mandate "of managing public land for multiple uses while conserving natural, historical, and cultural resources". The BLM will annualize proposed impacts and determine the best course of action to reduce impact to climate change through mandating BMP's and reclamation for all proposed impacts affecting climate change and all other resources. For example, the removal of vegetation associated with surface-disturbing activities could raise stream temperatures and alter their physical characteristics in addition to impacts from climate change.

The BLM anticipates that the types of potential impacts from cumulative actions and projects will continue. Energy development would continue to be a large user of freshwater with the majority of water coming from the Missouri River System. The associated ground disturbance could result in both the transport of soil eroded from roads and developed areas, and potential releases of chemical pollutants into area ponds, streams, tributaries, wetlands, or unconfined aquifers. The oil and gas RFD (BLM 2022a) estimates that 43,000 oil and gas production and support wells could be drilled in the planning area from 2020 through 2040, with an estimated surface disturbance of 56,000 acres. The coal RFD estimates that coal development could disturb 9,434 acres (or 7,766 acres under Alternative B.1) from existing and pending federal leases prior to 2040 (BLM 2022b). Mineral material development is estimated to disturb 40 acres per year (BLM 2022c).

Future actions are related to the implementation of oil and gas leases and potential exploration, development, and drilling of natural gas or oil wells, which could affect both surface water and groundwater resources. Water resources may be contaminated from hazardous materials spills, which are noted in **Appendix I, Table I-1**. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

Applicable BLM standards and guidelines, lease stipulations, lease terms, state regulations, and BMPs would combine to reduce the potential for these impacts and reduce, but not eliminate, the potential overall cumulative impacts of past, ongoing, and future actions. Potential cumulative impacts on water resources would range in frequency and severity, contingent on the degree of exploration and development, local and regional-scale factors, technologies such as hydraulic fracturing used to develop the oil and gas resources, and the reliability of measures intended to protect water resources. Most of this activity would occur on non-BLM-administered land, and the contribution to cumulative impacts from mineral development would be the same across the alternatives. On BLM-administered land in the planning area, the actions' potential

contribution to cumulative impacts from land allocations, vegetation management, ROWs, and livestock grazing would be similar across the alternatives.

Cumulative impacts from mineral development would be reduced under Alternatives B and D due to the increased closures and stipulations that would be applied to protect all resources. Cumulative impacts under Alternative C would be similar to those described for Alternatives B and D. However, cumulative impacts from mineral development would be slightly greater than those described for Alternatives B and D. This is because fewer acres would be closed or managed with stipulations.

3.2.4 Vegetation Communities

Issues

- How would permitted management activities such as oil and gas development, livestock grazing, and recreational use on BLM-administered lands impact vegetation communities?
- How would the alternatives affect the risk of invasive plant introductions and spread?
- How would the alternatives affect special status species?

Affected Environment

Vegetation communities in the planning area are primarily in the Northwestern Great Plains, Northwestern Glaciated Plains, and Northern Glaciated Plains ecoregions (see **Map 3-7**, Ecoregions, in **Appendix A**). Vegetation communities were mapped based on the National Vegetation Classification Standard (see **Map 3-8**, Vegetation, in **Appendix A**). Most lands in the planning area have Western Cool Temperate Crop and Pasture vegetation, comprising nearly 60 percent of the planning area.

On BLM-administered surface lands in the planning area, the Northern Great Plains Mesic Mixed-Grass Prairie Grassland and Shrubland vegetation community comprises the largest acreage. Habitats of conservation concern in the planning area are tallgrass prairie and woody draws. Acres of each of these communities within the decision areas are presented in **Table 3-45**.

As described further in **Section 3.2.5**, native prairies, which contain a mix of grasses and forbs, provide important habitats for wildlife. Native prairie is generally divided into three main categories: tallgrass, mixed-grass, and shortgrass. Tallgrass prairie in particular was historically found predominantly in the eastern quarter of North Dakota and has largely been converted to farmland (NDGFD 2020). Tallgrass prairie can include more than 200 plant species. The most common and dominant of these are big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), indiangrass (*Sorghastrum nutans*), and prairie dropseed (*Sporobolus heterolepis*) (see **Map 3-9**, Vegetation: Tallgrass Prairies and Woody Draws, in **Appendix A**). Mixed-grass and shortgrass prairies are more widespread throughout the state. Mixed-grass prairie is comprised of both tallgrass and shortgrass species and is also known for its forb diversity. Common grass and sedge species include prairie junegrass (*Koeleria macrantha*), western wheatgrass (*Agropyron smithii*), green needlegrass (*Nasella viridula*), needle-and-thread (*Hesperostipa comata*), blue grama (*Bouteloua gracilia*), little bluestem (*Schizachyrium scoparium*), and needleleaf sedge (*Carex duriuscula*). Shortgrass prairie is dominated by drought-tolerant warm season species. Common grass and sedge species include spikemoss (*Selaginella densa*), blue grama, needleleaf sedge, threadleaf sedge (*Carex filifolia*), buffalo grass (*Bouteloua dactyloides*), and needle-and-thread (NDGFD 2024).

Table 3-45
Acres of Vegetation Types in the Decision Areas

Vegetation Type	BLM Surface	% BLM Surface Decision Area	Fluid Minerals	% Fluid Minerals Decision Area	Coal	% Coal Decision Area	Other Minerals[1]	% Other Minerals Decision Area
Tallgrass prairie	300	0.5	2,100	0.4	300	0.0	1,700	0.5
Woody draws	6,100	10.4	24,500	5.0	11,700	0.3	14,500	4.0
Potential special status plant habitat	1,100	1.9	2,800	0.6	1,400	0.0	2,500	0.7
Riparian and wetland vegetation	2,000	3.4	24,900	5.1	23,500	0.6	21,600	6.0

Source: BLM GIS 2021
[1] Includes the decision area for mineral materials and locatable minerals

Woody draws, concentrated in western North Dakota, are threatened by the emerald ash borer (*Agrilus planipennis*; see **Map 3-9**, Vegetation: Tallgrass Prairies and Woody Draws, in **Appendix A**). This species was first observed in eastern North Dakota in 2019 and will likely move up the Missouri River Basin to infest the green ash that comprises a large portion of the trees in woody draws in the planning area. Woody draws are a limited habitat type with high diversity. Numerous plant and wildlife species of conservation priority, such as the northern long-eared bat (*Myotis septentrionalis*), rely on woody draws.

Seventy-nine percent of the acres permitted for livestock grazing are meeting the standards for rangeland health. Current grazing practices, invasive species encroachment, and conversion to nonnative grass are some of the causes for not meeting standards on the remaining lands.

Populations of nonnative, invasive, and noxious weeds are established in the planning area. Most invasive and noxious weed control in the planning area, both on and off BLM-administered lands, has been conducted in Dunn, Bowman, and Stark Counties. These counties are where most of the BLM-administered surface land is located. The most widespread noxious weeds are leafy spurge (*Euphorbia esula*) and Canada thistle (*Cirsium arvense*), with cheatgrass (*Bromus tectorum*) as a common invasive plant. Some infestations that have received treatments in recent years are leafy spurge along the Little Missouri River and leafy spurge and Canada thistle at the Schnell Ranch Recreation Area. The abundance of noxious weeds and invasive species has been influenced by drought, fire, disturbance, and improper grazing practices. Established weed populations in many areas continue to expand, and new weed species appear in the planning area.

The western prairie fringed orchid (*Platanthera praeclara*) is the only ESA-listed threatened plant species in the planning area; however, there is no known habitat for it on BLM-administered lands. Several BLM sensitive plant species do have the potential to occur on BLM-administered lands in the planning area. The list of special status plant species is expected to change over the life of the RMP and, as such, these are addressed generally without specific references to individual species. Acres of potential special status plant habitat within the decision areas are presented in **Table 3-45**.

Wetlands and riparian areas occur throughout the planning area (see **Map 3-10**, Wetlands, Riparian Areas, and Fish-bearing Streams, in **Appendix A**). **Table 3-45** presents the acres of wetland and riparian vegetation within the decision areas. A large portion of the wetlands is in the prairie pothole region (see **Map 3-11**, Prairie Pothole Region, in **Appendix A**), while the major riparian areas in the state are on the Yellowstone, Missouri, and Little Missouri Rivers. Draining, filling, burning, farming, or other destruction of wetlands, often for agricultural development, have historically reduced their acreage. Riparian areas have

been affected by such activities as cattle grazing overuse, housing development, and dam creation. Continuing degradation is a concern due to invasive species.

A 2007 survey of riparian and wetland conditions found that most riparian areas assessed were in proper functioning condition (PFC) or functional-at-risk, with an improving trend (BLM 2020c). Most wetlands assessed were functional-at-risk, with either an improving or downward trend. Additional riparian areas were assessed in 2020, and these were found to be functional-at-risk, with variable trends.

As described in **Section 3.2.1**, Air Quality and Climate, and Section 2.1 of the AMS (BLM 2020b), climate change has caused an increase in temperatures, precipitation, and flooding risk. Also, wildfires are projected to increase in midsummer through early fall. High interannual variability in water availability may lead to an increase in droughts (USGCRP 2018). Increased evapotranspiration rates associated with higher temperatures and predicted increases in drought may favor some species over others. These may be particularly favorable to noxious weeds and invasive plants; this is because noxious weeds and invasive plants may be better able to compete with native species in the changing conditions (Derner et al. 2015). Some species' ranges may shift in response to warmer temperatures (EPA 2016a; Roman-Palacios and Weins 2020), and suitable habitat for special status plants may be further reduced. Negative trends in biodiversity and ecosystem functions caused by a changing climate are projected to continue or worsen in the near future (IPBES 2019).

In a multitaxon study, Maclean and Wilson (2011) found that approximately 10-70 percent of plant and animal species may be at an increased risk of extinction from the impacts of climate change, or that climate-induced changes in habitat would result in 15-35 percent of species extinction by 2050. Some of these impacts may be offset by the increase in grassland productivity caused by increases in CO_2 concentrations, which stimulate plant growth and increase the efficiency of plants' water use (USGCRP 2018; Scheffers et al. 2016; Derner et al. 2015). The increase in temperatures and shallow depths of prairie potholes may lead to faster evaporation and drying of wetlands (URS 2010), causing movement away from PFC.

Chen et al. (2011) presented strong supporting evidence that species have changed the timing of their lifecycles during the year and is correlated to annual and longer-term variations in temperature. Warmer temperatures may cause plants to grow and flower earlier in the spring, which may disrupt the timing of pollinators (USGCRP 2018; EPA 2016a; Derner et al. 2015). This may lead to pollinators not finding food or plants not being pollinated and being unable to reproduce (Morton and Rafferty 2017). This may be of particular concern for special status plants, some of which rely on specific pollinators for reproduction.

Models have predicted that the anticipated increase in precipitation associated with climate change will lead to an increase in runoff, leading to sediment accumulation in the prairie potholes (Skagen et al. 2016). Many of the prairie potholes will be either partially or fully filled with sediment. This would reduce the ecosystem services and wildlife habitat these areas provide and move them away from PFC. Increased flooding and changes in streamflow may cause plant mortality and change riparian plant community composition, potentially favoring herbaceous species, drought-tolerant woody species, and late successional woody species, including invasive species (Garssen et al. 2015; Perry et al. 2012). Floods may put riparian areas at risk of destabilizing streambanks, erosion, and a reduced ability to filter nutrients, pollutants, and sediments.

Finally, climate change has been modeled to cause a nearly four-fold increase in acres burned, particularly in the western portion of the state (URS 2010). Increased unplanned fire ignitions exacerbate the impacts

on vegetation from wildfire, as described above. This is particularly true for those resources in western North Dakota, such as woody draws.

Additional information is available in Section 2.4, Vegetation Communities, and Section 2.5, Riparian and Wetland Communities, of the AMS (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

Unplanned fire ignitions could cause short- or long-term damage to vegetation, depending on the vegetation community affected and the extent and severity of the fire. In the short term, fire and fuels treatments remove vegetation and cause bare areas to be more susceptible to soil loss, noxious weed, or invasive plant introduction. Chemical treatments could additionally cause plant or pollinator mortality or reduced productivity from unintended contact with chemicals via drift, runoff, wind transport, or accidental spills, as well as through direct spraying on nontarget vegetation. In the long term, wildland and prescribed fires and fuels treatments would continue to reduce dense vegetation, improve species composition, and return nutrients to the soil. Often, fire and fuels treatments result in improved vegetation diversity and ecosystem function and lower the risk for an uncharacteristically large or severe wildfire. Prescribed burn plans would reduce the likelihood of effects on sensitive vegetation communities or special status species.

Permitted surface-disturbing activities, such as ROW development, could result in the removal or fragmentation of native plant communities and the loss of pollinator habitat. ROWs are often linear and may stretch for miles, thereby increasing the potential for the introduction or spread of noxious weeds or invasive plants over a large area. ROW exclusion areas would prevent impacts on vegetation, wetlands, and riparian areas in certain areas by prohibiting ROW development. ROW avoidance areas would reduce the likelihood of impacts because, although the ROW would be developed, it would be sited away from sensitive resources, such as sensitive vegetation, wetlands, and riparian areas.

Impacts from mineral development would be similar to those described for ROW development, above. Mineral exploration and development, such as road construction and use, facility construction, well pad and pipeline construction, and excavation, would cause vegetation loss, fragmentation, pollinator habitat loss, or an increased potential for noxious weed and invasive plant introduction or spread. After vegetation is removed, the remaining vegetation could have reduced vigor or productivity due to mechanical damage, soil compaction, and dust. Soil compaction would inhibit natural revegetation in areas without active reclamation efforts and would reduce plant vigor. This would make plants more susceptible to disease, drought, or insect attack. In most cases, soils in reclaimed areas would be ripped and seeded during interim or final reclamation. Placement of subsurface or temporary facilities in highly degraded areas may benefit vegetation if more desirable species become established following reclamation.

Fluid mineral developments also increase the potential for accidental spills of petroleum products that could kill native vegetation or contaminate wetlands or riparian areas, causing movement away from PFC. While the acres available for mineral materials disposal and fluid mineral leasing (and applicable stipulations) vary by alternative, the reasonably foreseeable surface disturbance under all alternatives would not be expected to move wetlands or riparian areas away from PFC (see **Section 3.1.1**). Similarly, while much of the federal mineral estate is available for locatable mineral development, such development is not reasonably foreseeable. Therefore, no impacts are expected under any of the alternatives. However, an analysis of potential impacts from locatable mineral development is provided in case demand for locatable minerals occurs in the future. If development were proposed in open areas, locatable mineral development

would still be allowed, but the regulations require any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations requires site-specific analysis under NEPA when the impacts on vegetation will be revisited.

Recreation uses are not subject to site-specific environmental review and monitoring requirements, and vegetation impacts would not be apparent until after damage has occurred. Examples of impacts on vegetation from recreation include trampling from humans and animals, removing vegetation, removing pollinator habitat, fragmenting vegetation communities, increasing dust, compacting soil, and increasing the likelihood for noxious weed or invasive plant introduction or spread. Increased soil compaction damages the soil structure and decreases the pore size in smaller-particle soils. This would decrease infiltration rates and soil moisture and increase erosion or surface runoff. Impacts are more likely to occur in areas where visitation would be high.

Overall, the BLM would aim to achieve or trend toward achieving Dakota Standards 1, 2, and 5, which would improve ecosystem function, vegetation diversity, and soil stability. Overutilization of vegetation and desired plant communities from livestock or wildlife could occur. This would lead to reduced plant vigor, which would change the vegetation structure and species composition. Such impacts would affect the BLM's ability to meet rangeland health standards. Impacts would vary depending on the extent of removal, type of vegetation impacted, and length of the grazing period. In general, the more acres that are available for livestock grazing under a given alternative, the greater the risk for impacts.

In general, specially designated areas such as ACECs, WSRs, and national scenic and historic trails restrict surface-disturbing activities. They also would prevent or reduce impacts on vegetation, such as vegetation removal, fragmentation, and noxious weed and invasive plant spread. Resource uses (for example, livestock grazing, forestry, recreation, travel, lands and realty actions, and energy and minerals leasing and development) in the planning area are stressors that could cause vegetation removal, degradation, or fragmentation; an increase in noxious weeds and invasive plants; or riparian areas and wetlands to move away from PFC, as described above. These effects may intensify impacts from climate change. In particular, mineral developments, especially oil and gas and coal developments, and power plants are a major source of GHG emissions in North Dakota (URS 2010). Under alternatives that have limited restrictions on resources uses, including mineral developments, vegetation may be vulnerable to the impacts described above. The BLM management's contribution to climate change impacts in the planning area would be limited by the total acreage in the fluid mineral decision area (1 percent of the total planning area) and coal decision area (9 percent of the total planning area).

Alternative A

In general, Alternative A relies on management guidance that does not reflect current conditions and issues. The lack of comprehensive planning for vegetation, riparian areas and wetlands, and special status plants would continue resulting in vegetation management that is applied on a case-by-case basis and may be inconsistently implemented. Protection for vegetation, riparian areas, and wetlands would continue, and management flexibility would continue allowing the BLM to adaptively manage resources. The BLM would continue to carry out vegetation treatments and range improvements; this would improve vegetation conditions and trend toward achieving land health standards and movement toward PFC in riparian areas and wetlands. The BLM would continue to concentrate noxious weed and invasive plant treatments in the Schnell Ranch Recreation Area.

Under Alternative A, most tallgrass prairie, woody draw, and riparian and wetland vegetation would be managed as open to ROWs (see **Table 3-46)**. There would be no management direction directly protecting these types of vegetation from ROW development. As such, tallgrass prairie, woody draws, and riparian and wetland vegetation would be subject to the impacts described above. Despite the lack of direct management to protect vegetation from ROW development, most potential special status plant habitat would be incidentally protected through management for GRSG habitats as ROW avoidance[24] (see **Table 3-46**).

Table 3-46
Decision Area Rights-of-Way Management by Vegetation Type under Alternative A (Acres)[1]

Right-of-Way Management	Tallgrass Prairie	% of Decision Area	Woody Draws	% of Decision Area	Potential Special Status Plant Habitat	% of Decision Area	Riparian and Wetland Vegetation	% of Decision Area
Open	300	0.5	5,600	9.6	100	0.1	1,000	1.7
ROW avoidance [2]	0	0.0	600	1.0	900	1.5	1,000	1.7
Total	300	0.5	6,200	10.6	1,000	1.7	2,000	3.4

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[2] ROW acreages are incidental and not designed to directly protect the vegetation types.

Alternative A does not include specific management to protect tallgrass prairie, woody draws, and potential special status plant habitat from fluid leasable mineral development. Despite this, incidental protections would be provided to these vegetation types from NSO and CSU stipulations that would be applied to protect other resources. As such, NSO stipulations would continue to provide the greatest protection to vegetation communities by prohibiting surface-disturbing activities in these areas (see **Table 3-47**). Under Alternative A, an NSO stipulation would be applied within 200 feet of wetlands, lakes, and ponds and along the Yellowstone and Missouri Rivers to protect surface water and related vegetation. This would continue to prevent the disturbances to vegetation in these areas from fluid mineral development, as described above. CSU stipulations would continue to provide slightly less protection to vegetation communities; this is because surface-disturbing activities would be allowed, and vegetation could be disturbed or removed. However, CSU stipulations could protect riparian and wetland vegetation in certain instances by requiring special operational constraints or by moving the surface-disturbing activity to protect these vegetation communities. Under Alternative A, most vegetation would be incidentally protected by NSO stipulations, thereby reducing impacts from fluid mineral exploration and development in these areas. The likelihood of impacts on BLM-administered surface lands would also be low, given the small acreage of surface disturbance expected, as described in the oil and gas RFD (BLM 2022a) (see **Section 3.1.1**).

Most of each vegetation type would be open to mineral materials disposal under Alternative A (see **Table 3-48**). Impacts as described under *Impacts Common to All Alternatives* for mineral exploration and development could occur in these areas. However, disturbance is estimated at 40 acres on average annually, which could be distributed throughout the decision area.

[24] Priority habitat management area is exclusion for solar and wind, but the BLM does not anticipate solar or wind development on BLM-administered land in North Dakota. Therefore, GRSG habitat management areas are considered avoidance for ROWs.

Table 3-47
Vegetation Type and Fluid Mineral Leasing Allocations under Alternative A (Acres)[1]

Fluid Leasable Mineral Stipulation	Tallgrass Prairie[2]	% of Decision Area	Woody Draws[2]	% of Decision Area	Potential Special Status Plant Habitat[2]	% of Decision Area	Riparian and Wetland Vegetation[3]	% of Decision Area
NSO	600	0.1	7,600	1.6	1,500	0.3	24,800	5.1
CSU	0	0.0	500	0.1	100	<0.1	3,800	0.8
Open, subject to STC	0	0.0	1,600	0.3	0	0.0	0	0.0

Source: BLM GIS 2021
[1] Stipulations may overlap, so total acreage of the vegetation types are not additive across the stipulations. [2]Stipulation acreages are incidental and not designed to directly protect the vegetation types. [3]The allocation is designed to directly protect the vegetation type.

Table 3-48
Decision Area Mineral Materials Management by Vegetation Type under Alternative A (Acres)[1]

Mineral Materials Management	Tallgrass Prairie	% of Decision Area	Woody Draws	% of Decision Area	Potential Special Status Plant Habitat	% of Decision Area	Riparian and Wetland Vegetation	% of Decision Area
Open to disposal	1,700	0.5	14,500	4.0	1,500	0.4	20,900	5.8
Closed to disposal [2]	100	0.0	100	0.0	1,000	0.3	800	0.2
Total	1,800	0.5	14,600	4.0	2,500	0.7	21,700	6.0

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area. [2]Closed acreages are incidental and not designed to directly protect the vegetation types.

Under Alternative A, 7,700 acres within the decision area would remain not open to locatable mineral entry (land acquired by exchange), and 354,900 acres would be open to locatable mineral entry. Impacts as described under *Impacts Common to All Alternatives* for mineral exploration and development could occur in open areas, if demand for locatable minerals occurs in the future.

Acres of NEL minerals open and closed to leasing are shown in **Table 3-49**. Impacts on vegetation from NEL mineral leasing would be similar to those described under *Impacts Common to All Alternatives* for mineral exploration and development and could occur in open areas, if demand for NEL minerals occurs in the future. Impacts would not occur in those areas closed to leasing.

Coal development is the biggest threat to woody draws and tallgrass prairie. This is because these sensitive vegetation communities are found in coal potential areas. Under Alternative A, the BLM would continue to manage 573,900 acres as acceptable for further consideration for coal leasing and 435,800 acres as unacceptable. Impacts would be limited to 9,434 acres through the end of 2040, which are expected to be developed over the life of the plan in Mercer, McLean, and Oliver Counties. Under Alternative A, coal development is subject to a special vegetation reclamation stipulation that an acreage equivalent to that disturbed by coal mining will be reclaimed to approximately its former condition, thus helping to reduce the potential for coal mining impacts on vegetation. Further, under Alternative A, there is a wildlife habitat threshold for the coal screen that protects important wildlife habitat, including woody draws. The wildlife threshold is a leasable acreage of wildlife habitat beyond which no further leasing will be allowed without a joint review of the situation by BLM, USFWS, and NDGFD.

Table 3-49
Decision Area Nonenergy Leasable Minerals by Vegetation Type under Alternative A (Acres)[1]

Nonenergy Leasable Minerals Management	Tallgrass Prairie	% of Decision Area	Woody Draws	% of Decision Area	Potential Special Status Plant Habitat	% of Decision Area	Riparian and Wetland Vegetation	% of Decision Area
Open to leasing	1,700	0.5	14,500	4.0	1,500	0.4	20,900	5.8
Closed to leasing	100	0.0	100	0.0	1,000	0.3	800	0.2
Total	1,800	0.5	14,600	4.0	2,500	0.7	21,600	6.0

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area. [2]Closed acreages are incidental and not designed to directly protect the vegetation types.

The Schnell Ranch Recreation Area would continue to be managed according to the Final Activity Plan and EA for the Schnell Ranch Recreation Area (BLM 1996), which is not entirely responsive to all issues. Under Alternative A, there would continue to be no management of SRMAs or BCAs and impacts from recreation would continue in popular areas.

Under Alternative A, all surface lands in the decision area (58,500 acres) would be suitable for livestock grazing. On these lands, the BLM would limit utilization to 50 percent by weight. If overutilization were to occur, the BLM would adjust AUMs or use, or both, for livestock. The BLM also would implement additional measures, such as range improvements, to reduce impacts.

Under Alternative A, a 0.25-miles buffer around three river segments would be managed as eligible for inclusion in the NWSRS; interim protective management guidelines would help to prevent or reduce impacts on riparian vegetation in these areas.

Resource uses (for example, livestock grazing, forestry, recreation, travel, lands and realty actions, and energy and minerals leasing and development) in the planning area under Alternative A are stressors that could cause vegetation removal, degradation, or fragmentation; an increase in noxious weeds and invasive plants; or riparian areas and wetlands to move away from PFC, as described above. These effects could intensify impacts from climate change. In particular, mineral developments, especially oil and gas and coal developments, and power plants are a major source of GHG emissions in North Dakota (URS 2010). Because there are limited restrictions on resources uses, including mineral developments, under Alternative A, vegetation could be vulnerable to the impacts described above.

Alternative B

The nature and type of impacts on vegetation from Alternative B would be similar to those described for *Impacts Common to All Alternatives* and Alternative A. However, they would differ in intensity depending on the specific management of, and acres available for, certain uses. Compared with Alternative A, Alternative B would include more protective vegetation management measures and more stipulations and restrictions to reduce impacts from resource uses, as described below.

Vegetation management under Alternative B would include an increased focus on management, inventories, and monitoring to attain land health. Alternative B also would prioritize the use of native species for restoration, which would affect vegetation in the long term through improved biodiversity, increased cover of native plant communities, reduced fragmentation, and restrictions on associated activities that could degrade native plant communities. Riparian and wetland management under Alternative

B would strive to attain PFC or move areas beyond PFC in some locations. Such management would provide more specific actions than Alternative A to increase the likelihood of meeting or moving toward PFC.

Managing more areas as ROW exclusion or avoidance under Alternative B would reduce the impacts on vegetation described under *Impacts Common to All Alternatives* and Alternative A but could hinder the development of critical infrastructure projects in the state. Specifically, tallgrass prairie, woody draws, and special status plants would be directly protected from ROW development because they would be managed as ROW exclusion areas (see **Table 3-50**, below). Management of riparian and wetland vegetation as ROW exclusion areas, with the exception of existing land use authorizations, would also prevent future impacts from ROW development in these areas. Management for other resources would provide incidental protection to vegetation in some areas through ROW avoidance.

Table 3-50
Decision Area Rights-of-Way Management by Vegetation Type under Alternative B (Acres) [1]

Right-of-Way Management	Tallgrass Prairie[1]	% of Decision Area	Woody Draws[1]	% of Decision Area	Potential Special Status Plant Habitat[2]	% of Decision Area	Riparian and Wetland Vegetation[1]	% of Decision Area
Open	0	0.0	0	0.0	0	0.0	0	0.0
ROW avoidance	0	0.0	0	0.0	900	1.5	0	0.0
ROW exclusion	300	0.5	6,200	10.6	200	0.3	2,000	3.4
Total	300	0.5	6,200	10.6	1,200	2.1	2,000	3.4

Source: BLM GIS 2021
[1] The allocation is designed to directly protect the vegetation type.
[2] The exclusion allocation protects the direct locations of special status plants but not all potential habitat. Potential habitat would be incidentally protected by ROW avoidance.

The BLM would manage more acres as closed to fluid mineral exploration and development under Alternative B than under Alternative A (**Table 3-51**; see **Maps 2-13** through **2-22** in **Appendix A** for closed area locations). The focus on using existing infrastructure under Alternative B would reduce new disturbance. Under Alternative B, vegetation that occurs in low development potential areas and the eastern portion of the planning area would be further protected through closures prohibiting speculative leasing. While the amount of fluid minerals projected to be produced is tied to the factors described in the oil and gas RFD (BLM 2022a), management under Alternative B would limit the locations where fluid mineral exploration and development would be allowed, therefore limiting indirect impacts from such development on vegetation associated with such disturbances as transport and the need for additional infrastructure as described under *Impacts Common to All Alternatives* and Alternative A. More acres would be managed with NSO, CSU, and TL stipulations specifically to protect vegetation, riparian areas, and wetlands. For example, NSO and CSU stipulations would encompass all tallgrass prairie, woody draws (NSO), riparian and wetland vegetation (CSU), and potential special status plant habitat (NSO) (see **Table 3-51**, below). Incidental protections from NSO stipulations for other resources would provide additional protections for vegetation, such as for riparian and wetland vegetation (**Table 3-51**). For example, the NSO stipulation that would prohibit fluid mineral development and associated surface disturbance within 0.50 miles of ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe would prevent disturbance to riparian vegetation in these areas. Alternative B further would include a requirement for a plan to ensure that wetlands and riparian areas would be maintained or improved. The likelihood of impacts on BLM-

Table 3-51
Vegetation Type and Fluid Mineral Leasing Allocations under Alternative B (Acres)[1]

Fluid Leasable Mineral Stipulation	Tallgrass Prairie[2]	% of the Decision Area	Woody Draws[2]	% of the Decision Area	Potential Special Status Plant Habitat[2]	% of the Decision Area	Riparian and Wetland Vegetation[2]	% of the Decision Area
NSO	200	0.04	21,800	4.5	1,400	0.3	8,700	1.8
CSU	100	0.02	21,600	4.4	900	0.2	8,700	1.8
Open, subject to STC	0	0.0	0	0.0	0	0.0	0	0.0

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[2] NSO allocations are designed to directly protect vegetation.

administered surface lands would be low, given the small acreage of surface disturbance expected, as described in the oil and gas RFD (BLM 2022a; see **Section 3.1.1**).

Under Alternative B, riparian, wetland, and tallgrass prairie vegetation would be directly protected through management that would close these areas to mineral materials disposal. This would prevent the impacts described for Alternative A in these areas (**Table 3-52**). Impacts would also be reduced for woody draws and potential special status plant habitat, as more than half of the acreage in the decision area for each of these vegetation types would be closed to mineral materials disposal as a result of incidental protections for other resources, not through direct protection for these vegetation communities. Impacts would remain estimated at 40 acres on average annually, which could be distributed throughout the decision area.

Table 3-52
Decision Area Mineral Materials Management by Vegetation Type under Alternative B (Acres)[1]

Mineral Materials Management	Tallgrass Prairie [3]	% of Decision Area	Woody Draws [2]	% of Decision Area	Potential Special Status Plant Habitat [2]	% of Decision Area	Riparian and Wetland Vegetation [3]	% of Decision Area
Open to disposal	0	0.0	5,600	1.5	800	0.2	0	0.0
Closed to disposal	1,700	0.5	9,000	2.5	1,600	0.4	21,700	6.0
Total	1,700	0.5	14,600	4.0	2,400	0.7	21,700	6.0

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area. [2]Acreages are incidental and not designed to directly protect the vegetation types. [3]The allocation is designed to directly protect the vegetation type.

Under Alternative B, 8,300 acres (compared to 0 acres under Alternative A) would be recommended for withdrawal from locatable mineral entry; impacts from locatable mineral development would be reduced in these areas. Two percent more acres would be open to locatable mineral entry under Alternative B (362,600 acres). Impacts described above for mineral exploration and development could occur in these areas, if demand for locatable minerals occurs in the future.

More acres of vegetation types would be closed for NEL mineral leasing under Alternative B, and if NEL mineral development were to occur, impacts on vegetation in these areas would be reduced from Alternative A (**Table 3-53**).

Table 3-53
Decision Area Nonenergy Leasable Minerals by Vegetation Type under Alternative B (Acres)[1]

Nonenergy Leasable Minerals Management	Tallgrass Prairie[3]	% of Decision Area	Woody Draws[2]	% of Decision Area	Potential Special Status Plant Habitat[2]	% of Decision Area	Riparian and Wetland Vegetation[2]	% of Decision Area
Open to leasing	0	0.0	7,900	2.2	1,200	0.3	26,200	7.2
Closed to leasing	1,700	0.5	6,800	1.9	1,300	0.4	14,300	3.9
Total	1,700	0.5	14,700	4.1	2,500	0.7	40,500	11.2

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area. [2]Acreages are incidental and not designed to directly protect the vegetation types. [3]The allocation is designed to directly protect the vegetation type.

Acres of coal acceptable and unacceptable for coal development under Alternative B are shown in **Table 3-54**. The impacts described for coal under Alternative A would not occur on BLM-administered surface lands identified as unsuitable for coal development, which encompass most of the vegetation resources analyzed in this section. Despite this, the bypass of federal coal to reach nonfederal coal reserves could potentially result in effects on vegetation on nonfederal lands; depending on the vegetation present, impacts may be greater than if the federal lands were developed. In areas acceptable for further consideration for leasing (54,400 acres), coal development would introduce the potential for the establishment or spread of noxious weeds and invasive plants. As under Alternative A, 9,434 acres are expected to be developed through the end of 2040 over the life of the plan in Mercer, McLean, and Oliver Counties, which would limit the extent of the impacts.

Table 3-54
Decision Area Coal Acceptability by Vegetation Type under Alternative B (Acres)[1]

Coal Management	Tallgrass Prairie	% of Decision Area	Woody Draws	% of Decision Area	Potential Special Status Plant Habitat	% of Decision Area	Riparian and Wetland Vegetation	% of Decision Area
Acceptable for development	0	0.0	600	<0.1	0	0.0	22,600	0.57
Unacceptable for development	0	0.0	11,100	0.3	1,400	<0.1	1,100	<0.1
Total	0	0.0	11,700	0.3	1,400	<0.1	23,700	0.6

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area. [2]Closed acreages are incidental and not designed to directly protect the vegetation types.

In areas acceptable for further consideration for leasing under Alternative B.1 (16,400 acres), coal development would introduce the potential for the establishment or spread of noxious weeds and invasive plants. Of all alternatives, Alternative B.1 would offer slightly more to vegetation communities than Alternative B (see **Table 3-55**). Of the areas acceptable for further consideration for coal leasing under Alternative B.1, 7,766 acres are expected to be developed through the end of 2040 in Mercer, McLean, and Oliver Counties, which would limit the extent of the impacts; development would occur within the existing mine permit boundaries as of September 9, 2022.

Table 3-55
Decision Area Coal Acceptability by Vegetation Type under Alternative B.1 (Acres)[1]

Coal Management	Tallgrass Prairie	% of Decision Area	Woody Draws	% of Decision Area	Potential Special Status Plant Habitat	% of Decision Area	Riparian and Wetland Vegetation	% of Decision Area
Acceptable for development	0	0.0	200	<0.1	0	0.0	400	0.1
Unacceptable for development	0	0.1	11,500	0.28	1,400	0.03	23,200	0.57
Total	0	0.1	11,700	0.29	1,400	0.03	23,600	0.58

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area. [2]Closed acreages are incidental and not designed to directly protect the vegetation types.

To prevent this impact in habitat for species of high interest to the state, Criterion 15 includes reclamation as a stipulated method of coal mining. This stipulation would require reclamation using an approved seed mix that is appropriate to the soil type(s) and resident species of fish, wildlife, or plant species found within the disturbance area. There would remain the potential for the introduction or spread of noxious weeds and invasive plants in other areas developed for coal.

BLM management of recreation in the Schnell Ranch SRMA (2,000 acres), Figure 4 BCA (3,500 acres), and Lost Bridge BCA (8,900 acres) would reduce the vegetation impacts described for recreation under *Impacts Common to All Alternatives* and Alternative A. For example, certain resource uses, such as ROW development, mineral leasing, and livestock grazing, would be restricted in these recreation areas. Impacts on vegetation would be concentrated in these areas; however, these areas would limit more extensive, widespread impacts, and would reduce fragmentation of vegetation communities throughout the decision area.

The BLM would manage 52,200 acres (11 percent fewer acres than under Alternative A) as available and 6,300 acres (compared with 0 acres under Alternative A) as unavailable to livestock grazing. The impacts from livestock grazing described for Alternative A would not occur in areas managed as unavailable. While the forage utilization limit would be 50 percent (the same as under Alternative A), Alternative B would include the ability to adjust grazing management to improve rangeland health in accordance with thresholds and responses specified in adaptive management. The use of adaptive management would benefit vegetation by allowing flexible resource management decision-making that can be adjusted in an appropriate time frame in the face of uncertainties, as outcomes from management direction and other events become better understood. This would reduce the likelihood for vegetation removal, degradation, or fragmentation that would cause a departure from land health standards on lands available to livestock grazing.

Management of the Mud Buttes ACEC (960 acres), interim protections of the three river segments suitable for inclusion in the NWSRS, and management of the Lewis and Clark NHT management corridor and North Country NST management corridor would include restricting some surface-disturbing activities within these areas. Examples of restrictions that would apply include an NSO stipulation for fluid minerals, closure to mineral materials disposal in the ACEC and within 0.50 miles of the national trails, and ROW exclusion in the ACEC. Further, a plan of operations would be required for locatable mineral development in the ACEC. As such, vegetation, riparian areas, and wetlands would generally be protected from surface disturbances and associated impacts within these areas.

Alternative C

Impacts on vegetation from noxious weed and invasive plant management would be the same as those described under Alternative B.

Impacts from vegetation management would be similar to those described for Alternative B, but the BLM would not manage riparian areas and wetlands beyond PFC. As a result, riparian areas and wetlands may not be managed to meet certain related resource objectives.

Managing more areas as ROW exclusion or avoidance under Alternative C (**Table 3-56**, below) would reduce the vegetation impacts described under Alternative A. Specifically, impacts from ROW development would be reduced, but not always entirely prevented, for tallgrass prairie, woody draws, potential special status plant habitat, and riparian and wetland vegetation, which would be managed as ROW avoidance areas. Some woody draw habitat would be incidentally protected from management for other resources as ROW exclusion.

The BLM would manage the same acres as closed to fluid mineral exploration and development under Alternative C as Alternative A; however, more acres under Alternative C would be managed with NSO, CSU, and TL stipulations specifically to protect vegetation, riparian areas, and wetlands (**Table 3-57**, below). Impacts from stipulations for tallgrass prairie (NSO) and riparian areas and wetlands (CSU) would be the same as those described for Alternative B. Incidental protections would also occur for woody draws, potential special status plant habitat, and riparian and wetland vegetation from NSO stipulations that would be applied to protect other resources. Applying a CSU stipulation to woody draws under Alternative C would avoid some impacts, but vegetation could be disturbed or removed in woody draws that were not already protected by an NSO stipulation. The likelihood of impacts on BLM-administered surface lands would be low, given the small acreage of surface disturbance expected, as described in the oil and gas RFD (BLM 2022a; see **Section 3.1.1**).

Table 3-56
Decision Area Rights-of-Way Management by Vegetation Type under Alternative C (Acres)[1]

Right-of-Way Management	Tallgrass Prairie[1]	% of Decision Area	Woody Draws[1]	% of Decision Area	Potential Special Status Plant Habitat[1]	% of Decision Area	Riparian and Wetland Vegetation[1]	% of Decision Area
Open	0	0.0	0	0.0	0	0.0	0	0.0
ROW avoidance	300	0.5	6,200	10.6	1,100	1.9	2,000	3.4
ROW exclusion	0	0.0	0	0.0	0	0.0	0	0.0
Total	300	0.5	6,200	10.6	1,100	1.9	2,000	3.4

Source: BLM GIS 2021

[1] The ROW avoidance allocation is designed to directly protect the vegetation type.

Table 3-57
Vegetation Type and Fluid Mineral Leasing Allocations under Alternative C (Acres)[1]

Fluid Leasable Mineral Stipulation	Tallgrass Prairie[2]	% of Decision Area	Woody Draws[3]	% of Decision Area	Potential Special Status Plant Habitat[3]	% of Decision Area	Riparian and Wetland Vegetation[2]	% of Decision Area
NSO	2,100	0.4	17,000	3.5	1,800	0.4	24,800	5.1
CSU	1,800	0.4	24,500	5.0	1,800	0.4	24,800	5.1
Open, subject to STC	0	0.0	0	0.0	0	0.0	0	0.0

Source: BLM GIS 2021
[1] Stipulations may overlap, so total acreage of the vegetation types are not additive across the stipulations.
[2] NSO allocations (tallgrass prairie, potential special status plan habitat, riparian and wetland vegetation) and CSU allocations (woody draws) are designed to directly protect vegetation.
[3] Acreages are incidental and not designed to directly protect the vegetation types.

Under Alternative C, most of each vegetation type would be open to mineral materials disposal and subject to the impacts described for Alternative A (**Table 3-58**). Some areas would be closed as a result of incidental protections from closures to protect other resources. Avoiding mineral materials disposal within 300 feet of riparian and wetland vegetation would avoid some impacts associated with this mineral development, but areas may be affected due to the proximity of development. Impacts would remain estimated at 40 acres on average annually, which could be distributed throughout the decision area.

Compared with Alternative A, 2 percent more acres would be open to locatable mineral entry under Alternative C (362,600 acres); potential impacts in these areas would be as described above for mineral exploration and development, if demand for locatable minerals occurs in the future. No areas would be recommended for withdrawal under Alternative C; therefore, no areas would be protected from locatable mineral entry.

More acres of vegetation types would be closed for NEL mineral leasing under Alternative C and impacts on vegetation in these areas would be reduced from Alternative A if NEL mineral development were to occur (**Table 3-59**).

Table 3-58
Decision Area Mineral Materials Management by Vegetation Type under Alternative C (Acres)[1]

Disposal Management	Tallgrass Prairie[3]	% of Decision Area	Woody Draws[2]	% of Decision Area	Potential Special Status Plant Habitat[2]	% of Decision Area	Riparian and Wetland Vegetation[3]	% of Decision Area
Open to disposal	1,700	0.5	10,100	2.8	1,500	0.4	20,400	5.6
Closed to disposal	100	0.0	4,500	1.2	1,000	0.3	1,200	0.3
Total	1,800	0.5	14,600	4.0	2,500	0.7	21,600	6.0

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area. [2]Acreages are incidental and not designed to directly protect the vegetation types. [3]The allocation is designed to directly protect the vegetation type.

Table 3-59
Decision Area Nonenergy Leasable Minerals by Vegetation Type under Alternative C (Acres)[1]

Nonenergy Leasable Minerals Management	Tallgrass Prairie[2]	% of Decision Area	Woody Draws[2]	% of Decision Area	Potential Special Status Plant Habitat[2]	% of Decision Area	Riparian and Wetland Vegetation[2]	% of Decision Area
Open to leasing	1,700	0.5	10,100	2.8	1,500	0.4	33,700	9.3
Closed to leasing	100	0.0	4,500	1.2	1,000	0.3	6,800	1.9
Total	1,800	0.5	14,600	4.0	2,500	0.7	40,500	11.2

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[2]Acreages are incidental and not designed to directly protect the vegetation types.

Acres of coal acceptable and unacceptable for coal development under Alternative C are shown in **Table 3-60**. Impacts from managing the criteria from Coal Screen 2 (unsuitability) related to vegetation, riparian and wetland vegetation, and special status plants would have impacts as described for Alternative B, including the stipulation associated with Criterion 15. Under Alternative C, more acres (553,600 acres) would be acceptable for further consideration of leasing, and noxious weeds and invasive plants could be introduced in these areas. As under Alternative A, 9,434 acres are expected to be developed through the end of 2040 over the life of the plan in Mercer, McLean, and Oliver Counties, which would limit the extent of the impacts.

BLM management of recreation in the Schnell Ranch SRMA (2,000 acres), Figure 4 BCA (3,100 acres), and Lost Bridge BCA (5,300 acres) would reduce the vegetation impacts described for recreation under Alternative A. Impacts on vegetation would be similar to those described for Alternative B; however, they would occur over a smaller area since the Figure 4 and Lost Bridge BCAs would each cover a smaller area.

Table 3-60
Decision Area Coal Acceptability by Vegetation Type under Alternative C (Acres)[1]

Coal Management	Tallgrass Prairie	% of Decision Area	Woody Draws	% of Decision Area	Potential Special Status Plant Habitat	% of Decision Area	Riparian and Wetland Vegetation	% of Decision Area
Acceptable for development	0	0.0	3,200	0.1	200	<0.1	12,100	0.3
Unacceptable for development	0	0.0	8,500	0.2	1,200	<0.1	11,400	0.3
Total	0	0.0	11,700	0.3	1,400	<0.1	23,500	0.6

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[2]Closed acreages are incidental and not designed to directly protect the vegetation types.

The BLM would manage 56,500 acres (3 percent fewer acres than under Alternative A) as available and 2,000 acres (compared with 0 acres under Alternative A) as unavailable to livestock grazing. The impacts from livestock grazing described above for Alternative A would not occur in areas managed as unavailable. Impacts from adaptive management would be the same as those described for Alternative B.

Impacts from special designations management would be similar to those described for Alternative B. Compared with Alternative B, under Alternative C, the BLM would have fewer restrictions on surface-

disturbing activities in the Mud Buttes ACEC and within the Lewis and Clark NHT management corridor and the North Country NST management corridor. Examples include management of the ACEC as a ROW avoidance area and consulting with the NPS on a case-by-case basis for proposed mineral materials disposal in the national scenic and historic trails. Further, a plan of operations would be required for locatable mineral development in the Mud Buttes ACEC. Compared with Alternative A, Alternative C would not afford protections within eligible river segments, as these would be determined not suitable for inclusion in the NWSRS and released from interim management protections.

Alternative D

Impacts on vegetation from noxious weed, invasive plant management, vegetation management, and recreation management would be the same as described under Alternative B. Impacts from ROW management and livestock grazing management would be the same as under Alternative C.

Managing more areas as ROW exclusion or avoidance under Alternative D (**Table 3-61**) would reduce the impacts on vegetation described under *Impacts Common to All Alternatives* and Alternative A. Impacts would be mostly similar to Alternative B with the exception of riparian and wetland vegetation would be managed as a ROW avoidance area, and woody draws which would be managed as ROW avoidance areas and have a CSU stipulation for fluid mineral leasing instead of the NSO stipulation under Alternative B. Impacts from management of woody draws as ROW avoidance and CSU for fluid mineral leasing would be the same as described for Alternative C. Impacts from managing riparian and wetland vegetation as ROW avoidance could allow temporary impacts to these areas, though design features and BMPs would mitigate impacts and maintain riparian area and wetland functionality.

Table 3-61
Decision Area Rights-of-Way Management by Vegetation Type under Alternative D (Acres)[1]

Right-of-Way Management	Tallgrass Prairie	% of Decision Area	Woody Draws	% of Decision Area	Potential Special Status Plant Habitat	% of Decision Area	Riparian and Wetland Vegetation	% of Decision Area
Open	0	0.0	0	0.0	0	0.0	0	0.0
ROW avoidance	0	0.0	6,100	10.4	1,100	1.9	2,000	3.4
ROW exclusion	300	0.5	0	0.0	0	0.0	0	0.0
Total	300	0.5	6,100	10.4	1,100	1.9	2,000	3.4

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.

The BLM would manage more acres as closed to fluid mineral exploration and development under Alternative D than under Alternative A (**Table 3-62**; see **Maps 2-13** through **2-26** in **Appendix A** for closed area locations). Impacts would be largely similar to Alternative B, though incidental protections from NSO and CSU stipulations for other resources would change the acres protected.

Table 3-62
Vegetation Type and Fluid Mineral Leasing Allocations under Alternative D (Acres)[1]

Fluid Leasable Mineral Stipulation	Tallgrass Prairie	% of Decision Area	Woody Draws	% of Decision Area	Potential Special Status Plant Habitat[3]	% of Decision Area	Riparian and Wetland Vegetation[3]	% of Decision Area
NSO	200[3]	0.04	21,800[2]	4.5	1,300	0.3	8,700	1.8
CSU	100[2]	0.02	21,600[3]	4.4	900	0.2	8,700	1.8
Open, subject to STC	0	0.0	0	0.0	0	0.0	0	0.0

Source: BLM GIS 2021
[1] Stipulations may overlap, so total acreage of the vegetation types are not additive across the stipulations.
[2]Stipulation acreages are incidental and not designed to directly protect the vegetation types.
[3]The allocation is designed to directly protect the vegetation type.

The BLM would manage more acres as closed to mineral materials under Alternative D than under Alternative A (**Table 3-63**). Impacts would be largely similar to Alternative B, though incidental protections from closures for other resources would change the acres protected. Impacts would remain estimated at 40 acres on average annually, which could be distributed throughout the decision area.

Table 3-63
Decision Area Mineral Materials Management by Vegetation Type under Alternative D (Acres)[1]

Mineral Materials Management	Tallgrass Prairie [3]	% of Decision Area	Woody Draws [2]	% of Decision Area	Potential Special Status Plant Habitat [2]	% of Decision Area	Riparian and Wetland Vegetation [3]	% of Decision Area
Open to disposal	0	0.0	6,800	1.9	800	0.2	0	0.0
Closed to disposal	1,700	0.5	7,800	2.2	1,600	0.4	21,700	6.0
Total	1,700	0.5	14,600	4.0	2,400	0.7	21,700	6.0

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[2]Acreages are incidental and not designed to directly protect the vegetation types.
[3]The allocation is designed to directly protect the vegetation type.

Under Alternative D, 1,000 acres (more than the 0 acres under Alternative A) would be recommended for withdrawal from locatable mineral entry; impacts from locatable mineral development would be reduced in these areas. Two percent more acres would be open to locatable mineral entry under Alternative D (362,600 acres) as compared to Alternative A. Impacts described above for mineral exploration and development could occur in these areas, if demand for locatable minerals occurs in the future.

More acres of vegetation types would be closed for NEL mineral leasing under Alternative D, and if NEL mineral development were to occur, impacts on vegetation in these areas would be reduced from Alternative A (**Table 3-64**).

Table 3-64
Decision Area Nonenergy Leasable Minerals by Vegetation Type under Alternative D (Acres)[1]

Nonenergy Leasable Minerals Management	Tallgrass Prairie[3]	% of Decision Area	Woody Draws[2]	% of Decision Area	Potential Special Status Plant Habitat[2]	% of Decision Area	Riparian and Wetland Vegetation[2]	% of Decision Area
Open to leasing	0	0.0	700	<0.1	200	<0.1	1,100	<0.1
Closed to leasing	1,700	0.5	11,000	0.3	1,200	<0.1	22,500	0.6
Total	1,700	0.5	11,700	0.3	1,400	<0.1	23,600	0.6

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[2]Acreages are incidental and not designed to directly protect the vegetation types.
[3]The allocation is designed to directly protect the vegetation type.

Acres of coal acceptable and unacceptable for coal development under Alternative D are shown in **Table 3-65**. The impacts described for coal under Alternative A would not occur on BLM-administered surface lands identified as unsuitable for coal development, which encompass most of the vegetation resources analyzed in this section. In areas acceptable for further consideration for leasing (58,600 acres), coal development would introduce the potential for the establishment or spread of noxious weeds and invasive plants. As under Alternative A, 9,434 acres are expected to be developed through the end of 2040 over the life of the plan in Mercer, McLean, and Oliver Counties, which would limit the extent of the impacts.

Table 3-65
Decision Area Coal Acceptability by Vegetation Type under Alternative D (Acres)[1]

Coal Management	Tallgrass Prairie	% of Decision Area	Woody Draws	% of Decision Area	Potential Special Status Plant Habitat	% of Decision Area	Riparian and Wetland Vegetation	% of Decision Area
Acceptable for development	0	0.0	700	<0.1	200	<0.1	1,100	<0.1
Unacceptable for development	0	0.0	11,000	0.3	1,200	<0.1	22,500	0.6
Total	0	0.0	11,700	0.3	1,400	<0.1	23,600	0.6

Source: BLM GIS 2021
[1] Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[2]Closed acreages are incidental and not designed to directly protect the vegetation types.

Cumulative Impacts

The cumulative impacts analysis area for vegetation is the planning area. The types of vegetation impacts that have occurred in the past are expected to continue. These impacts include conversion of vegetation and filling wetlands for agricultural use; the degradation and loss of riparian vegetation from livestock grazing and housing developments; the loss of vegetation due to mineral development, renewable energy development, and ROWs; and the spread of noxious weeds and invasive plants. Vegetation on split-estate lands may be affected by mineral developments on adjacent private lands if vegetation is removed or altered on split-estate lands; this is particularly true in areas with checkerboard patterns of landownership. Reasonably foreseeable impacts include vegetation loss with the expected spread of the emerald ash borer. However, past and ongoing vegetation treatments have been implemented through such programs as the NRCS Sage-Grouse Initiative and have restored vegetation communities.

The oil and gas RFD (BLM 2022a) estimates that 43,000 oil and gas production and support wells could be drilled in the planning area from 2020 through 2040, with an estimated surface disturbance of 56,000 acres. The coal RFD (BLM 2022b) estimates that coal development would disturb 9,434 acres (or 7,766 acres under Alternative B.1) from existing and pending leases through the end of 2040. The mineral materials RFD estimates that mineral materials could disturb 40 acres per year (BLM 2022c).

Vegetation may die or be degraded from hazardous materials spills, which are noted in **Appendix I, Table I-1**. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

Extreme weather patterns and precipitation events are expected to become more frequent and, coupled with surface-disturbing activities, may result in soil stability that becomes more susceptible to erosion, a reduction in soil moisture, and an increased potential for salt accumulation. BLM management's contribution to climate change impacts in the planning area would be limited by the total acreage in the fluid mineral decision area (1 percent of the total planning area) and coal decision area (9 percent of the total planning area). While BLM management may not significantly contribute GHG emissions relative to global emissions, implementation of management decisions could exacerbate local climate change impacts in some cases. For example, activities that disrupt soil may lead to sediment accumulation in the prairie potholes, exacerbating this effect already worsened by climate change.

BLM management's contribution of nonmineral uses to cumulative impacts would be limited on BLM-administered surface lands, which comprise 0.13 percent of surface lands in the planning area. Because BLM-administered mineral estate comprises a larger portion of the planning area (9 percent for the coal decision area and 1 percent for the fluid minerals decision area), minerals management under Alternative A, combined with past, present, and reasonably foreseeable actions, would continue to have a slightly larger, though still limited, impact on vegetation in the planning area. As a result, vegetation conditions and trends in the cumulative impacts analysis area would be largely influenced by management on lands not administered by the BLM. Based on the activities described above, vegetation, riparian areas, and wetlands throughout the planning area would continue to be at risk from development, including infrastructure, recreational and residential developments, and agricultural land conversion.

Given the limited surface acreage administered by the BLM in the cumulative impacts analysis area, cumulative impacts under Alternatives B and D would be similar to those described for Alternative A. Cumulative impacts from mineral development would be reduced under Alternatives B and D due to the increased closures and stipulations that would be applied to protect all resources, including tallgrass prairies, woody draws, special status plants, and riparian and wetland vegetation. Cumulative impacts under Alternative C would be similar to those described for Alternatives B and D. Cumulative impacts from mineral development would be slightly greater than those described for Alternatives B and D because fewer acres would be closed or managed with stipulations.

3.2.5 Wildlife

Issues

- How would the alternatives affect BLM's achievement of land health standards?
- How would permitted management activities such as oil and gas development, livestock grazing, and recreational use on BLM-administered lands impact wildlife species?

- How would the alternatives contribute to the restoration of priority species (including special status species) and their habitats?
- How would the alternatives address the management of priority big game species, such as elk and elk habitat, to provide hunting and wildlife viewing opportunities?

Affected Environment

This section focuses on species in which management direction affects the recovery, maintenance, control, or improvement of wildlife populations and their habitat. These include species listed as threatened or endangered under the ESA, BLM sensitive species, species of conservation priority in the North Dakota State Wildlife Action Plan (NDGFD 2015), game species, migratory birds, and invasive species. While each species is not discussed individually and mapped habitat is not available for all species, acres are presented in this analysis for those species for which mapped habitat is available.

General Wildlife

The planning area contains diverse wildlife and supporting vegetation communities (see **Section 3.2.4**, Vegetation Communities). Over 300 wildlife species inhabit the planning area and include a variety of migratory birds, small and large mammals, reptiles, amphibians, and insects. Acres of habitat for sharp-tailed grouse within the decision areas are presented in **Table 3-66**, below. Migratory birds are discussed in the next section. Wildlife management areas are shown in **Map 3-12**, State Wildlife Management Areas, in **Appendix A**.

Table 3-66
Acres of General Wildlife Habitats in the Decision Areas

Species	BLM Surface	% BLM Surface Decision Area	Fluid Minerals	% Fluid Minerals Decision Area	Coal	% Coal Decision Area	Other Minerals[1]	% Other Minerals Decision Area
General Wildlife	-	-	-	-	-		-	-
Sharp-tailed grouse (*Tympanuchus phasianellus*) lek[2]	100	0.2	19,000	3.9	37,200	0.9	10,200	2.8
Migratory Birds	-	-	-	-	-	-	-	-
Ferruginous hawk (*Buteo regalis*) nest[3]	800	1.4	1,100	0.2	1,500	0	1,100	0.3
Golden eagle (*Aquila chrysaetos*) nest[3]	2,400	4.1	13,500	2.8	6,300	0.2	7,200	2.0
Bald eagle (*Haliaeetus leucocephalus*) nest[4]	1,800	3.1	4,500	0.9	2,400	0.1	3,500	1.0

Source: BLM GIS 2021
[1] Includes mineral materials and locatable minerals
[2] Includes a 2-mile buffer around the leks
[3] Includes a 0.50-mile buffer around the nest
[4] Includes a 1-mile buffer around the nest

Terrestrial nonnative or introduced species, such as feral cats (*Felis catus*) and feral swine (*Sus scrofa*), and nonnative and invasive plants and aquatic species inhabit the planning area. These species can compete for resources, degrade vegetation communities, transfer diseases, or directly prey on native wildlife species; however, wildlife habitat degradation due to invasive weeds remains the greater threat to native wildlife.

Management of terrestrial wildlife species is tied to their habitat availability and quality. In North Dakota, many habitats for native wildlife have been lost or have become greatly fragmented and modified due to

multiple land uses. The intensity of land uses varies across the landscape. Much of the land has been converted to tilled cropland and livestock rangelands. The remaining native prairie is fragmented by roads, fences, ROWs, urbanization, mineral development, and infrastructure. Such habitat loss, degradation, and fragmentation have caused population declines for numerous species and have contributed to the federal listing or candidacy of the ten federally listed and one candidate species within the planning area. Further, the loss of native habitats and fragmentation of existing habitats have caused local extirpation of several species, including grizzly bears (*Ursus arctos horribilis*), gray wolves (*Canis lupus*), and black-footed ferrets (*Mustela nigripes*). However, black footed ferrets were reintroduced on Standing Rock Reservation in October 2021.

Challenges to wildlife management include conflicting management goals across jurisdictions and landownership, the mismatch of scale between collecting data and applying the results of data analyses, inconsistencies between funding allocation and management priorities, and the balance of wildlife needs with other multiple-use land needs.

Additional information is available in Section 2.6, Wildlife, of the AMS (BLM 2020b).

Migratory Birds

There have been widespread population declines in avifauna in North America over the past 48 years, and more recently, over a 10-year observation period conducted by a continent-wide weather radar network, there has been a similar decline in the biomass of migratory birds. This loss of bird abundance signals the need to identify threats to mitigate further avifaunal collapse and the associated ecosystem integrity, function, and services (Rosenberg et al 2019). Another study by Pacifici et al. (2017) estimated a 23.4 percent of threatened bird species (out of 1,272 species) may have already been negatively impacted by climate change. These impacts were associated with high maximum temperature recorded within breeding areas, low dispersal distances, longer generation lengths, reduced seasonal precipitation, and restricted altitudinal ranges in non-breeding distributions (Pacifici et al. 2017). Widespread population declines attributed to climate change may be more pronounced in bird species than mammals, particularly in areas where mean temperature has increased at a more rapid rate (Spooner et al. 2018; Chen et al. 2011).

The planning area provides habitat for a suite of migratory bird species associated with Mixed-Grass Prairie and Shrub-Steppe habitats. All of these species are protected by the Migratory Bird Treaty Act and a number are also BLM sensitive (**Appendix J**). Bald and golden eagles are protected by the Bald and Golden Eagle Protection Act and are also managed as BLM sensitive species. While every migratory bird species will not be analyzed individually, all of the species above and all other avian species in the decision areas are covered by the analysis below. Acres of habitat for certain migratory bird species within the decision areas are presented in **Table 3-66**, above.

Game Species

Several big game species inhabit the planning area: elk (*Cervus canadensis*), mule deer, white-tailed deer (*O. virginianus*), pronghorn antelope, bighorn sheep, moose (*Alces alces*), and mountain lion (*Puma concolor*). Seasonal big game habitats within the decision areas are presented in **Table 3-67**, below. In addition, game birds are found throughout the state (see Table 2-37, Common Game Species in the Planning Area, in the AMS; BLM 2020b). Big game habitats in the planning area are shown in **Map 3-13**, Wildlife Habitat Types, in **Appendix A**.

Table 3-67
Acres of Big Game Seasonal Habitats in the Decision Areas

Species	BLM Surface	% BLM Surface Decision Area	Fluid Minerals	% Fluid Minerals Decision Area	Coal	% Coal Decision Area	Other Minerals[1]	% Other Minerals Decision Area
Bighorn sheep crucial habitat[2]	7,300	12.5	21,800	4.5	1,900	0.0	11,800	3.3
Bighorn sheep birthing habitat	6,500	11.1	18,600	3.8	1,700	0.0	10,100	2.8
Elk calving	23,400	40.0	114,000	23.0	19,500	0.5	48,400	13.3
Mule deer fawning	8,300	14.2	34,400	7.0	17,600	0.4	17,800	4.9

Source: BLM GIS 2021
[1] Includes mineral materials and locatable minerals
[2] "Crucial habitat" is defined as "sensitive use areas that, because of limited abundance and/or unique qualities, constitute irreplaceable crucial requirements for high interest wildlife"

Special Status Species

BLM special status species include (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 species. All federal candidate species, proposed species, and delisted species in the 5 years following delisting are considered BLM sensitive species. **Appendix J**, Vegetation and Wildlife Species Tables includes the BLM Montana/Dakotas special status species list.

There are 46 special status species (12 ESA-listed species, 1 candidate, and 33 BLM sensitive species) with the potential to exist in the planning area (see **Appendix J**, Vegetation and Wildlife Species Tables), though potential habitat is not present for all of these. Of these, 27 are species of conservation priority identified by the NDGFD included in the North Dakota State Wildlife Action Plan (NDGFD 2015). Acres of special status species habitats in the decision areas are presented in **Table 3-68**, below; only those species for which mapped habitat is available are included in the table, though habitat likely exists for other special status species, such as whooping crane (*Grus americana*).

Native prairie, tallgrass prairie, and woody draws are important habitats. Tallgrass prairie and woody draws are two key habitats for special status species in the decision areas. Characteristics of these habitats are described in **Section 3.2.4**, Vegetation Communities, above. Native prairie habitats have historically provided host plants for federally-listed and BLM sensitive species, such as the monarch butterfly (*Danaus plexippus*) and the western bumblebee (*Cyrtopogon dasylloides*). Native prairies also provide cover, nesting substrate, and forage for numerous sensitive bird species. Native prairies, and in particular tallgrass prairie, have been largely converted to farmland, so the tallgrass prairie that remains on BLM-administered lands is of high importance to maintaining the habitat.

Woody draws with connections to water sources are important for wildlife because they provide a wooded oasis within the surrounding dry prairie. Species such as the northern long-eared bat use woody draws for foraging and roosting/maternity colonies, and BLM sensitive birds such as bald eagle and black-billed cuckoo (*Coccyzus erythropthalmus*), use this habitat for nesting. Since these habitats are localized and uncommon on the landscape, the BLM plays an essential role in maintaining woody draws through management such as limiting juniper encroachment, as well as connecting woody draws through restoration or reseeding.

Table 3-68
Acres of Special Status Wildlife Species Habitats in the Decision Areas

Species	Status[1]	BLM Surface	% BLM Surface Decision Area	Fluid Minerals	% Fluid Minerals Decision Area	Coal	% Coal Decision Area	Other Minerals[2]	% Other Minerals Decision Area
Prairie dog (*Cynomys ludovicianus*) occupied habitat	BLM S	100	0.2	300	0.1	500	0.1	200	0.1
Piping plover (*Charadrius melodus*)[3]	T	700	1.2	2,800	0.6	700	0.1	2,600	0.7
Least tern (*Sternula antillarum*)[3, 4]	BLM S	300	0.5	3,500	0.7	5,100	1.0	2,900	0.8
GRSG (*Centrocercus urophasianus*) general habitat management area (GHMA)	BLM S	100	0.2	5,300	1.1	25,300	5.2	1,000	0.3
GRSG (*Centrocercus urophasianus*) priority habitat management area (PHMA)	BLM S	33,100	56.4	62,600	1.3	5,400	1.1	44,500	12.3
Dakota skipper (*Hesperia dacotae*)[5]	T	4,100	7	48,300	10	652,400	16	39,400	11

Source: BLM GIS 2021
[1] BLM S: BLM sensitive species; T: ESA-threatened species
[2] Includes mineral materials and locatable minerals
[3] Includes a 0.50-mile buffer around the habitat
[4] Delisted on January 13, 2021; currently a BLM sensitive species
[5] Includes a 0.62-mile buffer around the habitat

Endangered Species Act-Listed Species

Federally listed wildlife species with potential habitat in the planning area include black-footed ferret (endangered), gray wolf (endangered), grizzly bear (threatened), northern long-eared bat (endangered), piping plover (*Charadrius melodus*, threatened), red knot (*Calidris canutus rufa*, threatened), whooping crane (endangered), Dakota skipper (threatened), Poweshiek skipperling (*Oarisma poweshiek*, endangered), and rusty patched bumble bee (*Bombus affinis*, endangered). Monarch butterfly (*Danaus plexippus*) is a candidate for listing with the potential to occur. A map of modeled Dakota skipper habitat is presented in **Map 3-14**, Modeled Dakota Skipper Habitat.

The planning area contains critical habitat for Dakota skipper, piping plover, and Poweshiek skipperling. Critical habitat for these species is shown in **Map 3-15**, US Fish and Wildlife Critical Habitat, in **Appendix A**. Additional areas may contain occupied, suitable, or potentially suitable habitat for ESA-listed species.

BLM Sensitive Species

BLM sensitive species in the planning area include 21 bird species, 1 invertebrate species, 3 mammal species, 4 reptile species and 4 fish species (see **Table J-4** in **Appendix J**, Vegetation and Wildlife Species Tables and **Section 3.2.6**, Fish and Aquatic Species for a discussion of fish). Nine of the bird species are addressed above under *Migratory Birds*. GRSG habitats in the planning area are shown in **Map 3-13**, Wildlife Habitat Types, in **Appendix A**.

Climate Change

As described in **Section 3.2.1**, Air Quality and Climate, above, and Section 2.1 of the AMS (BLM 2020b), climate change has caused an increase in temperatures, precipitation, and flooding risk. Also, wildfires are projected to increase in midsummer through early fall. High interannual variability in water availability may lead to an increase in droughts (USGCRP 2018). Additionally, humans have been estimated to have caused an observable warming of roughly 1 degree Celsius by 2017 (compared to pre-industrial levels), with average temperatures rising by 0.2 degrees Celsius over the last 30 years alone (IPBES 2019). These changes have contributed to widespread impacts on plants and wildlife species, including species distribution, phenology, population dynamics, community structure and ecosystem function (IPBES 2019).

Using associations between aspects of climate and species' occurrences to estimate conditions that are suitable to maintain viable conditions, Warren et al. (2011) compiled research on the thresholds of warming temperatures and impacts on wildlife habitats across the globe. Their findings show bioclimatic envelopes were exceeded, leading to eventual transformation of 16 percent of global ecosystems: loss of 58 percent wooded tundra, 31 percent cool conifer forest, 25 percent scrubland, 20 percent grassland/steppe, 21 percent tundra, 21 percent temperate deciduous forest, and 19 percent savanna (Warren et al. 2011).

Impacts from the anticipated temperature and precipitation increases would affect vegetation as described in **Section 3.2.4**. This would affect the habitats that wildlife rely on. Additionally, declines in plant and wildlife populations have shown to result in an erosion of ecosystem function and loss of ecosystem services (Spooner et al. 2018). For instance, an increase in the competitive ability of noxious weeds and invasive plants would lead to a reduction in native vegetation that many wildlife use for food, cover, or reproduction habitat. This may then reduce wildlife survival, prevent successful reproduction, or cause wildlife to be displaced to other areas. Similarly, a reduction in prairie potholes would reduce the availability of this habitat to the many species that rely on them, particularly breeding waterfowl and migrant shorebirds. According to Warren et al. (2011), 38–54 percent loss of waterfowl habitat in the prairie pothole region will be attributed to climate change.

Further, changes in temperature and water availability may cause changes to wildlife physiology, movement, and timing of activities, such as changing diurnal behaviors or dispersal and movement patterns. Impacts from climate change on species physiology include changes in tolerances to high temperatures, shifts in sex ratios in in species with temperature-dependent sex determination, and increased metabolic costs of living in a warmer climate (Scheffers et al. 2016). Warmer temperatures may cause wildlife to shift their migration patterns. Changes in seasonal movements have been observed in marine and freshwater fish spawning events as well as changes in populations ranges like expansion in warm-adapted species, and range contraction in cold-adapted species (Scheffers et al. 2016; Cahill et al. 2012). In recent years, researchers have found that the distributions of many terrestrial organisms have been shifting in latitude or elevations two to three times faster than previously documented, approximately 11 meters a decade for elevational shifts, and 16.9 kilometers at latitudinal shifts (Chen et al. 2011). Additionally, changes in species interactions are an important factor in documents populations declines and extinctions related to climate change (Cahill et al. 2012). These effects may be more pronounced on species with narrow habitat requirements or environmental tolerances, those that depend on interactions between species, or those that have limited dispersal abilities (NDGFD 2015). Further, Román-Palacios and Wiens (2020) identified specific climatic factors that are associated to widespread population declines. They found that areas with highest peak temperatures in the year are more strongly associated with local extinction, than changes in precipitation or in other temperature- related variables (Román-Palacios and Wiens 2020). Additionally, populations that are able to shift their ecological niches are more resilient to dramatic temperature changes (Román-Palacios and Wiens 2020).

Other changes in response to a changing climate include changes in phenology, abundance, and distribution of vegetative communities. For example, temperate plants have been observed to bud and flower earlier in the spring and later in autumn (Scheffers et al. 2016). Additionally, Scheffers et al. (2016) found that higher atmospheric CO_2 concentrations coupled with a warming climate extended the growing periods for many plant species across the globe, shifting population ranges. If native plant communities shift their ranges, it may also cause wildlife to shift. The National Audubon Society has modeled range shifts for nearly 400 bird species in North American, including a high vulnerability for special status species in North Dakota, such as piping plover, yellow rail (*Coturnicops noveboracensis*), horned grebe (*Podiceps auritus*), and long-billed curlew (Audubon 2021). Other species' ranges have expanded, such as a tick species (*Ixodes scapularis*) that is a vector for Lyme disease, which has expanded westward into North Dakota (NDGFD 2015).

Finally, climate change can increase fire frequency, and may be proximate causes of extinction (Cahill et al. 2012). Climate change has been modeled to cause a nearly four-fold increase in acres burned, particularly in the western portion of the state (URS 2010). Increased unplanned fire ignitions would exacerbate the wildfire impacts on wildlife and the associated habitats, particularly in western North Dakota.

Environmental Consequences

Impacts Common to All Alternatives

This section describes impacts on wildlife that could occur under all alternatives. Additional impacts associated with management in the alternatives described in this EIS are presented below. Note that acres presented for all alternatives represent the acres available/open or unavailable/closed to certain resource uses; not all of these acres would likely be affected during the life of the plan. Further, while each species is not discussed individually and mapped habitat is not available for all species, acres are presented in this analysis for those species for which mapped habitat is available. Tallgrass prairie and woody draws provide

important habitat for many wildlife species and impacts on these habitats are presented in **Section 3.2.4**, Vegetation Communities.

General Wildlife

Vegetation treatments for fuels management under all alternatives would cause short- or long-term changes to wildlife habitat. In the short term, treatments remove vegetation, causing localized habitat loss or modification. Until they are revegetated, these areas may be more susceptible to soil loss or nonnative, invasive, or noxious weed invasion. Individual wildlife species and habitats, including those used for cover, foraging, and breeding, could experience disturbance, displacement, injury, or mortality for the duration of, and a short time following, treatments in the affected area. Short-term effects would not affect large expanses of habitat. Chemical treatments could additionally cause wildlife to experience illness or mortality. This would be due to exposure during or after chemical treatments, including direct spray and spills, indirect contact with foliage after direct spray, and ingestion of contaminated food items after direct spray.

In the long term, fuels treatments would restore and maintain fire regimes and land health, thereby protecting existing wildlife habitats by reducing the threat of catastrophic wildfire. Such management would further improve wildlife habitat by changing plant communities, such as reducing dense vegetation and standing biomass, and modifying vegetation distribution, structure, and understory (Reich et al. 2001). This would help restore a fire-dependent ecosystem.

Under all alternatives, ROW exclusion areas would continue preventing wildlife impacts in certain areas by prohibiting ROW development. ROW avoidance areas would reduce the likelihood of impacts because, although the ROW would be developed, it would be sited away from sensitive resources, such as sensitive wildlife habitats. Impacts from wind energy ROWs are not expected under any alternative since the fragmented nature of the landownership pattern makes such development unlikely, despite North Dakota's high potential for wind energy.

Where road and ROW construction occur, they may cause soil compaction and vegetation loss and may reduce habitat quality. ROWs are often linear and may stretch for miles. Direct impacts may include an increased likelihood for injury or mortality; interference with acoustic signals, which may reduce the ability to hear and avoid predators, which may lead to injury or mortality; and noise or visual disturbance that may lead to habitat avoidance. Habitat avoidance may prevent wildlife from successfully foraging, finding cover from predators, or reproducing. This may result in individuals being more susceptible to starvation or malnutrition, predation, or population declines.

Indirect effects may include habitat fragmentation or degradation, which may cause changes in wildlife movement patterns and prevent individuals from successfully foraging, finding cover from predators, or reproducing. Indirect effects may also include noxious weed and invasive plant spread, which may lead to a reduction in native vegetation, thus reducing preferred native plants used for food and the cover that native vegetation provides (Ouren et al. 2007; Parris and Schneider 2009). ROWs may increase predation by providing perches and nesting opportunities for predatory birds (DeGregorio et al. 2014, APLIC 2006). Impacts would be more likely to occur on smaller, less mobile species that would be unable to flee the area quickly. Impacts would change over time. In the short term, construction activities would cause noise, surface disturbance, and human presence. Over the long term, there would remain the continued potential for collisions with vehicles or infrastructure, as well as road avoidance by wildlife and habitat

fragmentation. Additionally, dirt roads increase the level of fugitive dust, which could result in impacts on pollinators.

Surface disturbance from fluid mineral development is limited to 1,625 acres of federal mineral estate through 2040 (less than 1 percent of federal mineral estate); of these, 72 acres of disturbance could be on BLM-administered surface (less than 1 percent of BLM-administered surface). Disturbance would be concentrated in the high and medium potential areas. The reasonably foreseeable surface disturbance associated with mineral materials is similarly small, expected to be no more than 40 acres annually (BLM 2022c). Therefore, impacts on wildlife from mineral materials disposal and fluid mineral development would not impact wildlife habitat and would be localized under all alternatives. Similarly, while much of the federal mineral estate is available for locatable and NEL mineral development, such development is not reasonably foreseeable (see **Section 3.1.1**). Therefore, no impacts from locatable or NEL mineral development are expected under any alternative.

The types of impacts from coal and mineral exploration and development activities, such as road construction and use, facility construction, well pad and pipeline construction, and excavation, include surface disturbance and could degrade, remove, or fragment wildlife habitat. Noise and human presence increase the potential for displacement of individuals to nearby habitats, causing increased competition for resources in those areas. Vehicles on site during construction and operation may cause injury to or mortality of individual wildlife species, causing localized population declines. Impacts would be greater in the short term during construction due to the higher level of noise, surface disturbance, and human presence during this time. Impacts would also be greater during sensitive breeding or wintering periods. However, over the long term, impacts would continue at a lower level during operation. This would be due to noise and human presence.

Human presence and nonmotorized use of trails can also affect wildlife by causing habitat avoidance or through direct injury or mortality. Noise associated with recreational uses may cause habitat avoidance, potentially reducing the ability of individual wildlife to use habitats needed for foraging, cover, and reproduction. This may make individuals more susceptible to starvation or malnutrition, predation, or reduced reproductive success and population declines. Hebblewhite and Merrill (2008) conducted a meta-analysis of over 160 studies and found an average 0.60-mile avoidance response from human disturbance, with the greatest avoidance in summer. Further, recreation may cause direct injury or mortality to individual wildlife, through accidental human trampling by feet or bikes or intentional harm.

Comprehensive trails and travel management would cause impacts similar to those described above for recreation. Past and current use along designated routes is likely to continue causing noxious and invasive weed spread and habitat avoidance due to noise and human presence. Once discovered, the BLM would mitigate impacts to the extent practicable and feasible through such measures as closures or use restrictions.

Overall, the BLM's management of livestock grazing would aim to achieve or trend toward achieving Dakota Standards 1, 2, and 5, which would improve ecosystem function, vegetation diversity, and soil stability, thereby supporting healthy wildlife habitats. Adverse impacts on wildlife could occur in some areas until permits are renewed to address site-specific issues; impacts may last for the duration of a grazing permit, up to 10 years. In general, the more acres that are available for livestock grazing, the higher the percentage of allowable utilization; the higher the AUMs available for permitted use, the greater the acreage that would be subject to impacts. Impacts on wildlife habitats from livestock grazing will depend on the current year's conditions, habitat type relative to grazing season, grazing management across years (rest-rotation, deferred), stocking rate, and length of livestock grazing.

Indirect effects on habitat include the loss of vegetation cover, which may increase susceptibility to predation; the loss of the forage and prey base, which may lead to starvation, malnutrition, or habitat displacement; and habitat degradation through the introduction of noxious weeds and invasive plants, which may lead to a reduction in native vegetation. This would reduce preferred native plants used for food and the cover that native vegetation provides. There is also the potential for increased competition with some wildlife species for forage, and potentially reduced cover and nesting habitat for other species. Further, wildlife may be displaced from their habitats, which could increase competition for resources in adjacent habitats, affecting survival or reproductive success for some individuals.

In general, specially designated areas, such as ACECs, wild and scenic rivers, and national scenic and historic trails, are managed in ways to restrict surface-disturbing activities. These specially designated areas would prevent or reduce impacts on wildlife, such as habitat removal, fragmentation, and human disturbance, such as those described above for recreation.

Under all alternatives, impacts from climate change could affect wildlife and wildlife habitat. Changes in temperature and water availability may cause changes to wildlife physiology, movement, and timing of activities, such as changing diurnal behaviors or dispersal and movement patterns. Warmer temperatures may cause wildlife to shift their migration patterns. These effects may be more pronounced on species with narrow habitat requirements or environmental tolerances, those that depend on interactions between species, or those that have a limited dispersal ability (NDGFD 2015).

Migratory Birds

Most impacts on migratory birds are covered above under *General Wildlife*. Impacts specific to migratory birds from human activities include the potential for injury to or mortality of birds. Further, activities may cause direct disturbance to or removal of nesting habitat, including habitat fragmentation, as well as human disturbance near nests. This may cause nest abandonment and a decrease in reproductive success for some birds, leading to localized population declines. Beyond impacts on nesting areas, any disturbances or removal of vegetation have the potential to affect the suitability of migratory bird habitat for foraging, such as habitat for prey species such as small mammals, insects, or vegetation. If foraging habitat is unsuitable or unavailable for migratory bird prey species, birds may have to find new habitat elsewhere or forage further away. Because migratory birds travel long distances during migration, a lack of food or extra energy expenditure to find food may make birds more susceptible to predation, illness, or mortality.

In addition to the impacts described under *General Wildlife*, the types of impacts that could occur on migratory birds from livestock grazing include trampling of or disturbance to ground-nesting or riparian-dependent birds during the breeding season. This may result in nest abandonment or reproductive failure and localized population declines.

Game Species

Most impacts on game species are covered above under *General Wildlife*. In addition to the benefits from preventing uncharacteristically large or intense wildfires, mechanical treatments can reduce conifer encroachment, thereby improving forage for big game.

Human disturbance, specifically near lambing habitat, has been shown to be detrimental to some populations of bighorn sheep (Beecham et. al. 2007). Allowing surface disturbances in bighorn sheep lambing and winter ranges and in elk, pronghorn, and mule deer winter range could impact these species. Impacts on these seasonally important habitats could include disturbance and loss of plant communities, food sources, cover, breeding areas, and interference in species' movement patterns.

Impacts from recreation, ROWs, mineral exploration, and mineral development would be similar to those described above under *General Wildlife* for mineral exploration and development. Roads and off-road recreation have been shown to affect terrestrial wildlife, particularly big game species (Wisdom et al. 2004; Rowland et al. 2004; Trombulak and Frissell 2000). Impacts include those stated previously, such as weed spread, sedimentation, reduced water quality, habitat degradation, injury or mortality, and noise. Other impacts include increased movement rates and probabilities of flight response (Wisdom et al. 2004) and increased daily movements and home range (Rowland et al. 2004). Such increases in movement and stress levels would cause individuals to expend more energy, which could impact reproductive success or mortality, predation, or disease susceptibility. One study found the average distances from roads to areas of high winter use by mule deer were 0.27 to 0.60 miles (Sawyer et al. 2006). It is important to note that average avoidance distances do not correspond to total habitat loss, as some deer and elk will use habitats closer to disturbances, depending on individual responses.

Impacts from livestock grazing would be similar to those described above under *General Wildlife* for mineral exploration and development. Bighorn sheep are particularly susceptible to diseases spread by domestic livestock, leading to illness or death. This is most likely to occur where bighorn sheep and livestock graze near each other (BLM 2016).

Special Status Species

Most impacts on special status species are covered above under *General Wildlife*. Note that management for special status species in this RMP applies only to those species on BLM surface and split-estate locations. Impacts on tallgrass prairie, woody draws, and riparian and wetland vegetation are described above in **Section 3.2.4**. Impacts on these vegetation communities would affect the habitat for those wildlife species that rely on them. For instance, protections for woody draws would affect northern long-eared bat habitat, and protections for tallgrass prairie vegetation would support habitat for listed and BLM sensitive pollinators and birds, as described under the *Affected Environment*. Regardless of the alternative, the BLM would use the most up-to-date list of species under the ESA and BLM sensitive species and follow requirements to comply with the ESA and BLM Manual 6840.

This analysis incorporates by reference the analysis of the proposed plan amendment in the 2015 North Dakota Greater Sage-Grouse Proposed RMPA and Final EIS for management of GRSG (BLM 2015a, pp. 4-9 to 4-47). In particular, the North Dakota GRSG RMPA addressed threats to GRSG by including management to retain isolated/small populations; land tenure decisions to reduce conversion of habitats to agriculture and ex-urban development; applying stipulations and closures within PHMA and GHMA to limit disturbance from mineral development; requiring habitat disturbance caps and design features to protect existing habitat from loss, degradation, and fragmentation; and prioritizing vegetation treatments to consider GRSG habitat. Applying stipulations would help maintain the habitat connectivity between crucial wildlife habitat and wildlife corridors. However, because the majority of the planning area is under other management jurisdictions, BLM's actions are not the only actions influencing connectivity.

Alternative A

General Wildlife

Under Alternative A, most wildlife habitats would be managed as open to ROWs. There would be no management direction directly protecting wildlife from ROW development, with the exception of GRSG habitats (**Table 3-69**, below); as such, wildlife and their habitats would continue to be subject to the impacts described above. Despite the lack of direct management to protect most wildlife from ROW development, some wildlife habitats would be incidentally protected within the 33,000 acres managed as ROW avoidance and exclusion for GRSG and other resources (**Map 2-5**, Alternative A: Right-of-Way Exclusion and Avoidance, in **Appendix A**).

Table 3-69
ROW Management by Wildlife Habitat under Alternative A (Acres)

Wildlife Habitat[1]	Total Acres	Open	% of Decision Area	ROW Avoidance	% of Decision Area
General Wildlife	-	-	-	-	-
Sharp-tailed grouse	100	100	0.2	0	0.0
Migratory Birds	-	-	-	-	-
Bald eagle nests	1,800	700	3.1	1,000	0.0
Golden eagle nests	2,400	600	1.5	1,700	2.6
Ferruginous hawk nests	800	0	0.0	800	1.4
Big Game	-	-	-	-	-
Bighorn sheep birthing habitat	7,300	4,500	11.1	2,000	0.0
Bighorn sheep crucial habitat	6,500	5,300	12.5	2,000	0.0
Elk calving	23,400	15,100	30.4	8,300	9.6
Mule deer fawning	8,300	4,400	8.0	3,900	6.0
Special Status Species	-	-	-	-	-
Least tern	300	300	0.5	0	0.0
GRSG GHMA	100	0	0.0	100[a]	0.2
GRSG PHMA[2]	33,100	200	0.0	32,900[a]	56.6
Piping plover	700	700	1.2	0	0.0
Occupied prairie dog habitat	100	0	0.0	100	0.2
Dakota skipper	4,100	4,000	6.8	100	0.2

Source: BLM GIS 2021

Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.

[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for ROWs. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.

[2] GRSG PHMA is exclusion for solar and wind and avoidance for all other types of ROWs. However, the BLM does not anticipate solar or wind development on BLM-administered land.

[a] Indicates the avoidance allocation is designed to directly protect the applicable species. All other acreages are incidental and not designed to directly protect the applicable species. Alternative A does not include NSO or CSU stipulations to protect general wildlife from fluid leasable mineral development. Despite this, incidental protections would be provided to some wildlife habitats within the 202,300 acres of NSO and 15,800 acres of CSU stipulations that would be applied to protect other resources (**Map 2-15**, Alternative A: Fluid Minerals Leasing, No Surface Occupancy, and **Map 2-19**, Alternative A: Fluid Minerals Leasing, Controlled Surface Use, in **Appendix A**). As such, NSO stipulations would continue to provide the greatest protection to wildlife and associated habitats by prohibiting surface-disturbing activities in these areas (**Table 3-70**, below).

CSU and TL stipulations would continue to provide slightly less protection to wildlife and their associated habitats. This is because surface-disturbing activities would be allowed, and habitats could be disturbed or removed, or wildlife could avoid the area. However, CSU and TL stipulations could protect wildlife in certain instances by requiring special operational constraints or by moving the surface-disturbing activity to protect sensitive habitats (for CSUs), or by avoiding sensitive times of year (for TLs). Under Alternative A, a number of TLs would be applied to specifically protect migratory birds and big game; these TLs would provide incidental protections to other wildlife habitats (**Table 3-70**, below and **Map 2-23**, Alternative A: Fluid Minerals Leasing, Timing Limitations, in **Appendix A**). Incidental protections from TLs would reduce impacts from fluid mineral exploration and development in certain habitats during sensitive time periods for these wildlife species, thereby preventing disruptions that may affect reproduction or winter survival.

Table 3-70
Wildlife Habitat and Fluid Mineral Leasing Allocations under Alternative A (Acres)

Wildlife Habitat[1]	Total Acres	NSO	% of Decision Area	CSU	% of Decision Area	TL	% of Decision Area	Open, subject to STC	% of Decision Area
General Wildlife	-	-	-	-	-	-	-	-	-
Sharp-tailed grouse	19,000	5,300	1.0	2,000	0.3	12,400	2.4	5,900	1.0
Migratory Birds	-	-	-	-	-	-	-	-	-
Bald eagle nests	4,500	2,700	0.6	600	0.1	3,400	0.7	200	0.0
Golden eagle nests[2]	13,500	13,500[a]	2.8	500	0.1	13,500[a]	2.8	0	0.0
Ferruginous hawk nests[2]	1,100	1,100[a]	0.2	0	0.0	1,100[a]	0.2	0	0.0
Big Game	-	-	-	-	-	-	-	-	-
Bighorn sheep birthing	18,600	7,300	1.5	700	0.1	18,600[a]	3.8	0	0.0
Bighorn sheep crucial habitat	21,800	8,400	1.7	800	0.2	21,800[a]	4.5	0	0.0
Elk calving	114,000	45,900	9.4	4,700	1.0	114,000[a]	23.3	0	0.0
Mule deer fawning	34,400	20,300	4.1	1,300	0.3	25,600	5.2	1,800	0.4
Special Status Species		-	-	-	-	-	-	-	-
Least tern	3,500	1,200	0.2	100	0.0	2,400	0.5	900	0.2
GRSG GHMA	5,300	1,000	0.2	5,300[a]	1.1	1,300	0.3	0	0.0
GRSG PHMA	62,600	62,600[a]	12.8	1,600	0.3	18,000	3.7	0	0.0
Piping plover	2,800	2,800	0.6	400	0.1	2,100	0.4	0	0.0
Occupied prairie dog habitat	300	200	0.0	0	0.0	100	<0.1	100	<0.1
Dakota skipper	200	0	0.0	0	0.0	0	0.0	100	<0.1

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for fluid mineral leasing. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 0.50-mile buffer around the golden eagle and ferruginous hawk nest
[a] Indicates the stipulation is designed to directly protect the applicable species. All other acreages are incidental and not designed to directly protect the applicable species.

Most general wildlife habitats would be open to mineral materials disposal under Alternative A (**Table 3-71**, below). The impacts described under *Impacts Common to All Alternatives* for mineral exploration and development could occur in these areas. Despite the lack of direct management to protect general wildlife habitats from mineral materials disposal, habitats for some species, particularly species who live in sagebrush habitats in the southwestern portion of the decision area, would be incidentally protected through closures in the 44,500 acres of GRSG PHMA (**Map 2-42**, Alternative A: Mineral Materials, in **Appendix A**). Impacts would be limited in magnitude because the reasonably foreseeable surface disturbance associated with mineral materials is expected to be approximately 40 acres annually (BLM 2022c).

Table 3-71
Mineral Materials Management by Wildlife Habitat under Alternative A (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Closed	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse	10,200	2.8	0	0.0
Migratory Birds				
Bald eagle nests	3,500	1.0	0	0.0
Golden eagle nests	4,800	1.3	2,400	0.7
Ferruginous hawk nests	300	0.1	900	0.2
Big Game	-	-	-	-
Bighorn sheep birthing	10,100	2.8	0	0.0
Bighorn sheep crucial winter range	11,800	3.3	0	0.0
Elk calving	39,700	10.9	8,700	2.4
Mule deer fawning	12,400	3.4	5,400	1.5
Special Status Species	-	-	-	-
Least tern	2,900	0.8	0	0.0
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA[2]	0	0.0	44,500	12.3
Piping plover	2,600	0.7	0	0.0
Occupied prairie dog habitat	100	<0.1	200	0.1
Dakota skipper	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for mineral materials. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] GRSG PHMA would be directly protected as closed to mineral materials disposal; all other wildlife habitats that are closed would be due to incidental protections for other resources.

Most general wildlife habitats would be open to locatable mineral entry under Alternative A (**Table 3-72**, below). The impacts described under *Impacts Common to All Alternatives* for mineral exploration and development could occur in these areas. Despite the lack of direct management to protect most general wildlife from locatable mineral entry, some habitats would be incidentally protected within the 7,700 acres, spread throughout the decision area, of existing segregations without an opening order (**Map 2-38**, Alternative A: Locatable Minerals, in **Appendix A**). The management of eligible WSR segments would also provide some additional protection from locatable minerals development. Locatable mineral development is still allowed in these areas, but the regulations require any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations requires site-specific analysis under NEPA when the impacts on wildlife will be revisited.

Table 3-72
Locatable Minerals Management by Wildlife Habitat under Alternative A (Acres)

Wildlife Habitat[1, 2]	Open	% of Decision Area	Not Open[2]	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse	10,200	2.8	100	0.0
Migratory Birds	-	-	-	-
Bald eagle nests	3,300	0.9	200	0.1
Golden eagle nests	6,800	1.9	400	0.1
Ferruginous hawk nests	1,100	0.3	0	0.0
Big Game	-	-	-	-
Bighorn sheep birthing	10,000	2.8	100	0.0
Bighorn sheep crucial winter range	11,600	3.2	200	0.1
Elk calving	47,300	13.0	1,200	0.3
Mule deer fawning	17,300	4.8	500	0.1
Special Status Species	-	-	-	-
Least tern	2,600	0.7	300	0.1
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA	42,500	11.7	2,100	0.6
Piping plover	2,000	0.6	600	0.2
Occupied prairie dog habitat	200	0.1	0	0.0
Dakota skipper	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for locatable minerals. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Alternative A does not include direct protections for wildlife from locatable mineral development; all wildlife habitats in this table that are not open to locatable minerals would be due to incidental protections for other resources.

Under Alternative A, 573,900 acres would continue being managed as acceptable, and 435,800 acres would be managed as unacceptable, for further consideration for coal leasing (**Maps 2-27** through **2-29** in **Appendix A**). Alternative A includes consideration for wildlife under Coal Screens 2 and 3. These include a wildlife threshold as part of the coal screening. The wildlife threshold is a leasable acreage of wildlife habitat beyond which no further leasing will be allowed without a joint review of the situation by the BLM, USFWS, and NDGFD. Acreages above the threshold would continue to be preliminarily excluded from further consideration for coal leasing under the multiple-use tradeoff screen. Further, coal development under Alternative A would be subject to a special vegetation reclamation stipulation that an acreage equivalent to that disturbed by coal mining will be reclaimed to approximately its former condition. This would help to reduce the potential for coal mining impacts on wildlife habitats, as described under *Impacts Common to All Alternatives*.

Acres of NEL minerals that are open and closed to leasing in wildlife habitat are shown in **Table 3-73**. Impacts on wildlife from NEL minerals leasing would be similar to those described under *Impacts Common to All Alternatives* for mineral exploration and development and could occur in open areas, if future demand for NEL minerals occurs. Impacts would not occur in those areas closed to leasing.

Table 3-73
NEL Minerals Management by Wildlife Habitat under Alternative A (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Not Open	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse	10,200	2.8	0	0.0
Migratory Birds	-	-	-	-
Bald eagle nests	3,500	1.0	0	0.0
Golden eagle nests	4,800	1.3	2,400	0.7
Ferruginous hawk nests	300	0.1	900	0.2
Big Game	-	-	-	-
Bighorn sheep birthing	10,100	2.8	0	0.0
Bighorn sheep crucial winter range	11,800	3.3	0	0.0
Elk calving	39,700	10.9	8,700	2.4
Mule deer fawning	12,400	3.4	5,400	1.5
Special Status Species	-	-	-	-
Least tern	2,900	0.8	0	0.0
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA[2]	0	0.0	44,500	12.3
Piping plover	2,600	0.7	0	0.0
Occupied prairie dog habitat	100	<0.1	200	0.1
Dakota skipper	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for NEL minerals. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] GRSG PHMA would be directly protected as closed to NEL minerals; all other wildlife habitats that are closed would be due to incidental protections for other resources.

Under Alternative A, there would continue to be no management of SRMAs or BCAs, and impacts from recreation impacts would continue to be dispersed throughout the decision area. Impacts from comprehensive trail and travel management, as described under *Impacts Common to All Alternatives,* would continue to occur throughout the decision area. Such effects would not occur in the 2,000 acres of the Schnell Ranch Recreation Area that would be closed to motorized off-road vehicle use (**Map 2-49**, Alternative A: Travel, Transportation Management, and Access, in **Appendix A**).

All decision area lands would be available for livestock grazing under Alternative A. Under Alternative A, 12,007 AUMs would continue to be available for permitted use, and allowable utilization would not exceed 50 percent by weight. Adjusting grazing leases to improve rangeland health would indirectly reduce effects on wildlife habitat over the long term.

Under Alternative A, a 0.25-mile buffer around three river segments would be managed as eligible for inclusion in the NWSRS; interim protective management guidelines would help to prevent or reduce impacts on habitats in these areas, which would particularly affect riparian-dependent species.

Migratory Birds

Under Alternative A, most migratory bird habitats would be managed as open to ROWs (**Map 2-5**, Alternative A: Right-of-Way Exclusion and Avoidance, in **Appendix A**). There would be no management direction directly protecting migratory birds from ROW development; as such, migratory birds and their

habitats would continue to be subject to the impacts described above. Despite the lack of direct management to protect most migratory birds from ROW development, some habitats would be incidentally protected within the 33,000 acres managed as ROW avoidance and exclusion for GRSG and other resources (**Table 3-69**, above). These include ferruginous hawk nests, which would be protected through management as ROW avoidance for all ROWs, except solar and wind, which would be managed as ROW exclusion. Similar protections would also be afforded to some nesting golden eagle habitat. It is likely that such incidental protections would provide benefits to numerous other migratory birds for which mapped habitat is not available.

Under Alternative A, an NSO stipulation would be applied to prevent impacts near prairie falcon, golden eagle, and ferruginous hawk nests (**Table 3-70**, above, **Map 2-15**, Alternative A: Fluid Minerals Leasing, No Surface Occupancy, in **Appendix A**). This NSO stipulation would continue to prevent the disturbances from fluid mineral development, described above, to the nesting raptors in these areas. Further, the 202,300 acres of NSO and 15,800 acres of CSU would provide incidental protection to the other migratory birds species in these areas (**Map 2-15**, Alternative A: Fluid Minerals Leasing, No Surface Occupancy, and **Map 2-19**, Alternative A: Fluid Minerals Leasing, Controlled Surface Use, in **Appendix A**). A number of TLs would be applied to specifically protect migratory birds, including for waterfowl nesting habitat and prairie falcon, golden eagle, and ferruginous hawk nests (**Map 2-23**, Alternative A: Fluid Minerals Leasing, Timing Limitations, in **Appendix A**). These TLs would reduce impacts from fluid mineral exploration and development in certain habitats during sensitive time periods for these and other migratory bird species in these areas, thereby preventing disruptions that may affect reproduction or winter survival.

Most migratory bird habitats would be open to mineral materials disposal under Alternative A (**Table 3-71**, above). The impacts described under *Impacts Common to All Alternatives* for mineral exploration and development could occur in these areas. Despite the lack of direct management to protect migratory bird habitats from mineral materials disposal, some golden eagle and ferruginous hawk habitats, as well as habitat for other bird species who use sagebrush habitats in the southwestern portion of the decision area, would be incidentally protected through closures in the 44,500 acres of GRSG PHMA (**Map 2-32**, Alternative A: Mineral Materials, in **Appendix A**).

Impacts on migratory bird habitats from management for locatable minerals, NEL minerals, coal, recreation, travel, livestock grazing, and special designations under Alternative A would be as described for *General Wildlife* under Alternative A, above.

Game Species

Maintaining or improving habitats for big game reduces the likelihood for continued loss, modification, or fragmentation of wildlife habitat and supports big game populations throughout the planning area.

Under Alternative A, most big game habitats would be managed as open to ROWs (**Map 2-5**, Alternative A: Right-of-Way Exclusion and Avoidance, in **Appendix A**). There would be no management direction directly protecting big game from ROW development; as such, big game and their habitats would continue to be subject to the impacts described above. Despite the lack of direct management to protect most big game from ROW development, some big game habitats would be incidentally protected within the 33,000 acres managed as ROW avoidance and exclusion for GRSG and other resources (**Table 3-69**, above). These include some elk calving habitat and mule deer fawning habitat, which would be protected through management as ROW avoidance for all ROWs, except solar and wind, which would be managed as ROW exclusion.

Alternative A would not include NSO or CSU stipulations to protect game species from fluid leasable mineral development. Despite this, incidental protections would be provided to some game habitats within the 202,300 acres of NSO and 15,800 acres of CSU stipulations that would be applied to protect other resources (**Map 2-15**, Alternative A: Fluid Minerals Leasing, No Surface Occupancy, and **Map 2-19**, Alternative A: Fluid Minerals Leasing, Controlled Surface Use, in **Appendix A**). As such, NSO stipulations would continue to provide the greatest protection to game species and associated habitats by prohibiting surface-disturbing activities in these areas (**Table 3-70**, above). A number of TLs would be applied to specifically protect big game, including for bighorn sheep lambing habitat and winter range and elk calving and winter ranges (**Map 2-23**, Alternative A: Fluid Minerals Leasing, Timing Limitations, in **Appendix A**). These TLs would reduce impacts from fluid mineral exploration and development in certain habitats during sensitive time periods for these species, thereby preventing disruptions that may affect reproduction or winter survival.

Most big game habitats would be open to mineral materials disposal under Alternative A (**Table 3-71**, above). The impacts described under *Impacts Common to All Alternatives* for mineral exploration and development could occur in these areas. Despite the lack of direct management to protect big game habitats from mineral materials disposal, some elk calving and mule deer fawning habitats would be incidentally protected through closures in the 44,500 acres of GRSG PHMA in the southwestern portion of the decision area (**Map 2-42**, Alternative A: Mineral Materials, in **Appendix A**).

Impacts on big game habitats from management for locatable minerals, NEL minerals, coal, recreation, travel, livestock grazing, and special designations under Alternative A would be as described for *General Wildlife* under Alternative A, above.

Special Status Species

Under Alternative A, most special status wildlife habitats would be managed as open to ROWs (**Map 2-5**, Alternative A: Right-of-Way Exclusion and Avoidance, in **Appendix A**). There would be no management direction directly protecting special status wildlife from ROW development, with the exception of approximately 33,000 acres of GRSG habitats (**Table 3-69**, above); as such, special status wildlife and their habitats would continue to be subject to the impacts described above. Despite the lack of direct management to protect most special status wildlife from ROW development, some habitats would be incidentally protected through ROW management for GRSG and other resources. These include prairie dog occupied habitat, which would be protected through management as ROW avoidance for all ROWs, except solar and wind, which would be managed as ROW exclusion.

Aside from protections for special status migratory birds described above, Alternative A would not include NSO or CSU stipulations to protect other special status wildlife from fluid leasable mineral development. Despite this, incidental protections would be provided to some special status wildlife habitats within the 202,300 acres of NSO and 15,800 acres of CSU stipulations that would be applied to protect other resources (**Map 2-15**, Alternative A: Fluid Minerals Leasing, No Surface Occupancy, and **Map 2-19**, Alternative A: Fluid Minerals Leasing, Controlled Surface Use, in **Appendix A**). As such, NSO stipulations would continue to provide the greatest protection to special status wildlife and associated habitats by prohibiting surface-disturbing activities in these areas (**Table 3-70**, above).

Most special status species habitats would be open to mineral materials disposal under Alternative A (**Table 3-71**, above). The impacts described under *Impacts Common to All Alternatives* for mineral exploration and development could occur in these areas. The exception is 44,500 acres of GRSG PHMA, centralized in the

southwestern portion of the decision area, which would be entirely closed to mineral materials disposal. Some occupied prairie dog habitat or habitat for other special status species who use sagebrush habitats would be incidentally protected where it occurs in GRSG PHMA as well (**Map 2-42**, Alternative A: Mineral Materials, in **Appendix A**).

Impacts on special status species habitats from management for locatable minerals, NEL minerals, coal, recreation, travel, livestock grazing, and special designations under Alternative A would be as described for *General Wildlife* under Alternative A, above.

Alternative B

The nature and type of impacts on wildlife from Alternative B management would be similar to those described for Alternative A. However, they would differ in intensity depending on the specific management and acres available for certain uses. Alternative B would include additional management and stipulations directly intended to protect wildlife and better balance multiple uses with wildlife habitat needs, as described below.

General Wildlife

Vegetation management under Alternative B would include an increased focus on management, inventories, and monitoring to attain land health, which would then support habitats for a variety of wildlife species throughout the decision area. Vegetation management that emphasizes the maintenance of mixed grass prairie habitat and woody draws, as well as using native species and implementing a comprehensive weed program, would maintain and improve the quality and extent of existing wildlife habitat and prevent habitat degradation and fragmentation. Impacts would be concentrated in tallgrass prairie (300 acres in the surface decision area) and woody draw habitats (6,100 acres in the surface decision area). Habitat maintenance or improvement would potentially result in an increase in reproductive success and population growth for numerous wildlife species.

Similarly, wildlife and special status species management under Alternative B would maintain or improve habitat and reduce habitat fragmentation throughout the decision area. Compared with Alternative A, Alternative B would include more stipulations to reduce the effects of mineral exploration and development and lands and realty actions on wildlife, as described below. Under Alternative B, wildlife that occur in low development potential areas and the eastern portion of the planning area would be further protected through closures prohibiting speculative leasing. Design features would be required for surface-disturbing activities (except coal and locatable minerals) to reduce impacts on sharp-tailed grouse and greater prairie chicken leks. Design features that would be applied for other species are included under the *Migratory Birds*, *Game Species*, and *Special Status Species* headers below.

Managing more areas as ROW exclusion (57,000 acres) or avoidance (300 acres outside of ROW exclusion areas) (**Map 2-6**, Alternative B: Right-of-Way Exclusion and Avoidance, in **Appendix A**) under Alternative B than under Alternative A would reduce the impacts on general wildlife and their habitats described under *Impacts Common to All Alternatives* and Alternative A. With 97 percent of the decision area managed as ROW exclusion, impacts from ROW development on general wildlife would be nearly eliminated. Sharp-tailed grouse leks would be directly protected as ROW avoidance, which would reduce the likelihood of impacts on this species (**Table 3-74**, below).

Table 3-74
ROW Management by Wildlife Habitat under Alternative B (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	ROW Avoidance	% of Decision Area	ROW Exclusion	% of Decision Area
General Wildlife	-	-	-	-	-	-
Sharp-tailed grouse[2]	0	0.0	100[a]	0.2	0	0.0
Migratory Birds	-	-	-	-	-	-
Bald eagle nests[3]	0	0.0	0	0.0	1,800	3.1
Golden eagle nests[4]	0	0.0	400[a]	0.7	2,000	3.4
Ferruginous hawk nests[4]	0	0.0	0	0.0	800	1.4
Big Game	-	-	-	-	-	-
Bighorn sheep birthing	0	0.0	0	0.0	6,500[b]	11.1
Bighorn sheep crucial winter range	0	0.0	0	0.0	7,300[b]	12.5
Elk calving	0	0.0	1,300[a]	33.8	22,100	37.8
Mule deer fawning	0	0.0	1,500[a]	2.6	6,800	11.6
Special Status Species	-	-	-	-	-	-
Least tern[5]	0	0.0	0	0.0	300	0.5
GRSG GHMA	0	0.0	0	0.0	100	0.2
GRSG PHMA	0	0.0	20,700	2.2	12,300[b]	21.0
Piping plover[5]	0	0.0	0	0.0	700	1.2
Occupied prairie dog habitat	0	0.0	0	0.0	100	0.2
Dakota skipper	500	0.9	300	0.5	3,300	5.6

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for ROWs. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[a] Sharp-tailed grouse leks, golden eagle nests, and mule deer, elk, and antelope birthing and foraging areas would be directly protected as ROW avoidance areas for all ROWs. Prairie dog colonies, ferruginous hawk nests, bald eagle nests, least tern active nests, piping plover critical habitat, and GRSG GHMA would also be ROW avoidance for all ROWs, but all of these habitats are protected as ROW exclusion incidental to protection for other resources. The GRSG PHMA that is ROW avoidance would be due to incidental protections for other resources.
[b] Known or proposed bighorn sheep crucial habitat (which encompasses all bighorn sheep birthing areas and a portion of bighorn sheep crucial winter range) would be directly protected as ROW exclusion areas for all ROWs; GRSG PHMA is exclusion for solar and wind and avoidance for all other types of ROWs. However, the BLM does not anticipate solar or wind development on BLM-administered land. All other wildlife habitats that are ROW exclusion would be due to incidental protections for other resources.

The BLM would manage more acres as closed to fluid mineral exploration and development under Alternative B than under Alternative A, with more acres managed with NSO (366,166 acres), CSU (371,521 acres), and TL stipulations (328,331 acres) specifically to protect wildlife (**Map 2-16**, Alternative B: Fluid Minerals Leasing, No Surface Occupancy; **Map 2-20**, Alternative B: Fluid Minerals Leasing, Controlled Surface Use; and **Map 2-24**, Alternative B: Fluid Minerals Leasing, Timing Limitations; **Appendix A**). These stipulations include a NSO stipulation within 0.25 miles of sharp-tailed grouse leks and a CSU stipulation within 2 miles of sharp-tailed grouse and greater prairie chicken leks. Incidental protections for wildlife would be provided by stipulations for other resources, as well, including the NSO stipulation that

would prohibit fluid mineral development and associated surface disturbance within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe. **Table 3-75**, below, presents the acres of wildlife habitat that would be affected by fluid minerals management.

Table 3-75
Wildlife Habitat and Fluid Mineral Leasing Allocations under Alternative B (Acres)

Wildlife Habitat[1]	NSO	% of Decision Area	CSU	% of Decision Area	TL	% of Decision Area	Open, subject to STC	% of Decision Area
General Wildlife	-	-	-	-	-	-	-	-
Sharp-tailed grouse[2]	4,800[a]	0.8	7,700	1.2	3,300	0.5	0	0.0
Migratory Birds	-	-	-	-	-	-	-	-
Bald eagle nests[3]	2,300[a]	0.5	2,100	0.4	2,100	0.4	0	0.0
Golden eagle nests[4]	13,100[a]	2.6	11,800	2.3	9,600	1.9	0	0.0
Ferruginous hawk nests[4]	1,100	0.2	1,100	0.2	1,100[c]	0.2	0	0.0
Game Species	-	-	-	-	-	-	-	-
Bighorn sheep birthing	18,200[a]	3.7	17,300	3.5	17,900	3.7	0	0.0
Bighorn sheep crucial winter range	20,600	4.2	20,300	4.1	20,900	4.3	0	0.0
Elk calving	81,000	16.3	96,100	19.3	102,500[c]	20.6	0	0.0
Mule deer fawning	28,000	5.7	30,100	6.1	31,600[c]	6.4	0	0.0
Special Status Species	-	-	-	-	-	-	-	-
Least tern[5]	2,900[a]	0.6	2,900[b]	0.6	1,800	0.4	0	0.0
GRSG GHMA	200	0.0	1,100[b]	0.2	0	0.0	0	0.0
GRSG PHMA	57,700[a]	11.8	36,900	7.5	17,500	3.6	0	0.0
Piping plover[6]	1,000[a]	0.2	1,000[b]	0.2	800	0.2	0	0.0
Occupied prairie dog habitat	300[a]	0.1	200	<0.1	100	<0.1	0	0.0
Dakota skipper[7]	200[a]	<0.1	200	<0.1	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for fluid mineral leasing. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.25-mile buffer around the habitat for NSO and 0.50-mile buffer around the habitat for CSU
[6] Includes a 0.50-mile buffer around the habitat
[7] Includes a 0.62-mile buffer around the habitat
[a] Sharp-tailed grouse leks, bald eagle nests, golden eagle nests, bighorn sheep crucial habitats, within 0.25 miles of least tern active nests, within 0.5 miles of piping plover critical habitat, occupied prairie dog habitat, within 0.62 miles of occupied Dakota skipper habitat, and GRSG PHMA would be directly protected by NSO stipulations; all other wildlife habitats that are shown as NSO would be due to incidental protections for other resources.
[b] Sharp-tailed grouse leks, least tern active nests, piping plover critical habitat, and GRSG GHMA would be directly protected by a CSU stipulation; all other wildlife habitats that are shown as CSU would be due to incidental protections for other resources.
[c] Ferruginous hawk nests and big game birthing and foraging areas would be directly protected by TLs; all other wildlife habitats that are shown as protected by a TL would be due to incidental protections for other resources.

Table 3-76, below, presents the acres of wildlife habitats that would be open and closed to mineral materials disposal under Alternative B. Approximately 40 percent of sharp-tailed grouse leks would be closed to mineral materials disposal, thereby providing incidental protections and preventing impacts as described under *Impacts Common to All Alternatives* in these areas. Impacts would be limited in magnitude because

Table 3-76
Mineral Materials Management by Wildlife Habitat under Alternative B (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Closed	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	6,100	1.8	4,100	1.1
Migratory Birds	-	-	-	-
Bald eagle nests[3]	400	0.2	3,100	0.8
Golden eagle nests[4]	1,700	0.5	5,500	1.5
Ferruginous hawk nests[4]	200	0.1	1,000	0.3
Big Game	-	-	-	-
Bighorn sheep birthing	0	0.0	10,100[a]	2.8
Bighorn sheep crucial winter range	900	0.2	10,900[a]	3.0
Elk calving	15,300	4.2	33,100	9.1
Mule deer fawning	3,800	1.0	14,000	3.9
Special Status Species	-	-	-	-
Least tern[5]	0	0.0	2,900	0.8
GRSG GHMA	800	0.2	200	0.1
GRSG PHMA	0	0.0	44,500[a]	12.3
Piping plover[5]	0	0.0	2,600[a]	0.7
Occupied prairie dog habitat	0	0.0	200	0.1
Dakota skipper[6]	0	0.0	100[a]	<0.1

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for mineral materials. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around the habitat
[a] Known or proposed bighorn sheep crucial habitat (which encompasses all bighorn sheep birthing areas and a portion of bighorn sheep crucial winter range), piping plover critical habitat, Dakota skipper habitat, and GRSG PHMA would be directly protected as closed to mineral materials disposal; all other wildlife habitats that are closed would be due to incidental protections for other resources.

the mineral materials RFD is expected to be no more than 40 acres annually (BLM 2022c). Further, a design feature (DF-19; **Appendix D**, Design Features and Best Management Practices) would require a plan be approved that provides mitigation measures and conservation actions within 2 miles of sharp-tailed grouse leks and greater prairie chicken leks. This plan would protect breeding, nesting, and brood-rearing habitats from surface-disturbing and disrupting activities.

Acres of general wildlife habitats that would be open or recommended for withdrawal from locatable material entry under Alternative B are presented in **Table 3-77**. All sharp-tailed grouse leks would be open, with impacts as described under *Impacts Common to All Alternatives* possible in these areas. Other wildlife species that inhabit the 8,300 acres recommended for withdrawal from locatable mineral entry (**Map 2-39**, Alternative B: Locatable Minerals, in **Appendix A**) would not experience impacts from locatable mineral entry if the withdrawal is enacted. The special designations for ACECs and WSRs would also provide some additional protection from locatable minerals development. Locatable mineral development would still be

Table 3-77
Locatable Minerals Management by Wildlife Habitat under Alternative B (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Recommended for Withdrawal	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	10,200	2.8	0	0.0
Migratory Birds	-	-	-	-
Bald eagle nests[3]	3,500	1.0	600	0.2
Golden eagle nests[4]	7,200	2.0	800	0.2
Ferruginous hawk nests[4]	1,100	0.3	300	0.1
Game Species	-	-	-	-
Bighorn sheep birthing	10,100	2.8	5,400[a]	1.5
Bighorn sheep crucial winter range	11,800	3.3	5,400[a]	1.5
Elk calving	48,400	13.3	5,400	1.5
Mule deer fawning	17,800	5.0	1,600	0.4
Special Status Species	-	-	-	-
Least tern[5]	2,900	0.8	0	0.0
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA	44,500	12.3	1,000	0.3
Piping plover[5]	2,600	0.7	0	0.0
Occupied prairie dog habitat	200	0.1	0	0.0
Dakota skipper[6]	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for locatable minerals. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around the habitat
[a] Known or proposed bighorn sheep crucial habitat (which encompasses all bighorn sheep birthing areas and a portion of bighorn sheep crucial winter range) would be recommended for withdrawal from locatable mineral entry; all other wildlife habitats that are recommended for withdrawal would be due to incidental protections for other resources.

Table 3-78
NEL Management by Wildlife Habitat under Alternative B (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Not Open	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	9,600	2.6	600	0.2
Migratory Birds	-	-	-	-
Bald eagle nests[3]	1,300	0.4	2,100	0.6
Golden eagle nests[4]	2,500	0.7	4,700	1.3
Ferruginous hawk nests[4]	300	0.1	900	0.2
Big Game	-	-	-	-
Bighorn sheep birthing	0	0.0	10,100	2.8
Bighorn sheep crucial winter range	1,300	0.4	10,500	2.9

Wildlife Habitat[1]	Open	% of Decision Area	Not Open	% of Decision Area
Elk calving	21,500	5.9	26,900	7.4
Mule deer fawning	7,200	2.0	10,600	2.9
Special Status Species	-	-	-	-
Least tern[5]	200	0.1	2,700	0.7
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA	0	0.0	44,500	12.3
Piping plover[5]	0	0.0	2,600	0.7
Occupied prairie dog habitat	0	0.0	200	0.1
Dakota skipper[6]	0	0.0	100	<0.1

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for NEL minerals. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around the habitat

allowed in these areas, but the regulations would require any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations would require site-specific analysis under NEPA where the impacts on wildlife will be revised. Fewer acres of wildlife habitat would be open for NEL minerals leasing, and if future demand for NEL minerals occurs, then impacts in these areas would be reduced relative to Alternative A (**Table 3-73**).

As described in **Appendix F** (Coal Screening Process), unsuitability with exception or stipulation criteria are calculated as available acres. All unsuitability criteria will be reviewed at the time of application, and acreages may be made available without requiring an RMP amendment if resource data change. Criterion 15 requires reclamation as a stipulated method of coal mining in habitat for species of high interest to the state, which would reduce habitat impacts (see **Appendix F**, Coal Screening Process, for full text of the stipulation). However, no research has shown the successful restoration of habitat essential to Dakota skipper or other special status species. In the 16,900 acres of wildlife habitat acceptable for further consideration for coal leasing, the Alternative A impacts, such as habitat fragmentation, degradation, or disturbance to habitats or individual wildlife, could occur on wildlife habitats.

Under Alternative B.1, 4,000 acres of wildlife habitat (the smallest of all alternatives) would be acceptable for consideration for coal leasing and potential impacts on wildlife would be reduced compared with all other alternatives. All acceptable acres for both Alternatives B and B.1 would be within the three coal-producing counties of McLean, Mercer, and Oliver. Despite this, the bypass of federal coal to reach nonfederal coal reserves could potentially result in effects on wildlife on nonfederal lands; depending on the habitats present, impacts may be greater than if the federal lands were developed.

The BLM management of recreation in the Schnell Ranch SRMA (2,000 acres), Figure 4 BCA (3,500 acres), and Lost Bridge BCA (8,900 acres) would reduce the impacts on wildlife and their habitats described for recreation under *Impacts Common to All Alternatives* and Alternative A. For example, certain resource uses, such as ROW development, mineral leasing, and livestock grazing, would be restricted in these recreation areas. Impacts on wildlife would be concentrated in these areas; however, these areas would limit

more extensive, widespread impacts, and would reduce wildlife habitat fragmentation throughout the decision area.

Areas closed to motorized use on 2,900 acres under Alternative B (45 percent more acres than under Alternative A) would reduce the likelihood of the comprehensive trails and travel management impacts described for Alternative A.

Compared with Alternative A, under Alternative B, the BLM would manage fewer wildlife habitat acres as available for livestock grazing and more wildlife habitat acres as unavailable for grazing (**Table 3-79**, below). Under Alternative B, 9,283 AUMs (23 percent less than under Alternative A) would be available for permitted use. While the forage utilization limit would be 50 percent, which is the same as Alternative A, Alternative B would include the ability to adjust grazing management to improve rangeland health in accordance with thresholds and responses specified in adaptive management. The use of adaptive management would benefit wildlife by allowing flexible resource management decision-making that can be adjusted in an appropriate time frame in the face of uncertainties as outcomes from management direction and other events become better understood. This would allow the BLM to meet both wildlife and resource objectives at the site-specific level.

Table 3-79
Lands Identified as Available for Livestock Grazing by Wildlife Habitat under Alternative B (Acres)

Wildlife Habitat[1]	Available	% of Decision Area	Unavailable	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	0	0.0	0	0.0
Migratory Birds	-	-	-	-
Bald eagle nests[3]	1,300	2.2	500	0.9
Golden eagle nests[4]	2,000	3.4	400	0.7
Ferruginous hawk nests[4]	800	1.4	0	0.0
Big Game	-	-	-	-
Bighorn sheep birthing	6,300	10.8	200	0.3
Bighorn sheep crucial winter range	7,100	12.1	200	0.3
Elk calving	22,600	39.0	800	1.4
Mule deer fawning	8,000	13.7	200	0.3
Special Status Species	-	-	-	-
Least tern[5]	200	0.3	200	0.3
GRSG GHMA	100	0.2	0	0.0
GRSG PHMA	32,900	56.2	100	0.2
Piping plover[5]	0	0.0	700	1.2
Occupied prairie dog habitat	100	0.2	0	0.0
Dakota skipper[6]	0	0.0	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for livestock grazing. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest

[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around the habitat

Management of the Mud Buttes ACEC (960 acres), interim protections for the three suitable wild and scenic river segments, and management of the Lewis and Clark NHT management corridor and North Country NST management corridor would include restricting some surface-disturbing activities within these areas. Examples of applicable restrictions include an NSO stipulation for fluid minerals, closure to mineral materials disposal in the ACEC and within 0.50 miles of the national trails, and ROW exclusion in the ACEC. As such, wildlife and their habitats would generally be protected from most surface disturbances and associated impacts within these areas.

Migratory Birds

Impacts from vegetation management would be similar to those described for *General Wildlife*, above. The impacts would primarily affect migratory bird species that rely on tallgrass prairie and woody draw habitats, including BLM sensitive avian species. Habitat maintenance or improvement would support bird nesting habitat, potentially resulting in an increase in reproductive success and population growth.

Impacts from fuels treatments would be similar to those described for *General Wildlife*, above. Mechanical treatments can have immediate benefits to migratory bird habitat depending on the species; for instance, mechanical treatments can reduce conifer encroachment in habitat for grassland birds or restore open understories for birds of prey, especially nocturnal species.

Managing more areas as ROW exclusion (57,000 acres) or avoidance (300 acres outside of ROW exclusion areas) (**Map 2-6**, Alternative B: Right-of-Way Exclusion and Avoidance, in **Appendix A**) under Alternative B than under Alternative A would reduce the impacts on migratory birds and their habitats described under *Impacts Common to All Alternatives* and Alternative A. With 97 percent of the decision area as ROW exclusion, impacts from ROW development on migratory birds would be nearly eliminated. Specifically, within 0.50 miles of raptor and ferruginous hawk nests and 1 mile of golden eagle, bald eagle, and peregrine falcon nests would be protected as ROW avoidance, which would reduce the likelihood of impacts on these species (**Table 3-74**, above).

Stipulations for fluid mineral leasing specifically to protect migratory birds include a NSO stipulation within 0.25 miles of raptor nests, 0.50 miles of golden eagle, and 1 mile of bald eagle and peregrine falcon nests. A TL stipulation would apply within 500 feet of waterfowl nesting habitat, within 0.50 miles of occupied ferruginous hawk nests, and in Sprague's pipit habitat. Acres of habitat for some migratory birds that would be affected by fluid minerals management are presented in **Table 3-75**, above. Impacts as described under *Impacts Common to All Alternatives* would be reduced in these areas.

Table 3-76, above, presents the acres of some migratory bird habitats that would be open and closed to mineral materials disposal under Alternative B. In particular, most golden eagle, bald eagle, and ferruginous hawk nests would be closed to mineral materials disposal due to incidental protections provided by closures for other resources. Design features would be applied to maintain habitat functionality in migratory bird habitat.

Acres of migratory bird habitats that would be open or recommended for withdrawal from locatable material entry under Alternative B are presented in **Table 3-77**. Most areas near golden eagle, bald eagle, and ferruginous hawk nests would be open, with impacts as described under *Impacts Common to All Alternatives* possible in these areas. Further, habitat for migratory birds which inhabit the 8,300 acres

recommended for withdrawal from locatable mineral entry (**Map 2-39**, Alternative B: Locatable Minerals, in **Appendix A**) would not experience impacts from locatable mineral entry once the withdrawal is approved. The special designations for the ACECand WSRs would also provide some additional protection from locatable minerals development. Locatable mineral development would still be allowed in these areas, but the regulations would require any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations would require site-specific analysis under NEPA where the impacts on wildlife would be revisited. No acres of migratory bird habitat are within existing segregations that would be opened to mineral entry.

Impacts on migratory birds from the coal screening process, NEL minerals, recreation, comprehensive trails and travel management, livestock grazing, and specially designated areas would be the same as described for *General Wildlife* under Alternative B, above.

Game Species

Managing more areas as ROW exclusion (57,000 acres) or avoidance (300 acres outside of ROW exclusion areas) (**Map 2-6**, Alternative B: Right-of-Way Exclusion and Avoidance, in **Appendix A**) under Alternative B than under Alternative A would reduce the impacts on big game and their habitats described under *Impacts Common to All Alternatives* and Alternative A. With 97 percent of the decision area as ROW exclusion, impacts from ROW development on big game would be nearly eliminated. Specifically, known or proposed bighorn sheep crucial habitat would be protected as ROW exclusion and big game birthing and foraging areas would be protected as ROW avoidance, which would reduce the likelihood of impacts on these species (**Table 3-74**, above).

Stipulations for fluid mineral leasing specifically to protect big game include an NSO stipulation within known or proposed bighorn sheep crucial habitats and a TL stipulation within big game birthing and foraging areas. Acres of habitat for some big game species that would be affected by fluid minerals management are presented in **Table 3-75**, above. Impacts as described under *Impacts Common to All Alternatives* would be reduced in these areas.

Table 3-76, above, presents the acres of big game habitats that would be open and closed to mineral materials disposal under Alternative B. In particular, known or proposed bighorn sheep crucial habitat would be closed to mineral materials disposal. Design features would be applied to maintain habitat functionality in bighorn sheep crucial habitat, and a timing limitation would be applied in big game birthing and foraging areas.

Acres of big game habitats that would be open or recommended for withdrawal from locatable material entry under Alternative B are presented in **Table 3-77**. Bighorn sheep birthing areas and most bighorn sheep crucial winter range would be recommended for withdrawal, preventing impacts as described under *Impacts Common to All Alternatives* in these areas (**Map 2-39**, Alternative B: Locatable Minerals, in **Appendix A**). Most elk calving and mule deer fawning habitats would be open, with impacts possible in these areas. The special designations for the ACEC and WSRs would also provide some additional protection from locatable minerals development. Locatable mineral development would still be allowed in these areas, but the regulations would require any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations would require site-specific analysis under NEPA where the impacts on wildlife would be revisited.

Impacts on big game from the coal screening process, NEL minerals, recreation, comprehensive trails and travel management, livestock grazing, and specially designated areas would be the same as described for *General Wildlife* under Alternative B, above.

Management to prevent disease transmission from domestic sheep or goats to bighorn sheep would help reduce the likelihood of illness or death to bighorn sheep in and within 15 miles of current or proposed bighorn sheep range. In these areas, conversions from cattle to domestic sheep or goats and new grazing applications for domestic sheep or goats would be prohibited.

Special Status Species

Impacts from vegetation management would be similar to those described for *General Wildlife*, under Alternative B above. The impacts would primarily affect special status species that rely on mixed grass prairie and woody draw habitats, such as Dakota skipper and northern long-eared bat. Habitat maintenance or improvement would support bat roosting, maternity, and connectivity habitat and Dakota skipper host and nectar plants, potentially resulting in an increase in reproductive success and population growth.

Managing more areas as ROW exclusion (57,000 acres) or avoidance (300 acres outside of ROW exclusion areas) (**Map 2-6**, Alternative B: Right-of-Way Exclusion and Avoidance, in **Appendix A**) under Alternative B than under Alternative A would reduce the impacts on special status species and their habitats described under *Impacts Common to All Alternatives* and Alternative A. With 97 percent of the decision area as ROW exclusion, impacts from ROW development on special status species would be nearly eliminated. Specifically, tallgrass prairie, woody draws, and GRSG PHMA (solar and wind only) would be protected as ROW exclusion areas. ROW avoidance areas would include occupied prairie dog colonies, within 0.50 miles of least tern active nests and piping plover critical habitat, within 0.62 miles of Dakota skipper habitat, and GRSG PHMA, which would reduce the likelihood of impacts on these species (**Table 3-74**, above).

Stipulations for fluid mineral leasing specifically to protect special status species include an NSO stipulation within tallgrass prairie, 0.25 miles of prairie dog habitat, least tern active nests, and piping plover critical habitat, GRSG PHMA, and 0.62 miles of Dakota skipper habitat. CSU stipulations would be applied in all special status species habitats and woody draws. Acres of habitat for some special status species that would be affected by fluid minerals management are presented in **Table 3-75**, above. Impacts as described under *Impacts Common to All Alternatives* would be reduced in these areas.

Table 3-76, above, presents the acres of special status species habitats that would be open and closed to mineral materials disposal under Alternative B. In particular, tallgrass prairie habitat, GRSG PHMA, in 0.50 miles of piping plover critical habitat, and within 0.62 miles of Dakota skipper habitat would be closed to mineral materials disposal. Incidental protections would be provided to some other special status species due to closures for other resources. Design features would be applied to maintain habitat functionality in special status species habitat.

Acres of special status species habitats that would be open or recommended for withdrawal from locatable material entry under Alternative B are presented in **Table 3-77**. Most special status species habitats would be open, with impacts as described under *Impacts Common to All Alternatives* possible in these areas. Further, special status species that inhabit the 8,300 acres recommended for withdrawal from locatable mineral entry (**Map 2-39**, Alternative B: Locatable Minerals, in **Appendix A**) would not experience impacts from locatable mineral entry once the withdrawal is approved. The special designations for the ACEC and WSRs would also provide some additional protection from locatable minerals development.

Locatable mineral development would still be allowed in these areas, but the regulations would require any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations would require site-specific analysis under NEPA where the impacts on wildlife would be revisited.

Although management under Alternative B would not specifically exclude certain special status species' habitats from livestock grazing, piping plover critical habitat is located in the areas that would be unavailable for livestock grazing. This would remove a threat to this species' habitat.

Impacts from the coal screening process, NEL minerals, recreation, comprehensive trails and travel management, and specially designated areas would be the same as described for *General Wildlife* under Alternative B, above.

Alternative C

General Wildlife

Impacts on wildlife from noxious weed and invasive plant management would be the same as those described under Alternative B. Impacts from vegetation management would be similar to those described for Alternative B, but the BLM would not manage riparian areas and wetlands beyond PFC under Alternative C. As a result, riparian areas and wetlands may not be managed to meet suitable habitat conditions for certain species that rely on these areas. Other impacts would be similar to those described for Alternative B, with the exceptions noted below.

Under Alternative C, managing more areas as ROW exclusion (34,900 acres) or avoidance (22,200 acres outside of ROW exclusion areas) (**Map 2-7**, Alternative C: Right-of-Way Exclusion and Avoidance, in **Appendix A**) would reduce the impacts, as described under Alternative A, on wildlife and their habitats. Impacts would be similar to those described for Alternative B (**Table 3-80**, below).

Table 3-80
ROW Management by Wildlife Habitat under Alternative C (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	ROW Avoidance[2]	% of Decision Area	ROW Exclusion	% of Decision Area
General Wildlife	-	-	-	-	-	-
Sharp-tailed grouse[3]	0	0.0	100	0.2	0	0.0
Migratory Birds	-	-	-	-	-	-
Bald eagle nests[4]	0	0.0	1,800	3.1	0	0.0
Golden eagle nests[4]	0	0.0	2,300	3.9	0	0.0
Ferruginous hawk nests[4]	0	0.0	800	1.4	0	0.0
Big Game	-	-	-	-	-	-
Bighorn sheep birthing	0	0.0	6,500	11.1	0	0.0
Bighorn sheep critical winter range	0	0.0	7,300	12.5	0	0.0
Elk calving	0	0.0	23,400	40.0	0	0.0
Mule deer fawning	0	0.0	8,300	14.2	0	0.0
Special Status Species	-	-	-	-	-	-
Least tern[5]	0	0.0	300	0.5	0	0.0
GRSG GHMA	0	0.0	100	0.2	0	0.0
GRSG PHMA[2]	0	0.0	33,000	56.4	0	0.0
Piping plover[6]	0	0.0	700	1.2	0	0.0

Wildlife Habitat[1]	Open	% of Decision Area	ROW Avoidance[2]	% of Decision Area	ROW Exclusion	% of Decision Area
Occupied prairie dog habitat	0	0.0	100	0.2	0	0.0
Dakota skipper	500	0.9	3,600	6.2	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for ROWs. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] All wildlife habitats in this table would be directly protected as ROW avoidance areas for all ROWs; GRSG PHMA is exclusion for solar and wind and avoidance for all other types of ROWs. However, the BLM does not anticipate solar or wind development on BLM-administered land.
[3] Includes a 2-mile buffer around leks
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.25-mile buffer around the habitat
[6] Includes a 0.50-mile buffer around the habitat

Like under Alternative A, 0 acres would be closed to fluid mineral exploration and development under Alternative C. However, Alternative C would include more acres managed with NSO (267,400 acres), CSU (303,400 acres), and TL stipulations (281,000 acres) specifically to protect wildlife and their habitats (**Table 3-81**, below, and **Map 2-17**, Alternative C: Fluid Minerals Leasing, No Surface Occupancy; **Map 2-21**, Alternative C: Fluid Minerals Leasing, Controlled Surface Use; and **Map 2-25**, Alternative C: Fluid Minerals Leasing, Timing Limitations in **Appendix A**). These stipulations would reduce impacts on wildlife and their habitats from fluid mineral development on these lands. Stipulations would be the same as described for Alternative B, except that under Alternative C, the BLM would not apply a NSO stipulation near sharp-tailed grouse leks or within the North Dakota wildlife management areas, though some of these areas would receive incidental protection from stipulations to protect other resources. In areas where a NSO stipulation would not be applied, the impacts from fluid mineral development may be more likely to occur as described under *Impacts Common to All Alternatives*.

Table 3-81
Wildlife Habitat and Fluid Mineral Leasing Allocations under Alternative C (Acres)

Wildlife Habitat[1]	NSO	% of Decision Area	CSU	% of Decision Area	TL	% of Decision Area	Open, subject to STC	% of Decision Area
General Wildlife	-	-	-	-	-	-	-	-
Sharp-tailed grouse[2]	7,600	1.6	20,900[b]	4.3	12,500	2.6	100	<0.1
Migratory Birds	-	-	-	-	-	-	-	-
Bald eagle nests[3]	4,000[a]	0.9	4,100	0.8	3,400	0.7	0	0.0
Golden eagle nests[3]	13,500[a]	2.8	12,300	2.5	13,500	2.8	0	0.0
Ferruginous hawk nests[3]	1,100	0.2	1,100	0.2	1,100[c]	0.2	0	0.0
Big Game	-	-	-	-	-	-	-	-
Bighorn sheep birthing	15,100	3.1	17,500	3.6	18,600[c]	3.8	0	0.0
Bighorn sheep critical winter range	17,300	3.6	20,500	4.2	21,800[c]	4.5	0	0.0
Elk calving	78,200	16.0	106,100	21.7	114,000[c]	23.3	0	0.0
Mule deer fawning	27,100	5.5	32,700	6.7	34,400[c]	7.0	0	0.0

Wildlife Habitat[1]	NSO	% of Decision Area	CSU	% of Decision Area	TL	% of Decision Area	Open, subject to STC	% of Decision Area
Special Status Species	-	-	-	-	-	-	-	-
Least tern[4]	3,400[a]	0.7	3,500[b]	0.7	2,500	0.5	0	0.0
GRSG GHMA	1,400	0.3	5,300[b]	1.1	1,300	0.3	0	0.0
GRSG PHMA	62,600[a]	12.8	41,100	8.4	23,200	4.7	0	0.0
Piping plover[5]	2,800[a]	0.6	2,800[b]	0.6	2,000	0.4	0	0.0
Occupied prairie dog habitat	300	0.1	300[b]	0.1	100	<0.1	0	0.0
Dakota skipper[6]	200[a]	<0.1	200	<0.1	100	<0.1	0	0.0

Source: BLM GIS 2021

Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.

[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for fluid mineral leasing. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.

[2] Includes a 2-mile buffer around leks

[3] Includes a 0.50-mile buffer around the nest

[4] Includes a 0.25-mile buffer around the habitat for NSO and 0.50-mile buffer around the habitat for CSU

[5] Includes a 0.50-mile buffer around the habitat

[6] Includes a 0.62-mile buffer around the habitat

[a] Bald eagle nests, golden eagle nests, least tern active nests, piping plover, prairie dog, Dakota skipper, and GRSG PHMA would be directly protected by NSO stipulations; all other wildlife habitats that are shown as NSO would be due to incidental protections for other resources.

[b] Sharp-tailed grouse leks; threatened, endangered, or other special status species; prairie dog habitat; and GRSG GHMA would be directly protected by a CSU stipulation; all other wildlife habitats that are shown as CSU would be due to incidental protections for other resources.

[c] Ferruginous hawk nests, known or proposed bighorn sheep crucial habitat (which encompasses all bighorn sheep birthing areas and a portion of bighorn sheep crucial winter range), and big game birthing and foraging areas would be directly protected by TLs; all other wildlife habitats that are shown as protected by a TL would be due to incidental protections for other resources.

Acres of wildlife habitats that would be open or closed to mineral materials disposal under Alternative C are presented in **Table 3-82**, below. Impacts on sharp-tailed grouse leks would be the same as Alternative A and would also be limited in magnitude, because the reasonably foreseeable surface disturbance associated with mineral materials is expected to be no more than 40 acres annually (BLM 2022c). Impacts as described under *Impacts Common to All Alternatives* would be reduced for other wildlife species that inhabit the 59,700 acres that would be closed to mineral materials disposal under Alternative C.

Acres of wildlife habitats that would be open or recommended for withdrawal from locatable material entry under Alternative C are presented in **Table 3-83**, below. Impacts would be as described for Alternative A. The special designations for the ACEC would also provide some additional protection from locatable minerals development. Locatable mineral development would still be allowed in these areas, but the regulations would require any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations would require site-specific analysis under NEPA, where the impacts on wildlife would be revisited.

Under Alternative C, fewer acres of wildlife habitat would be open for NEL mineral leasing, and if future demand for NEL minerals occurs, then impacts in these areas would be reduced relative to Alternative A (**Table 3-84**).

Table 3-82
Mineral Materials Management by Wildlife Habitat under Alternative C (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Closed	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	10,200	2.8	0	0.0
Migratory Birds	-	-	-	-
Bald eagle nests[3]	2,500	0.7	1,000	0.3
Golden eagle nests[4]	3,900	1.1	3,300	0.9
Ferruginous hawk nests[4]	300	0.1	900	0.2
Big Game	-	-	-	-
Bighorn sheep birthing	0	0.0	10,100[a]	2.8
Bighorn sheep crucial winter range	1,600	0.4	10,100[a]	2.8
Elk calving	26,500	7.3	22,000	6.1
Mule deer fawning	8,700	2.4	9,100	2.5
Special Status Species	-	-	-	-
Least tern[5]	2,900	0.8	0	0.0
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA	0	0.0	44,500[a]	12.3
Piping plover[5]	2,600	0.7	0	0.0
Occupied prairie dog habitat	0	0.0	200	0.1
Dakota skipper[6]	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for mineral materials. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around the habitat
[a] Known or proposed bighorn sheep crucial habitat (which encompasses all bighorn sheep birthing areas and a portion of bighorn sheep crucial winter range) and GRSG PHMA would be directly protected as closed to mineral materials disposal; all other wildlife habitats that are closed would be due to incidental protections for other resources.

Table 3-83
Locatable Minerals Management by Wildlife Habitat under Alternative C (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Recommended for Withdrawal	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	10,200	2.8	0	0.0
Migratory Birds	-	-	-	-
Bald eagle nests[3]	3,500	1.0	0	0.0
Golden eagle nests[4]	7,200	2.0	0	0.0
Ferruginous hawk nests[4]	1,100	0.3	0	0.0
Big Game	-	-	-	-
Bighorn sheep birthing	10,100	2.8	0	0.0
Bighorn sheep crucial winter range	11,800	3.3	0	0.0
Elk calving	48,400	13.3	0	0.0
Mule deer fawning	17,800	4.9	0	0.0
Special Status Species	-	-	-	-
Least tern[5]	2,900	0.8	0	0.0
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA	44,500	12.3	0	0.0
Piping plover[5]	2,600	0.7	0	0.0
Occupied prairie dog habitat	200	0.1	0	0.0
Dakota skipper[6]	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for locatable minerals. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around the habitat

Table 3-84
NEL Management by Wildlife Habitat under Alternative C (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Not Open	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	10,200	2.8	0	0.0
Migratory Birds	-	-	-	-
Bald eagle nests[3]	2,500	0.7	1,000	0.3
Golden eagle nests[4]	3,900	1.1	3,300	0.9
Ferruginous hawk nests[4]	300	0.1	900	0.2
Big Game	-	-	-	-
Bighorn sheep birthing	0	0.0	10,100	2.8
Bighorn sheep crucial winter range	1,600	0.4	10,100	2.8
Elk calving	26,500	7.3	22,000	6.1
Mule deer fawning	8,700	2.4	9,100	2.5

Wildlife Habitat[1]	Open	% of Decision Area	Not Open	% of Decision Area
Special Status Species	-	-	-	-
Least tern[5]	2,900	0.8	0	0.0
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA	0	0.0	44,500	12.3
Piping plover[5]	2,600	0.7	0	0.0
Occupied prairie dog habitat	0	0.0	200	0.1
Dakota skipper[6]	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for NEL minerals. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around the habitat

Impacts from managing the criteria from Coal Screen 2 (unsuitability) related to wildlife and wildlife habitats would have the impacts as described for Alternative B. Under Alternative C, more acres (547,569 acres) would be acceptable for further consideration of leasing. Wildlife and their associated habitats could be fragmented, degraded, or disturbed in these areas.

BLM management of recreation in the Schnell Ranch SRMA (2,000 acres), Figure 4 BCA (3,100 acres), and Lost Bridge BCA (5,300 acres) would reduce the impacts on wildlife and their habitats that are described for recreation under Alternative A. Impacts on wildlife and their habitats would be similar to those described for Alternative B. However, they would occur over a smaller acreage.

Impacts from comprehensive trails and travel management would be the same as those described under Alternative A.

Impacts from livestock grazing management would be the same as those described under Alternative B.

Impacts from special designations management would be similar to those described for Alternative B. Under Alternative C, the BLM would apply fewer restrictions than under Alternative B on surface-disturbing activities in the Mud Buttes ACEC and within the Lewis and Clark NHT management corridor and the North Country NST management corridor. Examples include managing the ACEC as ROW avoidance, applying NSO for fluid minerals, closing the ACEC to mineral materials disposal, and managing the ACEC as unacceptable for coal leasing. Alternative C would not afford protections within eligible river segments; this is because these segments would be determined not suitable for inclusion in the NWSRS and released from interim management protections.

Migratory Birds

Impacts on migratory birds from ROW management would be similar to those described under *General Wildlife* under Alternative C, above. Impacts would be similar to those described for Alternative B, with

slightly greater impacts on raptor nests because they would be managed as ROW avoidance (**Table 3-79**, above).

Fluid mineral leasing stipulations would be the same as described for Alternative B, except that under Alternative C, the BLM would apply a NSO stipulation around a smaller buffer of raptor nests (0.25 miles instead of 0.50 miles). The smaller buffer size is expected to create more impacts due to the proximity to disturbance and the behavioral characteristics of the avian species. Other migratory bird species would receive incidental protection from stipulations to protect other resources. In areas where a NSO stipulation would not be applied, the impacts from fluid mineral development may be more likely to occur as described under *Impacts Common to All Alternatives*.

Acres of migratory bird habitats that would be open or closed to mineral materials disposal under Alternative C are presented in **Table 3-82**, above. Impacts on ferruginous hawk nests would be the same as Alternative B. More acres of bald eagle and golden eagle nests would be closed as a result of incidental protections for other resources, compared with Alternative A. Impacts as described under *Impacts Common to All Alternatives* would be reduced for other migratory bird species that inhabit the 59,700 acres that would be closed to mineral materials disposal under Alternative C.

Impacts on migratory birds from locatable minerals management, NEL minerals, the coal screening process, recreation, comprehensive trails and travel management, livestock grazing, and specially designated areas would be the same as described for *General Wildlife* under Alternative C, above.

Game Species

Impacts on big game from ROW management would be similar to those described under *General Wildlife*. Impacts would be similar to those described for Alternative B, with slightly greater impacts on known or proposed bighorn sheep crucial habitat because these areas would be managed as ROW avoidance (**Table 3-79**, above). However, design features would be applied in these areas to minimize habitat disturbance.

Fluid mineral leasing stipulations would be the same as described for Alternative B, except that under Alternative C, fewer acres of big game habitat would be protected with an NSO stipulation. In areas where a NSO stipulation would not be applied, the impacts from fluid mineral development may be more likely to occur as described under *Impacts Common to All Alternatives*.

Acres of big game habitats that would be open or closed to mineral materials disposal under Alternative C are presented in **Table 3-82**, above. Impacts would be similar to those described for Alternative B, though fewer acres of big game habitats would be closed as a result of incidental protections for other resources. Impacts as described under *Impacts Common to All Alternatives* would be more likely to occur in open areas.

Impacts on game species from locatable minerals management, NEL minerals, the coal screening process, recreation, comprehensive trails and travel management, livestock grazing, and specially designated areas would be the same as described for *General Wildlife* under Alternative C, above.

Impacts on game species from management to prevent disease transmission from domestic sheep or goats to bighorn sheep would be similar to those described under Alternative B. Prohibitions would be applied within a smaller distance of current or proposed bighorn sheep range (10 miles), which is expected to allow for the possibility of greater impacts due to the proximity to domestic sheep or goats.

Special Status Species

Impacts on special status species from ROW management would be similar to those described under *General Wildlife*. Impacts would be similar to those described for Alternative B, with slightly greater impacts on most special status species and key habitats because these areas would be managed as ROW avoidance (**Table 3-79**, above).

Fluid mineral leasing stipulations would be the same as described for Alternative B, except that under Alternative C, fewer acres would be protected with an NSO stipulation for some special status species. In areas where a NSO stipulation would not be applied, the impacts from fluid mineral development may be more likely to occur as described under *Impacts Common to All Alternatives*.

Impacts from mineral materials management would be similar to those described for Alternative B, except that a buffer around piping plover critical habitat, least tern active nests, and Dakota skipper habitat would not be closed to mineral materials disposals. The habitats for these species would remain protected through the application of design features to maintain the function and suitability of the habitat and through compliance with the ESA.

Impacts on special status species from locatable minerals management, NEL minerals, the coal screening process, recreation, comprehensive trails and travel management, livestock grazing, and specially designated areas would be the same as described for *General Wildlife* under Alternative C, above.

Alternative D

General Wildlife

Impacts on wildlife would be similar to those described under Alternative B. However, not applying an NSO stipulation near sharp-tailed grouse leks could allow for impacts to these areas, although some of these areas would receive incidental protection from stipulations to protect other resources.

Under Alternative D, managing more areas as ROW exclusion (34,900 acres) or avoidance (22,200 acres outside of ROW exclusion areas) (**Map 2-8**, Alternative D: Right-of-Way Exclusion and Avoidance, in **Appendix A**) would reduce the impacts, as described under Alternative A, on wildlife and their habitats. Impacts would be similar to those described for Alternative B (**Table 3-85**, below). The BLM would manage more acres as closed to fluid mineral exploration and development under Alternative D than under Alternative A, with more acres managed with NSO (261,500 acres), CSU (257,200 acres), and TL stipulations (235,500 acres) specifically to protect wildlife (**Map 2-18**, Alternative D: Fluid Minerals Leasing, No Surface Occupancy; **Map 2-22**, Alternative D: Fluid Minerals Leasing, Controlled Surface Use; and **Map 2-26**, Alternative D: Fluid Minerals Leasing, Timing Limitations; **Appendix A**). These stipulations include a CSU stipulation within 2 miles of sharp-tailed grouse and greater prairie chicken leks. Incidental protections for wildlife would be provided by stipulations for other resources as well, including the NSO stipulation that would prohibit fluid mineral development and associated surface disturbance within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe. **Table 3-86**, below, presents the acres of wildlife habitat that would be affected by fluid minerals management.

Table 3-85
ROW Management by Wildlife Habitat under Alternative D (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	ROW Avoidance	% of Decision Area	ROW Exclusion	% of Decision Area
General Wildlife	-	-	-	-	-	-
Sharp-tailed grouse[2]	0	0.0	100[a]	0.2	0	0.0
Migratory Birds	-	-	-	-	-	-
Bald eagle nests[3]	0	0.0	1,800	3.1	0	0.0
Golden eagle nests[4]	0	0.0	1,900[a]	3.2	500	0.9
Ferruginous hawk nests[4]	0	0.0	500	0.9	300	0.5
Big Game	-	-	-	-	-	-
Bighorn sheep birthing	0	0.0	6,500	11.1	0[b]	0.0
Bighorn sheep crucial winter range	0	0.0	7,300	12.5	0[b]	0.0
Elk calving	100	0.2	23,400[a]	40.6	0	0.0
Mule deer fawning	0	0.0	8,200[a]	14.0	100	0.2
Special Status Species	-	-	-	-	-	-
Least tern[5]	0	0.0	300	0.5	0	0.0
GRSG GHMA	0	0.0	100	0.2	0	0.0
GRSG PHMA	0	0.0	32,000	54.7	1,000[b]	1.7
Piping plover[5]	0	0.0	700	1.2	0	0.0
Occupied prairie dog habitat	0	0.0	100	0.2	0	0.0
Dakota skipper	600	1.0	3,000	5.1	500	0.9

Source: BLM GIS 2021

Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.

[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for ROWs. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.

[2] Includes a 2-mile buffer around leks

[3] Includes a 1-mile buffer around the nest

[4] Includes a 0.50-mile buffer around the nest

[5] Includes a 0.50-mile buffer around the habitat

[a] Sharp-tailed grouse leks, golden eagle nests, proposed bighorn sheep lambing habitat, and mule deer, elk, and antelope birthing areas would be directly protected as ROW avoidance areas for all ROWs. Occupied black-tailed prairie dog colonies, ferruginous hawk nests, bald eagle nests, least tern active nests, piping plover critical habitat, and GRSG GHMA would also be ROW avoidance for all ROWs, but all of these habitats are protected as ROW exclusion incidental to protection for other resources. The GRSG PHMA that is ROW avoidance would be due to incidental protections for other resources.

[b] GRSG PHMA is exclusion for solar and wind and avoidance for all other types of ROWs. However, the BLM does not anticipate solar or wind development on BLM-administered land. All other wildlife habitats that are ROW exclusion would be due to incidental protections for other resources.

Table 3-86
Wildlife Habitat and Fluid Mineral Leasing Allocations under Alternative D (Acres)

Wildlife Habitat[1]	NSO	% of Decision Area	CSU	% of Decision Area	TL	% of Decision Area	Open, subject to STC	% of Decision Area
General Wildlife	-	-	-	-	-	-	-	-
Sharp-tailed grouse	1,300[a]	0.3	7,700	1.6	3,400	0.7	100	<0.1
Migratory Birds	-	-	-	-	-	-	-	-
Bald eagle nests[2]	1,900[a]	0.4	2,100	0.4	2,100	0.4	0	0.0
Golden eagle nests[2]	13,100[a]	2.7	12,000	2.5	13,100	2.7	0	0.0
Ferruginous hawk nests[2]	1,000[a]	0.2	1,100	0.2	1,100[c]	0.2	0	0.0
Game Species	-	-	-	-	-	-	-	-
Bighorn sheep birthing	14,300[a]	2.9	17,400	3.6	18,200	3.7	0	0.0
Bighorn sheep crucial winter range	16,300	3.3	20,300	4.1	21,300	4.4	0	0.0
Elk calving	64,100	13.1	96,500	19.7	102,500[c]	20.9	0	0.0
Mule deer fawning	21,000	4.3	30,100	6.2	31,600[c]	6.5	0	0.0
Special Status Species	-	-	-	-	-	-	-	-
Least tern[3]	2,900[a]	0.6	2,900[b]	0.6	2,100	0.4	0	0.0
GRSG GHMA	100	<0.1	1,100	0.2	0	0.0	0	0.0
GRSG PHMA	57,700[a]	11.8	37,400	7.6	19,300	3.9	0	0.1
Piping plover[3]	1,000[a]	0.2	1,000[b]	0.2	800	0.2	0	0.0
Occupied prairie dog habitat	200[a]	<0.1	300	0.1	100	<0.1	0	0.0
Dakota skipper[4]	100[a]	<0.1	200[b]	<0.1	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for fluid mineral leasing. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 0.50-mile buffer around the nest
[3] Includes a 0.25-mile buffer around the habitat for NSO and 0.50-mile buffer around the habitat for CSU
[4] Includes a 0.62-mile buffer around occupied habitat
[a] Bald eagle nests, golden eagle nests, least tern active nests, piping plover critical habitat, within 500 meters of occupied Dakota skipper habitat, and GRSG PHMA would be directly protected by NSO stipulations; all other wildlife habitats that are shown as NSO would be due to incidental protections for other resources.
[b] Sharp-tailed grouse leks, occupied black-tailed prairie colonies, least tern active nests, piping plover critical habitat, within 0.62 miles of occupied Dakota skipper habitat, and GRSG GHMA would be directly protected by a CSU stipulation; all other wildlife habitats that are shown as CSU would be due to incidental protections for other resources.
[c] Ferruginous hawk nests, bighorn sheep lambing habitat, bighorn sheep winter range, and big game birthing areas would be directly protected by TLs; all other wildlife habitats that are shown as protected by a TL would be due to incidental protections for other resources.

Table 3-87, below, presents the acres of wildlife habitats that would be open and closed to mineral materials disposal under Alternative D. Approximately 40 percent of sharp-tailed grouse leks would be closed to mineral materials disposal, thereby providing incidental protections and preventing impacts as described under *Impacts Common to All Alternatives* in these areas. Impacts would be limited in magnitude because the mineral materials RFD is expected to be no more than 40 acres annually (BLM 2022c). Further, a design feature (DF-19; **Appendix D**, Design Features and Best Management Practices) would require a plan be approved that provides mitigation measures and conservation actions within 2 miles of sharp-tailed grouse leks and greater prairie chicken leks. This plan would protect breeding, nesting, and brood-rearing habitats from surface-disturbing and disrupting activities.

Table 3-87
Mineral Materials Management by Wildlife Habitat under Alternative D (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Closed	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	6,300	1.7	3,900	1.1
Migratory Birds	-	-	-	-
Bald eagle nests[3]	600	0.2	2,900	0.8
Golden eagle nests[4]	2,300	0.6	4,900	1.4
Ferruginous hawk nests[4]	200	0.1	1,000	0.3
Big Game	-	-	-	-
Bighorn sheep birthing	3,600	1.0	6,600[a]	1.8
Bighorn sheep crucial winter range	4,400	1.2	7,300[a]	2.0
Elk calving	19,900	5.5	28,500	7.9
Mule deer fawning	4,700	1.3	13,200	3.6
Special Status Species	-	-	-	-
Least tern[5]	0	0.0	2,800	0.8
GRSG GHMA	800	0.2	200	0.1
GRSG PHMA	0	0.0	44,500[a]	12.3
Piping plover[5]	0	0.0	2,600[a]	0.7
Occupied prairie dog habitat	100	<0.1	200	0.1
Dakota skipper[6]	0	0.0	100[a]	<0.1

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for mineral materials. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around occupied habitat
[a] Piping plover critical habitat, occupied Dakota skipper habitat, and GRSG PHMA would be directly protected as closed to mineral materials disposal; all other wildlife habitats that are closed would be due to incidental protections for other resources.

Acres of general wildlife habitats that would be open or recommended for withdrawal from locatable material entry under Alternative D are presented in **Table 3-88**. All sharp-tailed grouse leks would be open, with impacts as described under *Impacts Common to All Alternatives* possible in these areas. Other wildlife species that inhabit the 1,000 acres recommended for withdrawal from locatable mineral entry (**Map 2-41**, Alternative D: Locatable Minerals, in **Appendix A**) would not experience impacts from locatable mineral entry if the withdrawal is enacted. Impacts would be similar to those described for Alternative B. Fewer acres of wildlife habitat would be open for NEL minerals leasing, and if future demand for NEL minerals occurs, then impacts in these areas would be reduced relative to Alternative A (**Table 3-89**).

Table 3-88
Locatable Minerals Management by Wildlife Habitat under Alternative D (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Recommended for Withdrawal[7]	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	10,200	2.8	0	0.0
Migratory Birds	-	-	-	-
Bald eagle nests[3]	3,500	1.0	0	0
Golden eagle nests[4]	6,700	1.8	500	0.1
Ferruginous hawk nests[4]	800	0.2	300	0.1
Game Species	-	-	-	-
Bighorn sheep birthing	10,100	2.8	0	0
Bighorn sheep crucial winter range	11,800	3.3	0	0
Elk calving	48,400	13.3	0	0
Mule deer fawning	17,700	4.9	100	<0.1
Special Status Species	-	-	-	-
Least tern[5]	2,900	0.8	0	0.0
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA	43,600	12.0	1,000	0.3
Piping plover[5]	2,600	0.7	0	0.0
Occupied prairie dog habitat	200	0.1	0	0.0
Dakota skipper[6]	100	<0.1	0	0.0

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for locatable minerals. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around occupied habitat
[7] All wildlife habitats that are recommended for withdrawal would be due to incidental protections for other resources.

Table 3-89
NEL Management by Wildlife Habitat under Alternative D (Acres)

Wildlife Habitat[1]	Open	% of Decision Area	Not Open	% of Decision Area
General Wildlife	-	-	-	-
Sharp-tailed grouse[2]	9,900	2.7	300	0.1
Migratory Birds	-	-	-	-
Bald eagle nests[3]	2,300	0.6	1,100	0.3
Golden eagle nests[4]	4,500	1.2	2,700	0.7
Ferruginous hawk nests[4]	300	0.1	900	0.2
Big Game	-	-	-	-
Bighorn sheep birthing	5,100	1.4	5,000	1.4
Bighorn sheep crucial winter range	6,400	1.8	5,400	1.5
Elk calving	30,000	8.3	18,400	5.1
Mule deer fawning	9,400	2.6	8,500	2.3

Wildlife Habitat[1]	Open	% of Decision Area	Not Open	% of Decision Area
Special Status Species	-	-	-	-
Least tern[5]	2,900	0.8	0	0.0
GRSG GHMA	1,000	0.3	0	0.0
GRSG PHMA	0	0.0	44,500	12.3
Piping plover[5]	0	0.0	2,600	0.7
Occupied prairie dog habitat	100	<0.1	200	0.1
Dakota skipper[6]	0	0.0	100	<0.1

Source: BLM GIS 2021
Note: Due to GIS inaccuracies, numbers do not always sum to the total acreage for the decision area.
[1] Species presented in the table represent those species for which mapped habitat is available and management direction has been included in **Chapter 2**. Acres shown encompass the entirety of management for NEL minerals. As such, it includes both management that would directly protect wildlife habitat, as well as management for other resources that would protect wildlife habitat incidentally.
[2] Includes a 2-mile buffer around leks
[3] Includes a 1-mile buffer around the nest
[4] Includes a 0.50-mile buffer around the nest
[5] Includes a 0.50-mile buffer around the habitat
[6] Includes a 0.62-mile buffer around occupied habitat

In the 16,900 acres of wildlife habitat acceptable for further consideration for coal leasing, the Alternative A impacts, such as habitat fragmentation, degradation, or disturbance to habitats or individual wildlife, could occur on wildlife habitats. All acceptable acres for Alternative D would be within the three coal-producing counties of McLean, Mercer, and Oliver.

Migratory Birds

Impacts on migratory birds would be the same as described for Alternative B, with the exception of the timing limitation on active raptor nests, which would have impacts as described for Alternative C and the differences in incidental protections from ROW avoidance and closures or limitations on mineral development.

Game Species

Impacts on bighorn sheep lambing range and winter range would be the same as described under Alternative A. Alternative D would not recommend known or proposed bighorn sheep crucial habitat for withdrawal from locatable mineral entry and would not manage these areas as closed to NEL or mineral materials disposal. This could allow for some impacts to known or proposed bighorn sheep crucial habitat from these uses.

Impacts from management for big game would be similar to Alternative B, though under Alternative D, the BLM would remove restrictions in big game foraging areas. As a result, there could be impacts from surface disturbing activities to big game foraging areas.

Special Status Species

Impacts would be similar to those described for Alternative B with the exceptions described below. Impacts from prohibiting surface disturbance and NSO management within 0.25 miles of known special status plant species or populations, ROW avoidance for golden eagle nests and special status plants, CSU for occupied black-tailed prairie dog colonies, and NSO for bald and golden eagles, would be the same as described for Alternative C. Other changes were primarily clarifications to help with implementation.

Cumulative Impacts

The cumulative impacts analysis area for wildlife is defined as the planning area. Past impacts on wildlife that have occurred and that are reasonably foreseeable activities expected to continue include conversion of habitat to tilled cropland and livestock rangelands and habitat fragmentation from roads, fences, ROWs, urbanization, and infrastructure. Such habitat loss may prevent wildlife from successfully foraging, finding cover from predators, or reproducing. This may result in individuals being more susceptible to starvation or malnutrition, predation, or population declines.

Other reasonably foreseeable activities include fluid mineral, coal, and mineral materials development, which would have impacts as described for these resources above. The oil and gas RFD estimates that 43,000 oil and gas production and support wells could be drilled in the planning area from 2020 through 2040, with an estimated surface disturbance of 56,000 acres (BLM 2022a). Coal development is estimated to disturb 9,434 acres (or 7,766 acres under Alternative B.1) from pending and future leases prior to 2040 (BLM 2022b). The mineral materials RFD estimates that development of mineral materials will disturb 40 acres per year (BLM 2022c).

Wildlife habitats may be contaminated from hazardous materials spills, which are noted in **Appendix I, Table I-1**. Further, wildlife could be poisoned from spills, making them sick or causing mortality. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

Past and ongoing vegetation treatments have been implemented through such programs as the NRCS Sage-Grouse Initiative, which have restored wildlife habitats. Such habitat restoration efforts would improve the likelihood of successful foraging, finding cover from predators, or reproducing, thereby supporting population increases.

By restricting uses and activities on BLM-administered lands, BLM management would reduce the impacts of the past, present, and reasonably foreseeable future actions described above to the extent practical and feasible. By restricting habitat disturbance, the BLM would maintain habitat conditions that support foraging, cover, and reproduction, which would support population increases. BLM management's contribution of nonmineral uses to cumulative impacts would be limited on BLM-administered surface lands, which comprise 0.13 percent of surface lands in the planning area. Because BLM-administered mineral estate comprises a larger portion of the planning area (9 percent for the coal decision area and 1 percent for the fluid mineral decision area), minerals management under Alternative A, combined with past, present, and reasonably foreseeable actions, would continue to have a slightly larger, though still limited, impact on wildlife in the planning area. As a result, wildlife conditions and trends in the cumulative impacts analysis area would be largely influenced by management on lands not administered by the BLM. Based on the activities described above, wildlife throughout the planning area would continue to be at risk from development, including infrastructure, mineral developments, and agricultural land conversion.

Given the limited surface acreage administered by the BLM in the cumulative impacts analysis area, cumulative impacts under Alternatives B and D would be similar to those described for Alternative A. Cumulative impacts from mineral development would be reduced under Alternatives B and D; this is due to the increased closures and stipulations that would be applied to protect resources, including a number of wildlife species and their important habitats. Cumulative impacts under Alternative C would be similar to

those described for Alternatives B and D. Cumulative impacts from mineral development would be slightly greater than those described for Alternatives B and D because fewer acres would be closed or managed with stipulations.

Climatic changes, such as increasing air temperature, changes to precipitation and runoff patterns, and changes to wildfire prevalence, would cumulatively continue to impact wildlife species. Modeling efforts have suggested that climate change may cause a nearly four-fold increase in acres burned, particularly in western North Dakota (URS 2010). Wildfire can cause immediate wildlife habitat changes, including habitat loss and modification, as a result of burning, heating, and noxious weed spread. This would reduce availability of food, cover, or reproduction habitat, which may then reduce wildlife survival, prevent successful reproduction, or cause wildlife to be displaced to other areas. Further, changes in temperature and water availability may cause changes to wildlife physiology, movement, timing of activities, and migration patterns (NDGFD 2015). The decisions in this RMP would result in negligible contributions to climate change relative to global emissions, however implementation of management decisions that result in the disturbance of wildlife habitat could exacerbate local climate change impacts on wildlife.

It is anticipated that past, present, and reasonably foreseeable impacts will continue to affect wildlife by altering vegetation resources, increasing wildfires, and changing both temperature and water availability. However, the magnitude and duration of these impacts is not expected to change as a result of management direction proposed in this plan.

3.2.6 Fish and Aquatic Species

Issues

- How would the alternatives affect potential for aquatic habitat loss and alteration in fish-bearing and non-fish-bearing streams?
- How would the alternatives affect the potential for disturbance, displacement, injury, or mortality of fish and aquatic species?
- How would the alternatives affect the risk of invasive aquatic species introduction and spread?

Affected Environment

Aquatic habitats in the planning area are diverse and consist of prairie and badland rivers and streams, springs, seeps, lakes, reservoirs, ponds, and swamps and marshes. All of these aquatic ecosystems provide key habitats for aquatic species, and the availability varies by location, elevation, and proximity to landforms and vegetation. Acres or miles of several types of aquatic habitats within the decision areas are presented in **Table 3-90**, below, and shown on **Map 3-10**, Wetlands, Riparian Areas, and Fish-bearing Streams, in **Appendix A**.

Aquatic species found in these habitats are fishes (game and nongame), amphibians, aquatic reptiles, and macroinvertebrates. There are six aquatic special status species (ESA-listed species and BLM sensitive species), including four reptiles and five fish, known to exist in the planning area (see **Appendix J**, Vegetation and Wildlife Species Tables). Additionally, there are 22 fishes, 10 mussels, 2 amphibians, and 4 aquatic reptiles that are designated as species of conservation priority in North Dakota; they may exist in the planning area.

Table 3-90
Aquatic Habitats in the Decision Areas

Aquatic Habitat Type	BLM Surface	BLM Subsurface		
		Fluid Minerals	Coal	Other Minerals[1]
Fish-bearing streams (miles)[2]	11	74	107	44
Pallid sturgeon range (acres)[3]	1,400	9,200	8,700	7,500
Intermittent, Perennial, and Ephemeral Streams (miles)[4]	300	1,200	3,200	800
Waterbodies (acres)[5]	400	10,800	5,700	10,200

Source: BLM GIS 2021
[1] Includes mineral materials and locatable minerals
[2] This is a subset of intermittent, perennial, and ephemeral streams
[3] With a 0.50-mile buffer
[4] Based on the National Hydrography Dataset hydrographic category codes 46006, 46003, 46007
[5] Waterbodies include areas of water surrounded by land, such as lakes, ponds, and reservoirs, excluding ephemeral, intermittent, and perennial streams

Waterbodies, such as lakes and reservoirs, provide access to sport fishing, a popular recreation activity in North Dakota, and many waters are stocked to support game fish populations (NDGFD 2018). Several nonnative, invasive aquatic species have also been introduced to the planning area; these are nonindigenous, aquatic-dependent species that are a threat to native and desirable aquatic species or habitats. Nonnative species often times compete with and prey upon native species, which can lead to local population extirpations (IPBES 2019).Habitat loss and fragmentation are considered to be the primary drivers of biodiversity loss. In a global scale, there are numerous studies that suggest that the conversion of natural habitat to anthropogenic land uses leads to local declines in both species' richness and abundance. Further, that these declines are greater where conversion to anthropogenic land use has been greater (Spooner et al. 2018; Cahill et al. 2013; Maclean and Wilson 2011). Aquatic resource conditions in the planning area have been altered due to such land use practices as livestock grazing, development, agriculture, and water diversions. Over 50,000 basins were lost from 1997 to 2009, representing a habitat loss of 3.3 percent (Dyke et al. 2015). According to the North Dakota 2018 Integrated Water Quality Report (NDDOH 2018), 32 percent of rivers and streams fully support aquatic life, 45 percent support aquatic life but are threatened, and 23 percent do not support aquatic life. Habitat improvement projects, changes in land management, increases in monitoring, and changes in harvest regulations have improved habitat conditions in some portions of the planning area, particularly for angling opportunities (Dyke et al. 2015).

Aquatic habitats also depend on climate cycles that may be in various stages of drought or deluge. Freshwater species may be especially vulnerable to the effects from climate change as shifts in water availability (changes in precipitation), and temperature can substantially alter or eliminate habitat (Wiens 2016; Maclean and Wilson 2011). Ongoing climate change in North Dakota is causing warmer and wetter conditions. These changes, coupled with declines in regional wetlands and increasing use of tile drainage in agricultural areas, will continue to affect ecological patterns and processes that are critical for maintaining aquatic resources (Dyke et al. 2015; Johnson et al. 2005, 2010).

Climatic conditions strongly influence surface water and groundwater quantity and quality. As described in **Section 3.2.1**, Air Quality and Climate, climate change is expected to result in increased temperatures, precipitation, and flood and wildfire risk. High interannual variability in water availability may pose a particular challenge to fish and aquatic species and their habitats.

Because air and water temperatures are correlated, increased air temperatures will result in increased surface and groundwater temperatures. Warming water temperatures are likely to alter ecological processes and the geographic distribution of aquatic species (Jacobson et al. 2017). Species can respond to climate change through niche shifts or shifting their geographical range (moving to higher elevations, or latitudes), however, for those species who are not able to do so, may become extinct (Wiens 2016; Maclean and Wilson 2011). Observed effects of warming water temperatures on aquatic species' physiological systems include exceeded critical thermal tolerances, reduced cardiorespiratory performance, compromised immune function, and modified reproduction patterns (Whitney et al. 2016). For aquatic species already living near their critical thermal tolerance limit, predicted temperature increases may lead to extirpations and extinctions. This may be of particular concern for special status aquatic species. Species' ranges may also shift in response to warming water temperatures, which could result in new species interactions and altered predatory-prey dynamics. This could also increase the potential for the colonization of invasive and nonnative species (Rahel and Olden 2008).

Changes in precipitation and runoff patterns will alter the hydrologic regime, which can negatively affect species composition, ecological productivity, and reproduction. Studies have predicted the expected increase in precipitation and subsequent runoff to lead to sediment accumulation in prairie potholes (Skagen et al. 2016). This may result in prairie potholes being filled completely or by half with sediments, thereby negatively affecting aquatic species dependent on this habitat (Skagen et al. 2016). However, flooding may also benefit aquatic species and their habitats by recharging groundwater, increasing fish production, creating wildlife habitat, recharging wetlands, and improving soil fertility (Poff 2002).

Finally, modeling efforts have suggested that climate change may cause a nearly four-fold increase in acres burned, particularly in western North Dakota (URS 2010). Wildfire can cause immediate water chemistry changes as a result of heating, smoke, and ash inputs (Spencer and Hauer 1991). These water chemistry effects, along with changes in turbidity and runoff levels, can displace or kill aquatic species.

Additional information is available in Section 2.3, Water Resources; Section 2.5, Riparian and Wetland Communities; and Section 2.7, Fish and Aquatic Species, of the AMS (BLM 2020b).

Environmental Consequences

Impacts specific to aquatic species and their habitats include the following:

- Sediment and turbidity—Increased sediment loading in waters containing sediment-intolerant fish species, the loss of recruitment, stress, habitat alteration, and habitat loss
- Habitat alteration—Changes in habitat that make it nonfunctional for select species or more conducive to competitive species
- Loss or reduction of streamside vegetation/cover—Increased temperatures, stress, reduced productivity, and impacts on food webs
- Water quality alteration—Actions that alter important water quality parameters, including pH, dissolved oxygen, temperature, hardness, alkalinity/salinity, and turbidity
- Water depletions—Loss of physical habitat, changes in water quality, sediment accumulation, habitat alteration, loss of habitat complexity, or food source reduction
- Potential for injury or mortality of aquatic wildlife

Impacts Common to All Alternatives

Surface-disturbing activities associated with land use authorizations would have impacts on aquatic species' habitat due to soil compaction and vegetation loss. Aboveground linear ROWs, including renewable energy development such as transmission lines, may stretch for miles, fragmenting large swaths of habitats and opening large areas to traffic, noxious weed and invasive plant spread, and risk of fire. If the routing of ROWs places them in riparian habitat or near streams, soil loss could result in sediment delivery to waterways. This would cause lower dissolved oxygen, higher turbidity, and higher temperature, and ultimately cause habitat loss and alteration in affected areas.

Livestock grazing can affect riparian and aquatic species more than terrestrial species because livestock disproportionately use riparian and aquatic areas for forage, water, and shade. Excessive grazing can alter streambank stability, channel structure, and riparian composition, leading to degraded stream functionality. For example, trampling streambanks can widen streams, cause undercut banks to collapse, reduce riparian vegetation, increase surface runoff, and erode soil. These changes would ultimately degrade water quality due to excess nutrients and sedimentation and elevate in-stream temperatures due to reduced vegetation cover. They could also lead to a loss of wetland and riparian vegetation and backwater pools, which provide nursery habitat for fish (Belsky et al. 1999). In addition, overgrazing in riparian zones can negatively affect riparian vegetation vigor, community structure, and species composition, which would reduce habitat quality for riparian species. Other effects of grazing in riparian areas include facilitating dispersal of nonnative predators by constructing stock tanks, trampling individuals and eggs, and spreading disease (Belsky et al. 1999).

Rangeland management that excludes livestock from riparian areas would reduce these disturbances (Belsky et al. 1999). Excluding livestock grazing from riparian areas would help maintain or improve habitat quality due to reduced soil disturbance and vegetation loss; thus, excluding livestock grazing would reduce streambank erosion and sedimentation into aquatic habitat. This would maintain or increase miles of streams with high-quality fish and aquatic species habitat.

Under all alternatives, the BLM would manage livestock grazing to comply with BLM standards and guidelines for livestock grazing. Grazing allotments would be managed to meet standards for rangeland health. In areas not meeting rangeland health standards, where livestock grazing is determined to be a factor, grazing leases would be adjusted to make significant progress toward achieving standards for rangeland health. This would improve vegetation conditions and would have long-term, indirect impacts on aquatic habitats.

Impacts on fish and aquatic species could occur from mineral development. Land use changes and surface-disturbing activities, such as from road construction and use, facility construction, and excavation, could affect fisheries by removing riparian vegetation and altering the hydrology and sediment regimes that can change channel form and sediment inputs (Dauwalter et al. 2008). Increasing sediment and turbidity in aquatic environments could result in lower dissolved oxygen, a higher temperature, stress to fish and other aquatic species, habitat alteration and loss, and decreased population growth. Construction of infrastructure, such as roads, well pads, pipelines, culverts, and bridges, would result in localized permanent loss or alteration of aquatic habitats due to the placement of fill. In addition, fill placement within waterbodies would adversely affect habitat in the long term by removing the fill footprint's capacity to contribute nutrients or organic matter to the waterbody, and by altering the hydrology in the immediate area. Activities that affect stream channels, stream banks, or in-stream flow could also affect fish and aquatic species, creating unsuitable conditions for some species (Bonner and Wilde 2000; Matthews et al. 2004).

During mineral exploration and development, wastewaters are most often injected back into deep water aquifers through designated disposal wells; however, there is a potential for accidental releases, which could result in water quality alterations, specifically increased concentrations of salts and total dissolved solids (Farag and Harper 2013). Large salt concentrations may disrupt the ion balance and can result in toxic impacts on aquatic organisms.

There would be a risk of accidental wastewater release under all alternatives. Similarly, environmental pollutants, such as accidental spills during fluid mineral development, may result in direct lethal and sublethal impacts on fish and aquatic communities. Typically, the impacts occur through changes in the water temperature, salinity, dissolved oxygen, nutrient loading, and pH (Scott and Sloman 2004; Farag and Harper 2013). Examples of sublethal impacts are physiological impacts, such as disrupting sensory, hormonal, neurological, and metabolic systems, and behavioral impacts, such as disrupting predator avoidance, reproduction, and social behaviors (Scott and Sloman 2004).

Mineral exploration and development activities may increase water use, as described in the oil and gas RFD (BLM 2022a). Depending on the water source and quantity used, water depletions could cause an alteration or loss of fish species habitat. Reduced water levels can also increase water temperatures, change food supplies, and cause carrying capacity loss. Important microhabitats, such as spawning bars and pools, can be lost or altered (Matthews et al. 2004). Water withdrawal from aquatic areas, such as streams, can limit habitat connectivity by reducing the flow if levels are too low to allow passage. Flow alterations can also result from obstructions in the natural flow path, either by infrastructure or placement of piers or piles. Such obstructions may cause barriers to movement that may impede fish passage, alter migration patterns, reduce access to quality feeding or breeding habitat, and increase energetic demands, which could compromise survival.

Surface-disturbing activities associated with mineral exploration and development could also injure or kill fish and other aquatic species. This would result from trampling or crushing species with machinery and/or vehicles, smothering species (for example, invertebrates) and eggs or redds with sediment, and directly removing species during new infrastructure placement. Sound pressures generated from seismic surveys for exploration, vehicles, and machinery (for example, pile drivers) could also impact fish; such impacts could include disturbance, displacement, stress-induced fleeing, physical damage (for example, to auditory sensory hair cells in fish, swim bladders, organs, and tissue), and mortality (McCauley et al. 2003; Popper 2003; Smith et al. 2004; Morris and Winters 2005).

The application of BMPs and mitigation measures (**Appendix D**, Design Features and Best Management Practices) for most surface-disturbing activities would likely reduce the effects on fish and aquatic species associated with authorized land uses or activities such as road, pipeline, or power line construction; mineral development; range improvements; and recreation. BMPs and mitigation measures would reduce or eliminate the removal or alteration of aquatic habitat.

Fluid mineral leasing stipulations (**Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing) would not prevent development in areas already leased; here, the risk of effects on fish and other aquatic species would be greater. While the acres available for mineral materials disposal and fluid mineral leasing (and applicable stipulations) vary by alternative, the reasonably foreseeable surface disturbance under all alternatives would be not impact fish and other aquatic species (see **Section 3.1.1**). Similarly, while much of the federal mineral estate is available for locatable mineral development, such development is not reasonably foreseeable. Therefore, it is unlikely that impacts would occur under any of the alternatives from locatable mineral development.

Requiring a reclamation stipulation (Alternative A) or reclamation plan (Alternatives B and C; **Appendix E**, Reclamation Standards) for all surface-disturbing activities across all alternatives would continue to stabilize disturbed areas in the short term and stabilize landscapes in the long term, reducing the potential effects from the loss or alteration of habitat.

For all alternatives, goals for managing riparian areas and wetlands are to maintain or improve the condition of riparian, wetland, and aquatic ecosystems to achieve related resource goals and objectives. These include goals and objectives for water quantity, water quality, terrestrial and aquatic species habitat, recreation, wildland fire mitigation, floodwater retention, and drought resilience.

Unplanned fire ignitions could cause short- or long-term impacts on fish and aquatic species through habitat loss and alteration. This is because unplanned fire ignitions could cause vegetation loss, erosion, sedimentation into waterways, increased stream temperatures, and water quality changes. Fire and fuels treatments that remove vegetation near aquatic habitats could temporarily increase sedimentation into aquatic habitats and degrade habitat conditions for fish and aquatic species. Over the long term, wildland and prescribed fires and fuels treatments would lower the risk for an uncharacteristically large or severe wildfire that could cause aquatic habitat loss or alteration.

The majority of recreation on BLM-administered lands is dispersed recreation that includes walking and vehicle use (limited to existing roads and trails). This type of recreation, particularly from motorized vehicles, causes minor amounts of vegetation loss, soil compaction, soil erosion, and invasive species spread. These would incidentally impact fish and aquatic species by altering the habitat from erosion and sedimentation (Eubanks 2004). Vehicles and foot traffic in riparian areas and wetlands could also injure or kill aquatic species, such as amphibians and aquatic reptiles, by trampling them.

Management approaches that direct recreation to specific areas and avoid dispersed recreation can result in more predictable, localized, and manageable impacts. In general, activities allowed in BCAs would cause lower-intensity impacts on aquatic species and habitats, whereas activities permitted in developed recreation areas, such as increased motorized access and developed campgrounds, would cause relatively higher levels of impacts due to increased use levels. Impacts from high-intensity use are especially evident in areas of higher recreation preference, such as wetlands, meadows, and streams. Species that inhabit aquatic habitat types may experience disproportionately higher effects due to concentrated use in their habitat.

Other recreational activities, such as fishing and waterfowl hunting, would increase the human presence in aquatic habitat, which may cause disturbance or habitat alterations, as described above. Fishing can lead to the spread of nonnative invasive species, such as common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), and zebra mussels (*Dreissena polymorpha*) (NDGFD 2018). Fishing also can contribute to degradation of riparian and aquatic habitat from human presence in these areas.

Transportation management would cause impacts similar to those described above for recreation. Closing areas to off-road motorized vehicle travel would limit vegetation loss and sediment delivery into waterways. This would help to maintain the aquatic habitat quality and quantity and limit the potential for injury or mortality due to trampling. Under all alternatives, travel would be limited to existing or designated routes, where impacts would be reduced because past and current use has already impacted these areas. Therefore, impacts on fish and aquatic species from recreation would be the same across all alternatives.

Finally, climatic conditions are expected to become more variable and extreme over the next decade. Rising air temperatures will continue to influence the warming of surface and groundwater, posing a threat to aquatic life. Changes in precipitation intensity and frequency will alter soil composition, leading to changes in runoff and sediment patterns, and ultimately resulting in altered species composition, ecological productivity, and reproduction.

Alternative A

Table 3-91 compares ROW management on aquatic species habitats, including fish-bearing streams and pallid sturgeon range, in BLM-administered surface lands. Under Alternative A, 18 miles of perennial, intermittent, and ephemeral streams; 4 miles of fish-bearing streams; and 1,300 acres of pallid sturgeon range would be open to ROWs. Aquatic species inhabiting these areas would continue to be subject to the impacts from ROWs as described above. No waterbodies would be open to ROWs; therefore, ROWs would not impact aquatic species in these areas. Impacts would continue to be avoided as a result of incidental protections from ROW exclusion management for other resources because no ROWs would be developed. The likelihood of impacts would continue to be reduced in ROW avoidance areas because, although the ROWs could be developed, they would be located away from sensitive resources, such as sensitive waterbodies, wetlands, and riparian areas.

Table 3-91
Rights-of-Way Management in Aquatic Species Habitat, by Alternative

Aquatic Habitat Type	Alternative A	Alternative B	Alternative C	Alternative D
Fish-bearing streams (miles)[1]	-	-	-	-
Open	4	0	0	0
ROW avoidance	7[a]	3	11	11
ROW exclusion	0	8	0	0
Pallid sturgeon range (acres)[2]	-	-	-	-
Open	1,300	0	0	0
ROW avoidance	100	100[a]	1,400[a]	1,400[a]
ROW exclusion	0	1,300	0	0
Intermittent, Perennial, and Ephemeral Streams (miles)	-	-	-	-
Open	62	1	1	3
ROW avoidance	175[a]	7	236	224
ROW exclusion	0	229	0	11
Waterbodies (acres)	-	-	-	-
Open	200	0	0	0
ROW avoidance	100	0	300	300
ROW exclusion	0	300	0	0

Source: BLM GIS 2021

[1] This is a subset of intermittent, perennial, and ephemeral streams

[2] With a 0.50-mile buffer

[a] Direct protection is provided by management of the Little Missouri River and pallid sturgeon habitat as ROW avoidance. Other aquatic habitats in the table that are ROW avoidance or exclusion would be due to incidental protections for other resources.

Table 3-92 compares the livestock grazing allocations along fish-bearing streams on BLM-administered surface lands in the decision area (58,500 acres). Under Alternative A, all these lands would be suitable for livestock grazing, including 1,400 acres of pallid sturgeon range; 24 miles of intermittent, perennial, and ephemeral streams; and 11 miles of fish-bearing streams. Aquatic species inhabiting these areas could experience the impacts described above if improper or excessive grazing were to occur. On these lands, the BLM would limit utilization to 50 percent by weight. If overutilization were to occur, the BLM would adjust livestock AUMs or use, or both, and implement additional measures, such as range improvements, to reduce impacts.

Table 3-92
Grazing Management in Aquatic Species Habitat, by Alternative

Aquatic Habitat Type	Alternative A	Alternative B	Alternative C	Alternative D
Fish-bearing streams (miles)[1]	-	-	-	-
Lands identified as suitable for livestock grazing	11	N/A	N/A	N/A
Available for livestock grazing	N/A	7	7	11
Unavailable for livestock grazing[3]	N/A	4	4	N/A
Pallid sturgeon range (acres)[2]	-	-	-	-
Lands identified as suitable for livestock grazing	1,400	N/A	N/A	
Available for livestock grazing	N/A	400	1,400	1,400
Unavailable for livestock grazing	N/A	1,000	0	0
Intermittent, Perennial, and Ephemeral Streams (miles)	-	-	-	-
Lands identified as suitable for livestock grazing	237	N/A	N/A	N/A
Available for livestock grazing	N/A	218	227	227
Unavailable for livestock grazing	N/A	19	10	10
Waterbodies (acres)	-	-	-	-
Lands identified as suitable for livestock grazing	400	N/A	N/A	N/A
Available for livestock grazing	N/A	300	300	300
Unavailable for livestock grazing	N/A	0	0	N/A

Source: BLM GIS 2021
[1] This is a subset of intermittent, perennial, and ephemeral streams
[2] With a 0.50-mile buffer
[3] Aquatic species habitat unavailable to grazing is incidental and not designed to directly protect the Aquatic species habitat

Table 3-93, Table 3-94, and **Table 3-95** show miles of aquatic species' habitats on BLM-administered lands that would be open or closed to locatable mineral entry, mineral materials disposal, NEL minerals, fluid mineral leasing, and coal development. Areas open to these uses could cause the impacts described for mineral exploration and development under *Impacts Common to All Alternatives*, above, including habitat loss and alteration and aquatic species injury or mortality. **Table 3-93** also shows miles of aquatic species' habitats on BLM-administered lands that would be subject to NSO, CSU, and TL stipulations.

Table 3-93
Mineral Development in Aquatic Species Habitat, by Alternative

Aquatic Habitat Type	Alternative A	Alternative B	Alternative C	Alternative D
Fish-bearing streams (miles)[1]	-	-	-	-
Locatable minerals – not open to entry	1	0	0	0
Locatable minerals – open to entry	44	45	45	45
Locatable minerals – open, recommended for withdrawal[2]	0	4	0	0
Mineral materials – open to disposal	38	0	34	0
Mineral materials – closed to disposal	7	45[a]	11	45[a]
NEL minerals – open to leasing	38	29	34	33
NEL minerals – closed to leasing	7	16	11	12
Pallid sturgeon range (acres)[3]	-	-	-	-
Locatable minerals – not open to entry	500	0	0	0
Locatable minerals – open to entry	6,900	7,500	7,500	7,500
Mineral materials – open to disposal	7,500	0	7,400	0
Mineral materials – closed to disposal	0	7,500[a]	100	7,500[a]
NEL minerals – open to leasing	7,500	0	7,400	6,500
NEL minerals – closed to leasing	0	7,500	100	1,000
Intermittent, Perennial, and Ephemeral Streams (miles)	-	-	-	-
Locatable minerals – not open to entry	21	0	0	0
Locatable minerals – open to entry	806	827	827	823
Locatable minerals –open, recommended for withdrawal[2]	0	28	0	4
Mineral materials – open to disposal	604	2	556	2
Mineral materials – closed to disposal	223	825[a]	270	825[a]
NEL minerals – open to leasing	604	514	556	555
NEL minerals – closed to leasing	223	313	270	272
Waterbodies (acres)	-	-	-	-
Locatable minerals – not open to entry or recommended for withdrawal[2]	1,300	0	0	0
Locatable minerals – open to entry	8,900	10,200	10,200	10,200
Mineral materials – open to disposal	10,000	100	10,000	100
Mineral materials – closed to disposal	200	10,100	200	10,100
NEL minerals – open to leasing	10,000	8,200	10,000	8,200
NEL minerals – closed to leasing	200	2,000	200	2,000

Source: BLM GIS 2021

[1] This is a subset of intermittent, perennial, and ephemeral streams

[2] All aquatic habitats in the table that are recommended for withdrawal would be due to incidental protections for other resources.

[3] With a 0.50-mile buffer

[a] Direct protection is provided by management of the Little Missouri WSR and pallid sturgeon habitat as closed to disposal. Other aquatic habitats in the table that are closed to disposal would be due to incidental protections for other resources.

Table 3-94
Fluid Mineral Development in Aquatic Species Habitat, by Alternative

Aquatic Habitat Type	Alternative A	Alternative B	Alternative C	Alternative D
Fish-bearing streams (miles)[1]	-	-	-	-
Fluid minerals – closed by discretionary or nondiscretionary decisions	0	32	0	32
Fluid minerals – open, NSO	44[a]	43[b]	75[b]	43[b]
Fluid minerals – open, CSU	72	43[c]	75[c]	43[c]
Fluid minerals – open, TL	61	32	48	32
Pallid sturgeon range (acres)[2]	-	-	-	-
Fluid minerals – closed by discretionary or nondiscretionary decisions	0	2,100	0	2,100
Fluid minerals – open, NSO	4,400[a]	7,100[b]	9,200[b]	7,100[b]
Fluid minerals – open, CSU	900	7,100	9,200	7,100
Fluid minerals – open, TL	5,900	4,100	6,000	4,700
Fluid minerals – open, STC	1,500	0	0	0
Intermittent, Perennial, and Ephemeral Streams (miles)	-	-	-	-
Fluid minerals – closed by discretionary or nondiscretionary decisions	0	368	0	368
Fluid minerals – open, NSO	1,301[a]	941[b]	,309[b]	941[b]
Fluid minerals – open, CSU	1,309	941[c]	1,309[c]	941[c]
Fluid minerals – open, TL	674	557	764	571
Waterbodies (acres)	-	-	-	-
Fluid minerals – closed by discretionary or nondiscretionary decisions	0	8,158	0	8,158
Fluid minerals – open, NSO	10,833	2,675	10,833	2,675
Fluid minerals – open, CSU	402	2,652	10,750	2,675
Fluid minerals – open, TL	10,074	2,169	10,099	2,176

Source: BLM GIS 2021
[1] This is a subset of intermittent, perennial, and ephemeral streams
[2] With a 0.50-mile buffer
[a] Direct protection would be provided by applying an NSO stipulation to wetlands, lakes, and ponds, the Yellowstone River floodplain, and the Missouri River Floodplain
[b] Direct protection would be provided by applying an NSO stipulation to perennial or intermittent streams, lakes, ponds, reservoirs, pallid sturgeon habitat, and the Little Missouri WSR
[c] Direct protection would be provided by apply a CSU stipulation to ephemeral, intermittent, and perennial drainages. Other aquatic habitats in the table that would have a CSU stipulation applied would be due to incidental protections for other resources.

Table 3-95
Coal Development in Aquatic Species Habitat, by Alternative

Aquatic Habitat Type	Alternative A	Alternative B	Alternative B.1	Alternative C	Alternative D
Fish-bearing streams (miles)[1]	-	-	-	-	-
Acceptable for coal development	N/A	3	1	50	3
Unacceptable for coal development	N/A	104	106	57	104
Coal-producing counties with current or pending coal leases – acceptable	N/A	3	1	7	3
Coal-producing counties with current or pending coal leases – unacceptable	N/A	3	6	0	3
Pallid sturgeon range (acres)[2]	-	-	-	-	-
Acceptable for coal development	N/A	0	0	0	0
Unacceptable for coal development	N/A	8,700	8,700	8,700	8,700
Coal-producing counties with current or pending coal leases – acceptable	N/A	0	0	0	0
Coal-producing counties with current or pending coal leases – unacceptable	N/A	1,300	1,300	1,300	1,300
Intermittent, Perennial, and Ephemeral Streams (miles)	-	-	-	-	-
Acceptable for coal development	N/A	177	47	1,562	190
Unacceptable for coal development	N/A	3,180	3,310	1,794	3,167
Coal-producing counties with current or pending coal leases – acceptable	N/A	176	47	351	190
Coal-producing counties with current or pending coal leases – unacceptable	N/A	233	362	58	305
Waterbodies (acres)	-	-	-	-	-
Acceptable for coal development	N/A	300	100	2,700	300
Unacceptable for coal development	N/A	5,500	5,700	3,100	5,500
Coal-producing counties with current or pending coal leases – acceptable	N/A	300	100	700	300
Coal-producing counties with current or pending coal leases – unacceptable	N/A	600	800	200	600

Source: BLM GIS 2021
[1] This is a subset of intermittent, perennial, and ephemeral streams
[2] With a 0.50-mile buffer

Aquatic areas closed to mineral development would largely be as a result of incidental protections for other resources. These closed areas would have the greatest likelihood to maintain suitable habitat conditions for fish and aquatic species by prohibiting any type of development within these areas. These areas would likely maintain the highest water quality for spawning and migratory and juvenile rearing habitat for fish. These areas also would maintain fish presence and productivity during the spawn. Indirect effects, such as sedimentation into waterways, could occur from mineral development nearby.

For fluid minerals, areas managed with NSO, CSU, and TL stipulations would prevent or limit surface disturbance and the associated impacts in certain areas and at certain times. In areas that are open to fluid mineral leasing, NSO stipulations would continue to provide the greatest protection of fish and aquatic species by prohibiting surface-disturbing activities in these areas. Under Alternative A, NSO stipulations 11-33, 11-36, and 11-39 would continue to prevent the disturbances from fluid mineral development described above to aquatic species and habitats in these areas. In effect, Alternative A includes 44 miles of fish-bearing streams, 4,400 acres of pallid sturgeon range, 1,301 miles of intermittent, perennial, and ephemeral streams, and 10,833 acres of waterbodies that are subject to NSO stipulations (**Table 3-93**). The magnitude and intensity of impacts from mineral exploration and development as described under *Impacts Common to All Alternatives* would continue to be reduced in these areas, but to a lesser extent than areas that are closed to mineral leasing.

CSU stipulations would continue to provide slightly less protection of fish and aquatic species. This is because surface-disturbing activities would be allowed, and species and habitat could be disturbed, altered, or lost. However, CSU stipulations could protect fish and aquatic species in certain instances by requiring special operational constraints or by moving the surface-disturbing activity to protect sensitive aquatic areas. Under Alternative A, a CSU stipulation would be applied in riparian areas and wetlands, thereby reducing impacts from fluid mineral exploration and development in these areas. Additional protections would result from CSU stipulations applied to protect other resources. In effect, Alternative A would include 72 miles of fish-bearing streams; 900 acres of pallid sturgeon range; 1309 miles of intermittent, perennial, and ephemeral streams; and 402 acres of waterbodies that are subject to CSU stipulations (**Table 3-93**). The magnitude and intensity of impacts from mineral exploration and development as described under *Impacts Common to All Alternatives* would continue to be reduced in these areas, but to a lesser extent than areas subject to NSO stipulations.

Areas identified with a TL, which is a moderate constraint, would continue to be closed to fluid mineral exploration and development, surface-disturbing activities, and intensive human activity for periods that may exceed 60 days. Construction, drilling, completions, and other operations considered to be intensive would not be allowed during specified periods. In effect, Alternative A would include 61 miles of fish-bearing streams; 5,900 acres of pallid sturgeon range; 647 miles of intermittent, perennial, and ephemeral streams; and 10,074 acres of waterbodies that are subject to a TL. These would all be incidental protections provided by TLs that would be applied to protect other resources. The magnitude and intensity of impacts from mineral exploration and development as described under *Impacts Common to All Alternatives* would continue to be reduced in these areas, but to a lesser extent than areas subject to NSO and CSU stipulations (**Table 3-93**).

Under Alternative A, 38 miles of fish-bearing streams; 7,500 acres of pallid sturgeon range; 10,000 acres of waterbodies; and 604 miles of intermittent, perennial, and ephemeral streams would continue to be open to mineral materials disposal (**Table 3-93**). The impacts described above for mineral exploration and development could occur in these areas.

Under Alternative A, 44 miles of fish-bearing streams; 6,900 acres of pallid sturgeon range; 478 miles of intermittent, perennial, and ephemeral streams; and 200 acres of waterbodies would continue to be open to locatable mineral entry. The impacts described under *Impacts Common to All Alternatives* for mineral exploration and development could occur in open areas. However, impacts would be unlikely because development is not reasonably foreseeable.

Under Alternative A, overall, 573,900 acres would continue to be managed as acceptable for further consideration for coal leasing, and 435,800 acres would be managed as unacceptable (**Maps 2-27** through **2-29** in **Appendix A**). The list of acceptable and unacceptable areas for further consideration for coal leasing in the 1988 RMP are listed in **Table 2-1** in **Chapter 2**. Aquatic and riparian areas and wetlands that are acceptable would be at risk of future degradation. Fish and aquatic species that inhabit these areas could potentially be impacted from mineral development, as described above. Coal development under Alternative A would be subject to a special vegetation reclamation stipulation that an acreage equivalent to that disturbed by coal mining will be reclaimed to approximately its former condition, If reclaimed areas occur within or near riparian areas and wetlands, this stipulation would help reduce the potential for impacts on aquatic habitats from coal mining by improving habitat conditions to their pre-development condition.

Acres of NEL minerals open and closed to leasing in aquatic species habitats are shown in **Table 3-96**. Impacts on aquatic species from NEL minerals leasing would be similar to those described under *Impacts Common to All Alternatives* for mineral exploration and development and could occur in open areas, if future demand for NEL minerals occurs. Impacts would not occur in those areas closed to leasing.

Table 3-96
NEL Minerals Management in Aquatic Species Habitat, by Alternative

Aquatic Habitat Type [1]	Alternative A	Alternative B	Alternative C	Alternative D
Fish-bearing streams (miles)[2]	-	-	-	-
Open to leasing	38	29	34	33
Closed to leasing	7	16	11	12
Pallid sturgeon range (acres)[3]	-	-	-	-
Open to leasing	7,500	-	7,400	6,500
Closed to leasing	-	7,500	100	1,000
Intermittent, Perennial, and Ephemeral Streams (miles)	-	-	-	-
Open to leasing	604	518	556	568
Closed to leasing	223	308	270	259
Waterbodies (acres)	-	-	-	-
Open to leasing	10,000	8,500	10,000	8,500
Closed to leasing	200	1,800	200	1,700

Source: BLM GIS 2021
[1] Mileages are incidental and not designed to directly protect the aquatic species habitat. [2] This is a subset of intermittent, perennial, and ephemeral streams. [3] With a 0.50-mile buffer.

Alternative A would include an objective to improve riparian areas and wetlands toward PFC or a higher ecological status. However, it does not define any specific activities or management on how to achieve this objective. Site-specific objectives and management strategies for riparian areas and wetlands would continue to be developed during the development and implementation of proposed actions and activity plans. Management actions to protect water quality and quantity on BLM-administered lands in municipal watersheds and SWPAs (municipal and rural) would have beneficial impacts on fish and aquatic species by helping to protect habitat conditions, namely the water quality and quantity.

Alternative A does not include a stipulation to manage water developments and impoundments in a manner that minimizes adverse effects on water quality, riparian habitat, watershed function, hydrologic and ecologic systems. Therefore, this alternative would not provide protection for pallid sturgeon habitat or other aquatic species by considering the connectivity of aquatic habitats and upland habitats and the functionality they provide to sturgeon and aquatic habitat (thermal buffers, food source, structure, etc.).

Prescribed fires would continue to be the primary fire and fuels management activity under Alternative A. This would have the effects as described under *Impacts Common to All Alternatives*. The BLM would continue to prepare prescribed burn plans to reduce the likelihood of effects on aquatic species and habitats.

Under Alternative A, the Schnell Recreation Area would be managed according to the 1996 Activity Plan, which is not entirely responsive to all issues. Under this alternative, there would continue to be no management of SRMAs or BCAs, and impacts from recreation would continue in popular areas, such as the Schnell Recreation Area and Lost Bridge area (**Table 3-97**, below). Dispersed recreation would continue to result in smaller levels of impacts across the planning area, as described above. Fish and aquatic species that inhabit these areas could experience the impacts described above.

Table 3-97
Recreation Management in Aquatic Species Habitat, by Alternative

Aquatic Habitat Type	Alternative A	Alternative B	Alternative C	Alternative D
Fish-bearing streams (miles)[1]	-	-	-	-
BCA	N/A	3	3	3
SRMA	N/A	-	-	-
Pallid sturgeon range (acres)	-	-		-
BCA	N/A	200	100	200
SRMA	N/A	-	-	-
Intermittent, Perennial, and Ephemeral Streams (miles)	-	-	-	-
BCA	N/A	34	23	32
SRMA	N/A	10	10	10
Waterbodies (acres)	-	-	-	-
BCA	N/A	0	0	0
SRMA	N/A	0	0	0

Source: BLM GIS 2021
[1] This is a subset of intermittent, perennial, and ephemeral streams.

River segments eligible or suitable for inclusion in the NWSRS, as well as a 0.25-mile buffer of these areas, are managed to protect the free-flowing condition of the segments and would maintain the ORVs for which the segment was found eligible. Such management would reduce the likelihood for impacts from surface-disturbing activities, such as soil compaction, vegetation cover loss, erosion, and sediment delivery into waterways. This could have beneficial impacts for fish and aquatic species by providing habitat connectivity and improved water quality, particularly for pallid sturgeon along the 3.4-mile Missouri River and 0.1-mile Yellowstone River segments, which would be managed as eligible and for which pallid sturgeon is an ORV.

Table 3-98 shows aquatic habitat types within eligible or suitable river segments. Alternative A would have 5 miles of fish-bearing streams as eligible for inclusion in the NWSRS; fish and aquatic species inhabiting these areas would likely experience the impacts described above.

Table 3-98
River Segments Eligible or Suitable for Inclusion in the National Wild and Scenic Rivers System in Aquatic Species Habitat, by Alternative

Aquatic Habitat Type	Alternative A (Eligible)	Alternative B (Suitable)	Alternative C (Not Suitable)	Alternative D (Not Suitable)
Fish-bearing streams (miles)[1]	-	-	-	-
Little Missouri River	3	3	0	0
Missouri River	2	2	0	0

Source: BLM GIS 2021
[1] This is a subset of intermittent, perennial, and ephemeral streams

Alternative B

The nature and type of impacts on fish and aquatic species from Alternative B management would be similar to those described for *Impacts Common to All Alternatives* and Alternative A. However, they would differ in intensity depending on the specific management and acres available for certain uses. Alternative B would include management direction intended to better balance multiple uses with aquatic species habitat needs, as described below.

Under Alternative B, managing more areas as ROW exclusion and avoidance would reduce the impacts, described under Alternative A, on aquatic species and their habitats. Specifically, fish-bearing streams; pallid sturgeon range; and perennial, intermittent, and ephemeral streams—and the aquatic species that inhabit these areas—would be incidentally protected from ROW development as a result of management for other resources (**Table 3-91**). Management of riparian and wetland vegetation as ROW exclusion areas (**Table 3-50** in **Section 3.2.4,** Vegetation Communities), with the exception of existing land use authorizations, also would prevent future impacts from ROW development in these areas. Riparian and wetland species, such as amphibians and aquatic reptiles, would be protected from the impacts described for Alternative A.

Alternative B would include additional management to protect pallid sturgeon by designating ROW avoidance within 0.50 miles of the water's edge of identified pallid sturgeon habitat; allowed ROWs would be subject to design features that maintain the functionality of identified pallid sturgeon habitat. This would help protect pallid sturgeon habitat from loss and degradation, and potentially allow for future reoccupation of planning area waterways by this species.

The impacts from livestock grazing described for Alternative A could occur in aquatic areas available to livestock grazing. Under Alternative B, more acres or miles of pallid sturgeon range; fish-bearing streams; and intermittent, perennial, and ephemeral streams would be unavailable for livestock grazing. The impacts from livestock grazing described for Alternative A would not occur in unavailable areas. The forage utilization limit would be 50 percent, which is the same as Alternative A, but Alternative B would include the ability to adjust grazing management to improve rangeland health in accordance with thresholds and responses specified in adaptive management. The use of adaptive management would benefit aquatic species and habitats by reducing the likelihood for vegetation removal, degradation, or fragmentation that would cause a departure from land health standards.

Under Alternative B, 32 miles of fish-bearing streams; 368 miles of intermittent, perennial, and ephemeral streams; 2,100 acres of pallid sturgeon range and 8,158 acres of waterbodies, would be closed to fluid mineral development by discretionary or nondiscretionary decisions, and impacts from mineral exploration

and development described above would not occur in these areas. Additionally, under Alternative B, more miles of fish-bearing streams and acres of pallid sturgeon range would be subject to NSO and CSU stipulations to directly protect these aquatic habitats (**Table 3-94**). The magnitude and intensity of impacts from mineral exploration and development described above would be reduced in these areas, compared with Alternative A.

Alternative B would include NSO 11-70, which would prevent the disturbances from fluid mineral development described above to aquatic species and habitats in areas where the stipulation is applied (perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas). Incidental protection could also occur from the NSO stipulation that would prohibit fluid mineral development and associated surface disturbance within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe. Under Alternative B, a CSU stipulation in riparian areas and wetlands would require approval of a plan to maintain or improve the functionality of these areas prior to surface occupancy and use. This would help protect the unique biological and hydrological features associated with riparian areas and wetlands by reducing impacts from fluid mineral exploration and development in these areas, including from indirect effects produced within the adjacent ground. Alternative B also would include a NSO stipulation that would prohibit surface occupancy and use within 0.50 miles of the water's edge of identified pallid sturgeon habitat. This would protect pallid sturgeon habitat from loss and alteration, and potentially allow for future reoccupation of waterways in the planning area by this species.

Under Alternative B, 100 acres of waterbodies and 2 miles of intermittent, perennial, and ephemeral streams would be open to mineral materials disposal (**Table 3-93**). The impacts described above for mineral exploration and development could occur in these areas, but to a lesser extent than under Alternative A. This is because fewer acres and miles would be open to mineral materials disposal under Alternative B as a result of direct protections for aquatic habitats (**Table 3-93**). Areas within 0.50 miles of the water's edge of identified pallid sturgeon habitat would be closed to mineral materials disposal; with this stipulation, no miles of fish-bearing streams or acres of pallid sturgeon range would be open to mineral materials disposal. This would help protect pallid sturgeon and other fish species from mineral exploration and development impacts.

Under Alternative B, 45 miles of fish-bearing streams; 7,500 acres of pallid sturgeon range; and 492 miles of intermittent, perennial, and ephemeral streams would be open to locatable mineral entry. The impacts described above for mineral exploration and development could occur in these open areas, and to a greater extent than under Alternative A. This is because more acres and miles would be open to locatable mineral entry under Alternative B (**Table 3-93**). Locatable development within 0.50 miles of the ordinary high-water mark of identified pallid sturgeon streams would be subject to design features that maintain the functionality of pallid sturgeon habitat. The special designations for ACECs and WSRs would also provide some additional protection from locatable minerals development. Locatable mineral development would still be allowed in these areas, but the regulations would require that any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations would require site-specific analysis under NEPA where the impacts on aquatic species will be revisited.

Overall, fewer acres of aquatic species habitat would be open for NEL mineral leasing and, if development were to occur, impacts in these areas would be reduced from Alternative A (**Table 3-96**).

Some aquatic species and habitats would be unsuitable under Coal Screen 2, including pallid sturgeon habitat, riparian areas, and wetlands. However, some Coal Screen 2 criterion have an exception that, if met,

could make them suitable for consideration for coal leasing. Therefore, the analysis of impacts considered these criterion as acceptable. Those areas identified as unacceptable were determined using the coal screening process outlined in 43 CFR 3420 et seq., which removes lands that would conflict with resources of high value from further consideration for coal leasing. The screening process is further described in **Chapter 2** and **Appendix F**, Coal Screening Process.

Under Alternative B, 104 miles of fish-bearing streams, including 3 miles in the three coal-producing counties of Mercer, McLean, and Oliver, would be unacceptable for coal leasing. Aquatic habitats identified as unacceptable for coal development would not be impacted by coal development, as described under Alternative A. Fish and aquatic species inhabiting these areas would not be directly impacted. However, they could experience indirect impacts, such as habitat degradation from sedimentation, if development occurs nearby. Under Alternative B.1, 1 mile of fish-bearing streams would be acceptable for coal development, which is in the three coal-producing counties. Aquatic habitats acceptable to coal development but outside of the three coal-producing counties would not be likely to experience impacts from coal development. Impacts described for Alternative A on aquatic habitats identified as acceptable for coal development could occur. Aquatic species inhabiting these areas could experience habitat loss and degradation and the potential for injury or mortality.

Management of water and riparian areas and wetlands under Alternative B would include an increased focus on active management and minimizing impacts. This alternative would include management to maintain or improve the health, complexity, and spatial extent of riparian, wetland, and aquatic ecosystems. It would implement active or passive restoration actions, or both, to accelerate progress toward potential natural conditions where needed to sequester contaminants, especially from upstream sources. Such management would have beneficial impacts on fish and aquatic species by helping improve habitat conditions, such as natural surface water flow regimes, water quality, water availability, floodwater retention, and drought resilience.

This alternative includes additional management direction to enhance or restore unsatisfactory or declining fish and aquatic habitat. For example, the BLM, through cooperative efforts with federal, state, or private interests, will implement projects to protect special status species and their habitats. Additionally, the BLM will maintain or enhance plant communities needed to improve fish and aquatic habitat through riparian pastures, fencing, specialized grazing methods, low-tech process-based restoration, and other restoration measures. This would help improve habitat conditions for fish and aquatic species.

This alternative includes a stipulation to manage water developments, impoundments, and supplemental water to provide resource values that support the BLM's multiple-use objectives in a manner that minimizes adverse effects on water quality, riparian habitat, watershed function, and hydrologic and ecologic systems. Along with buffers around riparian areas and floodplains for surface-disturbing activities as described above, this would provide protection for pallid sturgeon habitat by considering the connectivity of aquatic habitats and upland habitats and the functionality they provide to sturgeon habitat.

Habitat improvement and restoration projects that modify riparian vegetation, such as livestock grazing, fire, mowing, haying, and chemical treatments, would initially affect aquatic species through localized and temporary habitat alterations due to surface disturbance and vegetation removal. This would temporarily increase the likelihood for soil erosion, bank instability, and sediment delivery to nearby waterways. Projects that require in-stream construction would also cause temporary sedimentation and could injure or kill individuals.

Over the long term, restoration treatments would maintain or improve the health, complexity, and spatial extent of riparian, wetland, and aquatic ecosystems by increasing native plant cover and species diversity, stabilizing soils, and reducing erosion and sediment delivery into waterways that provide habitat for fish and other aquatic species. This would ultimately increase the amount of habitat for riparian-dependent species such as native fish, amphibians, and aquatic reptiles. Maintaining special status species habitat and improving habitat connectivity would improve habitat conditions for species such as the pallid sturgeon, which has lost habitat due to dam construction on the Missouri River.

Under Alternative B, 3 miles of BCAs would overlap fish-bearing streams; 200 acres of BCAs would overlap pallid sturgeon range; and 34 miles of BCAs and 10 miles of SRMAs would overlap intermittent, perennial, and ephemeral streams. These areas would experience the impacts described for recreation under *Impacts Common to All Alternatives*. No waterbodies occur in the BCAs or SRMA; thus, recreation in these areas would not impact waterbodies. Impacts from travel management would be the same as those for Alternative A.

Alternative B would find a total of 5 miles of fish-bearing streams in the Little Missouri River segment as suitable for inclusion in the NWSRS, with a tentative classification of scenic. The Missouri River and Yellowstone River segments would also be suitable, which would benefit pallid sturgeon, the ORV for these segments. Impacts would be similar to those described under Alternative A. However, managing the streams with a scenic classification rather than recreational would likely increase the beneficial impacts along the Little Missouri River segment. This is because surface-disturbing activities would likely be reduced to a greater extent. Fish and aquatic species inhabiting these areas would likely benefit from increased habitat connectivity and improved water quality.

Alternative C

Impacts on fish and aquatic species from Alternative C management would be similar to those described for Alternative A. However, they would differ in intensity depending on the specific management and acres available for certain uses. Management under Alternative C would include direction to balance multiple uses with aquatic species habitat needs, but there is a greater focus on development, as described below.

Under Alternative C, managing more areas as ROW exclusion or avoidance would reduce the impacts, as described under Alternative A, on aquatic species and their habitats. Impacts from ROW development would be reduced, but not always entirely prevented, for fish-bearing streams, pallid sturgeon range, and intermittent, perennial, and ephemeral streams. All protections would result from incidental protections provided by management for other resources. Impacts from ROW development on aquatic species that inhabit these areas would be reduced, compared with Alternative A, but to a lesser extent than under Alternative B. This is because more miles and acres would be managed as ROW avoidance rather than exclusion areas (**Table 3-91**). Impacts from avoiding ROWs within 0.50 miles of the water's edge of identified pallid sturgeon habitat would be the same as those described for Alternative B.

The same acres or miles of pallid sturgeon range, fish-bearing streams, and intermittent, perennial, and ephemeral streams as Alternative B would be managed as available and unavailable to livestock grazing. The impacts would be the same as those described for Alternative B. Impacts from adaptive management would also be the same as those described for Alternative B.

In addition to the NSO and CSU stipulations described under Alternative B, Alternative C would include NSO stipulation 11-71. This would add additional protection of aquatic habitats by protecting source waters (such as, lakes, streams, and aquifers) from contamination. Overall, direct protections of fish-bearing

streams, pallid sturgeon range, and intermittent, perennial, and ephemeral streams from NSO, CSU, and TL stipulations would be the same as Alternative B, but under Alternative C there would be more incidental protections of these aquatic habitats than Alternative B. As a result, more miles and acres would be subject to stipulations and limitations; the exception is that fewer miles of intermittent, perennial, and ephemeral streams would be subject to a CSU stipulation under Alternative C. Impacts from the NSO stipulation within 0.50 miles of the water's edge of identified pallid sturgeon habitat would be the same as those described for Alternative B.

Under Alternative C, 34 miles of fish-bearing streams; 7,400 acres of pallid sturgeon range; 10,000 acres of waterbodies; and 556 miles of intermittent, perennial, and ephemeral streams would be open to mineral materials disposal (**Table 3-93**). The impacts described under Alternative A for mineral exploration and development could occur in these areas. Impacts on pallid sturgeon range and intermittent, perennial, and ephemeral streams would occur to a lesser extent than under Alternative A; this is because fewer acres and miles would be open to mineral materials disposal under this alternative. All aquatic habitats closed would be a result of protections provided for other resources. However, impacts on fish-bearing streams would occur to a great extent because more miles would be open to mineral materials disposal (**Table 3-93**). The acres of waterbodies open to mineral materials disposal would be the same under Alternatives A and C; impacts would be the same. Mineral materials disposal within 0.50 miles of the water's edge of identified pallid sturgeon habitat would be subject to design features that maintain the functionality of identified pallid sturgeon habitat. This would help protect pallid sturgeon and other fish species from impacts due to mineral development and exploration, but to a lesser extent than under Alternative B. This is because the area would not be closed to mineral materials disposal.

Under Alternative C, the miles of fish-bearing streams, acres of pallid sturgeon range, and miles of intermittent, perennial, and ephemeral streams open to locatable mineral entry would be the same as for Alternative B. Impacts from mineral exploration and development would be the same as those for Alternative B (**Table 3-93**). These include the impacts from the stipulation, if it were applied, that locatable development within 0.50 miles of the water's edge of identified pallid sturgeon habitat is subject to design features that maintain the functionality of identified pallid sturgeon habitat. The special designations for ACECs would also provide some additional protection from locatable minerals development. Locatable mineral development would still be allowed in these areas, but the regulations would require that any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations would require site-specific analysis under NEPA where the impacts on aquatic species would be revisited.

Overall, fewer acres of aquatic species habitat would be open for NEL mineral leasing, and, if development were to occur, impacts in these areas would be reduced from Alternative A (**Table 3-96**).

Under Alternative C, impacts on fish and aquatic species from coal development would be similar to those described for Alternative B; however, more acres of aquatic species habitats would be identified as acceptable for coal development (**Table 3-95**). The magnitude and extent of impacts would be the same as Alternative B, because the level of coal development is expected to be the same through the end of 2040, the life of the plan, in Mercer, McLean, and Oliver Counties under all alternatives (BLM 2022b).

Impacts from water and riparian-wetland management would be similar to those described for Alternative B. However, the BLM would not manage riparian areas and wetlands beyond PFC or maintain or improve the health, complexity, and spatial extent of riparian, wetland, and aquatic ecosystems. As a result, riparian areas and wetlands may not be managed to meet objectives for water quantity, water quality, or aquatic

species habitat, and aquatic species may not benefit from improved habitat conditions to the same extent as under Alternative B.

Under Alternative C, impacts from managing water developments and impoundments in a manner that minimizes adverse effects on water quality, riparian habitat, watershed function, and hydrologic and ecologic systems would be the same as described under Alternative B.

Under Alternative C, 3 miles of BCAs would overlap fish-bearing streams; 100 acres of BCAs would overlap pallid sturgeon range; and 23 miles of BCAs and 10 miles of SRMAs would overlap intermittent, perennial, and ephemeral streams. Impacts would be the same as those described for Alternative B. Impacts from travel management would be the same as those described for Alternative A.

Alternative C would not find any river segments suitable for inclusion in the NWSRS; there would be no impacts on fish and aquatic species from the associated management.

Alternative D

Impacts on fish and aquatic species from Alternative D would be similar to those described for Alternative B. Incidental protections provided from ROW avoidance and exclusion and closures to mineral resources would vary slightly as shown in **Table 3-91**. Impacts from ROW protections would be similar to those described for Alternative C, though with more intermittent, ephemeral, and perennial streams within ROW exclusion areas under Alternative D. Impacts from grazing and WSRs would be the same as those described for Alternative C. Impacts from locatable minerals, mineral materials, fluid minerals, and recreation management would be the same as described for Alternative B. Impacts from coal management would be similar to those described for Alternative B. Impacts from NEL management would also be similar to those described for Alternative B, but with more areas open to NEL mineral leasing under Alternative D.

Cumulative Impacts

The cumulative impacts analysis area for fish and aquatic species is the planning area. The types of past, present, and reasonably foreseeable activities that have impacts on aquatic species include livestock grazing, road and ROW construction and maintenance, urbanization and housing development, mineral development, construction of infrastructure, and recreation. All these activities can impact fish and aquatic species through habitat loss and alteration.

The oil and gas RFD (BLM 2022a) estimates that 43,000 oil and gas production and support wells could be drilled in the planning area from 2020 through 2040, with an estimated surface disturbance of 56,000 acres. coal development is estimated to disturb 13,204 acres from existing and pending leases prior to 2040 (BLM 2022b). The mineral materials RFD estimates that development of mineral materials will disturb 40 acres per year (BLM 2022c).

Aquatic habitats may be contaminated from hazardous materials spills, which are noted in **Appendix I, Table I-1**. Fish may be poisoned by spills, making them sick or causing mortality. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

Past, present, and reasonably foreseeable activities, such as river restoration, fuels and vegetation treatments, and management for special status species, would have beneficial cumulative impacts on fish

and aquatic species by improving aquatic habitat conditions, and in the case of fuels treatments, by reducing the likelihood of habitat loss and degradation from wildfires.

BLM management's contribution of minerals and nonmineral uses to cumulative impacts would be limited on BLM-administered surface lands, which comprise 0.13 percent of surface lands in the planning area. When combined with past, present, and reasonably foreseeable actions, the incremental contribution of minerals management under Alternative A to cumulative impacts on fish and aquatic species would be slightly larger than other alternatives. This is because BLM-administered mineral estate would continue to comprise a larger portion of the planning area (9 percent for the coal decision area and 1 percent for the fluid mineral decision area) under this alternative. As a result, fish and aquatic species would be largely influenced by management on lands not administered by the BLM. These species would continue to be at risk from the activities described above, including mineral exploration and developments.

Compared with Alternative A, the contribution of mineral development to cumulative impacts would be reduced under Alternatives B and D. This is due to the increased closures and stipulations that would be applied to protect all resources, including fish and aquatic species and their habitats. The contribution of mineral development to cumulative impacts under Alternative C would be greater than that described for Alternatives B and D. This is because fewer acres would be closed or managed with stipulations.

Climatic conditions strongly influence surface water and groundwater quantity and quality. As described in **Section 3.2.1**, climate change is expected to result in increased temperatures, precipitation, and flood and wildfire risk. High interannual variability in water availability may pose a particular challenge to fish and aquatic species and their habitats.

Because air and water temperatures are correlated, increased air temperatures will result in increased surface and groundwater temperatures. Warming water temperatures are likely to alter ecological processes and the geographic distribution of aquatic species (Jacobson et al. 2017). Observed effects of warming water temperatures on aquatic species' physiological systems include exceeded critical thermal tolerances, reduced cardiorespiratory performance, compromised immune function, and modified reproduction patterns (Whitney et al. 2016). For aquatic species already living near their critical thermal tolerance limit, predicted temperature increases may lead to extirpations and extinctions. This may be of particular concern for special status aquatic species. Species' ranges may also shift in response to warming water temperatures, which could result in new species interactions and altered predatory-prey dynamics. This could also increase the potential for the colonization of invasive and nonnative species (Rahel and Olden 2008).

Changes in precipitation and runoff patterns will alter the hydrologic regime, which can negatively affect species composition, ecological productivity, and reproduction. Studies have predicted the expected increase in precipitation and subsequent runoff to lead to sediment accumulation in prairie potholes (Skagen et al. 2016). This may result in prairie potholes being filled completely or by half with sediments, thereby negatively affecting aquatic species dependent on this habitat (Skagen et al. 2016). However, flooding may also benefit aquatic species and their habitats by recharging groundwater, increasing fish production, creating wildlife habitat, recharging wetlands, and improving soil fertility (Poff 2002).

Finally, modeling efforts have suggested that climate change may cause a nearly four-fold increase in acres burned, particularly in western North Dakota (URS 2010). Wildfire can cause immediate water chemistry changes as a result of heating, smoke, and ash inputs (Spencer and Hauer 1991). These water chemistry effects, along with changes in turbidity and runoff levels, can displace or kill aquatic species.

Climatic changes such as increasing air temperature, which in turn increases surface and groundwater temperatures; changes to precipitation and runoff patterns; and changes to wildfire prevalence would cumulatively continue to impact fish and aquatic species. Implementation of BLM management decisions that result in impacts on fish and aquatic species could cumulatively exacerbate local climate change impacts on fish and aquatic species.

3.2.7 Wildland Fire Ecology and Management

Issues

- How would the alternatives affect fire resiliency at the landscape scale?
- How would the alternatives affect fire hazard within close proximity to developed areas?

Affected Environment

The fuels complex in the planning area primarily consists of perennial grasses, western annual grasses, sagebrush, juniper, and ponderosa pine. The fire regime group characterizes the presumed historical fire regimes and provides general descriptions of typical fire frequencies and fire severities. In the planning area, 92 percent of landownership is in Fire Regime Group II. It is characterized by a fire frequency of 0 to 35 years, where high-severity fires replace greater than 75 percent of the dominant overstory vegetation (Landfire 2019).

The current location, extent, frequency, and duration of wildland fire can be forecast based on the expected population growth and climate. While most fire starts in the planning area originate from agricultural burning on non-BLM-administered lands that escapes containment, human activities remain a source of potential ignitions. Dunn County's population has increased 25 percent since 2010 (US Census Bureau 2019); this may increase the risk of wildland fire in the county. Bowman County's population has decreased 4 percent since 2010, so the likelihood of human-caused fire starts may not be as much of a potential risk. The duration of the fire season currently runs from March 1 through October 31 and experiences multiple peaks with warm and dry conditions. Over the 20-year planning period, warmer temperatures or drier conditions would increase the duration of the peaks or the overall fire season and may also lead to an increased extent, intensity, and frequency of wildland fire.

There is no recent history of hazardous fuels-related prescribed burns in the planning area. In addition, no non-fire fuels treatments, such as mechanical thinning, biomass removal, or chemical and biological treatments, have recently occurred within the planning area. These treatment methods, however, remain available as a tool for future use.

As described in **Section 3.2.1**, Air Quality and Climate, above, and Section 2.1 of the AMS, climate change has caused an increase in temperatures and precipitation, the risk of flooding has increased, and wildfires are projected to increase in midsummer through early fall. High interannual variability in water availability may lead to an increase in droughts (USGCRP 2018). **Section 3.2.4**, Vegetation, describes the anticipated impacts from climate change on vegetation conditions in the decision area.

Climate change has been modeled to cause a nearly four-fold increase in acres burned, particularly in the western portion of North Dakota (URS 2010), which is comprised primarily of annual crops and perennial grasses. Increased unplanned fire ignitions would increase the likelihood of catastrophic wildfire and departure from desired fire regimes, particularly in western North Dakota. Further, the anticipated increase in temperature and changes in precipitation and water availability are expected to favor the spread of

noxious weed and invasive plant populations; this would exacerbate fuel conditions and increase the risk of departure from desired fire regimes.

Additional information is available in Section 2.8, Wildland Fire Ecology and Management, of the AMS (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

Under all alternative, the BLM could use prescribed fire, pile burns, mechanical treatments, and chemical treatments to manage fuel conditions. The BLM's use of a variety of fuel treatment methods would result in a higher likelihood of restoring and maintaining fire regimes, thereby preventing uncharacteristically large or intense wildfires.

Continuing to develop and implement prescribed burn plans under all alternatives would reduce the potential for prescribed fire to escape the treatment area and cause unintended damage to nontarget vegetation or structures. Further, plans would ensure prescribed fire would be conducted in appropriate treatment areas. Plans also can indicate where and how much vegetation would be managed to change fuel conditions and influence fire regimes.

The BLM could use fire or fuels mitigation as a resource benefit and would partner with adjacent communities. Overall, these actions would improve the BLM's ability to change fuel conditions, influence fire regimes, and reduce the risks and threats from wildfire.

The development of ROWs and energy and mineral resources increases the risk of wildfires by introducing new ignition sources; however, the road infrastructure supporting ROWs and energy and mineral development would provide increased accessibility to remote areas for fire suppression and would provide fuel breaks in the event of wildland fire. Energy development also poses hazards to firefighters, including unknown toxins, the risks posed by protecting facilities and evacuating industry personnel, and dangerous overhead power lines. While the acres available for mineral materials disposal and fluid mineral leasing (and applicable stipulations) vary by alternative, the reasonably foreseeable levels of development under all alternatives would not increase the risk of wildfires (see **Section 3.1.1**). Similarly, while much of the federal mineral estate is available for locatable and NEL mineral development, such development is not reasonably foreseeable. Therefore, no impacts are expected from locatable or NEL mineral development under any of the alternatives.

Alternative A

Under Alternative A, the BLM would continue to manage most areas as open to ROWs, fluid minerals, solid leasable minerals, mineral materials, and locatable minerals, with resulting impacts as described under *Impacts Common to All Alternatives*.

Alternative B

Prioritizing the Schnell Ranch SRMA for prescribed fire treatment would focus resources to manage fuel conditions in this area. This action would help reduce fuels and maintain the fire regime, which would be especially useful since areas popular for recreation are often sources of human-caused fire ignitions.

The types of impacts from minerals management would be as described under Alternative A. The expected magnitude of the impacts would be reduced, however, due to the increase in acreage that would be closed or unavailable for mineral development or managed with stipulations under Alternative B.

Alternative C

Impacts from wildland fire management, such as the expanded use of fuels management tools, would be the same as those described for Alternative B.

Under Alternative C, the BLM would not prioritize the Schnell Ranch SRMA for prescribed fire treatment, which would prevent a focus on changing fuel conditions in this area. Management of the Schnell Ranch SRMA, however, would allow targeted grazing to reduce wildfire risk, which could have similar impacts on fuel conditions.

Impacts from minerals management would be similar to those described under Alternative B. The expected magnitude of the impacts would be greater, however, due to the reduced acreage that would be closed or unavailable for mineral development or managed with stipulations under Alternative C. Impacts would remain less than those described under Alternative A.

Alternative D

Impacts from wildland fire management under Alternative D would be the same as those described for Alternative B.

Cumulative Impacts

The cumulative impacts analysis area for fire is defined as the planning area. The factors influencing fire that have occurred in the past and are expected to continue include weather and climate (particularly drought) and population growth. Most fire starts in the planning area originate from agricultural burning on non-BLM-administered lands that escapes containment, thereby limiting the BLM's ability to mitigate such impacts. It is unlikely this plan would alter the magnitude of effects resulting from climate change on wildland fire (see **Section 3.2.1**, Air Quality and Climate). Therefore, climate change trends described under **Section 3.2.7**, *Affected Environment*, are expected to continue.

The contribution of BLM management under Alternative A to cumulative impacts would be limited, since BLM-administered surface lands comprise 0.13 percent of surface lands in the planning area. As a result, fuel conditions and trends in the cumulative impacts analysis area would be largely influenced by factors outside the BLM's control. Based on the factors described above, trends in fuel conditions and fire regimes are likely to continue.

Given the limited surface acreage managed by the BLM in the cumulative impacts analysis area, cumulative impacts under Alternatives B and D would be similar to those described for Alternative A. Cumulative impacts from mineral development would be reduced under Alternatives B and D due to the increased closures and stipulations that would be applied to protect resources. Cumulative impacts under Alternative C would be similar to those described for Alternatives B and D; however, cumulative impacts from mineral development would be slightly greater than those described for Alternatives B and D. This is because fewer acres would be closed or managed with stipulations.

3.2.8 Cultural Resources

Issues

- How would BLM land management actions affect cultural resources under each alternative?

Affected Environment

Cultural resources are locations of human activity, occupation, or use that contain materials, structures, or landscapes that were used, built, or modified by people. Cultural resources include archaeological sites, buildings, structures, objects, districts, and locations associated with cultural practices or beliefs of contemporary communities. Historic properties are those cultural resources that are listed on or are eligible for listing on the National Register of Historic Places (NRHP). Section 106 of the NHPA requires federal agencies to consider whether a proposed undertaking has the potential to affect historic properties.

Common precontact archaeological site types in North Dakota are lithic scatters, earth lodge villages, stone circles (e.g. tipi rings), short-term campsites, stone cairns, stone alignments, and Knife River flint stone quarries. Less common are animal bone concentrations resulting from game drives, vision quest stations, eagle-trapping pits, rock art, and scatters of artifacts that include ceramics. Well-stratified, multiple-component sites have been found in remnant alluvial fans, stream terraces, and spring deposits and in the terraces lining the Missouri and Little Missouri Rivers.

Common historic era sites in the planning area include the remains of farmsteads, dumps, schools, churches, roads, railroad grades, trails, trading posts, and military forts. Historic properties are susceptible to natural wind and water erosion, looting, vandalism, farming, urban growth, and neglect.

Since most federal undertakings reviewed by the BLM avoid recorded sites, these undertakings are a minor factor in affecting historic properties in North Dakota. The substantial exception is coal strip mines, which bear the potential to affect large acreages and numbers of sites. Approximately 24% of all surface overlaying federal coal has been surveyed for cultural resources. These investigations have identified more than 11,000 sites overlaying federal coal in North Dakota, covering more than 25,000 acres. Additionally, the setting, feeling, or association of many more sites could be impacted by coal strip mining activities. Oil and gas production is increasingly affecting the viewshed of the landscape.

The analysis area for cultural resources includes all counties with BLM-administered surface or mineral estate in North Dakota. On BLM-administered surface lands, the BLM manages all surface activities and subsurface resources. On the subsurface decision areas, the BLM has decision authority for accessing subsurface coal, fluid minerals, and other minerals. The bulk of the cultural resource reviews conducted by the NDFO address the subsurface mineral estate for oil, gas, and coal. For leasable minerals on split-estates, where the surface is privately owned and the mineral estate is federal, the BLM has the authority to take reasonable measures to avoid or minimize adverse environmental impacts that may result from authorized mineral leasing (see **Appendix K**, Split-Estate Lands). Decisions made by the BLM in such cases are subject to compliance with Section 106 of the NHPA.

In the AMS (BLM 2020b), Table 2-45, Cultural Resources in the Analysis and Decision Areas, summarizes the cultural resources of the analysis area and the BLM-administered surface and subsurface decision areas. The analysis area includes all counties in North Dakota where the BLM has some decision responsibilities and is not inclusive of the entire planning area.

Preservation of historic properties in North Dakota varies by region according to the land use and natural setting. Damage to historic properties is typically from looting, vandalism, road and dam construction, minerals exploration and coal mining, natural erosion, plowing and other farming activities, wildfire, cattle trampling (especially around water tanks), and land development for housing and commercial uses. The biggest overall loss to North Dakota's archaeological resource base was the destruction of sites along the Missouri River during reservoir construction and maintenance and the related bank erosion.

Changes in the planning area's landscape character will likely occur as a result of climate change, with effects extending to historic properties. With climate change, extreme weather events are projected to increase in frequency, further exacerbating impacts from wind and water erosion, wildfire, and ground-disturbing activities. Warmer year-round temperatures, combined with an increase in seasonal wildfire duration and fire frequency, will continue to change the appearance of the landscape within the planning area. More frequent and more intense droughts and storms will increase the potential for larger, more frequent wildfires; erosion of soils; and changes in the vegetation cover.

Additional information is available in Section 2.9, Cultural Resources, of the AMS (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

Under all alternatives, continuing to adhere to the existing laws, such as the NHPA; Executive Orders, such as Executive Order 13007; and cultural resource policies (for example, BLM manuals and handbooks) would protect culturally significant resources. Additionally, continued consultation and cooperation with the State Historic Preservation Office (SHPO) and Native American Tribes would allow information on cultural properties and cultural landscapes to continue to be compiled. This would allow better future management and protections of these sensitive areas. Cultural resource use categories and values, and compliance actions would continue under all alternatives, except Alternative A.

Many cultural resources are evaluated only by their surface manifestations, and resources may be lost through project implementation. Adverse effects would continue, especially effects on unidentified resources. The effects would result from ongoing unevaluated or unsupervised activities, natural processes, and unanticipated events, such as wildfire.

Actions under all alternatives that protect springs, wetlands, and riparian areas from livestock grazing would help protect water features and sources that may be culturally important to Tribes. Actions that improve rangeland health could reduce the potential for effects from direct disturbance, erosion, and wildfire.

While the acres available for mineral materials disposal and fluid mineral leasing (and applicable stipulations) vary by alternative, the reasonably foreseeable surface disturbance under all alternatives (approximately 40 acres per year from federal mineral material development and 1,625 acres total, or 81 acres per year from federal fluid mineral development) would be unlikely to impact cultural resources (see **Section 3.1.1**). Similarly, while much of the federal mineral estate is available for locatable and NEL mineral development, such development is not reasonably foreseeable. Therefore, no impacts are expected under any of the alternatives. However, an analysis of potential impacts from locatable mineral development is provided in case demand for locatable minerals occurs in the future. If development were proposed in open areas, locatable mineral development would still be allowed, but the regulations require any activity beyond casual use to be conducted under an approved plan of operations. A plan of operations requires site-specific analysis under NEPA when the impacts on cultural resources will be revisited.

Stipulations for fluid mineral leasing (**Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing) would restrict surface-disturbing activities, which would reduce the likelihood of disturbance, where applicable. The application of BMPs and mitigation measures (**Appendix D**, Design Features and Best Management Practices) for surface-disturbing activities would likely reduce the effects on cultural resources associated with authorized land uses or activities, such as road, pipeline, or power line construction; mineral development; range improvements; and recreation.

Alternative A

Current management practices under Alternative A would continue. This would result in no specific additional impacts on cultural resources with proper avoidance and mitigation measures, tribal consultation, and the adherence to applicable laws protecting cultural resources. Surface-disturbing activities and development for resource uses have changed, and would continue to change, the landscape, scenic quality, and setting in the decision area. Surface-disturbing activities, motorized vehicle use, theft and vandalism, and natural processes (for example, erosion) may adversely affect cultural resources across the decision area.

The management directions would include additional stipulations and visual buffers for several historic properties. These stipulations and buffers are designed to preserve the use, physical features in their respective settings, feelings, and associations that contribute to those properties' historic integrity. Under Alternative A, all applicable NEPA and NRHP laws would be applied to surface-disturbing activities. NRHP criteria would be applied to evaluate significance, and NRHP eligibility guides the management of cultural resources. Avoidance is the preferred mitigation choice for historic properties. Where historic properties are present and where impacts on them are unavoidable, resolution of those adverse effects would be required (36 CFR 800.6).

Under Alternative A, oil and gas production has had little direct effect on historic properties where there is federal involvement. Generally, these sites are avoided in accordance with standard stipulations. However, visual impacts on adjacent sacred areas or historic properties may increase as new oil and gas plays are developed. Impacts resulting from the development, access, and operation of oil and gas facilities without federal involvement will continue (BLM 2020b). Continued strip mining for coal will likely have adverse effects on historic properties. Coal mining has the potential to destroy many historic properties; however, coal companies try to avoid historic properties and mitigate impacts in compliance with state law and Section 106 of the NHPA (BLM 2020b).

Under Alternative A, two areas eliminated from further consideration for coal leasing include the Lynch Knife River Flint Quarry District and Writing Rock State Historic Site (32DV4) (these sites are also unsuitable for coal leasing under Coal Screen 2 in all action alternatives). Furthermore, no surface occupancy or use is currently allowed in a visible area within a 3.5-mile radius of the Fort Union Trading Post National Historic Landmark. These prohibitions have served to protect the integrity, setting, and character of these NRHP-listed historic properties while avoiding potentially adverse effects from strip coal mining.

Under Alternative A, 354,900 acres of federal mineral estate would be open to locatable mineral entry, with 0 acres recommended for withdrawal and 7,700 acres not open to locatable mineral entry (existing segregation). A total of 318,100 acres would be open to NEL mineral leasing and mineral materials sales, and 44,500 acres would be closed to NEL mineral leasing and mineral materials sales under Alternative A. There is no reasonably foreseeable possibility of development of locatable or NEL minerals, so no impacts are anticipated. The limited reasonably foreseeable development of mineral materials (see *Impacts Common to All Alternatives*) would similarly limit impacts. Any development of these resources that might occur would be required to comply with Section 106 of the NHPA, which would reduce or mitigate impacts.

All these mechanisms could adversely affect the setting, character, and scientific value of cultural resources. When coupled with other impacts from ground-disturbing activities, impacts on cultural resources from climate change would likely be exacerbated. Alternative A has fewer restrictions on ground-disturbing

activities and less mitigation for visual impacts on historic properties than the action alternatives; therefore, Alternative A may be less effective in mitigating impacts that may be caused, at least in part, by climate change.

Alternative B

Compared with Alternative A, management under Alternative B would provide significantly more measures designed to protect the setting, feeling, and integrity of historic properties. For those historic properties located on BLM-administered lands, this alternative aims to manage historic properties, or areas where concentrations of historic properties occur, based on their nature, significance, and use allocation as outlined in **Table 3-99**, below. Management under all action alternatives would include designation for specific use allocations. These use allocations of historic properties could provide several positive impacts, including a framework to develop priorities for historic property protection measures based on use categories, site attributes, and foreseeable threats or natural processes. With this framework the BLM could consider special management, surface use restrictions, visual buffers, physical barriers, and stabilization for historic properties with significant use (BLM 2020b).

Table 3-99
Use Allocations and Management Actions for Historic Properties

Use Allocation	Desired Future Condition
Scientific use	Preserved until the research potential is realized
Conservation for future use	Preserved until conditions for use are met
Traditional use	Long-term preservation
Public use	Long-term preservation and on-site interpretation
Experimental use	Protected until used
Discharged from management	No use after recordation; not preserved

Management actions under Alternatives B, C, and D would use this framework for use allocations of certain historic properties according to their nature and relative preservation value. Proposed BLM actions that have the potential to affect historic properties on private lands will be reviewed under Section 106 of the NHPA and analyzed under NEPA as appropriate and applicable. Use allocations would be confined to cultural resources located on BLM-administered lands. See **Table 2-2** in **Chapter 2** for more detailed descriptions of the use allocations.

Alternative B would provide more protective measures than Alternative A for listed and eligible NRHP sites, TCPs, and sites that meet the criteria for designation for scientific use, conservation use, traditional use, public use, and experimental use allocations (**Table 3-99**, above). Specifically, Alternative B would prohibit occupancy within any of these sites and require a 300-foot buffer surrounding each site. Because Alternative B would have a 300-foot buffer surrounding these historic properties, less adverse local impacts on historic properties would be anticipated, compared with Alternative A, which would not provide such a buffer. In addition, cultural resources would receive incidental protection from surface-disturbing impacts within 0.50 miles of the ordinary high-water mark for the Missouri River, Lake Sakakawea, and Lake Oahe.

Under Alternative B, Doaks Butte (32BO222) would be protected and managed for further archaeological research. Future archaeological investigations at Doaks Butte (32BO222) would likely be focused on cultural chronology and subsistence. This alternative would close Doaks Butte (32BO222) and a 300-foot buffer surrounding the site boundary to mineral materials disposal. Furthermore, the BLM would mandate a ROW exclusion and an NSO stipulation within 300 feet. Alternative B would recommend a withdrawal from locatable mineral entry within the same 300-foot buffer. Alternative B would close the 300-foot buffer

to NEL minerals leasing. These public land orders would preserve the character, setting, feeling, and integrity of the Doaks Butte (32BO222) site and ensure the possibility of cultural resource data recovery. Further archaeological investigations at Doaks Butte (32BO222) may have a positive impact because they would add to the body of knowledge in the region and benefit scientific and sociocultural use by present and future generations.

Coal mining has the potential to adversely affect historic properties; however, coal companies try to avoid historic properties and mitigate impacts in compliance with state law and Section 106 of the NHPA (BLM 2020b). Alternative B would make 1,042,000 acres unacceptable for coal leasing in the coal decision area; this would be a substantial increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This reduction in acreage of federal coal acceptable for coal mining would reduce the likelihood of incidental adverse and local impacts on historic properties that could be discovered during coal strip mining. Impacts would be similar under Alternative B.1, however additional reduction of areas acceptable for coal leasing to the smallest size of all alternatives could further reduce impacts associated with coal. Coal strip mining is a practice that can disturb large tracts of land potentially containing historic properties and adversely affect the setting, character, and feel of these sites over a great distance and duration. The coal RFD estimates surface disturbance from coal development to be approximately 9,434 acres (approximately 7,766 acres under Alternative B.1) through the end of 2040, which limits the potential acreage and cultural resources that may be affected by these activities.

Under Alternative B, the Lynch Knife River Flint Quarry District and Writing Rock State Historic Site (32DV4) would not be considered for coal leasing; these areas would be unsuitable in Coal Screen 2 (see **Appendix F**, Coal Screening Process).The Knife River Indian Villages Historic Site and viewshed would also be unacceptable for further consideration for coal leasing under multiple-use Coal Screen 3. Therefore, no ground disturbance impacts from coal leasing would be permitted at these two NRHP-listed historic properties, and no impacts would be anticipated.

Notably under Alternative B, surface occupancy and use would be prohibited within the visible areas in a 3-mile radius surrounding the following historic properties: Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32Dux1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Fort Union Trading Post National Historic Landmark, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), and Cross Ranch Archaeological District. This stipulation would mitigate visual impacts and prohibit ground-disturbing activities that could adversely impact these historic properties or the setting, feeling, and association that contribute to these properties' historic integrity. Compared with Alternative A, this would be a positive impact on these resources. Furthermore, under Alternative B, 218,700 more acres of BLM-administered federal mineral estate would be closed to fluid mineral leasing than under Alternative A. These constraints under Alternative B could slightly reduce the potential for effects on historic properties resulting from discretionary actions, compared with Alternative A, which has significantly fewer constraints and more federal mineral estate open to fluid mineral leasing.

Furthermore, under Alternative B, a 3-mile visible area surrounding Fort Union Trading Post National Historic Landmark, Knife River Flint Quarry District, Knife River Indian Villages National Historic Site,

Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32Dux1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), Standing Rock State Historic Site (32RM32), and Cross Ranch Archaeological District would be closed to mineral materials disposal and NEL mineral leasing. This closure would restrict additional ground-disturbing activities associated with mineral materials disposal. Also, this closure would serve to further protect the setting, character, feeling, and integrity of these historic properties.

Under Alternative B, the BLM would anticipate impacts from mineral materials disposal to be generally the same as described under Alternative A. This is because mineral materials permits are stipulated for protection of resource values, including important historic properties. However, it is notable that this alternative would close significantly more areas, including sensitive habitat and buffer areas surrounding some historic properties, to mineral materials disposal than Alternative A. This could work to protect areas important to the affected Tribes. The development of additional gravel pits in the planning area would increase the chance of an incidental discovery of cultural resources. Continued use and further development of federally reserved mineral materials would not be anticipated to result in adverse effects on cultural resources that could not be resolved.

Recommending the area within 300-feet of the Doaks Butte (32BO222) site boundary for withdrawal from locatable mineral entry would restrict ground-disturbing activities associated with locatable mineral development and would protect the setting, character, feeling, and integrity of this historic property.

Alternative C

Management under Alternative C, like under Alternative B, would incorporate significantly more management actions designed to protect the setting, feeling, and integrity of historic properties than Alternative A. Alternative C would include management objectives identical to those for Alternative B in terms of providing a basis for historic properties' use allocations (scientific use, conservation use, traditional use, public use, and experimental use) on BLM-administered lands. This would provide and promote archaeological research opportunities. It also would promote stewardship and public understanding of cultural resources through education and public outreach programs through the BLM Heritage Education Program. Proposed BLM actions that have the potential to affect historic properties on private lands will be reviewed under Section 106 of the NHPA and analyzed under NEPA as appropriate and applicable. Use allocations would be confined to cultural resources located on BLM-administered lands.

Compared with Alternative A, management directions under Alternative C would provide more protective measures for NRHP-listed properties, other historic properties, TCPs, and properties that meet the criteria for designation for scientific use, conservation use, traditional use, public use, and experimental use allocations. Specifically, Alternative C would prohibit occupancy within any of these historic properties, as well as a 100-foot buffer surrounding the historic property. Because Alternative C would have a 100-foot buffer surrounding these historic properties, fewer adverse local impacts would be anticipated than under Alternative A, which would not provide for such a buffer.

Under Alternative C, Doaks Butte (32BO222) would be protected and managed for further archaeological research. Future archaeological investigations at Doaks Butte (32BO222) would likely be focused on

cultural chronology and subsistence. This alternative would close the Doaks Butte (32BO222) site and a 300-foot buffer surrounding the site boundary to mineral materials disposal. Furthermore, this alternative would establish a ROW exclusion and an NSO stipulation within 300 feet of the site boundary. Alternative B would also close the 300-foot buffer to NEL minerals leasing. These public land orders would preserve the character, setting, feel, and integrity of Doaks Butte (32BO222) and ensure the possibility of cultural resource data recovery. Further archaeological investigations at Doaks Butte (32BO222) may have a positive impact because they would add to the body of knowledge in the region and benefit scientific and sociocultural use by present and future generations.

Alternative C would make 542,800 acres unacceptable for coal leasing in the coal decision area. This is an increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This increase in acreage of federal coal unacceptable for coal mining would decrease the likelihood of incidental adverse and local impacts on potentially important historic properties that could be discovered during coal strip mining and associated development. The coal RFD identifies surface disturbance from coal development would be approximately 9,434 acres through the end of 2040, which limits the potential acreage and cultural resources that may be affected by these activities (BLM 2022b).

Under Alternative C, as in all alternatives, Lynch Knife River Flint Quarry District and Writing Rock State Historic Site (32DV4) would not be considered for coal leasing under Coal Screen 2 and would not experience impacts.

Under Alternative C, the same total acreage of federal mineral estate would be open to fluid mineral leasing as under Alternative A. Under Alternative C, designating specific use allocations for historic properties could provide several positive impacts, including a framework to develop priorities for resource protection measures based on use categories, attributes, and foreseeable threats or natural processes (BLM 2020b). With this framework, the BLM would consider special management, surface use restrictions, visual buffers, physical barriers, and stabilization for historic properties with significant use potential. For these reasons, Alternative C would have less adverse direct and indirect impacts and more positive direct impacts on historic properties than Alternative A. Alternative C would foster positive impacts through conservation, stewardship, and interpretation, and benefit scientific and sociocultural use by present and future generations.

Under Alternative C, a CSU stipulation would apply design criteria to mitigate visual impacts within 2 miles surrounding the following historic properties: Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, Writing Rock State Historic Site (32DV4), Doaks Butte (32BO222), Killdeer Mountain Battle Study Area (32DUx1120), Medicine Rock State Historic Site (32GT129), Theodore Roosevelt's Elkhorn Ranch and Greater Elkhorn Ranchlands District, Fort Union Trading Post National Historic Landmark, Custer Military Trail Archaeological District, Fort Clark Archaeological District, Chateau de Mores State Historic Site (32BI60), Fort Buford State Historic Site/Confluence (32WI25), Huff National Historic Landmark (32MO11), Double Ditch State Historic Site (32BL8), Menoken National Historic Landmark (32BL2), Turtle Effigy State Historic Site (32ME1270), Pulver Mounds (32ML112), and Cross Ranch Archaeological District. This stipulation would work to mitigate visual impacts around these notable historic properties. Visual impacts caused by oil and gas development could adversely affect these historic properties or the setting, feeling, and association that contribute to these properties' historic integrity. This measure would provide more protection from adverse effects on these resources, compared with Alternative A.

Closing the area within 300-feet of the Doaks Butte (32BO222) site boundary to NEL mineral development would restrict ground-disturbing activities associated with such developments and would protect the setting, character, feeling, and integrity of this historic property.

Management directions under Alternative C would follow Alternative A's protocol in that they do not close any known historic properties to mineral materials disposal. Mineral materials disposal could increase the probability of adverse, local ground disturbance impacts on historic properties. Lands open to locatable mineral development would be the same as Alternative A.

The BLM would anticipate the impacts from mineral materials disposal under Alternative C to be the same as those described under Alternative A; this is because mineral materials permits are stipulated for protection of resource values, including important Tribal and cultural resources. The development of additional gravel pits in the planning area increases the chance of an incidental discovery of historic properties. Continued use and further development of federally reserved mineral materials would not be anticipated to result in adverse effects on cultural resources that could not be resolved.

Alternative D

Impacts on cultural resources would be similar to those described for Alternative B with the exceptions described below. Impacts from applying a CSU within 2 miles of cultural sites would be the same as described for Alternative C, with the exception of Fort Union Trading Post National Historic Landmark, which would remain NSO similar to Alternatives and A and B. Impacts from mineral materials and NEL mineral leasing management would be the same as described for Alternative C. Impacts from locatable minerals management would be the same as described for Alternative A. Management of Doaks Butte and impacts from management of significant cultural resources, NRHP-eligible properties and districts, and TCPs as NSO would be the same as for Alternative C.

Cumulative Impacts

The cumulative impacts analysis area for cultural resources includes the entire planning area, regardless of surface or mineral ownership. Past and present actions with direct and indirect impacts, such as reducing the historical integrity on historic properties, are those from oil and gas and infrastructure development, coal development and infrastructure, mineral materials development and disposal, travel off designated routes, recreation, and erosion and wildfire exacerbated by climate change. Reasonably foreseeable future actions with the potential to affect historic properties are similar to the past and present actions.

Management under all alternatives would contribute to cumulative impacts on historic properties in the planning area. Oil and gas exploration, coal development and its associated infrastructure, and leasing or ROW authorization in the decision areas, including activities (such as increased traffic, dust, noise, and light pollution) could result in physical or visual, auditory, and vibratory impacts on historic properties and aspects of integrity, such as setting or feeling.

Cultural resources may be degraded or contaminated from hazardous materials spills, which are noted in **Appendix I, Table I-1**. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

Proposed management under Alternative B would be the most restrictive toward oil and gas and coal development, which would reduce the contribution to cumulative impacts on historic properties in the

planning area. The potential contribution to cumulative impacts on historic properties would be increased under Alternatives C and D; however, the highest potential contributions to impacts on historic properties would occur under Alternative A. This is because management actions under Alternatives C and D would provide more protective measures than under Alternative A for NRHP-listed properties, other historic properties, TCPs, and properties that meet the criteria for designation for scientific use, conservation use, traditional use, public use, and experimental use allocations.

Changes in the planning area's landscape character will likely occur as a result of climate change, with effects extending to historic properties. The archaeological site types found in North Dakota are already susceptible to natural wind and water erosion, wildfire, and ground-disturbing activities. With climate change, extreme weather events are projected to increase in frequency. Warmer year-round temperatures, combined with an increase in seasonal wildfire duration and fire frequency, will continue to change the landscape's appearance within the planning area. More frequent and more intense droughts and storms will increase the potential for larger, more frequent wildfires; erosion of soils; and changes in the vegetation cover. Impacts on cultural resources stemming from climate change are expected to continue. The actions proposed under this plan would not have a measurable impact on climate change (see **Section 3.2.1**, Air Quality and Climate), so anticipated trajectory of impacts on cultural resources from climate change is also not expected to change, however the impacts of climate change have the potential to exacerbate the impacts of management decisions on cultural resources discussed above.

3.2.9 Paleontological Resources

Issues

- How would land management actions affect paleontological resources under each alternative?

Affected Environment

Paleontological resources are fossilized remains, traces, or imprints of organisms preserved in the earth's crust that are of paleontological interest and that provide information about the history of life on earth (PRPA, Section 6301; 16 USC 470aaa). Paleontological resources are managed for scientific, educational, and recreational values, such as collecting invertebrate fossils and petrified wood for a hobby, and to protect these resources from impacts. The probability of finding paleontological resources can be broadly predicted from the Potential Fossil Yield Classification (PFYC) rank of geologic units present at or near the surface. See **Map 3-16**, Potential Fossil Yield Classification (**Appendix A**), for estimated PFYC units in the planning area and **Table 3-100**, below, for acres of each PFYC in the fluid mineral decision area.

Table 3-100
Potential Fossil Yield Classification in the Fluid Mineral Decision Area

PFYC	Acres	Percentage of Decision Area
Class 2—low	42,400	8.7
Class 3—moderate	142,900	29.2
Class 4—high	227,700	46.5
Class 5—very high	21,700	4.4
Class Unknown	51,500	10.5
Water	3,100	0.6
Total	**489,300**	**100.0**

Source: BLM GIS 2021

All fossils contain information about past life, but not all fossils have significant scientific interest. Fossils considered scientifically significant are those that are unique, unusual, or rare; that are diagnostic; that are stratigraphically important; and that add to the body of knowledge. Scientific research is the primary use of the paleontological resources in the planning area, with hobby collecting likely accounting for a slightly smaller part. Researchers are required to have a BLM Paleontological Resources Use Permit to collect significant fossils (defined as all vertebrate fossils and any invertebrate or plant fossils determined to be significant). Permit holders are required to file an annual report that describes their research, lists the fossils collected, and includes locality forms for each location where fossils were collected. Fossils that are collected under a permit are required to be permanently curated in an approved repository. Hobbyists can collect common invertebrate and plant fossils, including petrified wood, in reasonable quantities for personal use only; they cannot sell or barter their material. Hobby collectors are not required to report their collections; therefore, the BLM has information on research efforts and can monitor the general use of the resource based on the reports, but it has no information on the level or degree of use for hobby collecting.

The combined Fox Hills and Hell Creek Formations and the overlying Ludlow Formation contain records of the last of the dinosaurs (Hell Creek Formation) and the beginning of the rise in mammal diversity and numbers (Ludlow Formation); they form a key geologic interval for paleontological resources. Significant fossil locations can be found often in bedrock exposures, especially in the Hell Creek Formation. These formations occur principally in the southwest corner of the state and near the Little Missouri River where it enters North Dakota. Although these formations occur sporadically throughout the central portion of the state, exposures become infrequent toward the middle and northern part of this region.

The middle Paleocene to earliest Eocene formations (Slope, Bullion Creek, Sentinel Butte, and Golden Valley) also produce significant fossils, but locations are more widely scattered and less predictable. Throughout the Williston Basin these formations represent most of the near-surface bedrock, but younger soils and alluvium deposits cover much of the bedrock. However, slopes of buttes and major ridgelines commonly have exposures of the bedrock where the alluvium or soil layers did not develop or were eroded away; therefore, these landform areas of thin or nonexistent alluvium and soil may be important for finding fossil resources from these formations.

The other geologic formations found in the western and central part of the state can also produce significant fossils, but these tend to be uncommon occurrences; however, the rarity of these occurrences then raises the significance of the finds. Most of these other formations, too, make up a small percentage of the near-surface bedrock, further decreasing the abundance of fossils from their respective ages.

Most recorded paleontological locations resulted from researchers performing permitted scientific fieldwork, while some have been found during BLM-required mitigation of surface-disturbing activities. Some locations are simply local knowledge. Overall, the level of fieldwork for scientific research has remained static or risen slightly in recent years. Additionally, illegal collecting has revealed the locations of some fossil resources.

Paleontological resources may occasionally be looted or vandalized. These are handled as a law enforcement issue, and attempts are made to recover fossil material during these actions. Any fossil collecting, including that for commercial sale or barter, is not permissible. Illegal activities are likely a minor issue in the planning area.

The BLM is increasing the level of paleontological mitigation, which will likely result in an increase in discoveries. This may result in new finds when mitigation work occurs in areas that researchers have not

studied; this is because researchers tend to return to areas that are proven to have fossils. Much of this mitigation work will be performed by private consultants, who must be qualified paleontologists and have a BLM-issued permit.

Changes in the decision area landscape will likely occur as a result of climate change, with effects extending to paleontological resources. With climate change, extreme weather events are projected to increase in frequency, thereby exacerbating natural wind and water erosion, and ground-disturbing activities. More frequent and more intense droughts, wildfires, and storms will increase the potential for larger, more frequent wildfires; erosion of soils; and changes in the vegetation cover. Fire can remove vegetation and expose previously undiscovered resources, allowing for their study and protection; however, locations exposed by fire can be susceptible to damage by subsequent erosion, vandalism, and unauthorized collecting.

Additional information is available in Section 2.10, Paleontological Resources, of the AMS (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

Under all alternatives, continuing to adhere to the existing laws, such as the Paleontological Resources Preservation Act, and BLM paleontological resource policies (for example, BLM manuals and handbooks) would protect paleontological resources. Additionally, continued scientific study by qualified researchers would allow information on paleontological resources to still be compiled, resulting in better future management of, and protections for, these sensitive resources.

Paleontological resources would continue to be considered during the preparation of all activity plans. This would minimize opportunities for degrading paleontological resources, such as through establishing areas where surface disturbances would not be allowed.

Potential ground disturbance and impacts on paleontological resources can be associated with development of fluid mineral leasing, locatable minerals, NEL minerals, and mineral material sales. While the acres available for mineral materials disposal and fluid mineral leasing (and applicable stipulations) vary by alternative, the reasonably foreseeable surface disturbance under all alternatives would not be likely to impact paleontological resources (see **Section 3.1.1**). Similarly, while much of the federal mineral estate is available for locatable and NEL mineral development, such development is not reasonably foreseeable. Therefore, no impacts are expected under any of the alternatives.

Alternative A

Current management practices under Alternative A would continue. Current management includes avoidance, mitigation, and adherence to the applicable laws protecting these nonrenewable resources. There would be no specific additional protections for paleontological resources. The BLM manages fossils to promote their use in research, education, and recreation in accordance with the PRPA, Subtitle D of the Omnibus Public Land Management Act of 2009 (16 USC 470aaa through 470aaa-11), and the general guidance of FLPMA and NEPA. The PRPA directs federal land managers to manage and protect fossils using scientific principles and expertise. The PRPA does not make a distinction between the types of organisms preserved; therefore, all plant, invertebrate, and vertebrate fossils are to be actively managed. The FLPMA and NEPA do not mention paleontological resources specifically, but they mandate the consideration of natural resources, which include paleontological values.

Management would include a determination of resource values, mitigation, and law enforcement efforts to protect the resource. As applicable, management also would include identification of collecting opportunities or on-site interpretation for public enjoyment. Paleontological resources are considered during environmental review of planning or projects, such as site-disturbing activities associated with ROWs or oil and gas operations (BLM 2020b).

Under Alternative A, the Mud Buttes ACEC would not be designated, resulting in the continued scientific and casual collection of fossils. Unregulated removal of fossils could result in a direct loss of the resource and potential knowledge that could be gained from this important paleontological location. Furthermore, the entire area within and surrounding Mud Buttes would continue to be open to coal, fluid mineral, and locatable mineral development and ROW locations.

BMPs, such as avoidance and monitoring, typically mitigate federal undertakings and resource extraction. Unmitigated surface-disturbing activities could dislodge or damage paleontological resources and features that were not visible before surface disturbance. The types of impacts are the permanent loss of the paleontological resource and the scientific data it could provide through damage or destruction caused by surface-disturbing activities.

Under the current management of Alternative A, vertebrate (animals with backbones) fossils and selected invertebrate and plant fossils are considered of scientific interest and cannot be collected or disturbed except by qualified paleontologists holding a valid Paleontological Resources Use Permit issued by the BLM. Most invertebrate and plant fossils are relatively common, and the public can collect them in reasonable quantities without a permit (BLM 2020b).

Surface-disturbing activities on public, private, or state lands that would be affected by a federal action are subject to a risk assessment that would analyze the potential impacts on paleontological resources. In areas where the potential to disturb or destroy significant paleontological resources is moderate to high, a field survey prior to disturbance is often required. A high-risk location may also warrant an on-site monitor during disturbance activities or spot checks of the area at key points during activities to recover fossil resources as they are uncovered (BLM 2020b). Furthermore, under Alternative A, there would be a LN that would require the lessee or operator to immediately alert the BLM of any paleontological resources or any other objects of scientific interest discovered as a result of approved operations under this lease. The LN also would require that such discoveries be left intact and undisturbed until the BLM directs the lessee or operator to proceed (BLM 2020b).

Furthermore, under Alternative A (as under both action alternatives) a LN would outline the lessee's responsibility to inventory paleontological resources if a lease is located within geologic units rated as moderate to very high potential for containing significant resources (PFYC 3, 4, or 5). The BLM would be responsible for assuring that the leased lands are examined to determine whether paleontological resources are present and to specify mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by a lease within PFYC 3, 4, or 5, the lessee or project proponent must contact the BLM to determine whether a paleontological resource inventory is required. If an inventory is required, the lessee or project proponent would complete the inventory subject to the following:

The project proponent must engage the services of a qualified paleontologist, acceptable to the BLM, to conduct the inventory.

The project proponent would, at a minimum, inventory a 10-acre area or larger to incorporate possible project relocation, which could result from environmental or other resource considerations.

Table 3-101 lists the acres of PFYC by fluid minerals allocations open with mapped stipulations (a combination of NSO, CSU, or TL) and areas open and subject to STC. PFYC 3, 4, or 5 are subject to a lease notice.

Table 3-101
Potential Fossil Yield Classification and Fluid Mineral Leasing Allocations under Alternative A

Stipulation[1]	PFYC	Acres	Percentage of Decision Area
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 2—low	38,400	7.8
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 3—moderate	137,000	28.0
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 4—high	157,700	32.2
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 5—very high	19,700	4.0
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class Unknown	46,500	9.5
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Water	3,100	0.6
Open to leasing, subject to STC	Class 2—low	4,000	0.8
Open to leasing, subject to STC	Class 3—moderate	5,900	1.2
Open to leasing, subject to STC	Class 4—high	70,000	14.3
Open to leasing, subject to STC	Class 5—very high	2,000	0.4
Open to leasing, subject to STC	Class Unknown	5,000	1.0
Open to leasing, subject to STC	Water	0	0.0

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect paleontological resources

Alternative B

Management under Alternative B would include an objective to protect major paleontological resources of scientific interest; no similar objective exists under the current plan. Additionally, under Alternative B, a management action would be implemented to promote the stewardship, conservation, and appreciation of paleontological resources through appropriate educational and public outreach programs. Preserving paleontological resources for further scientific use and public interpretation and outreach would allow information on paleontological resources to still be compiled. This would result in better future management of, and protections for, these sensitive resources.

Measures for interpretation and environmental education and the use of paleontological resources as interpretive sites could enhance appreciation and understanding of the fragile and finite nature of these resources; however, these uses could also lead to effects from access and use, such as exacerbated erosion from travel, vandalism, and unauthorized collection.

Under Alternative B, the 960-acre potential Mud Buttes ACEC would be designated, which would prohibit the casual collection of fossils by the general public. The Mud Buttes ACEC would be recommended for withdrawal from locatable mineral entry, unacceptable for further consideration for coal leasing, closed to

mineral materials, closed to NEL minerals leasing, and open to fluid mineral leasing but subject to a NSO stipulation. The stipulation would require that surface occupancy be located outside the ACEC area, so the rare paleontological resources would be protected from potential new energy development. The ACEC designation would require a plan of operations for locatable minerals. The proposed withdrawal, if enacted, would provide further protection from mineral development. This would result in protection for the potential Mud Buttes ACEC from surface disturbance associated with the activities described above; this would be a positive impact that would reduce the likelihood that important paleontological resources would be disturbed or permanently damaged. The designation of the Mud Buttes ACEC could potentially change the relative ease that qualified paleontologists have had under current management to conduct scientific research at the site. This would be an unintended impact, if qualified paleontologists could not easily gather scientific data from the Mud Buttes ACEC.

As under Alternative A, management actions under Alternative B would state that paleontological resources would be considered during the preparation of all activity plans. Notably, Alternative B would include the management action to prioritize evaluation of those areas in PFYC 3, 4, and 5. The further integration of PFYC maps in making implementation-level decisions would result in less potential adverse, local impacts on paleontological resources. The use of PFYC maps and classification are an important planning tool; however, they are not a substitute for on-the-ground paleontological surveys to inventory paleontological resources prior to ground-disturbing actions that could affect important paleontological resources in the decision area.

As required under Alternative A, under Alternative B a LN would require the lessee or operator to immediately alert the BLM of any paleontological resources or any other objects of scientific interest discovered as a result of approved operations under this lease. The LN also would require the operator or lessee to leave such discoveries intact and undisturbed until directed to proceed by the BLM. Additionally, under Alternative B, the same LN as under Alternative A would outline the lessee's responsibility to inventory paleontological resources if a lease is located within geologic units rated as moderate to very high potential for containing significant resources (PFYC 3, 4, or 5).

Under Alternative B, 213,100 more acres of BLM-administered federal mineral estate would be closed to fluid mineral leasing than under Alternative A. These constraints under Alternative B could slightly reduce the potential for effects on paleontological resources resulting from discretionary actions, compared with Alternative A, which would have significantly fewer constraints and more federal mineral estate open to fluid mineral leasing. **Table 3-102** lists the acres of PFYC by fluid minerals allocations and stipulations.

Table 3-102
Potential Fossil Yield Classification and Fluid Mineral Leasing Allocations under Alternative B

Stipulation[1]	PFYC	Acres	Percentage of Decision Area
Closed to leasing	Class 2—low	21,200	4.3
Closed to leasing	Class 3—moderate	100,600	20.6
Closed to leasing	Class 4—high	58,500	12.0
Closed to leasing	Class 5—very high	4,900	1.0
Closed to leasing	Class Unknown	25,600	5.2
Closed to leasing	Water	2,300	0.5

Stipulation[1]	PFYC	Acres	Percentage of Decision Area
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 2—low	20,700	4.2
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 3—moderate	41,700	8.5
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 4—high	156,900	32.1
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 5—very high	16,600	3.4
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class Unknown	24,900	5.1
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Water	800	0.2
Open to leasing, subject to STC	Class 2—low	500	0.1
Open to leasing, subject to STC	Class 3—moderate	600	0.1
Open to leasing, subject to STC	Class 4—high	12,300	2.5
Open to leasing, subject to STC	Class 5—very high	100	0.0
Open to leasing, subject to STC	Class Unknown	1,000	0.2
Open to leasing, subject to STC	Water	21,200	4.3

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect paleontological resources

Alternative B would make 1,042,000 acres unacceptable for coal leasing in the coal decision area, a substantial increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This reduction in acreage of federal coal acceptable for coal mining would reduce the likelihood of incidental adverse and local impacts on paleontological resources that could be discovered during coal strip mining. Coal strip mining is a practice that can disturb large tracts of land potentially containing paleontological resources. Coal Screen 3 (multiple-use), which defines areas as unacceptable for coal leasing, provides protections for the paleontological resources of Mud Buttes ACEC. Impacts would be similar under Alternative B.1; however, additional reduction of areas acceptable for coal leasing to the smallest size of all alternatives could further reduce impacts associated with coal.

Alternative C

Management under Alternative C would include an objective to protect major paleontological resources of scientific interest; no similar objective exists under the current plan. Additionally, under Alternative C, a management action would be implemented to promote the stewardship, conservation, and appreciation of paleontological resources through appropriate educational and public outreach programs. Preserving paleontological resources for further scientific use and public interpretation and outreach would allow information on paleontological resources to still be compiled. This would result in better future management of, and protections for, these sensitive resources. Measures for interpretation and environmental education and the use of paleontological resources as interpretive sites may enhance appreciation and understanding of the fragile and finite nature of these resources; however, these uses can also lead to effects from access and use, such as exacerbated erosion from travel, vandalism, and unauthorized collection.

As under Alternative A, under Alternative C a LN would require the lessee or operator to immediately alert the BLM of any paleontological resources or any other objects of scientific interest discovered as a result of approved operations under the lease. The LN also would require the operator or lessee to leave such

discoveries intact and undisturbed until directed to proceed by the BLM. Additionally, under Alternative C, the same LN as under Alternative A would outline the lessee's responsibility to inventory paleontological resources if a lease is located within geologic units rated as moderate to very high potential for containing significant resources (PFYC 3, 4, or 5).

Under Alternative C, the 960-acre potential Mud Buttes ACEC would be designated, prohibiting the casual collection of fossils by the general public. The Mud Buttes ACEC would be unacceptable for further consideration for coal leasing, closed to mineral materials, and open to fluid mineral leasing but subject to a NSO stipulation. The stipulation would require surface occupancy to be located outside the ACEC area, so the rare paleontological resources would be protected from potential new energy development. The ACEC designation would require a plan of operations for locatable minerals. This could result in protection for the potential Mud Buttes ACEC from surface disturbance associated with the activities described above. This would be a positive impact that would reduce the likelihood that important paleontological resources would be disturbed or permanently damaged. The designation of the Mud Buttes ACEC could potentially change the relative ease that qualified paleontologists have had under current management to conduct scientific research at the site. This would be an unintended impact, if qualified paleontologists could not easily gather scientific data from the Mud Buttes ACEC.

As under Alternative A, management actions under Alternative C would state that paleontological resources would be considered during the preparation of all activity plans. Alternative C would include a management action to prioritize evaluation of those areas in PFYC 3, 4, and 5. The further integration of PFYC maps in making implementation-level decisions would result in less potential adverse, local impacts on paleontological resources.

Under Alternative C, the same total acreage of federal mineral estate would be open to fluid mineral leasing as under Alternative A; therefore, impacts would be the same as under Alternative A. **Table 3-103** lists the acres of PFYC by fluid minerals allocations and stipulations under Alternative C.

Alternative C would make 542,800 acres unacceptable for coal leasing in the coal decision area; this is an increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This decrease in acreage of federal coal acceptable for coal mining would decrease the likelihood of incidental adverse and local impacts on potential paleontological resources that could be discovered during coal strip mining and the associated development.

Table 3-103
Potential Fossil Yield Classification and Fluid Mineral Leasing Allocations under Alternative C

Stipulation[1]	PFYC	Acres	Percentage of Decision Area
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 2—low	41,100	17.3
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 3—moderate	139,300	13.6
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 4—high	193,900	25.9
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 5—very high	21,100	6.3
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class Unknown	49,300	25.7

Stipulation[1]	PFYC	Acres	Percentage of Decision Area
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Water	3,100	2.7
Open to leasing, subject to STC	Class 2—low	1,300	1.2
Open to leasing, subject to STC	Class 3—moderate	3,500	1.0
Open to leasing, subject to STC	Class 4—high	33,800	2.9
Open to leasing, subject to STC	Class 5—very high	600	0.8
Open to leasing, subject to STC	Class Unknown	2,200	2.7
Open to leasing, subject to STC	Water	0	0

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect paleontological resources

Alternative C would have 44,500 acres of GRSG PHMA closed to NEL development (see Table 3-84). There is no reasonably foreseeable possibility of NEL minerals, so no impacts on paleontological resources are anticipated.

Alternative D

Impacts on paleontological resources would be similar to those described for Alternative B with the exceptions described below.

Under Alternative D, 213,100 more acres of BLM-administered federal mineral estate would be closed to fluid mineral leasing than under Alternative A. These constraints under Alternative D could slightly reduce the potential for effects on paleontological resources resulting from discretionary actions, compared with Alternative A, which would have significantly fewer constraints and more federal mineral estate open to fluid mineral leasing. **Table 3-104** lists the acres of PFYC by fluid minerals allocations and stipulations.

Table 3-104
Potential Fossil Yield Classification and Fluid Mineral Leasing Allocations under Alternative D

Stipulation[1]	PFYC	Acres	Percentage of Decision Area
Closed to leasing	Class 2—low	21,200	4.3
Closed to leasing	Class 3—moderate	100,600	20.6
Closed to leasing	Class 4—high	58,500	12.0
Closed to leasing	Class 5—very high	4,900	1.0
Closed to leasing	Class Unknown	25,600	5.2
Closed to leasing	Water	2,300	0.5
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 2—low	20,700	4.2
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 3—moderate	41,700	8.5
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 4—high	156,400	32.0
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class 5—very high	16,600	3.4

Stipulation[1]	PFYC	Acres	Percentage of Decision Area
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Class Unknown	24,800	5.1
Open to leasing, with mapped stipulations (NSO, CSU, and/or TL)	Water	800	0.2
Open to leasing, subject to STC	Class 2—low	500	0.1
Open to leasing, subject to STC	Class 3—moderate	600	0.1
Open to leasing, subject to STC	Class 4—high	12,800	2.6
Open to leasing, subject to STC	Class 5—very high	100	0.0
Open to leasing, subject to STC	Class Unknown	1,100	0.2
Open to leasing, subject to STC	Water	0	0

Source: BLM GIS 2021
[1] Acreages are incidental and not designed to directly protect paleontological resources

Alternative D would make 1,037,800 acres unacceptable for coal leasing in the coal decision area, a substantial increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This reduction in acreage of federal coal acceptable for coal mining would reduce the likelihood of incidental adverse and local impacts on paleontological resources that could be discovered during coal strip mining. Coal strip mining is a practice that can disturb large tracts of land potentially containing paleontological resources. Coal Screen 3 (multiple-use), which defines areas as unacceptable for coal leasing, provides protections for the paleontological resources of Mud Buttes ACEC. Impacts would be similar under Alternative B; however, additional reduction of areas acceptable for coal leasing to the smallest size of all alternatives could further reduce impacts associated with coal.

Cumulative Impacts

The cumulative impact analysis area for paleontological resources is the planning area, regardless of ownership. Past and present actions that have likely affected paleontological resources in this sensitive region may include such activities as oil, gas, coal, and energy infrastructure development; ground disturbance; mining and mineral use; unauthorized fossil collecting; recreation; and the effects of natural processes, including erosion.

Reasonably foreseeable future actions with the potential to affect paleontological resources are similar to the past and present actions. In the planning area, the development of fluid mineral resources would continue to be a major activity that would require ground disturbance from permanent and temporary roads, pits, drilled wells, associated well pads, pipelines, and transmission lines. Coal leasing and development would also continue to be a major ground-disturbing activity. Increased recreation and visitation to areas such as the Mud Buttes fossil locality may increase the potential for inadvertent impacts from recreation and opportunities for unauthorized fossil collection.

Paleontological resources may be degraded or contaminated from hazardous materials spills, which are noted in **Appendix I, Table I-1**. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

For actions on BLM-administered land and mineral estate, impacts would be minimized through existing laws, regulations, and stipulations addressing surface-disturbing activities in sensitive areas. The two action

alternatives propose additional allocations, stipulations, activities, reviews, and priorities that would reduce the potential for future actions to affect paleontological resources. Furthermore, the action alternatives would protect the scientifically valuable Mud Buttes ACEC fossil site, whereas Alternative A would leave the site with less protections. Other ground-disturbing activities, such as road construction, land development, and utility infrastructure, may be reviewed by other federal, state, Tribal, or local agencies for impacts on paleontological resources, and steps would be taken to recover or avoid significant finds.

Actions on private land could result in the inadvertent destruction of paleontological resources or the removal of fossils without any scientific study. Increasing visitation and outdoor recreation at fossil locations, such as the potential Mud Buttes ACEC, can affect resources through fossil removal, vandalism, incremental damage of surface resources, and subsequent erosion.

Under all the alternatives, the potential for impacts on paleontological resources would be minimized through management objectives that protect paleontological resources in planning and avoid disturbing sensitive formation and fossil locations. Paleontological resources would continue to be considered in management decisions, actions, and projects that may cause ground or other disturbance. Such projects could result in long-term direct damage to or loss of scientifically significant fossils or would contribute to erosion, exposure, or vandalism without scientific study. The potential incremental contribution of the alternatives to cumulative impacts on paleontological resources, when combined with other past, present, and reasonably foreseeable actions, is expected to be less than significant.

Impacts on paleontological resources stemming from climate change are expected to continue. Actions proposed under this plan would not have a measurable impact on climate change (see **Section 3.2.1**, Air Quality and Climate), however the impacts of climate change have the potential to exacerbate the impacts of management decisions on paleontological resources discussed above.

3.2.10 Visual Resources

Issues

- How would visual resource management and varying types and intensities of surface-disturbing activities affect visual resource values on BLM-administered lands in North Dakota?

Affected Environment

North Dakota lies within the Interior Plains, which stretches from the Rocky Mountains to the Appalachian Mountains. In North Dakota, the Missouri Escarpment divides the Interior Plains. To the north and east of the escarpment is the Central Lowlands Province, which has a glacially smoothed landscape. To the south and west, the Great Plains Province rises gradually westward toward the Rocky Mountains. Key features in the Great Plains and Central Lowlands physiographic provinces are described in the AMS (NDGS 2020; BLM 2020b) and are illustrated in **Map 3-17**, Physiographic Provinces, in **Appendix A**.

The badlands of southwestern North Dakota are carved into an astonishing variety of unusually shaped landforms. The badlands are a rugged, deeply eroded area along the Little Missouri River that stretches from Bowman County north to the confluence with the Missouri River. White Butte, at 3,506 feet above sea level in the southwestern corner of the state, is the highest point in North Dakota (NDGS 2020).

As described in the Visual Resource Management Inventory in Dunn County, North Dakota, the Little Missouri River riparian system contains the Little Missouri River gently flowing through the canyon bottom (Ecosystem Management, Inc. 2007). The riparian bottom is generally flat, with dense stands of cottonwood trees and willow, interspersed with higher benches of sagebrush. Although the river is perennial, the water

depth is usually too shallow for floating, except during spring runoff and large rainstorms in autumn. The steep, colorful, eroded badlands topography; the riparian vegetation; and the perennial water flow produce visual variety in the landscape, especially from late spring through the late autumn colors (Ecosystem Management, Inc. 2007).

Also, from the Dunn County inventory, the Little Missouri River Badlands is the transition zone between the Missouri Plateau and the Little Missouri River (Ecosystem Management, Inc. 2007). The landscape is complex and highly dissected and eroded, exposing multicolored bands of shale, siltstone, sandstone, and lignite coal. Vegetation is dense to scattered juniper, green ash, and shortgrass prairie species. Northern exposures are more vegetated, while southern exposures can be nearly devoid of vegetation. Exposed landforms are predominantly gray, with horizontal lines of reds, browns, and black, and exhibit strong conical shapes. The vegetation produces dark greens and sometimes distinct vertical and diagonal lines, where the vegetation follows drainages (Ecosystem Management, Inc. 2007).

In the planning area, no BLM-administered lands consist of 5,000 contiguous, roadless acres. Two large areas, Lost Bridge in Dunn County and Big Gumbo in Bowman County, are the closest to this type of land, as they are large tracts of BLM-administered landholdings; however, they are generally crisscrossed with oil and gas development roads or in parcels under 5,000 acres. The Big Gumbo and Lost Bridge areas offer the most dispersed recreation opportunities.

The 2,000-acre Schnell Ranch Recreation Area was once a working cattle ranch and now provides opportunities to view wildlife, including duck, ring-necked pheasant, sharp-tailed grouse, Hungarian or gray partridge, white-tailed and mule deer, turkey, rabbit, squirrel, porcupine, and neotropical migratory birds, such as bluebirds, warblers, and flickers (BLM 2020d).

Oil and gas wells on BLM-administered surface lands in Bowman County were primarily drilled in the 1960s and 2000s. Starting in the 1970s, Dunn County experienced an increasing number of wells drilled, with a sharp increase in wells starting in the late 2000s due to the Bakken Formation. This development will likely continue.

Most BLM-administered surface land is in western Bowman County and northern Dunn County. These two counties are also where future oil and gas development on BLM-administered surface land would likely occur. This would continue to increase the density of artificial structures and roads that do not resemble the surrounding undeveloped areas.

Gas flaring is a combustion process used to burn associated, unwanted, or excess gases and liquids released during normal or unplanned over-pressuring operation in many industrial processes, such as oil and gas extraction. Flaring, where present on the landscape, creates a high degree of visual contrast. The flame is distinct from surrounding colors and textures and can be seen from great distances.

The BLM is responsible for managing the BLM-administered lands for multiple uses and for ensuring the scenic values of these BLM-administered lands are considered when providing for various uses. The BLM's VRM system inventories scenic values and establishes management objectives for those values through the resource management planning process.

The BLM's visual resource inventory (VRI), completed in August 2020 (BLM 2020e), provides the BLM with a means for determining visual values. The inventory consists of a scenic quality evaluation, a sensitivity level analysis, and a delineation of distance zones. Based on these three factors, BLM-administered lands are placed into one of four VRI classes. These inventory classes represent the relative

value of the visual resources. Classes I and II are the most valued; Class III represents a moderate value, and Class IV is the least valued. The inventory classes provide the basis for considering visual values in the RMP process.

Based on the BLM's VRI for the planning area, there are no VRI Class I areas, which are assigned to all special areas where management situations require maintaining a natural environment essentially unaltered by humans (for example, designated wilderness areas). For the western portion of North Dakota, 10 percent of all land is VRI Class II, 3 percent is VRI Class III, and 87 percent is VRI Class IV. For just BLM-administered surface lands in the western portion of North Dakota, there are 17,700 acres in VRI Class II, 1,300 acres in VRI Class III, and 37,500 acres in VRI Class IV. Furthermore, there are 2,000 acres that could be VRI Class II, III, or IV, depending on the location in the eastern portion of the state (see **Map 3-18**, Visual Resources Inventory, in **Appendix A**). More detailed scenic quality rating units and sensitivity level rating units would be needed to determine the VRI class (BLM 2020e).

Increases in temperature, changes in precipitation patterns, and the increased frequency of wildfires resulting from climate change could result in changes to the characteristic landscape by changing the presence and composition of vegetation and water sources. In turn, the presence and behavior of animals viewed in the planning area could also change.

Additional information is available in Section 2.11, Visual Resources, of the AMS (BLM 2020b).

Environmental Consequences

The VRI classes form the basis for the analysis in this section. Although VRI classes use the same numerical scale (Class I through Class IV) as VRM classes, they are defined differently. VRI classes are the categories the BLM uses to classify the visual character of the landscape and are a way to communicate the degree of visual quality in the area. Generally, VRI Class I indicates high visual quality, and VRI Class IV indicates lower visual value. For more information on the VRI process, refer to BLM Handbook H-8410-1, Visual Resource Inventory (BLM 1986).

The BLM uses VRI classes to identify the relative importance of different landscapes in the area. Potential impacts on visual resources are assessed by comparing the VRI class to the VRM class assigned for an area for each alternative. **Table 3-105**, below, lists how the BLM would manage visual resources for each VRI class for the alternatives.

Table 3-105
VRM for Visual Resources by Alternative

VRM Class	VRI Class I	VRI Class II	VRI Class III	VRI Class IV	VRI Class II, III, or IV[1]	Total
Alternative A Acres						
I	0	0	0	0	0	0
II	0	0	0	0	0	0
III	0	0	0	0	0	0
IV	0	0	0	0	0	0
Unclassified	0	17,800	1,300	37,500	1,900	58,500
Total	**0**	**17,800**	**1,300**	**37,500**	**1,900**	**58,500**
Alternative B Acres						
I	0	0	0	0	0	0
II	0	13,600	200	1,900	0	15,700
III	0	4,200	1,100	11,400	0	16,700

VRM Class	VRI Class I	VRI Class II	VRI Class III	VRI Class IV	VRI Class II, III, or IV[1]	Total
IV	0	0	0	24,200	1,900	26,100
Unclassified	0	0	0	0	0	0
Total	**0**	**17,800**	**1,300**	**37,500**	**1,900**	**58,500**
Alternative C Acres						
I	0	0	0	0	0	0
II	0	8,400	0	0	0	8,400
III	0	9,400	200	2,600	0	12,200
IV	0	0	1,100	34,900	1,900	37,800
Unclassified	0	0	0	0	0	0
Total	**0**	**17,800**	**1,300**	**37,500**	**1,900**	**58,500**
Alternative D Acres						
I	0	0	0	0	0	0
II	0	12,400	0	1,500	0	13,900
III	0	5,400	200	11,800	0	17,400
IV	0	0	1,100	24,300	1,900	27,200
Unclassified	0	0	0	0	0	0
Total	**0**	**17,800**	**1,300**	**37,500**	**1,900**	**58,500**

Source: BLM GIS 2021

[1] Under all alternatives, BLM-administered lands in the eastern half of the state are either VRI II, III, or IV, depending on the location. These 2,000 acres are scattered/fragmented throughout the eastern half of the state.

Lands classified as VRI Class IV are landscapes with low visual value. This is generally due to a combination of their low scenic quality, low public sensitivity, and visibility. Managing these landscapes as VRM Class IV would allow for modifications that result in high changes to the scenic quality. By managing these landscapes as VRM Class I, II, or III, the scenic quality of the landscape would likely remain the same. In other words, scenic quality would be maintained when an area with a high VRI class number is assigned a lower VRM class number (for example, VRI Class III managed as VRM Class II).

Conversely, lands classified as VRI Class I represent landscapes with high visual value. This is the result of a landscape having higher visual variety leading to a higher scenic quality rating. These landscapes commonly have a higher public sensitivity rating. As such, lands classified as VRI Class I have the potential to experience changes to the scenic quality from being designated as VRM Class II, III or IV. In other words, scenic quality may not be maintained when an area with a low VRI class number is assigned a higher VRM class number (for example, VRI Class II managed as VRM Class III).

Impacts Common to All Alternatives

The BLM would continue to coordinate with other state and federal agencies regarding BLM operations that affect the landscape (for example, placement of signs, campgrounds, and less-developed recreation facilities). This would minimize opportunities for artificial structures to contrast with the characteristic landscape.

While the acres available for mineral materials disposal and fluid mineral leasing activities (and applicable stipulations) vary by alternative, the reasonably foreseeable development under all alternatives would not impact visual resources (see **Section 3.1.1**). Similarly, while much of the federal mineral estate is available for locatable and NEL mineral development, such development is not reasonably foreseeable. Therefore, no impacts are expected under any of the alternatives. The application of BMPs and mitigation measures (**Appendix D**, Design Features and Best Management Practices) for surface-disturbing activities would likely reduce the effects on visual resources associated with authorized land uses or activities such as road,

pipeline, or power line construction; mineral development; range improvements; and recreation. BMPs and mitigation measures would reduce or eliminate the removal or alteration of vegetation communities, which are components of the visual setting. Requiring a reclamation plan (**Appendix E**, Reclamation Standards) for all surface-disturbing activities across all alternatives would stabilize disturbed areas in the short term and stabilize the landscape setting in the long term.

Alternative A

The BLM would continue to not have VRM classes designated for Alternative A. Currently, the BLM manages BLM-administered surface lands similar to VRM Class III objectives, except where sufficient landscape alterations make it more appropriate to manage BLM-administered surface lands according to VRM Class IV objectives. Assuming all VRI Class III lands (1,300 acres) would be managed as VRM Class III, there would continue to be no change to the characteristic landscape. Assuming all VRI Class IV lands (37,500 acres) would be managed as VRM Class IV, there would continue to be no change to the characteristic landscape. There would continue to be 17,800 acres of VRI Class II lands. If these lands are managed as VRM Class III, the characteristic landscape could degrade. This is because the level of change should be low instead of moderate.

Alternative B

Table 3-105 lists how the BLM would manage visual resources under Alternative B. Compared with Alternative A, there would be a decrease of 13,300 acres of VRI Class II lands that would be managed as VRM Class III. Instead, those lands would be managed as VRM Class II. This alternative would increase the number of acres where the quality of VRI Class II lands would be maintained. However, the BLM would continue to manage 4,400 acres as VRM Class III. Because the BLM would manage these acres as VRM Class III instead of VRM Class II, this designation would potentially allow VRI Class II acres to degrade. This is because the level of change to the characteristic landscape should be low for VRM Class II lands, but the level of change can be moderate for VRM Class III lands. ROWs would be subject to design features to maintain or improve the integrity of VRM Class II areas.

The visual quality of all VRI Class III lands would be maintained under Alternatives A and B. This is because no VRI Class III lands would be managed as VRM Class IV. The BLM would manage all lands as VRM Class III, except for 200 acres under Alternative B where changes to the characteristic landscape would be low (instead of moderate) because of a VRM Class II designation.

The visual quality of all VRI Class IV lands would be maintained under Alternatives A and B. Instead of managing all VRI Class IV lands (37,500 acres) with a VRM Class IV designation (as under Alternative A), Alternative B would manage VRI Class IV lands with designations of VRM Class II (1,900 acres), Class III (11,400 acres), and Class IV (24,200 acres). This would still maintain the quality of all VRI Class IV lands by allowing low, moderate, and high changes to the characteristic landscape, respectively.

The BLM would manage the 2,000 acres of scattered/fragmented BLM-administered lands in the eastern half of the state that are VRI Class II, III, or IV as VRM Class IV. Because these acres would be managed as VRM Class IV instead of VRM Class II and III, this designation would potentially allow VRI Class II and III acres to degrade. This is because the level of change to the characteristic landscape should be low and moderate for VRM Class II and III lands, but the level of change can be high for VRM Class IV lands.

The BLM would manage the segment of the Little Missouri River determined suitable for inclusion in the NWSRS as VRM Class II, which would preserve the scenic ORV that characterizes this segment.

Alternative C

Table 3-105 lists how the BLM would manage visual resources under Alternative C. Compared with Alternative A, there would be a decrease of 8,100 acres of VRI Class II lands that would be managed as VRM Class III. Instead, the BLM would manage those lands as VRM Class II. Compared with Alternative A, this alternative would increase the number of acres where the quality of VRI Class II lands would be maintained. However, 9,400 acres would continue to be managed as VRM Class III. Because these acres would be managed as VRM Class III instead of VRM Class II, this designation would potentially allow VRI Class II acres to degrade. This is because the level of change to the characteristic landscape should be low for VRM Class II lands, but the level of change can be moderate for VRM Class III lands. ROWs would be subject to design features to maintain or improve the integrity of VRM Class II areas.

Under Alternative C, the visual quality of 1,100 acres of VRI Class III lands would be managed as VRM Class IV. Because these acres would be managed as VRM Class IV instead of VRM Class III, this designation would potentially allow VRI Class III acres to degrade. This is because the level of change to the characteristic landscape should be moderate for VRM Class III lands, but the level of change can be high for VRM Class IV lands. The remaining 200 acres of VRI Class III lands would continue to be managed as VRM Class III.

The visual quality of all VRI Class IV lands would be maintained under Alternatives A and C. Instead of managing all VRI Class IV lands (37,800 acres) with a VRM Class IV designation (as under Alternative A), Alternative C would manage VRI Class IV lands with designations of VRM Class III (2,600 acres) and Class IV (34,900 acres). This would still maintain the quality of all VRI Class IV lands by allowing moderate and high changes to the characteristic landscape, respectively.

The BLM would manage the 1,900 acres of scattered/fragmented BLM-administered lands in the eastern half of the state that are VRI Class II, III, or IV as VRM Class IV. Because these acres would be managed as VRM Class IV instead of VRM Class II and III, this designation would potentially allow VRI Class II and Class III acres to degrade. This is because the level of change to the characteristic landscape should be low and moderate for VRM Class II and III lands, but the level of change can be high for VRM Class IV lands.

Under Alternative C, the BLM would not manage the Little Missouri River to a certain VRM Class II but would manage within 0.50 miles of the Little Missouri River as ROW avoidance. Such management would provide some protection to the scenic ORV from ROW development.

Alternative D

Table 3-105 lists how the BLM would manage visual resources under Alternative D. There would be 13,900 acres managed as VRM Class II including Schnell Ranch SRMA, East Zone, Lost Bridge BCA, and Figure 4 BCA. Compared with Alternative A, there would be an increase in acres managed as VRM Class II under Alternative D, as there would be 0 acres managed as VRM Class II under Alternative A.

Under Alternative D, 17,400 acres would be managed as VRM Class III including Schnell Ranch SRMA, West Zone, Lewis and Clark NHT management corridor of 0.50 miles from the high-water mark of the Missouri and Yellowstone Rivers, Lake Sakakawea, and Lake Oahe, and additional non-designated parcels. Moreover, 27,200 acres would be managed as VRM Class IV. As described under Alternative C, the BLM would manage the 1,900 acres of scattered/fragmented BLM-administered lands in the eastern half of the state as VRM Class IV.

Under Alternative D, the BLM would not manage the Little Missouri River to a certain VRM Class II but would manage within 0.50 miles of the Little Missouri River as ROW avoidance. Such management would provide some protection to the scenic ORV from ROW development.

Cumulative Impacts

The BLM used the planning area to analyze cumulative effects on visual resources. Past, present, and reasonably foreseeable future actions and conditions in this area that have affected, and would likely continue to affect, visual resources are energy and mineral development, land use authorizations and access, livestock grazing, recreation, and vegetation management. These are described in Table I-1, Past, Present, and Reasonably Foreseeable Future Actions Considered in the Cumulative Effects Analysis (**Appendix I**, Approach to the Environmental Analysis).

Naturally occurring events, such as wildfire, can also alter the landscape with effects on visual resources in the planning area. Many of these actions and events have altered vegetation and landforms and have introduced artificial elements into the natural landscape. Some past developments are being reclaimed, and visual impacts are lessening, but not as fast as new developments are happening.

The BLM's VRI, completed in August 2020 (BLM 2020e), provides the BLM with a means for determining visual values. In the VRI, cultural modifications are any human-caused change in the landform, water form, or vegetation or the addition of a structure that creates a visual contrast in the basic elements (form, line, color, texture) of the naturalistic character of a landscape. Although the acres of cultural modifications are not available, Figure 8 in the VRI depicts the locations of cultural modifications. Agricultural land uses are the most prominent cultural modifications.

Any actions or projects that would disturb the terrain can affect the scenic quality. For example, proposed surface-disturbing projects such as energy and mineral development, vegetation management and treatments, and transmission lines can introduce cultural modifications or change the landform, vegetation, color, and adjacent scenery. Depending on the location and scale of the activities and modifications, the scenic quality of an area can be degraded. Table I-1 (in **Appendix I**, Approach to the Environmental Analysis) identifies the location and scale of the activities and modifications if the information is available. The RFDs provide more specific locations and scales for the RFDs of oil and gas (BLM 2022a), coal (BLM 2022b), and mineral materials (BLM 2022c). For example, oil and gas development would likely be in the northwest and west central portion of the state, and coal would likely be in Mercer, McLean, and Oliver Counties.

Urbanization is expected to continue to result in residential and commercial development expanding incrementally closer to BLM-administered lands. Development of lands in the vicinity could also increase demand for energy resources, building materials, utilities, and minerals, all of which could spur development that would affect visual resources. These demands generally involve surface disturbances.

Under Alternative A, the BLM would continue to manage visual resources on all BLM-administered lands in the planning area on a case-by-case basis. When combined with past, present, and reasonably foreseeable future actions or projects described above, Alternative A would have the greatest influence on cumulative impacts on visual resources; this is because 17,800 acres would be managed in a manner that could allow activities that have an increased potential to change the scenic quality in areas with high value (VRI Class II). Under Alternatives C and D, the BLM would manage either 9,400 or 5,400 acres respectively, in a manner that could allow activities that have an increased potential to change the scenic quality in areas with high value. Alternative B would allow these activities on 4,200 acres.

The effects of climate change, described above under the *Affected Environment* for this section, could influence the rate or degree of the potential cumulative impacts.

3.3 RESOURCE USES

3.3.1 Lands and Realty

Issues

- How would the alternatives affect land tenure in North Dakota?
- How would the alternatives affect the availability of BLM-administered lands for ROWs in North Dakota?
- How would the alternatives affect access to BLM-administered surface lands in North Dakota?

Affected Environment

The BLM lands, realty, and cadastral survey program includes land use authorizations for such uses as renewable energy, utilities, and access roads; land tenure; and withdrawals. Because the alternatives only speak to decisions related to land use authorizations, land tenure, and withdrawals, those are the primary issues discussed below. Although not a specific element of the lands and realty program, this section also discusses access, which is an issue of concern in the planning area.

While cadastral survey is part of the BLM's lands, realty, and cadastral survey program, there are no decisions related to cadastral survey in this RMP/EIS and thus no impacts on this program. There are no utility or ROW corridors in the planning area; therefore, these also are not discussed below.

Additional information is available in Section 3.2, Lands and Realty, of the AMS (BLM 2020b).

Land Use Authorizations

Land use authorizations on BLM-administered land include ROW grants, permits, leases, and easements under several different authorities, including Section 302 of the FLPMA; Title V of the FLPMA; the Recreation and Public Purposes (R&PP) Act, as amended (43 USC 869); and the Mineral Leasing Act of 1920, as amended (30 USC 185).

Rights-of-Way

The BLM NDFO administers 148 ROW grants that encumber approximately 1,280 acres (BLM 2020f). The BLM typically processes 8 to 10 ROW authorizations per year. These include applications for new ROWs and the amendments, assignments, renewals, relinquishments, or cancellations of existing ROWs. Most existing ROWs are for oil and gas pipelines, power lines, or roads (see Table 3-2, Existing ROWs in the Planning Area, in the AMS [BLM 2020b]). There are no renewable energy ROWs in the planning area. Because BLM-administered surface in the planning area consists mostly of small scattered parcels which are not conducive to wind and solar development, no renewable energy ROWs on BLM land are expected during the planning period.

The BLM administers three ROWs through the Sentinel Butte Communications Site Plan. This plan consists of three towers at Sentinel Butte in Golden Valley County (BLM 2019a).

Lands may be classified as exclusion or avoidance areas in an RMP. ROW exclusion areas are defined as areas that are not available for ROWs under any conditions. ROW avoidance areas are defined as those on which a ROW should be avoided, if possible.

There are approximately 33,000 acres designated as ROW avoidance areas for high-voltage transmission lines (100 kilovolt and over), large pipelines (24 inches wide), communication sites, and minor ROWs (see **Table 2-1**, Summary of the Alternatives). The same acres are also designated as ROW exclusion areas for new wind and solar energy authorizations. ROW avoidance and exclusion areas coincide with GRSG PHMA and GHMA (BLM 2015b; see **Map 2-5**, Alternative A: Right-of-Way Exclusion and Avoidance, in **Appendix A**).

Land Tenure

There are approximately 58,500 acres of BLM-administered surface lands in the planning area; approximately 33,000 of these acres are in Bowman County and 15,000 are in Dunn County (see Table 3-5, BLM-Administered Surface Land by County in the Decision Area, in the AMS and **Map 1-2**, BLM Surface Decision Area, in **Appendix A**).

Classification of lands is the process of determining whether the lands are more valuable or suitable for transfer or use under particular or various public land laws than for retention in federal ownership for management purposes. The classification process is currently used for land sales and potential disposals under the R&PP Act, Desert Land Entry applications, Indian Allotment applications, State Selection applications, and Carey Act applications.

Approximately 81 percent (47,600 acres) of BLM-administered surface lands are allocated as land tenure category 1 (retention) or category 2 (retention-limited disposal). The remaining 19 percent (10,900 acres) are disposal lands or those not zoned for land tenure (see **Table 2-1**, Summary of the Alternatives, and **Map 2-9**, Alternative A: Land Tenure, in **Appendix A**). **Appendix G**, Land Tenure Adjustment Categories has additional information. Disposal lands are generally isolated tracts that are considered difficult and uneconomic to manage.

There are 2,481 acres of lands with patents[25] in the planning area where the BLM has transferred title under the R&PP Act. The NDGFD administers approximately 68 percent of these lands to preserve wildlife habitat.

Withdrawals

Withdrawals are formal land actions that set aside, withhold, or reserve lands by statute or administrative order. A withdrawal withholds an area of federal lands from settlement, sale, location, or entry, under some or all of the general land laws and mineral laws, for the purpose of limiting activities under those laws in order to maintain other public values in the area or to reserve the area for a particular public purpose or program; or transferring administrative jurisdiction between Federal agencies (see **Section 3.3.2**, Energy and Minerals, *Locatable Minerals* subsection for further information about mineral withdrawals).

Withdrawals are established for a wide variety of purposes, such as Federal Energy Regulatory Commission power site reserves; Department of Defense military reservations; administrative sites; recreation sites; national parks; national forests; Bureau of Reclamation projects, such as reservoirs; wild and scenic rivers; and wilderness areas. Withdrawals are most often used to preserve sensitive environmental values and major federal investments in facilities or other improvements, to support national security, or to provide for public health and safety. Withdrawals can be designated by Congress through a statute or processed by the BLM administratively, while the Secretary of the Interior has been delegated the authority to make, modify,

[25] Patents issued under the R&PP Act convey a restricted title since they contain certain provisions or clauses that, if not complied with, may result in reversion of the title to the United States.

extend, or revoke withdrawals in accordance with FLPMA and 43 CFR 2300. The segregation of lands is an action, such as a withdrawal or allowed application (for example, R&PP), that suspends the operation to entry under all or portions of the public land laws, which include the mining and mineral leasing laws.

Approximately 7,700 acres of acquired land in the planning area are not open to mineral entry under the mining laws, pending the issuance of an opening[26] order in the *Federal Register*. There are no FLPMA withdrawals[27] in the planning area. However, mineral encumbrances could impact the disposal of lands.

Access

There are locations in the planning area that lack legal access to BLM-administered land. Acquiring access easements across nonfederal lands for roads and trails provides the BLM and the public with the necessary access to landlocked BLM-administered lands. No exclusive easements[28] have been acquired that provide legal access to BLM-administered land for the US and its assignee, licensees, permittees, or the public.

The North Dakota Section Line Law, which originates from the 1866 Mining Law, allows for public access 33 feet on either side of section lines.[29] In some locations, the primary access opportunity to BLM-administered parcels surrounded by non-BLM-administered land is along a section line.

Climate Change

Scientists predict that temperatures in North Dakota will increase by 3 to 5°F by the mid-twenty-first century and 5 to 10°F by the end of the twenty-first century (URS 2010). Rising CO_2 levels are expected to increase the productivity of grasslands; however, temperature changes may disrupt growing seasons and ecological processes (EPA 2016a). Scientists also predict there will be more frequent severe weather events, such as intense thunderstorms and flooding (URS 2010). Higher temperatures and more frequent severe storms would lead to incremental changes to the landscape over time, punctuated by rapid changes during extreme events. These conditions could influence the type and locations of avoidance criteria applied to new wind energy ROWs; these conditions may increase or decrease the viability of those ROWs. Effects from climate change may also influence the demand for certain types of ROWs in the decision area.

Environmental Consequences

Impacts Common to All Alternatives

The BLM would continue to pursue a long-term program of repositioning BLM-administered lands toward improved manageability and increased public benefit. The BLM would continue to accommodate ROW and other use demands while minimizing adverse impacts on natural resources. The BLM would continue to maintain the integrity of BLM-administered lands by resolving trespass, including resolving unauthorized use of BLM-administered lands through termination; a cooperative agreement authorized by the Sikes Act; authorization by ROW, permit or lease; or completion of a land exchange sale. These would aid in resources and uses on BLM-administered land being used in a balanced combination to meet the needs of a variety of BLM-administered land uses.

[26] Opening means restoring a specified area of BLM-administered lands to operation of the public land laws, including the mining laws.
[27] Through a withdrawal under Section 204 of the FLPMA, the Secretary of the Interior may close BLM-administered lands to location and entry under the mining laws, subject to valid existing rights. New mining claims cannot be located within withdrawn areas.
[28] An exclusive easement is one for the exclusive use of the grantee.
[29] A section line is the boundary line of a section in surveying or land distribution. Section lines in the United States are 1 mile apart.

The BLM would continue to obtain/reserve easements to preserve important resources determined to be in the public interest on public and private lands (for example, archaeological sites, historic sites, scenic areas, or habitat for wildlife species). This would both preserve the use of lands for those important resources and limit the use of those lands from incompatible activities.

The BLM would continue to reserve easements in patents, if needed, to ensure public access to other public land, and the BLM would continue to acquire access easements where legal/physical access is lengthy or arduous and a need has been demonstrated. This would provide public access to public lands and provide the BLM access to BLM-administered lands for management activities.

Due to the small amount of BLM-administered surface land acceptable for coal leasing (see **Appendix F**, Coal Screening Process), it is unlikely that coal leasing would impact ROWs under any alternative. The coal RFD estimates that based on pending lease applications, there are 2,150 acres of federal mineral estate that could be leased during the next 15 to 20 years (BLM 2022b). Based on this information, the mines could nominate approximately 4,960 acres of federal coal tracts for future leasing during the planning period that may contain approximately 95 million tons of coal; however, it is not known if leases would actually be issued during the planning period on these tracts.

Alternative A

Land Tenure

Under Alternative A, the BLM would identify 81 percent (47,600 acres) of the decision area for retention or retention-limited disposal; the remaining 19 percent (10,900 acres) would be available for disposal (see **Table 3-106**). The focus of land tenure decisions would be to create larger blocks of BLM-administered lands.

Lands available for disposal are mostly scattered parcels in areas outside Bowman and Dunn Counties (see **Map 2-9**, Alternative A: Land Tenure, in **Appendix A**). Transferring these isolated parcels out of federal ownership would consolidate the BLM's landownership pattern and improve the management efficiency of the contiguous areas of BLM-administered lands in Bowman and Dunn Counties.

Table 3-106
Land Tenure Allocations by Alternative

Name	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)	Alternative D
Land tenure category 1 (retention) or category 2 (retention-limited disposal)	47,600	0	0	0
Land tenure category 1 (retention)	0	2,500	1,000	1,000
Land tenure category 2 (retention-limited disposal)	0	56,000	56,700	57,400
Land tenure category 3 (disposal)	10,900	0	800	100
Total	58,500	58,500	58,500	58,500

Source: BLM GIS 2021

Under Alternative A, there are isolated parcels west of the Missouri River identified for retention, particularly in Bowman County. Under Alternative A, a continuation of current management would limit, but not preclude, the BLM's ability to dispose of these isolated parcels to improve management efficiency. The majority of isolated parcels are located east (or north, as the case may be in northwest North Dakota) of the Missouri River but are not necessarily in any particular county. The BLM would evaluate all

exchange or acquisition proposals according to the criteria listed in the State Director's Guidance for Land Pattern Review and Land Adjustments and site-specific criteria. The BLM would use the following order of preference when making land tenure decisions:

1. Exchange (including the mineral estate with the surface estate if the land does not contain known mineral deposits) for lands that would provide equal or greater public benefits
2. Transfer to other federal agencies better able to manage the land for public benefits
3. Dispose to state agencies or private groups better able to manage the land for public benefits
4. R&PP patent
5. Sale

Under Alternative A, land exchanges would be the only means to adjust land patterns within the Big Gumbo or Lost Bridge areas or lands contiguous to tracts retained for manageable resource values. This would result in those areas maintaining a contiguous landownership pattern.

Alternative A would obtain or reserve easements to preserve important resources determined to be in the public interest on public and private lands. These could include archaeological sites, historic sites, scenic areas, or habitats for wildlife species.

Land Use Authorizations

Under Alternative A, there would be the potential for new ROWs, except solar and wind energy ROWs, on 100 percent of the decision area. This would allow the BLM lands and realty program to accommodate the demand for new nonsolar or nonwind ROWs, including belowground ROWs (see **Table 3-107**). Within ROW avoidance areas, avoidance criteria such as siting and design requirements could limit the placement of new ROWs.

Table 3-107
Lands and Realty Right-of-Way Allocations by Alternative

ROW Decision	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)	Alternative D
ROW exclusion area[1]	0	36,000	0	2,700
ROW avoidance area	35,700	21,600	57,400	54,600
Open to ROW authorization	22,800	900	1,100	1,200

Source: BLM GIS 2021

[1] GRSG PHMA is exclusion for solar and wind. However, the BLM does not anticipate development of solar or wind on BLM-administered lands. Therefore, PHMA is considered in avoidance for the purposes of analysis.

The entire decision area is classified as having wind resources that are suitable for wind power (EIA 2023); however, excluding solar and wind energy ROW development on 56 percent (32,900 acres) of the decision area would eliminate the potential for new solar- or wind-related ROWs in those areas. There would be no impacts on solar ROWs because there are no areas within the decision area that have a developable solar energy resource (DOE 2022; Sengupta et al. 2018). The BLM does not anticipate wind energy development on BLM-administered lands for the reasons identified in **Chapter 2**.

Land Withdrawals

Under Alternative A, the BLM would review requests for new FLPMA land withdrawals on a case-by-case basis. Any withdrawn lands would be subject to the terms and conditions of the withdrawal, which could

include a suspension of the multiple-use mandates under FLPMA. The BLM does not anticipate any land withdrawal actions during the planning period.

Public Access

Under Alternative A, the BLM would acquire and maintain access to BLM-administered lands, such as through easements and in accordance with the North Dakota Section Line Law. This would improve management efficiency and facilitate multiple uses in coordination with other federal agencies, state and local governments, and private landowners. These actions would improve the BLM's ability to implement lands and realty decisions under FLPMA; this is because there would be improved access to BLM-administered lands for ROWs and other authorizations or uses.

Alternative B

Land Tenure

Identifying 96 percent (56,000 acres) of the decision area for retention-limited disposal would result in the BLM largely maintaining the current landownership pattern while transferring select parcels out of federal ownership, consistent with FLPMA requirements and the land tenure adjustment categories and criteria in **Appendix G**, Land Tenure Adjustment Categories. Identifying 2,500 acres for retention would ensure those lands are retained in federal ownership. Overall, compared with Alternative A, there would be 10,900 fewer acres identified for category 3 disposal. This would lessen the potential for lands to be transferred out of federal ownership under Alternative B.

Under Alternative B, there would be no options for Desert Land Entry and Indian Allotment classification and application. Alternative B would have no acres suitable for category 3 land disposal, and disposals would only prevail on lands identified in the RMP.

Land Use Authorizations

Compared with Alternative A, there would be fewer opportunities for the BLM to accommodate the demand for all types of ROWs. This is because Alternative B would manage all but 1 percent (900 acres) of the decision area as either ROW avoidance or exclusion areas. Restricting ROWs on 99 percent of BLM-administered surface lands in the decision area could render certain resource uses typically possible on those lands as infeasible due to ROW exclusion or avoidance management. On the 36,000 acres (62 percent) of the decision area managed as ROW exclusion areas, the BLM would not authorize any type of ROW.

Managing 21,600 acres (37 percent) of the decision area as avoidance areas would limit, but not preclude, the potential for new ROWs in those areas. While the number of acres managed as avoidance areas would be less than under Alternative A, nearly all lands not managed as avoidance areas would be ROW exclusion areas.

Under Alternative B, an additional 1 percent (500 acres) of the decision area managed as ROW avoidance areas for belowground ROWs would limit opportunities for those types of ROWs, compared with Alternative A. However, because so much of the decision area would be ROW avoidance for all types of ROWs (36,000 acres), potential impacts would be negligible.

Requiring new ROWs, including those associated with valid existing rights, to be collocated within existing ROWs or where they best minimize effects would influence the locations where the BLM would authorize new ROWs. Compared with Alternative A, which would not have these requirements, there would be the potential for more collocated ROWs under Alternative B.

Land Withdrawals

Under Alternative B, land withdrawals would use withdrawal actions with the least restrictive measures and minimum size necessary to accomplish the required purpose. Compared with Alternative A, this would reduce the size of any future land withdrawal. Under Alternative B, 8,300 acres would be recommended for withdrawal to protect known or proposed bighorn sheep crucial habitat, Doaks Butte, the Schnell Ranch SRMA, and the Mud Buttes ACEC.

Public Access

Under Alternative B, obtaining public or administrative access over nonfederal lands using all methods available, including a land exchange with willing parties, would improve access compared with Alternative A.

Alternative C

Land Tenure

The quantitative impacts on land tenure would be nearly the same as they would be under Alternative B. This is because nearly the same portion of the decision area (56,700 acres; 97 percent) would be identified for category 2 retention-limited disposal. However, Alternative C would allocate 800 acres as category 3 disposal. These are areas of BLM-administered land without any known sensitive biological, or paleontological resources, and they are surrounded by private land with no legal access. In these areas, however, there are known or potential cultural resources; these would require evaluation for significance prior to disposal from federal management. Compared with Alternative A, Alternative C would identify 10,100 fewer acres for category 3 disposal; the impacts would be the same as those described under Alternative B.

Under Alternative C, there would be only 800 acres suitable for disposal; this is 10,100 acres less than would be suitable under Alternative A. While possible, interest in pursuing Indian Allotments on suitable lands remains low; these are unlikely to occur in the foreseeable future.

Land Use Authorizations

Impacts from ROW exclusion areas would be similar to those under Alternative A. Excluding new aboveground ROWs on 6 percent (2,000 acres) of the decision area would reduce the potential for those ROWs on 2,000 more acres than under Alternative A.

Compared with Alternative A, there would be 21,100 more acres of the decision area where avoidance criteria for new ROWs would apply. Managing 57,400 acres (97 percent) of the decision area as ROW avoidance areas would result in the requirement for new ROWs to avoid certain areas or include specific design criteria to minimize impacts on other resource values. Restricting ROWs on 97 percent of BLM-administered surface lands in the decision area could render certain resource uses typically possible on those lands as infeasible due to ROW exclusion or avoidance management.

The number of acres open to ROW authorization is 21,700 acres less than Alternative A. There are 1,100 acres open to ROW authorization under Alternative C (2 percent of the decision area). Under Alternative C, there would be more ROW avoidance restrictions, which would result in less ROW development when compared with Alternative A.

Under Alternative C, an additional 1 percent (700 acres) of the decision area would be managed as ROW avoidance areas for belowground ROWs. Compared with Alternative A, this would limit opportunities for those types of ROWs.

Impacts from the requirement to collocate new ROWs would be the same as those under Alternative B.

Land Withdrawals

Under Alternative C, land withdrawals would use withdrawal actions with the least restrictive measures and minimum size necessary to accomplish the required purpose. There would be no recommended locatable mineral entry withdrawals under Alternative C.

Public Access

Impacts on access would be the same as those described under Alternative B.

Alternative D

Land Tenure

The quantitative impacts on land tenure would be similar to those described for Alternative C. This is because the acres (1,000 acres; 2 percent of the decision area) would be identified for category 1 (retention) and nearly the same acres (57,400 acres, 98 percent of the decision area) would be category 2 retention-limited disposal. However, Alternative D would manage 100 acres as category 3 disposal. These are areas of BLM-administered land under 10 acres without any sensitive biological, cultural, paleontological, or other sensitive resources, and they are surrounded by private land with no legal access. Compared with Alternative A, Alternative D would identify 10,800 fewer acres for category 3 disposal; the impacts would be similar to those described under Alternative C but would cover a smaller area.

Land Use Authorizations

Impacts from ROW exclusion areas for Alternative D would be similar to those under Alternative B, except that 33,300 fewer acres would be ROW exclusion, 33,000 more acres would be ROW avoidance, and 300 more acres would be open to ROW authorization under Alternative D. Excluding new aboveground ROWs on 2,700 acres of the decision area would reduce the potential for those ROWs on more acres than under Alternative A.

Compared with Alternative A, there would be 18,900 more acres of the decision area where avoidance criteria for new ROWs would apply. Managing 54,600 acres (93 percent) of the decision area as ROW avoidance areas would result in the requirement for new ROWs to avoid certain areas or include specific design criteria to minimize impacts on other resource values. Restricting ROWs on 98 percent of BLM-administered surface lands in the decision area could render certain resource uses typically possible on those lands as infeasible due to ROW exclusion or avoidance management.

The number of acres open to ROW authorization would be 21,600 acres less when compared with Alternative A. There would be 1,200 acres open to ROW authorization under Alternative D (2 percent of the decision area). Under Alternative D, there would be more ROW exclusion and avoidance restrictions, which would result in less ROW development when compared with Alternative B.

Under Alternative D, an additional 500 acres of the decision area would be managed as ROW avoidance areas for belowground ROWs. Alternative D would be similar to Alternative C by managing numerous areas, such as riparian areas and wetlands, woody draws, sensitive soils, and special status species habitats as ROW avoidance.

Impacts from the requirement to collocate new ROWs in the Mud Buttes ACEC would be the same as those described under Alternative B.

Land Withdrawals

Under Alternative D, land withdrawals would use withdrawal actions with the least restrictive measures and minimum size necessary to accomplish the required purpose. Compared with Alternative A, this would reduce the size of any future land withdrawal. Under Alternative D, 960 acres would be recommended for withdrawal to protect the Mud Buttes ACEC.

Public Access

Impacts on access under Alternative D would be the same as those described under Alternative B.

Cumulative Impacts

Cumulative impacts on lands and realty are the result of past, present, and reasonably foreseeable future actions in and next to the planning area that increase or decrease demand for land tenure actions and land use authorizations. The primary past, present, and reasonably foreseeable future actions and conditions that have affected and would likely continue to affect lands and realty are minerals and energy development in the planning area.

The incremental impacts from the demands on lands and realty would vary by alternative due to varying levels of management to protect biological, cultural, and visual resources. Under Alternative A, there would be the most opportunities for new ROWs on BLM-administered lands; this is because there would be the fewest ROW avoidance or exclusion areas of any alternative. There would be the least opportunity to accommodate demand for new ROWs under Alternative B; this is because it would designate the largest portions of the decision area as ROW avoidance and exclusion areas. Combined with past, present, and reasonably foreseeable future actions, ROW avoidance and exclusion area designations under Alternative C would result in fewer cumulative impacts than under Alternative B, but more than under Alternative A.

Combined with past, present, and reasonably foreseeable future actions, transferring lands out of federal ownership would result in a more consolidated landownership pattern. This would improve the BLM's ability to efficiently manage the remaining lands in the decision area. The nature and type of cumulative impacts from land tenure would be nearly the same across the alternatives.

Under Alternative A, the nature and types of impacts from climate change would continue as described under the *Affected Environment* for this section. Under Alternative B, those impacts would apply to fewer new ROWs because there would be fewer areas managed as open to ROW development. Under Alternatives C and D, those impacts could apply to fewer new ROWs or ROWs with different designs or locations; this is because there would be more areas managed as ROW avoidance areas.

Climate change may impact the types of ROWs requested in the next 15 to 20 years as additional restrictions for flaring are implemented, more renewable developments request ROWs, and possible carbon sequestration occurs in the decision area.

3.3.2 Energy and Minerals

Issues

- How would the alternatives affect the acres of land available for fluid minerals leasing?
- How would the alternatives affect acres of land recommended for withdrawal from locatable mineral entry?
- How would the alternatives affect salable mineral materials disposal?
- How would the alternatives affect the acres available for coal leasing?
- How would the alternatives affect acres available for NEL mineral leasing?

Fluid Leasable Minerals

Affected Environment

The BLM administers approximately 489,300 acres of federal fluid mineral estate in North Dakota (see **Map 1-2**, BLM Surface Decision Area, and **Map 1-4**, BLM Fluid Minerals Subsurface Decision Area, in **Appendix A**). The NDFO administers approximately 2,500 federal oil and gas leases and has approved an average of 577 applications for permits to drill per year over the last 10 years.[30] Fluid leasable minerals in the planning area include oil, gas, coal bed natural gas, helium, and geothermal resources, but currently only oil and gas are actively leased. Oil and natural gas are produced from several formations in the state. The primary targets of oil and gas development are the Bakken and Three Forks Formations. In North Dakota, most federal mineral estate takes the form of small parcels that are not contiguous, resulting in a high number of fee/fee/federal[31] and split-estate oil and gas wells. Approximately 195,500 acres, or 40 percent of BLM-administered federal fluid mineral estate, is currently leased for oil and gas development. The RFD for Fluid Minerals (BLM 2022a) ranked the development potential based on the existing levels of development, producing oil and gas fields, and productivity of the underlying formations, very high development potential indicates townships expected to have 307 or more producing wells by the end of the planning period, high potential indicates townships expected to have between 161 and 306 wells, medium potential indicates areas expected to have between 5 and 160 wells, and low potential indicates areas expected to have 0 to 4 wells. In the portion of the planning area ranked as very high development potential, approximately 41,800 acres (90 percent) are leased. In the high development potential portion, approximately 80,300 acres (93 percent) are leased. In the medium development potential portion, approximately 68,900 acres (50 percent) are leased.

The Williston Basin is an intracratonic sag basin[32] that encompasses the planning area. It is located in portions of North Dakota, South Dakota, Montana, and Saskatchewan and Manitoba Canada. The Williston Basin contains several productive oil and gas source and reservoir formations. The predominant focus of recent development is the Bakken and Three Forks Formations. Estimates of resources vary, but the most recent US Geological Survey study estimated mean technically recoverable undiscovered oil and gas resources of 134 million barrels of oil and 81 billion cubic feet of natural gas, and 6 million barrels of natural gas liquids in the Upper Paleozoic Strata of the Williston Basin Province which includes the Bakken and Three Forks Formations and extends across parts of North Dakota, South Dakota, and Montana (Schenk et al. 2021).

[30] Automated Fluid Minerals Support System query run on October 19, 2021.
[31] Fee/fee/federal wells are those that are drilled on privately owned surface with private mineral estate below, where at least some portion of the horizontal well bore penetrates and is completed in federal mineral estate.
[32] Basins formed within stable continental or cratonic blocks in which sediments have accumulated.

Exploratory wells for helium and geothermal resources have recently been drilled in the Deadwood Formation in southern Saskatchewan, Canada, to the north of the planning area. The Deadwood Formation is also present in North Dakota, so it is possible that helium and geothermal exploration and development could occur in the planning area within the next 20 years.

An RFD was created for fluid minerals to assist in the analysis of the proposed alternatives (BLM 2022a). This document projects an unconstrained scenario, a scenario designed to estimate the high end of oil and gas production with minimal restrictions applied to development, for the purposes of analyzing the maximum impacts. It estimates that over the analysis period of 2020 to 2040, a total of approximately 43,000 new production and support wells would be drilled in western North Dakota; approximately 38,100 of the new wells would be production wells. Of those, the sections of well bore producing from BLM-administered federal minerals would be equivalent to approximately 1,106 production wells (approximately 3 percent of the total). The estimated total production would be approximately 16.39 billion barrels of oil and 33.72 billion thousand cubic feet[33] (Mcf) of natural gas. Of that, approximately 475.74 million barrels of oil and 978.83 million Mcf of natural gas are expected to be produced from BLM-administered federal mineral estate from existing and new wells.

Additional information on fluid minerals is available in Section 3.3, Fluid Leasable Minerals, of the AMS (BLM 2020b) and in the oil and gas RFD (BLM 2022a).

Environmental Consequences

Impacts Common to All Alternatives

Under all alternatives, existing fluid mineral leases are managed under the RMP in place at the time of issuance; if leases are relinquished or allowed to expire, management from the new RMP would be applied to the area. **Table 3-108**, below, shows currently leased and unleased BLM-administered federal mineral estate by assigned fluid mineral development potential. Much of western North Dakota, the area with reasonable potential for future fluid mineral development, is currently under lease (195,500 acres, or 40 percent of total BLM fluid mineral estate), and existing leases are likely to be developed. Of the very high and high development potential areas, where new development is expected to be concentrated, only 11,000 acres of federal fluid mineral estate remain unleased. Additionally, if a lease not held by production is relinquished, allowed to expire by the lessee, or terminated due to the lessee's failure to make proper rental payments, the federal tract could be could be re-offered for lease subject to management under this RMP/EIS. **Appendix B** shows fluid mineral leasing allocations by alternative, development potential, and lease status.

Operators typically avoid locating wellheads and other facilities on BLM-administered surface estate, if possible, due to the additional permitting requirements. BLM-administered surface parcels in the planning area tend to be small, noncontiguous, and surrounded by state and private lands, which makes them easy to avoid. Instead, operators prefer to locate surface development on private lands and develop federal mineral estate using horizontal drilling. Wells can be placed on private surface and initially drilled entirely in private minerals before being extended into federal mineral estate. This is a type of well called "fee/fee/federal".

[33] Thousand cubic feet (Mcf) is the unit of measure for natural gas.

Table 3-108
Lease Status of BLM-Administered Fluid Mineral Estate by Development Potential

Development potential	Lease status	Acres
Very High potential	Lease held by production	37,700
Very High potential	Leased, no production	4,100
Very High potential	Unleased	4,700
High potential	Lease held by production	71,100
High potential	Leased, no production	9,200
High potential	Unleased	6,300
Medium potential	Lease held by production	51,200
Medium potential	Leased, no production	17,700
Medium potential	Unleased	69,300
Low potential	Lease held by production	0
Low potential	Leased, no production	4,500
Low potential	Unleased	213,500
-	**Total**	**489,300**

Source: BLM GIS 2021
Note: All acreages are rounded to the nearest 100.

In fee/fee/federal situations, the BLM often has limited jurisdiction; the approval of the APD for the well extension into federal minerals is the federal action or undertaking that requires NEPA analysis. Depending on if changes to an existing well pad or construction of a new well pad are proposed, the BLM must analyze impacts of the proposed action differently. The Permanent Instruction Memorandum 2018-014 Directional Drilling into Federal Mineral Estate from Well Pads on Non-Federal Locations clarifies how the BLM must analyze impacts from approving an APD under NEPA, depending on the specifics of the proposed fee/fee/federal well. In some cases, off-site surface impacts that cannot be regulated by the BLM may occur. As a result, surface use, occupancy, and timing stipulations on BLM-administered surface often do not have a meaningful impact on the development of federal minerals in the decision area. Wells in the planning area often produce both nonfederal and federal fluid mineral resources from a single horizontal well bore.

Alternative A

Under Alternative A, the BLM would continue to apply the current fluid mineral management allocations shown in **Table 3-109**.

Table 3-109
Alternative A Fluid Mineral Stipulations

Fluid Mineral Leasing	Acres
Closed to fluid mineral leasing	0
Open to fluid mineral leasing, with mapped stipulations	402,500
Open to fluid mineral leasing, subject to STC[1]	86,800
Total	489,300

Source: BLM GIS 2021
[1] See **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing for STC

Within the "open to fluid mineral leasing, with mapped stipulations" category in **Table 3-109,** above, several types of stipulations are included. These stipulations overlap in some areas; therefore, the total of the separate stipulations (listed in **Table 3-110**, below) is greater than the total above, which only considers

Table 3-110
Alternative A Fluid Mineral Stipulation Details

Fluid Mineral Leasing Stipulations	Acres
Open to fluid mineral leasing, subject to NSO stipulations	202,600
Open to fluid mineral leasing, subject to CSU stipulations	15,800
Open to fluid mineral leasing, subject to TLs	328,600

Source: BLM GIS 2021

stipulation(s) applied versus no special stipulations applied. The mapped stipulations, shown in **Table 3-110**, below, include NSO, CSU, and TL stipulations. In NSO areas, surface occupancy and surface-disturbing activities associated with fluid mineral leasing cannot be conducted on the surface of the land. CSU areas are open to fluid mineral leasing, but the stipulations allow the BLM to require special operational constraints. TL areas are open to fluid mineral leasing, but these stipulations allow the BLM to restrict development during certain times.

Under Alternative A, the equivalent of approximately 1,106 federal producing wells would be developed from BLM-administered federal mineral estate. An estimated 475.74 million barrels of oil and 978.83 million Mcf of natural gas are expected to be produced from BLM-administered federal mineral estate from existing and new wells from 2020 to 2040. Of that, 322.94 million barrels of oil and 664.44 million Mcf of natural gas are estimated to come from new development of BLM minerals occurring during the planning period.

Total surface disturbance caused by new development of BLM minerals is expected to be approximately 1,625 acres under this alternative. Disturbance on BLM-administered surface estate from new development is difficult to estimate. Because of split-estate ownership, disturbance to BLM surface could be due to development of non-BLM minerals; as a result, BLM mineral allocations have very little impact. Under Alternative A, it is estimated that approximately 72 acres of BLM surface could be disturbed due to new mineral development; however, due to additional permitting requirements for locating on federal surface and the small and noncontiguous nature of federal surface estate in the planning area, operators are expected to locate development on nonfederal surface in most cases.

Table 3-111, below, shows the number of projected new producing wells, new support wells, total producing wells, and mineral production from BLM-administered mineral estate by year.

Table 3-111
BLM Oil and Gas Development Projections by Year, Alternatives A and C

Year	Producing BLM well spuds	Support BLM well spuds	Total BLM producing wells	BLM oil production (barrels/year)	BLM gas production (Mcf/year)
2020	22	2.9	559	17,239,000	35,469,000
2021	29	3.8	588	18,030,000	37,097,000
2022	46	5.9	634	20,020,000	41,191,000
2023	46	6.0	680	20,823,000	42,842,000
2024	48	6.3	729	21,406,000	44,043,000
2025	50	6.5	778	21,916,000	45,091,000
2026	51	6.6	829	22,381,000	46,047,000
2027	52	6.8	882	22,874,000	47,062,000
2028	53	6.9	935	23,353,000	48,047,000
2029	54	7.1	989	23,863,000	49,097,000

Year	Producing BLM well spuds	Support BLM well spuds	Total BLM producing wells	BLM oil production (barrels/year)	BLM gas production (Mcf/year)
2030	55	7.2	1,044	24,024,000	49,429,000
2031	56	7.3	1,100	24,143,000	49,673,000
2032	57	7.4	1,157	24,006,000	49,391,000
2033	58	7.6	1,216	23,991,000	49,360,000
2034	59	7.6	1,274	23,894,000	49,162,000
2035	58	7.6	1,332	23,813,000	48,994,000
2036	58	7.6	1,391	23,772,000	48,910,000
2037	59	7.7	1,450	23,638,000	48,634,000
2038	62	8.1	1,512	23,608,000	48,573,000
2039	65	8.4	1,577	23,602,000	48,560,000
2040	66	8.6	1,643	23,659,000	48,679,000
Total	**1,104**	**143.9**	**22,299**	**474,055,000**	**975,351,000**

Sources: BLM 2022a; BLM GIS 2021

Alternative B

Under Alternative B, the BLM would apply the fluid mineral management allocations shown in **Table 3-112**.

Table 3-112
Alternative B Fluid Mineral Stipulations

Fluid Mineral Leasing	Acres
Closed to fluid mineral leasing	213,100
Open to fluid mineral leasing, with mapped stipulations	261,600
Open to fluid mineral leasing, subject to STC[1]	14,600
Total	489,300

Source: BLM GIS 2021
[1] See **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing for STC

Within the "open to fluid mineral leasing, with mapped stipulations" category in **Table 3-112** above, the stipulations listed in **Table 3-113** would be applied; these stipulations overlap in some areas, so the total is greater than the total in **Table 3-112**, which only considers if an area has stipulation(s) applied or is subject to STC. As shown in **Table 3-108**, much of the federal mineral estate with higher development potential is currently leased (BLM GIS 2021). Leases are managed under the RMP in place at the time of lease issuance, so much of the federal mineral estate with higher development potential would not be affected by these changes. If a lease not held by production is relinquished or allowed to expire by the lessee, or terminated due to lessee's failure to make proper rental payments, the federal tract it could be re-offered for lease subject to management under this RMP/EIS.

Table 3-113
Alternative B Fluid Mineral Stipulation Details

Fluid Mineral Leasing Stipulations	Acres[1]
Open to fluid mineral leasing, subject to NSO stipulation	180,200
Open to fluid mineral leasing, subject to CSU stipulation	211,000
Open to fluid mineral leasing, subject to TLs	179,200

Source: BLM GIS 2021
[1] Fluid mineral stipulations can overlap, so the total of this table may be greater than the "Open to fluid mineral leasing, with mapped stipulations" category in the previous table

Under Alternative B, 213,100 acres of BLM minerals would be closed to fluid mineral leasing. This would prohibit new leasing of minerals ranked as low development potential, accounting for approximately 44 percent of the approximately 489,300 acres of BLM-administered federal mineral estate within North Dakota. In response to guidance in the *Report on The Federal Oil And Gas Leasing Program* (DOI 2021), this alternative closes all low development potential areas to leasing outside of approximately 5 miles from producing oil and gas fields. State-designated drinking water source protection areas are also closed under this alternative. It is projected that under Alternative B, approximately 1,103 producing wells would be developed on BLM-administered mineral estate, a reduction of approximately 3 producing wells from Alternative A. Under Alternative B, an estimated 473.41 million barrels of oil and 974.03 million Mcf of natural gas could be produced from BLM-administered mineral estate from 2020 to 2040; of that, 321.97 million barrels of oil and 662.45 million Mcf of natural gas are estimated to come from new development of BLM minerals.

Total surface disturbance caused by new development of BLM minerals under this alternative is expected to be approximately 1,620 acres, a reduction of 5 acres from Alternative A. Under Alternative B, it is estimated that, due to the reduction in wells, slightly less BLM-administered surface would be disturbed due to new mineral development; however, due to rounding, the total of approximately 72 acres of disturbance remains.

Table 3-114, below, shows the number of projected new producing wells, new support wells, total producing wells, and mineral production on BLM-administered mineral estate by year.

Table 3-114
Alternatives B and D BLM Oil and Gas Development Projections by Year

Year	Producing BLM well spuds	Support BLM well spuds	Total BLM producing wells	BLM oil production (barrels/year)	BLM gas production (Mcf/year)
2020	22	2.9	559	17,237,000	35,465,000
2021	29	3.8	588	18,026,000	37,088,000
2022	45	5.9	634	20,011,000	41,172,000
2023	46	6.0	680	20,810,000	42,815,000
2024	48	6.3	728	21,390,000	44,009,000
2025	50	6.5	778	21,896,000	45,050,000
2026	51	6.6	828	22,357,000	45,999,000
2027	52	6.8	880	22,847,000	47,007,000
2028	53	6.9	934	23,323,000	47,987,000
2029	54	7.0	988	23,830,000	49,030,000
2030	55	7.1	1,043	23,989,000	49,357,000
2031	56	7.3	1,099	24,106,000	49,598,000
2032	57	7.4	1,155	23,968,000	49,313,000
2033	58	7.6	1,214	23,951,000	49,278,000
2034	59	7.6	1,272	23,853,000	49,077,000
2035	58	7.5	1,330	23,770,000	48,907,000
2036	58	7.6	1,388	23,728,000	48,819,000
2037	59	7.7	1,447	23,593,000	48,542,000
2038	62	8.1	1,509	23,562,000	48,478,000
2039	64	8.4	1,574	23,554,000	48,462,000
2040	66	8.6	1,640	23,610,000	48,576,000
Total	**1,102**	**144**	**22,268**	**473,411,000**	**974,029,000**

Sources: BLM 2022a; BLM GIS 2021

Alternative C

Under Alternative C, the BLM would apply the fluid mineral management allocations shown in **Table 3-115**.

Table 3-115
Alternative C Fluid Mineral Stipulations

Fluid Mineral Leasing	Acres
Closed to fluid mineral leasing	0
Open to fluid mineral leasing, with mapped stipulations	447,800
Open to fluid mineral leasing, subject to STC[1]	41,500
Total	489,300

Source: BLM GIS 2021
[1] See **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing for STC

Within the "open to fluid mineral leasing, with mapped stipulations" category in **Table 3-115** above, the stipulations listed in **Table 3-116** would be applied; these stipulations overlap in some areas, so the total of individual stipulations is greater than the total in **Table 3-115**, which only considers if an area has stipulation(s) applied or is subject to STC.

Table 3-116
Alternative C Fluid Mineral Stipulation Details

Fluid Mineral Leasing Stipulations	Acres[1]
Open to fluid mineral leasing, subject to NSO stipulation	250,100
Open to fluid mineral leasing, subject to CSU stipulation	348,900
Open to fluid mineral leasing, subject to TLs	337,100

Source: BLM GIS 2021
[1] Fluid mineral stipulations can overlap, so the total of this table may be greater than the "Open to fluid mineral leasing, with mapped stipulations" category in the previous table

Because Alternative C closes 0 acres to leasing, the impacts on oil and gas resources under this alternative would be the same as under Alternative A.

Table 3-111, above, shows the number of projected new producing wells, new support wells, total producing wells, and mineral production on BLM-administered mineral estate by year under Alternative C, which is the same as under Alternative A.

Alternative D

Under Alternative D, the BLM would apply the fluid mineral management allocations shown in **Table 3-117**.

Table 3-117
Alternative D Fluid Mineral Stipulations

Fluid Mineral Leasing	Acres
Closed to fluid mineral leasing	213,100
Open to fluid mineral leasing, with mapped stipulations	261,100
Open to fluid mineral leasing, subject to STC[1]	15,100
Total	489,300

Source: BLM GIS 2021
[1] See **Appendix B**, Stipulations and Allocations Applicable to Fluid Minerals Leasing for STC

Within the "open to fluid mineral leasing, with mapped stipulations" category in **Table 3-117** above, the stipulations listed in **Table 3-118** would be applied; these stipulations overlap in some areas, so the total of individual stipulations is greater than the total in **Table 3-117**, which only considers if an area has stipulation(s) applied or is subject to STC.

Table 3-118
Alternative D Fluid Mineral Stipulation Details

Fluid Mineral Leasing Stipulations	Acres[1]
Open to fluid mineral leasing, subject to NSO stipulation	130,000
Open to fluid mineral leasing, subject to CSU stipulation	213,100
Open to fluid mineral leasing, subject to TLs	183,000

Source: BLM GIS 2021
[1] Fluid mineral stipulations can overlap, so the total of this table may be greater than the "Open to fluid mineral leasing, with mapped stipulations" category in the previous table

Table 3-111, above, shows the number of projected new producing wells, new support wells, total producing wells, and mineral production on BLM-administered mineral estate by year under Alternative D, which is approximately the same as under Alternative B. Other impacts such as total surface disturbance would also be the same as under Alternative B.

Cumulative Impacts

Past actions that have affected energy and minerals development include market conditions, permitting delays, and new extractive technologies such as hydraulic fracturing. Present actions affecting energy and minerals are primarily market demand. An increase in demand and resource prices typically results in additional development, and decreased demand and resource prices typically result in slower development.

Future actions affecting fluid minerals would be similar to present actions, but they could also include new or enhanced extraction methods. These could increase total production or make currently noneconomic deposits economically viable. New pipeline and processing facilities could allow increased production. Changes in demand could reduce or increase the prices of minerals, which might affect the economics of production in marginal areas.

The contribution to cumulative impacts from proposed management under each alternative would parallel the impacts of the alternatives in the general impact analysis shown above. In general, management actions under every alternative would result in continued development of fluid mineral resources in the planning area; development would not vary significantly by alternative.

Environmental trends associated with climate change would not impact the availability, quality, or quantity of mineral and energy resources. Efforts to reduce CO_2 emissions could result in reduced production of oil and gas from the planning area.

Solid Leasable Minerals (Coal)

Affected Environment

Leasing and development of coal resources provides benefits such as efficient and reliable baseload power to support the economic and social needs and domestic security. North Dakota's Fort Union Coal Production Region contains an estimated 351 billion tons of lignite, the single largest deposit of lignite known in the world. North Dakota also contains an estimated 25 billion tons of economically minable coal reserves of thermal lignite coal (North Dakota Geological Survey 2021). Lignite coal is the predominant

federal solid leasable mineral in the planning area by tons produced. The decision area includes 4.1 million acres of federal coal mineral estate across 37 counties in North Dakota (see **Map F-1**, Screen 1 Coal Development Potential, in **Appendix F**, Coal Screening Process). However, most of the minable federal coal resources occur in the Fort Union Coal Production Region encompassing most of 24 counties located in western North Dakota (Shaffer 2020). Currently, the mining of federal and nonfederal thermal coal occurs only in an area of three contiguous counties: Mercer, McLean, and Oliver. Although the Federal Government is the single-largest coal owner in the region, there are few large, consolidated blocks of federal coal around the existing mines. As a result, there are sufficient nonfederal reserves and production potential to maintain the current annual production level without being critically dependent upon federal coal. Additionally, as federal coal exists as isolated tracts of split-estate, mining operations could avoid and bypass these areas in most instances. The management of federal coal does not control or have strong influence over the coal market in the planning area, as coal ownership is a mixture of federal, state, and private interests. In 2019, federal coal production accounted for approximately 11 percent of the total tonnage produced in North Dakota (BLM 2022b).

Lignite coal is mined to supply requirements of nearby power plants. Currently, five mines are operational in the planning area; they mine private, state, and federal coal. However, Heskett Station power plant has converted to run on natural gas, and the mine supplying it, Beulah Mine, is no longer producing and is in reclamation (BLM 2022b; **Appendix F**, Coal Screening Process). The current federal coal leases total 11,664 acres.

Additional information is available in Section 3.4, Solid Leasable Minerals, of the AMS (BLM 2020b) and in the coal RFD (BLM 2022b).

Environmental Consequences

Reasonably Foreseeable Development Scenario for Coal Development

The RFD for coal development estimates the federal and nonfederal lignite coal development potential in the North Dakota Fort Union Coal Production Region for the NDFO over 20 years (2020–2040). The scenario estimates that total federal and nonfederal coal production in North Dakota will remain relatively steady, ranging from 26 to 29 million short tons annually during the planning period. Total projected production of federal and nonfederal coal during the planning period is approximately 540 million tons, with approximately 120 million of those tons produced from federal mineral estate. Existing federal coal leases include 11,664 mineral estate acres. Pending federal leases include an additional 2,150 acres. Based on information collected during the creation of the RFD scenario, mines in the planning area could nominate approximately 4,960 acres of federal coal tracts for future leasing during the planning period. The potential nomination area contains approximately 95 million tons of federal coal (BLM 2022b).

Impacts Common to All Alternatives

Coal mineral leases are managed under the RMP in place at the time of issuance until the lease is modified, relinquished, or terminated due to a failure to meet diligent development requirements.

The coal screening process is conducted to identify areas acceptable for further consideration for coal leasing. The first step in this process identifies lands that have coal development potential. The second step reviews federal lands during land use planning to assess where there are areas unsuitable for all or stipulated methods of mining using the unsuitability criteria set forth in 43 CFR 3461. The third step evaluates multiple land use decisions (trade-offs) that may eliminate lands from leasing that contain resources presently deemed more important that coal. The fourth step requires surface owner consultation for private surface

lands overlying federal coal. **Appendix F**, Coal Screening Process, contains maps and information with unsuitability and coal screen results. Under all alternatives, the coal unsuitability screening process would be applied on a case-by-case basis in response to individual coal lease applications. All unsuitability criteria would be reviewed at the time of application, and acreages may be made available without requiring an RMP amendment if resource data change. Criterion 15 of the unsuitability criteria would require reclamation as a stipulated method of coal mining in areas identified as habitat for species of high interest to the state.

Alternative A

Under Alternative A, the coal screen results from the 1988 North Dakota RMP would continue to be applied. The BLM would continue to manage 435,800 acres as unacceptable for coal leasing, and 573,900 acres would continue to be managed as acceptable for coal leasing (**Table 3-119**). Under Alternative A, no new coal screening would occur, except for the reapplication of unsuitability criteria on a case-by-case basis at the time of application. During the planning period (2020–2040), approximately 120.11 million short tons of federal coal are projected to be produced.

Table 3-119
Alternative A Coal Allocations

Coal Allocations	Acres
Unacceptable for coal leasing	435,800
Acceptable for coal leasing	573,900
Total	1,009,700

Source: BLM GIS 2021

Alternative B

Under Alternative B, the updated coal screening criteria for Alternative B (see **Appendix F**, Coal Screening Process) would be applied. Under Coal Screen 3, Alternative B excludes areas with only leonardite potential (no mapped lignite potential) as part of the multiple-use screen. Leonardite is a low-quality coal rich in humic acid with high emission rates. Alternative B also applies a criterion that limits coal development to within a 4-mile area around the mine permit boundaries as of September 9, 2022. Focusing development near existing mines and infrastructure would reduce additional transportation needs and associated GHG emissions. This would also reduce surface-disturbing activities and potential impacts on cultural and physical (wildlife, water, and soil) resources. To protect steep slopes under Alternative B, slopes greater than or equal to 30 percent and covering continuous areas larger than 10 acres would be removed from consideration for leasing. The Mud Buttes ACEC, Schnell Ranch SRMA, and the two BCAs, as well as the Knife River Indian Villages National Historic Site viewshed would be removed from consideration for leasing. Under these criteria, 1,042,000 acres would be managed as unacceptable for coal leasing, and 54,400 acres would be managed as acceptable for coal leasing (**Table 3-120**). The existing leases are within the area acceptable for coal leasing. According to the RFD for coal development (BLM 2022b), existing mines estimated that they would nominate approximately 4,960 acres of federal coal tracts for future leasing during the approximately 20-year planning period; therefore, the BLM would not expect leasing of federal coal to be constrained by the coal allocations under this alternative. During the planning period (2020–2040), the RFD projects that approximately 120.11 million short tons of federal coal would be produced. While no reduction in emissions or coal production from existing mines would result from Alternative B, this Alternative would preclude the development of future mines using federal coal.

Table 3-120
Alternative B Coal Allocations

Coal Allocations	Acres
Unacceptable for coal leasing	1,042,000
Acceptable for coal leasing	54,400
Total	1,096,400

Source: BLM GIS 2021

Alternative B.1

Alternative B.1 is a sub-alternative to Alternative B that provides the same management opportunities and protections as found under Alternative B for all resources except coal. Under Alternative B.1, the coal screening criteria for Alternative B would be applied, with an additional multiple-use coal screen designating all lands outside of existing mine permit boundaries as of September 9, 2022, as unacceptable for further consideration for leasing (see **Appendix F**, Coal Screening Process). Under these criteria, 1,080,100 acres would be managed as unacceptable for coal leasing, and 16,400 acres would be managed as acceptable for coal leasing (**Table 3-121**). Alternative B.1 would reduce the potential for expansion of federal coal mining at all active North Dakota mines: BNI Center, Coyote Creek, Falkirk, and Freedom. It would also reduce the expected expansion at the Falkirk and Freedom Mines.

Under Alternative B.1, the assumption in the Coal RFD (BLM 2022b) that the two pending federal coal leasing actions at the Falkirk and Freedom mines would be modified because only the portion of the pending lease area that lies inside the mine permit boundaries as of September 9, 2022 would be leased. As a result approximately 1,670 acres and 23.7 million tons of coal from the pending federal leasing applications would not be offered for lease, the remaining 480 acres and 8.0 million tons of federal coal in the pending federal leasing applications would be available for leasing and would likely be leased. Of this resulting acreage and tonnage made available for leasing, 320 acres and 5.1 million tons would be mined by the end of 2040. Under this alternative, during the planning period (2020–2040), the coal RFD projects that approximately 92.04 million short tons of federal coal would be produced (BLM 2022b). The BLM anticipates that leased federal coal, including the portions of the pending leases inside the permit boundaries, would be exhausted at the Falkirk Mine in 2027 and the Freedom Mine in 2035 under Alternative B.1. It is anticipated that the reduction in federal coal production under Alternative B.1 would be replaced by an increase in nonfederal coal production so that coal mines could meet existing contract requirements, as a result the total production of coal in North Dakota is not expected to change. This replacement of federal coal with private coal would likely result in an increase in cumulative (private plus federal) impacts as companies bypass federal coal and reach out further to develop private coal. This would result in an increase in adverse impacts (for example greater surface disturbance and transportation emissions), as well as inefficient resource development and a loss of federal revenue. Estimated federal coal production and the reduction in federal production under Alternative B.1 compared to the Coal RFD baseline scenario (BLM 2022b) is shown below in **Table 3-122**.

Table 3-121
Alternative B.1 Coal Allocations

Coal Allocations	Acres
Unacceptable for coal leasing	1,080,100
Acceptable for coal leasing	16,300
Total	1,096,400

Source: BLM GIS 2021

Table 3-122
Alternative B.1 Estimated Coal Production (2020-2040)

Year	Total Production (million tons)	Alternative B.1 Federal Production (million tons)	Reduction in Federal Production from Baseline (million tons)
2021	26.38	4.75	0
2022	26.88	5.78	0
2023	27.24	6.19	0
2024	27.78	6.25	0
2025	27.26	6.18	0
2026	27.46	6.26	0
2027	27.98	5.90	0.4
2028	27.46	5.80	0.43
2029	27.67	5.89	0.43
2030	28.11	5.90	0.45
2031	26.40	5.49	0.42
2032	26.61	5.56	0.43
2033	26.87	5.51	0.45
2034	26.40	5.49	0.42
2035	26.61	2.19	3.8
2036	26.87	1.78	4.18
2037	26.40	1.76	4.15
2038	26.61	1.83	4.16
2039	26.87	1.78	4.18
2040	26.40	1.76	4.15
Total	540.26	92.04	28.07

Source: BLM 2022b

Alternative C

Under Alternative C, the new coal screening criteria for Alternative C (see **Appendix F**, Coal Screening Process) would be applied. Under these criteria, 542,800 acres would be managed as unacceptable for coal leasing, and 553,600 acres would be managed as acceptable for coal leasing (**Table 3-123**). According to the RFD for coal development (BLM 2022b), existing mines estimated that they might nominate approximately 4,960 acres of federal coal tracts for future leasing during the approximately 20-year planning period; therefore, the BLM would not expect the leasing of federal coal to be constrained by the coal allocations under this alternative. During the planning period (2020–2040), the RFD for coal development projects that approximately 120.11 million short tons of federal coal would be produced.

Table 3-123
Alternative C Coal Allocations

Coal Allocations	Acres
Unacceptable for coal leasing	542,800
Acceptable for coal leasing	553,600
Total	1,096,400

Source: BLM GIS 2021

Alternative D

Under Alternative D, the new coal screening criteria for Alternative D (see **Appendix F**, Coal Screening Process) would be applied. Areas unacceptable for further consideration would include: areas outside 4 miles from coal mine permit boundaries as of September 9, 2022, areas consisting of slopes greater than 30 percent covering more than a 10-acre area, Knife River Indian Villages Historic Site viewshed, areas with only leonardite potential, Mud Buttes ACEC, Schnell Ranch SRMA, and the two BCAs. Additionally, under Screen 4 Consultation with Qualified Surface Owners, Alternative D considered only trends or clusters of opposition to mining, rather than individual responses. Alternative D did not find significant clusters of opposition to mining and did not identify any lands as unavailable for further consideration for coal leasing under this screen. Before potential leases are delineated, surface owners would again be contacted as to their preference for or against surface coal mining, in accordance with the BLM Coal Leasing Handbook. Under these criteria, 1,037,800 acres would be managed as unacceptable for coal leasing, and 58,600 acres would be managed as acceptable for coal leasing (**Table 3-124**). According to the RFD for coal development (BLM 2022b), existing mines estimated that they might nominate approximately 4,960 acres of federal coal tracts for future leasing during the approximately 20-year planning period; therefore, the BLM would not expect the leasing of federal coal to be constrained by the coal allocations under this alternative. During the planning period (2020–2040), the RFD for coal development projects that approximately 120.11 million short tons of federal coal would be produced. While no reduction in emissions or coal production from existing mines would result from Alternative D, this Alternative would preclude the development of future mines using federal coal. Using a 4 mile buffer from coal mine permit boundaries as of September 9, 2022, would minimize bypass of federal coal reserves and related impacts on non-federal coal, and allow for efficient mine operations.

Table 3-124
Alternative D Coal Allocations

Coal Allocations	Acres
Unacceptable for coal leasing	1,037,800
Acceptable for coal leasing	58,600
Total	1,096,400

Source: BLM GIS 2021

Cumulative Impacts

Past actions that have affected energy and minerals include market conditions, permitting delays, and new extractive technologies. Present actions affecting coal resources are primarily market demand. An increase in demand and resource prices results in additional development, and decreased demand and resource prices result in slower development.

Future actions affecting solid energy leasable minerals would be similar to present actions. They could, however, also include new or enhanced extraction methods, which could increase total production or make currently noneconomic deposits economically viable. Changes in demand could reduce or increase the prices of minerals, which might affect the economics of production in marginal areas. The closure of coal power plants in the planning area would reduce demand for coal from supplying mines. The opening of new plants or the discovery of new resource uses could increase demand.

The contribution to cumulative impacts from proposed management under each alternative would parallel the impacts of the alternatives in the general impact analysis, above. In general, management actions under

every alternative would allow for continued development of resources in the planning area; development would not vary significantly by alternative.

Environmental trends associated with climate change would not have an impact on the availability, quality, or quantity of mineral energy resources. Efforts to reduce CO_2 emissions could result in reduced production of coal from the planning area.

Locatable Minerals

Affected Environment

The surficial geology of the planning area is primarily sedimentary, which limits significant occurrences of mineralized zones and associated minerals. Uranium, bentonite, and rare earth elements are the primary locatable minerals of interest in the planning area. No locatable minerals projects are currently being developed on federal mineral estate.

Researchers from the University of North Dakota are building a pilot plant to test extracting rare earth elements from coal deposits (University of North Dakota 2019). Should the pilot be successful, the program could expand demand for federal minerals.

Additional information is available in Section 3.5, Locatable Minerals, of the AMS (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

Under all alternatives, existing claims authorizations would remain in effect until they expire or are modified. Reclamation standards in **Appendix E** would be required, all operations would be conducted to protect resources in conformance with federal and state laws, and the performance standards at 43 CFR 3809.420 would be required. In certain areas, stipulations on locatable mineral development, such as requiring that all operations greater than casual use be plan level, would be applied in order to protect other resource values; these would not impact the availability of locatable minerals for development. Under the requirements of the Mining Law of 1872 the BLM has limited authority in the management of locatable mineral resources, some management direction employed to protect resource values in the planning area may not be applicable to locatable mineral development. Consistent with 43 CFR 3809 BLM will only apply management direction to prevent unnecessary or undue degradation and ensure conformance with applicable laws.

Alternative A

Under Alternative A, current management of locatable minerals would continue: 7,700 acres would remain not open to locatable mineral entry under existing segregations due to their status as previously acquired land without an opening order, and 354,900 acres would remain open to locatable mineral entry (**Table 3-125**).

Table 3-125
Alternative A Locatable Minerals

Locatable Minerals	Acres
Withdrawn from locatable mineral entry	0
Not open to locatable mineral entry (existing segregations)	7,700
Open to locatable mineral entry	354,900
Total	362,600

Source: BLM GIS 2021

Alternative B

Under Alternative B, all 362,600 acres would be open to locatable mineral entry (**Table 3-126**). The 7,700 acres of existing segregations currently not open to locatable mineral entry would have a recommendation that an opening order be issued. A total of 8,300 acres would be recommended for withdrawal from locatable mineral entry. If Congress or the Secretary of the Interior enacts this recommendation, the availability of these resources would be reduced, compared with Alternative A.

Under this alternative, per 43 CFR 3809, a plan of operations would be required for any locatable mineral activity greater than casual use within the Mud Buttes ACEC, and within the portions of the Little Missouri, Missouri, and Yellowstone Rivers deemed suitable for inclusion in the NWSRS. The need to develop and submit a plan of operations would result in increased costs for locatable mineral activities that would otherwise be classified as notice-level operations, but would not impact casual use or operations that would still be classified as plan-level operations outside of special status areas such as ACECs or WSRs.

Table 3-126
Alternative B Locatable Mineral

Locatable Minerals	Acres
Withdrawn from locatable mineral entry	0
Recommend for withdrawal from locatable mineral entry	8,300
Open to locatable mineral entry	362,600
Total	362,600

Source: BLM GIS 2021

Alternative C

Under Alternative C, all 362,600 acres would be open to locatable mineral entry (**Table 3-127**). The 7,700 acres of existing segregations currently not open to locatable mineral entry would have a recommendation that an opening order be issued. This would increase locatable mineral availability, compared with Alternative A.

Under this alternative, a plan of operations would be required for any locatable mineral activity greater than casual use within the Mud Buttes ACEC. The need to develop and submit a plan of operations would result in increased costs for locatable mineral activities that would otherwise be classified as notice-level operations, but would not impact casual use or operations that would still be classified as plan-level operations outside of special status areas such as ACECs.

Table 3-127
Alternative C Locatable Minerals

Locatable Minerals	Acres
Withdrawn from locatable mineral entry	0
Recommend for withdrawal from locatable mineral entry	0
Open to locatable mineral entry	362,600
Total	362,600

Source: BLM GIS 2021

Alternative D

Under Alternative D, all 362,600 acres would be open to locatable mineral entry (**Table 3-128**). The 7,700 acres of existing segregations currently not open to locatable mineral entry would have a recommendation that an opening order be issued. This would increase locatable mineral availability, compared with Alternative A. However, Alternative D would recommend the 960 acre Mud Buttes ACEC for withdrawal from locatable mineral entry. If Congress or the Secretary of the Interior enacts this recommendation, the mineral resources within the withdrawal area would no longer be available for development.

Under this alternative, a plan of operations would be required for any locatable mineral activity greater than casual use within the Mud Buttes ACEC. The need to develop and submit a plan of operations would result in increased costs for locatable mineral activities that would otherwise be classified as notice-level operations, but would not impact casual use or operations that would still be classified as plan-level operations outside of special status areas such as ACECs.

Table 3-128
Alternative D Locatable Minerals

Locatable Minerals	Acres
Withdrawn from locatable mineral entry	0
Recommend for withdrawal from locatable mineral entry	1,000
Open to locatable mineral entry	362,600
Total	362,600

Source: BLM GIS 2021

Cumulative Impacts

Past actions that have affected energy and minerals include market conditions, permitting delays, and new extractive technologies. Present actions affecting energy and minerals are primarily market demand. An increase in demand and resource prices results in additional development, and decreased demand and resource prices result in slower development.

Future actions affecting locatable minerals would be similar to present actions. They could, however, also include new or enhanced extraction methods, which could increase total production or make currently noneconomic deposits economically viable. Changes in demand could reduce or increase the prices of minerals, which might affect the economics of production in marginal areas.

The contribution to cumulative impacts from proposed management under each alternative would parallel the impacts of the alternatives in the general impact analysis, above. Management actions under every alternative would allow for continued development of locatable mineral resources in the planning area; development would not vary significantly by alternative.

Climate change would not have a noticeable impact on the availability, quality, or quantity of mineral and energy resources. Efforts to reduce CO_2 emissions could result in the increased production of rare earth elements and other minerals used in electric cars, batteries, infrastructure, and other elements of renewable energy development.

Mineral Materials

Affected Environment

Mineral materials, also referred to as salable materials, consist of common or low-value materials that are predominantly used in construction or other local uses. In North Dakota, the most common uses of mineral

materials are road surface and road base materials, well pad construction, earthen fill, and infrastructure construction and maintenance. The primarily sedimentary and glacial history of the planning area dictates that mineral materials are predominantly clays, sands, gravels, and clinker.

There are currently no authorized mineral materials developments on federal minerals. There are three recently expired contracts. There is one pending contract for leonardite, which is a weathered form of coal that is managed as mineral materials.

Additional information is available in the mineral materials RFD (BLM 2022c) and in Section 3.6, Salable Minerals, of the AMS (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

Under all alternatives, existing mineral materials and locatable mineral authorizations would remain in effect until they expire or are modified. Under all alternatives, increased demand for sand and gravel for road and well pad construction is expected to result in the opening of new mineral materials pits and the expansion of existing pits where deposits of mineral materials are located within the vicinity of oil and gas development areas. The disposal of mineral material resources is a discretionary decision under 43 CFR 3600, this means that even in areas open to disposal BLM may decline to dispose of these materials if it is determined that doing so would be detrimental to the public interest.

Alternative A

Under Alternative A, the BLM would continue current management of mineral materials resources. Approximately 44,500 acres would be closed to mineral materials disposal, and 318,100 acres would remain open to mineral materials disposal (**Table 3-129**). The mineral materials RFD (BLM 2022c) prepared for the planning area estimates that approximately 40 acres a year of BLM-administered mineral materials would be developed; the management under this alternative would not prevent or impede that level of development.

Table 3-129
Alternative A Mineral Materials

Mineral Materials	Acres
Closed to mineral materials disposal	44,500
Open to mineral materials disposal	318,100
Total	362,600

Source: BLM GIS 2021

Alternative B

Under Alternative B, approximately 206,500 acres would be closed to mineral materials disposal, and 156,100 acres would remain open to mineral materials disposal (**Table 3-130**). The mineral materials RFD (BLM 2022c) prepared for the planning area estimates that approximately 40 acres a year of BLM-administered mineral materials would be developed. Compared with Alternative A, management under Alternative B would reduce the acres open, but it would not prevent or impede the projected levels of development. Under this alternative, stipulations or required design features would be applied as required to protect other resource values.

Table 3-130
Alternative B Mineral Materials

Mineral Materials	Acres
Closed to mineral materials disposal	206,500
Open to mineral materials disposal	156,100
Total	362,600

Source: BLM GIS 2021

Alternative C

Under Alternative C, approximately 59,700 acres would be closed to mineral materials disposal, and 302,900 acres would remain open to mineral materials disposal (**Table 3-131**). The mineral materials RFD (BLM 2022c) prepared for the planning area estimates that approximately 40 acres a year of BLM-administered mineral materials would be developed. Compared with Alternative A, management under Alternative C would slightly reduce the acres open, but it would not prevent or impede the projected level of development. Under this alternative, stipulations or required design features would be applied as required to protect other resource values.

Table 3-131
Alternative C Mineral Materials

Mineral Materials	Acres
Closed to mineral materials disposal	59,700
Open to mineral materials disposal	302,900
Total	362,600

Source: BLM GIS 2021

Alternative D

Under Alternative D, approximately 198,900 acres would be closed to mineral materials disposal, and 163,700 acres would remain open to mineral materials disposal (**Table 3-132**). The mineral materials RFD (BLM 2022c) prepared for the planning area estimates that approximately 40 acres a year of BLM-administered mineral materials would be developed. Compared with Alternative A, management under Alternative D would slightly reduce the acres open, but it would not prevent or impede the projected level of development. Under this alternative, stipulations or required design features would be applied as required to protect other resource values.

Table 3-132
Alternative D Mineral Materials

Mineral Materials	Acres
Closed to mineral materials disposal	198,900
Open to mineral materials disposal	163,700
Total	362,600

Source: BLM GIS 2021

Cumulative Impacts

Past actions that have affected energy and minerals include market conditions, permitting delays, and new extractive technologies. Present actions affecting energy and minerals are primarily market demand. An increase in demand and resource prices results in additional development, and decreased demand and resource prices result in slower development.

Future actions affecting mineral materials would be similar to present actions. They could, however, also include new or enhanced extraction methods, which could increase total production or make currently noneconomic deposits economically viable. Changes in demand could reduce or increase the prices of minerals, which might affect the economics of production in marginal areas.

The contribution to cumulative impacts from proposed management under each alternative would parallel the impacts of the alternatives in the general impact analysis, above. Management actions under every alternative would allow for continued development of mineral resources in the planning area; development would not vary significantly by alternative.

Climate change would not have a noticeable impact on the availability, quality, or quantity of mineral materials in the planning area. Administrative focus on increasing renewable energies and rebuilding or improving infrastructure in efforts to combat climate change could drive up demand for mineral materials in the planning area. The changing climate, as discussed in **Section 3.2.1**, anticipates increased heavy rainfall events and increased flooding as climate change persists and continues. These natural events will erode infrastructure and demand more mineral materials to maintain or replace roadways, bridges, and foundations, among other infrastructure.

Nonenergy Leasable Minerals

Affected Environment

NEL minerals include phosphate, sodium, potassium, sulfur, and gilsonite. Deposits of potash and helium in North Dakota are the only NEL minerals that have been identified as having the potential for commercial accumulations in the planning area (Box and Cossette 2021).

Environmental Consequences

Impacts Common to All Alternatives

Deposits of potash and helium trapped in deep Williston Basin strata have been identified as having the potential for commercial accumulations (Box and Cossette 2021). There is no current development of these deposits on federal mineral lands. Technology exists to recover the deposits, but, due to the deposit depth, there are more economic deposits available in other areas. North Dakota deposits are likely to remain reserves unless reserves in other locations become depleted or demand increases. Closures or other stipulations would limit access to deposits in the event development were to occur, but under all alternatives, there is no foreseeable development likely during the life of the plan.

Alternative A

Under Alternative A, 318,100 acres would be open to NEL mineral leasing, and 44,500 acres would be closed to leasing.

Alternative B

Under Alternative B, 279,600 acres would be open to NEL mineral leasing, and 83,000 acres would be closed to leasing.

Alternative C

Under Alternative C, 302,900 acres would be open to NEL mineral leasing, and 59,700 acres would be closed to leasing.

Alternative D

Under Alternative D, 294,700 acres would be open to NEL mineral leasing, and 67,900 acres would be closed to leasing.

Cumulative Impacts

Past and future actions affecting NEL minerals include primarily market demand for the minerals where increased need for domestic supplies could increase demand for these minerals over time. Because no development is anticipated during the life of the plan, no cumulative impacts are anticipated.

3.3.3 Recreation and Visitor Services

Issues

- How would the alternatives affect the types and levels of BLM-provided recreation opportunities across North Dakota?
- How would BLM management affect the Big Gumbo and Lost Bridge areas?
- How would the BLM maintain or improve public access for recreation on BLM-administered lands?
- How would the alternatives affect the BLM's ability to provide trail and travel opportunities in North Dakota?

Affected Environment

Recreation opportunities in the planning area are mostly dispersed activities where visitors participate individually or in small groups. Hunting, fishing, and hiking are the main recreation activities, while some visitors participate in bicycling, wildlife viewing, horseback riding, and camping. There are developed recreation opportunities in the Schnell Ranch Recreation Area, which is the only established recreation area on BLM-administered surface lands in the planning area. There are no designated SRMAs, extensive recreation management areas, or BCAs in the planning area.

Additional information is available in Section 3.7, Recreation and Visitor Services, of the AMS (BLM 2020b).

Schnell Ranch Recreation Area

The 2,000-acre Schnell Ranch Recreation Area includes developed campsites, restroom facilities, trails, a picnic area, kiosks and other signage, and a headquarters site (see Map 3-3, Schnell Ranch Recreation Area, in Appendix A of the AMS [BLM 2020b]). Visitors to the area participate in camping, hunting, bicycling, horseback riding, hiking, picnicking, bird-watching, fishing, and environmental education. The Schnell Ranch Recreation Area contains 4 miles of nonmotorized trails, with an additional 1.3 miles under development. Dispersed primitive tent camping is allowed in the area, except within 100 feet of the 1.3-mile Bur Oak Nature Trail. With the exception of the graveled entrance road, the area is closed to OHV use.

Other Areas

Recreation outside the Schnell Ranch Recreation Area is dispersed, such as hunting, camping, hiking, recreational shooting, photography, canoeing, and wildlife viewing. The Big Gumbo area in Bowman County is the largest contiguous piece of BLM-administered land and is predominantly used for hunting and dispersed camping. Other dispersed recreation areas include the Figure Four Ranch and other portions of the Lost Bridge area along the Little Missouri River in Dunn County. These other BLM-administered surface lands in the planning area provide hunting and other recreation opportunities; however, limited

access to scattered parcels of BLM-administered surface land across private lands restricts the location and extent of these activities. Recreational OHV use is limited to existing roads and trails.

Climate Change

Climate warming could cause changes in the landscape character of the planning area, with effects extending to recreation. Warmer year-round temperatures and the associated increases in the growing season length, combined with an increase in the seasonal wildfire duration and fire frequency, will continue to change the appearance of the planning area's landscape. More frequent and more intense droughts and storms will increase the potential for larger, more frequent wildfires (Carter and Culp 2010), with indirect impacts on recreation. Wildfire reduces the quality and quantity of recreation opportunities and displaces visitors by damaging recreation facilities, degrading visual qualities, eroding trails, and potentially closing areas during and after fires. Wind-driven ash and particulates from regional wildfires will result in decreased seasonal visibility, affecting the visual character of the landscape; this will indirectly affect the recreational experience.

Similarly, lower soil moisture resulting from dryer climatic conditions and decreased rainfall can result in changes to the vegetation cover and a decline in the extent of forest cover within riparian areas. Over time, these incremental and nuanced changes to the landscape will result in impacts on the recreational experience within the planning area. The rate of change in flora and other landscape features will continue to be dependent on the associated changes in climatic conditions.

Environmental Consequences

Impacts Common to All Alternatives

Under all alternatives, the BLM would continue to place signage for sizable blocks of BLM-administered land to identify public access. The BLM also would continue to prepare activity plans for the development of recreational facilities, such as campgrounds, when necessary to meet public demand. These actions would create benefits for recreational users throughout the planning area. In addition, the proposed issuance of special recreation permits as appropriate for commercial, competitive, special events, and organized group activities (which would be subject to guidelines in BLM Handbook 2930) would allow for more effective management of recreational use. This would result in indirect beneficial effects on recreation and visitor services in the planning area. Similarly, reviewing special recreation permit applications and renewals on a case-by-case basis, monitoring changes in demand for permits and their resulting impacts, and identifying future thresholds that could lead to limits in the number of permits would also lead to improved recreation management by minimizing impacts on recreational resources, public safety, and overall visitor satisfaction. The use of prescribed fire, pile burns, mechanical treatments, and chemical treatments to restore and maintain fire regimes and land health would also lead to general enhancements in recreational landscapes.

Alternative A

Under Alternative A, the BLM would continue reviews of public use authorizations for all competitive recreational and commercial uses, and as required for private and group uses. These would result in no measurable changes to the recreational experience in the planning area. Similarly, the BLM would continue to place signage for sizable blocks of BLM-administered land to identify public access and continue preparing activity plans for the development of recreational facilities, such as campgrounds, when necessary to meet public demand. Most recreation on BLM-administered lands is dispersed and associated with hunting. Under Alternative A, most big game habitats are managed as open to ROWs, and there is no

management direction directly protecting big game from ROW development. Allowing surface disturbances in bighorn sheep lambing and winter ranges and in elk, pronghorn, and mule deer winter range could impact these species. Despite the lack of direct management to protect most big game from ROW development, however, some big game habitats are incidentally protected within the 33,000 acres managed as ROW avoidance and exclusion for GRSG and other resources. These include some elk calving habitat and mule deer fawning habitat, which are protected through management as ROW avoidance for all ROWs, except solar and wind, which are managed as ROW exclusion.

Alternative A does not include designated recreation management areas. Recreation would continue at Schnell Ranch Recreation Area but without a special designation. Activities such as hiking, bicycling, horseback riding, and dispersed camping would continue to occur. The BLM would continue to concentrate noxious weed and invasive plant treatments in the Schnell Ranch Recreation Area. These actions would not result in either adverse or beneficial impacts on recreation. Overall, continuation of current management under Alternative A would result in no change to recreation and visitor services.

Alternative B

Under Alternative B, managing the Schnell Ranch SRMA West and East Zones (15,000 acres and 500 acres, respectively) would maintain the recreation setting and could enhance recreational experiences for camping, hunting, bicycling, horseback riding, hiking, picnicking, bird-watching, fishing, and environmental education. Designating this SRMA under Alternative B, unlike under current management in Alternative A, would enhance opportunities for developed forms of recreation, while supporting the settings that contribute to positive recreational outcomes for all visitors. **Appendix H**, Recreation Management Areas, further describes allowable uses on the Schnell Ranch SRMA. All proposed BCAs and SRMAs are outside of areas with coal potential; therefore, coal leasing would not affect them.

Impacts on recreation at the Schnell Ranch SRMA would not occur from allocation of federal fluid minerals or coal leasing because those resources do not occur within the SRMA. Additionally, the SRMA would be closed to mineral material and NEL mineral development, and recommended for withdrawal from locatable minerals under Alternative B. The temporary authorization of prescribed grazing for noncommodity use would not create impacts on recreational uses occurring in the SRMA. Under Alternative B, portions of the Figure 4 and Lost Bridge BCAs would retain existing fluid mineral leases under NSO, with minimal effects on recreational resources. No effects on recreation from coal leasing would occur because that resource does not occur in the BCAs.

Providing habitat improvement projects, where identified, to restore wildlife habitat and improve unsatisfactory or declining wildlife habitat, including at Schnell Ranch SRMA, would generally enhance the recreational experience for visitors to the area participating in camping, hunting, bicycling, horseback riding, hiking, picnicking, bird-watching, fishing, and environmental education. Benefits would accrue to the recreational experience from habitat improvement projects that may include management actions such as grazing, fire, mowing, chemical treatments, and no-till grass seeding.

Alternative B would designate 3,500 acres as the Figure 4 BCA and 8,900 acres as the Lost Bridge BCA; managing these areas as BCAs would maintain the quality of the recreation setting and the associated experiences for backcountry users. Similarly, implementing active or passive restoration actions in riparian areas and wetlands to accelerate progress toward PFC, where conditions warrant, would result in enhancements to riparian and wetland landscapes where dispersed recreation occurs. **Appendix H**, Recreation Management Areas, further describes allowable uses in the Figure 4 and Lost Bridge BCAs.

Under Alternative B, allocation and management of cultural properties for public use (with the desired future condition of long-term preservation and on-site interpretation) would create value for recreational visitors and result in beneficial impacts on recreation. Moreover, the prohibition of surface occupancy of the visible area within 3 miles of several historic districts and sites (including, but not limited to, the Fort Union Trading Post National Historic Landmark, Lynch Knife River Flint Quarry District, Knife River Indian Villages National Historic Site, and Writing Rock State Historic Site [32DV4]) would promote enhancements to passive recreational experiences for visitors to these areas.

Alternative C

Under Alternative C, managing the Schnell Ranch SRMA (2,000 acres) would maintain the recreation setting and recreational experiences for camping, hunting, bicycling, horseback riding, hiking, picnicking, bird-watching, fishing, and environmental education. However, the Schnell Ranch SRMA would not have recreation management zones with different management within the SRMA. As a result, opportunities for developed forms of recreation, while maintained, would not be enhanced through additional designation. Alternative C would designate 3,100 acres as the Figure 4 BCA and 5,300 acres as the Lost Bridge BCA. Managing these areas as BCAs would maintain the quality of the recreation setting and the associated experiences for backcountry users. Impacts on recreation at the Schnell Ranch SRMA and both the Figure 4 and Lost Bridge BCAs would be the same as those described under Alternative B; however, these areas would be reduced in size, compared with Alternative B. All proposed BCAs and SRMAs are located outside of areas with coal potential; therefore, coal leasing would not affect them. **Appendix H**, Recreation Management Areas, further describes allowable uses on the Schnell Ranch SRMA and the Figure 4 and Lost Bridge BCAs.

To a large degree, impacts on recreation under Alternative C would be the same as those described under Alternative B. These include improvements to recreational resources, public safety, and overall visitor satisfaction; enhancements to riparian and wetland landscapes where dispersed recreation occurs; and beneficial impacts on recreation from allocation and management of cultural properties for public use, with long-term preservation and on-site interpretation as the desired future condition.

Additionally, habitat improvement projects to restore wildlife habitat and improve unsatisfactory or declining wildlife habitat at the Schnell Ranch SRMA would result in generalized enhancements to the recreational experience for visitors to the area. Moreover, the application of design criteria and CSU stipulations to mitigate visual impacts within 2 miles of historic districts and sites would promote enhancements to passive recreational experiences for visitors to these areas.

Alternative D

Impacts under Alternative D would be similar to those described for Alternative B. The one difference would be that the Schnell Ranch SRMA would not recommend locatable minerals for withdrawal. Therefore, the SRMA would not be protected from locatable mineral development but little to no locatable activity is anticipated anywhere in the planning area during the planning period.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and are likely to continue to affect recreation are activities that conflict with recreation activities and opportunities, particularly big game hunting. These include mineral development, ROW authorizations, and grazing and range improvements.

Under Alternative A, changes in the planning area's landscape character from the climate warming, with effects extending to recreation, would continue as described under this section's *Affected Environment*. Under Alternatives B and D these effects would be offset to some degree by the proposed consideration and prioritization of vegetation capture and storage of carbon, by considering resource objectives, and by using Standards for Rangeland Health and conservation action guidelines at the project-planning and implementation level. Vegetation management efforts that employ the use of prescribed burns and other techniques can increase recreation opportunities and experiences in the long term by restoring landscapes. In the short term, such projects can close areas to recreation, resulting in a temporary loss of recreation. Over the long term, however, management activities that occur in or near recreation sites and recreation management areas would preserve the recreation values and future opportunities in those areas. Under Alternative C, changes in the planning area's landscape character from the climate warming, with effects extending to recreation, would be the same as those described under Alternative A.

Approximately 43,000 new wells and 56,000 acres of new disturbance are expected across the planning area over the next 20 years. An estimated maximum of 72 acres of BLM-administered surface could be disturbed due to oil and gas development; however, expected disturbances on BLM-administered surface land are proportionally smaller than those on nonfederal lands due to the limited amount of BLM-administered surface area in the state. One reasonably foreseeable ROW authorization includes a potential transmission line greater than 230 kV, which would cause approximately 15 acres of disturbance. This is in addition to the existing 230-kilovolt transmission line, which currently accounts for approximately 13 acres of disturbance. With regard to livestock grazing, one range improvement is currently planned; it would be a 7-mile pipeline on BLM-administered lands in the Big Gumbo area.

Based on the activities described above, recreational uses throughout the planning area would not experience substantial changes—in the nature of use or constraints on public access to opportunities—from foreseeable development. The contribution of BLM management actions to the aforementioned past, present, and reasonably foreseeable future actions would be limited under all alternatives. Therefore, cumulative impacts from these activities on recreation in the planning area would not be considerable.

3.3.4 Livestock Grazing

Issues

- How would the alternatives affect the number of allotments available for livestock grazing and the associated acres of BLM-administered lands and animal unit months of forage allocated for livestock grazing?
- How would the alternatives affect BLM's ability to provide forage on those lands allocated for livestock grazing?

Affected Environment

The BLM administers leases for livestock grazing under Section 15 of the Taylor Grazing Act of 1934. Under the act, preference for receiving a BLM lease is given to applicants who own or control base property[34] next to BLM-administered land. Currently, there are 78 grazing leases on 81 grazing allotments in 14 counties throughout North Dakota.

[34] Base property is land that has the capability to produce crops or forage to support authorized livestock for a portion of the year.

There are 9,310 AUMs[35] permitted on 51,979 acres of BLM-administered land in the planning area. Most grazing allotments are in southwest Bowman County, northwest Dunn County, and McKenzie County (see **Map 2-53**, Alternative A: Livestock Grazing, in **Appendix A**). Seventy-nine of the allotments are grazed by cattle, one is grazed by bison, and one is grazed by sheep. In addition, 2,000 acres are grazed by cattle for research in the Schnell Ranch Recreation Area. This is part of an ongoing effort to control nonnative vegetation under a program between North Dakota State University Extension and the NDFO.

Seventy-nine percent of the acres permitted for grazing are meeting the standards for rangeland health.[36] Invasive species encroaching from adjacent croplands, past conversion of vegetation to crop fields, and conversion back to nonnative grass are the main causes for lands not meeting standards on 2,061 acres. Current livestock grazing is causing standards to not be met on one allotment with 8,955 acres of BLM-administered land in Bowman County. Management changes are being implemented on this allotment that is not meeting standards.

Permitted use levels have not changed significantly since the 1988 North Dakota RMP. While much of the data used for permitted use are old, generally the use levels are consistent with current vegetation production and the need to maintain sustainable use on rangelands. With the exclusion of severe drought years, grazing problems are often the result of improper livestock distribution and not a lack of forage.

Ranching had traditionally been a multigenerational livelihood, but this has been changing over the long term. High production and land costs and low profit potential are factors in this trend. In many cases, ranchers are retiring, and their children are not taking over the ranch. The decrease in multigenerational ranching and the increase in nontraditional owners result in more base property leases. These are authorized in cases where the owners of the base property lease their land to another party.

Cost sharing projects with the NRCS, the USDA Farm Service Agency, and other partners for planned grazing systems and range improvements on adjacent private lands have assisted local livestock grazing operators to efficiently graze livestock. Most of these improvements are installed on private land, but they may extend onto BLM-administered land with proper authorization. These cost-sharing projects have resulted in a higher number of watering sites throughout the planning area and an improved ability to implement a rotational grazing system by moving livestock through individual pastures. This collaboration will continue to provide opportunities for livestock grazing operators in the future.

The types of livestock grazed on BLM-administered lands have also slightly changed over time. Cow/calf operations have increased slightly, while sheep operations have gradually declined over the long term. The number of leases for bison has also declined. These trends can change based on the demand for specific types of livestock, such as increased use of sheep for targeted grazing.

Weather extremes or shifts in climatic variables, such as the increase in frost-free days, changes in the timing or amount of precipitation, and warmer summers, are often cited as a growing trend resulting from global climate change. If climate extremes continue or worsen, the sudden shift in climatic patterns associated with these extremes may affect vegetation in ways that are difficult to forecast. The BLM would

[35] The amount of forage required to sustain a 1,000-pound cow with her calf at her side (or 5 adult sheep) for 30 days

[36] Mitch Iverson, BLM South Dakota Field Office rangeland specialist, personal communication to Holly Prohaska, EMPSi rangeland specialist, regarding rangeland health, on December 3, 2019.

provide flexibility in livestock management to allow for timely responses during droughts, wet periods, and other climatic fluctuations.

The extent and intensity of wildland fire are expected to increase due to warming temperatures, which increase the availability of dry fuels. Due to increased temperatures leading to decreased fuel moisture, the frequency of wildland fire is also expected to increase, which would remove suitable forage for livestock. High-quality forage may be replaced with noxious weeds, which are often less palatable. Droughts are expected to occur more frequently, which has the potential to increase the frequency of wildland fires and indirectly affect livestock grazing.

Additional information is available in the AMS in Section 3.9, Livestock Grazing; Appendix H; and Appendix I (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

Under all alternatives, measures included for protecting GRSG habitat would be implemented. This analysis incorporates effects on GRSG from the North Dakota Field Office GRSG Proposed RMP Amendment and Final EIS by reference (BLM 2015a). In summary, measures to protect GRSG, including adaptive management, density and disturbance caps, regional mitigation, and lek buffers, could limit development and disturbance of livestock in certain areas. Further, areas not achieving the GRSG habitat objectives due to grazing would require site-specific adjustments to livestock grazing in order to achieve objectives. This strategy could result in site-specific changes in permitted use levels or grazing management strategy.

Alternative A

Under Alternative A, all 58,500 of BLM-administered surface acres within the decision area would be available for livestock grazing leases (**Table 3-133**). Alternative A would result in grazing continuing at its current levels of approximately 9,283 AUMs under 10-year leases, and potentially an additional 2,717 AUMs available on all the unleased parcels (**Table 3-133**).

Table 3-133
Acres of Livestock Grazing Decisions by Alternative

Livestock Grazing Decisions	Alternative A	% of Decision Area	Alternative B	% of Decision Area	Alternative C	% of Decision Area	Alternative D	% of Decision Area
Unavailable for standard term livestock grazing leases, unleased	0	0.0	6,300	10.8	2,000	3.4	2,000	3.4
Lands identified as suitable for livestock grazing	58,500	100.0	0	0.0	0	0.0	0	0
Available to livestock grazing, leased	0	0.0	52,200	89.2	52,200	89.2	52,200	0
Available to livestock grazing, unleased	0	0.0	0	0.0	4,300	7.4	4,300	7.4
Forage utilization (percent)	50	-	50 (40–60)[a]	-	50[b]	-	50 (40–60)[a]	-
Forage available for standard term grazing leases (AUMs)	12,007	-	9,283	-	11,172	-	11,172	-
Total	58,500	100.0	58,500	100.0	58,500	100.0	58,500	100.0

Source: BLM GIS 2021

[a] Forage utilization limits may be set at a value between 40 and 60 percent based on site-specific conditions and management, subject to project-level environmental review.

[b] Forage utilization limits on specific allotments may vary based on site-specific conditions and management, subject to project-level environmental review.

Under Alternative A, livestock grazing operations would receive no specific additional impacts. Also, present livestock use levels would continue, unless monitoring provides evidence for necessary adjustments. BLM rangeland managers would continue to monitor the actual use, utilization, and range conditions and trends within allotments. They also would continue to allocate forage within the permitted use levels. Forage allocation would be based on the ecological site potential to provide forage for livestock, while maintaining adequate resources for wildlife and preserving favorable watershed conditions.

Surface-disturbing activities under Alternative A, such as mineral exploration and development and ROW development, would have the potential to directly disturb livestock and remove forage. Limiting development can lessen these effects. Under Alternative A, 22,800 acres would be open to ROW development, which would impact livestock and their forage. The impacts include permanent removal of forage and increased disturbance to livestock from traffic, machinery, and human presence. Disturbance would also be prevented, to some extent, in the 35,700 acres of ROW avoidance areas (**Table 3-134**). If coal mines are developed lands identified as suitable for livestock grazing, grazing would not be able to occur until the area is reclaimed. Due to the small amount of BLM-administered surface land in the area where coal development is occurring coal leasing would have negligible effects on livestock grazing.

Table 3-134
Right-of-Way Management Decisions within Lands Available for Livestock Grazing

Right-of-Way Management	Alternative A	% of Decision Area	Alternative B	% of Decision Area	Alternative C	% of Decision Area	Alternative D	% of Decision Area
Open to ROW authorization	22,800	39.0	400	0.7	1,100	1.9	1,200	2.0
ROW exclusion	0	0	30,700	52.0	0	0	1,300	2.2
ROW avoidance	35,700	61.0	21,100	36.1	55,500	94.7	54,100	92.5

Source: BLM GIS 2021

Under Alternative A, livestock and livestock forage would be affected on surface acres open to locatable mineral entry (50,600 acres), open to NEL mineral leasing (19,900 acres), open to mineral materials disposal (19,900 acres), and open to fluid mineral exploration and development, subject to STC (2,000 acres). Fluid mineral development increases surface disturbance from the construction of oil pads, roads, and other infrastructure. While some loss of forage may occur, the largest impacts are increased livestock disturbance caused by more roads and traffic, and the increased risk of noxious weed invasions. Conversely, improved roads improve access for ranchers in many cases. These impacts on livestock would be negligible on acres subject to NSO stipulations (38,200 acres) and reduced on acres subject to CSU (1,200 acres) due to limitations on location of disturbance, as well as TL (25,700 acres) stipulations, which would limit disturbance to certain times of the year (**Table 3-135**).

Table 3-135
Mineral Management Decisions within Lands Available for Livestock Grazing

Mineral Decisions	Alternative A	% of Surface Decision Area	Alternative B	% of Surface Decision Area	Alternative C	% of Surface Decision Area	Alternative D	% of Surface Decision Area
Fluid Minerals Open, subject to STC	2,000	3.4	0	0.0	100	0.2	100	0
Fluid Minerals NSO	38,200	5.3	47,300	80.9	48,600	83.1	47,800	81.7
Fluid Minerals CSU	1,200	2.1	34,900	59.7	38,800	66.3	37,000	63.2
Fluid Minerals TL	25,700	43.9	23,700	40.5	27,800	47.5	26,300	45.0
Open to locatable mineral entry	50,600	86.5	52,300	89.4	48,700	83.2	48,700	83.2
Not open to locatable mineral entry	100	0.2	0	0.0	0	0.0	0	0.0
Mineral Materials Open	19,900	34.0	4,000	6.8	9,400	16.1	5,400	9.2
Mineral Materials Closed	30,800	52.6	42,100	72.0	39,300	67.2	43,300	74.0

Source: BLM GIS 2021

Alternative B

Compared with Alternative A, Alternative B would reduce the total amount of acres available for livestock grazing by approximately 11 percent. Alternative B would manage approximately 52,200 acres as available for permitted leasing for livestock grazing (**Table 3-133**). Livestock grazing would be unavailable on 6,300 acres, which include unleased parcels and the Schnell Ranch SRMA (both East and West zones). Current permitted use levels on lands currently leased for grazing would remain at approximately the same levels unless new information or changing conditions indicate that a change to permitted use levels is needed.

Alternative B would limit forage utilization to 50 percent on allotments without approved specific management objectives. Allotments with established specific management objectives would have their forage utilization limits set at a value between 40 and 60 percent, based on site-specific conditions and environmental review; thus, the BLM could reduce the utilization on parcels with the potential for improvement. Alternative B would only allow 9,283 AUMs available for standard grazing leases. Similar to Alternative A, adjustments in livestock grazing management, such as the stocking rate or season of use, could occur under Alternative B, with additional monitoring of soil and vegetation conditions for evaluation/determination of rangeland health.

Alternative B would manage the Figure 4 and Lost Bridge BCAs (3,500 acres and 8,900 acres, respectively) for their recreational quality, which could increase the likelihood of human-livestock conflicts. However, the implementation of passive and active vegetation restoration, prescribed fire, and mechanical or chemical vegetation treatments within these BCAs would likely enhance forage conditions and land health over the long term.

Surface-disturbing activities, such as mineral exploration and development and ROW development, have the potential to directly disturb livestock and remove forage, as described under Alternative A. Under Alternative B, development of 1,200 acres of ROWs would result in the potential disturbance of livestock and livestock forage. Livestock and forage disturbance would be prevented by classifying 24,100 acres

available to grazing as ROW exclusion areas. Disturbance could also be prevented, to some extent, in the 28,600 acres of ROW avoidance areas (**Table 3-134**). When compared with Alternative A, Alternative B would have approximately 21,600 fewer acres open to ROW authorization, and 24,100 more acres classified as ROW exclusion. These would offer additional protections to livestock and their forage, when compared with Alternative A.

Under Alternative B, livestock and livestock forage would be impacted on surface acres open to locatable mineral entry (52,300 acres), open to NEL mineral leasing (5,000 acres), and open to mineral materials disposal (4,000 acres). When compared with Alternative A, impacts from mineral development under Alternative B would be slightly less. This is due to the reduction in acres available for fluid mineral leasing, NEL mineral leasing, locatable mineral entry, and mineral materials. The impacts on livestock would be negligible on acres subject to closure to leasing (1,000 acres) or NSO stipulations (47,300 acres), and reduced on acres subject to CSU (34,900 acres) and TL (23,700 acres) stipulations (**Table 3-135**). Due to the small amount of BLM-administered surface land acceptable for coal (40 acres), coal leasing would have negligible effects on livestock grazing under Alternatives B and B.1.

Management under Alternative B would adjust livestock grazing management strategies where necessary. These adjustments would be determined from monitoring results; the BLM would give priority to improve and maintain priority allotments and those allotments in GRSG habitat. Areas not achieving the GRSG habitat objectives due to grazing would require site-specific adjustments to livestock grazing in order to achieve objectives. Over the short term, this would likely reduce the stocking rate of livestock on a site-specific basis; however, adaptive management, density and disturbance caps, regional mitigation, and lek buffers could limit development and disturbance of livestock in certain areas. Over the long term, this strategy would improve the overall vegetation conditions in GRSG habitat.

Alternative C

Compared with Alternative A, Alternative C would reduce the total amount of acres available for livestock grazing by approximately 3 percent. Alternative C would manage approximately 56,500 acres as available for livestock grazing. Livestock grazing would be unavailable on 2,000 acres, specifically on the Schnell Ranch SRMA (both East and West zones). Current permitted use levels on lands leased for grazing would remain the same, unless new information or changing conditions indicate that a change to permitted use levels is needed.

Under Alternative C, allotments would have variable forage utilization limits based on site-specific conditions, subject to project-level environmental review. Alternative C would allow approximately 11,172 AUMs available for standard grazing leases (9,283 AUMs on existing leases plus potentially 1,889 AUMs on unleased parcels). Similar to Alternatives A and B, adjustments in livestock grazing management, such as the stocking rate or season of use, could occur under Alternative C, with additional monitoring of soil and vegetation conditions or an evaluation/determination of rangeland health.

Alternative C would manage the Figure 4 and Lost Bridge BCAs (3,100 acres and 5,300 acres, respectively) for their recreational quality. Impacts within the BCAs would be the same as those discussed under Alternative B.

Surface-disturbing activities, such as mineral exploration and development and ROW development, have the potential to directly disturb livestock and remove forage. Under Alternative C, areas open to ROW development (1,100 acres) would result in potential disturbance of livestock and livestock forage. Impacts from ROW development under Alternative C would be similar to those described under Alternative B, and

less than those described under Alternative A. Disturbance could also be prevented, to some extent, in the 55,500 acres of ROW avoidance areas (**Table 3-134**).

Under Alternative C, livestock and livestock forage would be affected on surface acres open to locatable mineral entry (48,700 acres), open to NEL mineral leasing (9,400 acres), and open to mineral materials disposal (9,400 acres). The impacts on livestock would be negligible on acres subject to NSO stipulations (48,600 acres) and reduced on acres subject to CSU (38,800 acres) and TL (27,800 acres) stipulations (**Table 3-135**). When compared with Alternative A, impacts from mineral development under Alternative C would be slightly less. When compared with Alternative B, Alternative C would have slightly more impacts on livestock and livestock forage, due to a decrease of approximately 6,300 acres proposed for withdraw from locatable mineral entry. Due to the small amount of BLM-administered surface land acceptable for coal (200 acres), coal leasing would have negligible effects on livestock grazing.

Alternative D

Impacts under Alternative D would be similar to those described for Alternative B with the exception of the impacts described below. Impacts from managing approximately 56,500 acres as available for livestock grazing and 2,000 acres as unavailable for standard term grazing leases would be the same as described for Alternative C. Alternative D would allow approximately 11,172 AUMs available for standard grazing leases. Similar to Alternatives A, B, and C, adjustments in livestock grazing management, such as the stocking rate or season of use, could occur under Alternative D, with additional monitoring of soil and vegetation conditions or an evaluation/determination of rangeland health.

Surface-disturbing activities, such as mineral exploration and development and ROW development, have the potential to directly disturb livestock and remove forage, as described under Alternative A. Under Alternative D, development of 1,200 acres open to ROWs would result in the potential disturbance of livestock and livestock forage. Livestock and forage disturbance would be prevented by classifying 1,300 acres available to grazing as ROW exclusion areas. Disturbance could also be prevented, to some extent, in the 54,100 acres of ROW avoidance areas (**Table 3-133**). When compared with Alternative A, Alternative D would have approximately 21,600 fewer acres open to ROW authorization, and 1,300 more acres classified as ROW exclusion. These would offer additional protections to livestock and their forage, when compared with Alternative A.

Under Alternative D, livestock and livestock forage would be impacted on surface acres open to locatable mineral entry (48,700 acres), open to NEL mineral leasing (7,300 acres), and open to mineral materials disposal (5,400 acres). When compared with Alternative A, impacts from mineral development under Alternative D would be slightly less. This is due to the reduction in acres available for fluid mineral leasing, NEL mineral leasing, locatable mineral entry, and mineral materials. The impacts on livestock would be negligible on acres subject to closure to leasing (1,900 acres) or NSO stipulations (47,800 acres), and reduced on acres subject to CSU (37,000 acres) and TL (26,300 acres) stipulations (**Table 3-135**). Due to the small amount of BLM-administered surface land acceptable for coal (40 acres), coal leasing would have negligible effects on livestock grazing under Alternative D.

Cumulative Impacts

Past actions that have affected livestock grazing are human-caused surface disturbances (mineral development, recreation, prescribed burning, mechanical vegetation treatments, and historical grazing practices) and wildland fires that have contributed to current ecological conditions.

Present actions affecting livestock grazing are mainly those that reduce available grazing acreage and those that restrict management actions or the level of forage production in those areas. Key examples are a land sale, exchange, or conveyance; motorized vehicle use; recreation; habitat restoration; fuel reduction; and special designations that restrict grazing.

Future actions affecting livestock grazing would be similar to present actions. Demand for recreation and the potential for conflicts with livestock grazing are likely to increase over the life of the plan. Vegetation projects to reduce the fire risk or improve habitat conditions, such as hazardous fuels reduction and conifer removal, may result in short-term restrictions on grazing management. However, they could improve forage conditions in the long term.

The contribution to cumulative impacts from proposed management under each alternative would parallel the impacts of the alternatives in the general impact analysis, above. In general, management actions under every alternative would result in short-term or long-term changes in the availability of forage. This would be due to treatment activities, other surface-disturbing and disruptive activities, human disturbance, the presence of grazing wildlife, threatened or endangered species, and special designations.

Cumulative impacts from each resource or resource use would be greater on livestock grazing if the cumulative projects occur simultaneously. However, the BLM would implement the standard mitigation identified in the land health standards and guidelines across all alternatives and any other cumulative projects on BLM-administered lands. This would reduce or minimize cumulative impacts on decision area lands.

Cumulative projects that increase human disturbance in grazing areas could also directly affect grazing by displacing or injuring animals. Cumulative projects that increase human disturbance in grazing areas could also indirectly affect grazing by increasing weeds and invasive species. As stated above, weed invasion can reduce preferred livestock and wildlife forage and increase the chance of weeds being dispersed by roaming cattle.

Under Alternative A, changes to forage and vegetation in the planning area would likely continue as described under this section's *Affected Environment*. Under Alternatives B, C, and D, further ground disturbance could combine with impacts from climate change to create adverse, local effects on vegetation. However, management under Alternatives B and D would include actions to protect soil, vegetation, and water resources from surface-disturbing activities; thus, potential impacts on livestock grazing from ground disturbance, coupled with climate change, would likely be less than they would be under Alternative A.

3.4 SPECIAL DESIGNATIONS

3.4.1 Areas of Critical Environmental Concern

Issues

- How would the alternatives affect the relevant and important resource values of proposed ACECs?

Affected Environment

In accordance with BLM Manual 1613, Areas of Critical Environmental Concern, the NDFO interdisciplinary team reviewed all BLM-administered lands in the planning area to determine whether any areas would be considered for designation as ACECs. The BLM review included identifying areas through inventorying, monitoring, and considering external nominations. To be eligible for ACEC designation, an

area must require special management attention to protect the important and relevant values described in 43 CFR 1610.7-2 and BLM Manual 1613.

The North Dakota Geological Society nominated the Mud Buttes area in western Bowman County as an ACEC in March 2020 (see Figure 1, Vicinity—Mud Buttes Proposed Area of Critical Environmental Concern, in **Appendix L**, Evaluation of Proposed Areas of Critical Environmental Concern). The exposed Hell Creek Formation of this 960-acre area of badlands contains an abundance of vertebrate paleontological resources and significant scientific sites and has been a focus of paleontology research for several decades.

The Cretaceous-Paleogene (K-Pg) boundary in the Mud Buttes area is one of the best-preserved examples of this geological feature in North America. It is also one of the easiest K-Pg boundary sections to recognize and study in the field; elsewhere in the region, identification of the K-Pg boundary often requires additional laboratory testing to confirm its exact placement. Institutions from across the country have conducted numerous scientific studies on the Cretaceous extinction event in the Mud Buttes region; similar studies will likely continue, so long as the boundary section remains intact and accessible.

The K-Pg boundary section in the Mud Buttes area meets the relevance requirement by virtue of being a rare geological feature. The K-Pg boundary section in the Mud Buttes area meets the importance requirement in that it has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.

The Mud Buttes area has been a focus of paleontology research for several decades. The research informs us about the extinction of dinosaurs and the ecological recovery afterward. The rock exposed in the area is called the Hell Creek Formation. The Hell Creek is exposed across central and southeastern Montana and into both North and South Dakota. The Hell Creek was deposited along the western shore of the Late Cretaceous Interior Seaway in a complex series of low elevation rivers, estuaries, and marshes. Terrestrial animals and plants, as well as semiaquatic and fully aquatic animals, are well preserved in the Hell Creek.

Additionally, a phenomenal collection of fossil plants has come from Mud Buttes. Almost 90 separate species of plants, and several thousand specimens, have been collected. Sharks, crocodilians, champsosaurs (croc-like reptile), dinosaurs, and mammals are also common. The diversity of animal and plant fossils, as well as the boundary impact layer that marked the extinction of dinosaurs, make Mud Buttes uniquely significant in North Dakota.

The Mud Buttes area, for which the values for natural process/system (geological) and historic/cultural (paleontological) were determined to be both relevant and important, is referred to as a potential ACEC. On completion of the RMP revision, if the record of decision identifies the Mud Buttes area as a designated ACEC, the BLM will manage it as such.

Environmental Consequences

This section discusses impacts on the potential Mud Buttes ACEC and the BLM's ability to protect the natural process/system (geological) and historic/cultural (paleontological) relevant and important values from proposed management of other resources and resource uses.

The potential Mud Buttes ACEC does not overlap the three coal-producing counties. While it is open to coal leasing in Alternative A, the coal RFD does not anticipate development beyond the three-county area (BLM 2022b). Therefore, impacts from coal leasing and development are not anticipated under any alternative. While the acres available for mineral materials sales and fluid mineral leasing (and applicable

stipulations) vary by alternative, the reasonably foreseeable surface disturbance under all alternatives would not impact the potential Mud Buttes ACEC (see **Section 3.1.1**, Analytical Assumptions).

Alternative A

The potential Mud Buttes ACEC would not be designated under Alternative A. The casual collection of invertebrate or plant fossils would continue to be allowed under this alternative. Removal of fossils would result in a direct loss of the resource and the potential scientific knowledge that would be gained.

The entire area within the potential Mud Buttes ACEC would continue to be open to all forms of coal, locatable mineral entry, NEL minerals, oil and gas leasing, and ROW location. Surface disturbance from these types of resource uses would impact fossils that occur on or underneath the surface. Impacts would include the permanent loss of the paleontological resource—and the scientific data it would provide—through damage or destruction caused by surface-disturbing activities. Excessive erosion, especially from surface disturbance on exposed locations, would damage fossils at the surface.

Impacts can typically be mitigated to negligible levels by implementing paleontological mitigation identified in the BMPs or stipulations, such as construction monitoring, excavating materials, or avoiding surface exposures. Pedestrian surveys would typically be necessary before any surface-disturbing activities were authorized in those units with a high potential for yielding fossil vertebrates; on-site monitoring would be required during construction. If data recovery were the prescribed mitigation, this would also result in fossils being salvaged that would never have been unearthed as the result of natural processes. These newly exposed fossils would become available for scientific research, education, display, and preservation into perpetuity at a public museum. Unmitigated surface-disturbing activities would dislodge or damage paleontological resources and features that were not visible before surface disturbance.

Alternative B

The BLM would designate the 960-acre Mud Buttes ACEC under Alternative B. The casual collection of invertebrate and plant fossils would be prohibited. This would protect the area from the direct loss of the resource and the potential scientific knowledge that would be gained.

The Mud Buttes ACEC would be recommended for withdrawal from locatable mineral entry, unacceptable for further consideration for coal leasing, closed to mineral materials, closed to NEL mineral leasing, and open to fluid mineral leasing, subject to a NSO stipulation. The stipulation would require that surface occupancy be located outside the ACEC, thereby protecting the rare paleontological resources from potentially new energy development. The Mud Buttes ACEC would also be unacceptable for further consideration for coal leasing in Alternative B.1.

The Mud Buttes ACEC would also be managed as a ROW exclusion area, except for existing land use authorizations along the county road (96th Street West). This would eliminate the potential for impacts from new ROW location, unlike the impacts described under Alternative A.

The Mud Buttes ACEC would be closed to OHV use, except for administrative or permitted access. This would reduce soil erosion impacts and limit the number of people accessing the area, thereby reducing the potential for impacts on rare paleontological resources.

Compared with all alternatives, designating the potential Mud Buttes ACEC under Alternative B would provide the most protection to the ACEC's relevant and important values.

Alternative C

The BLM would designate the 960-acre Mud Buttes ACEC under Alternative C. The casual collection of invertebrate and plant fossils would be prohibited. This would protect the area from the direct loss of the resource and the potential scientific knowledge that would be gained.

The Mud Buttes ACEC would be unacceptable for further consideration for coal leasing and closed to mineral materials. It would remain open to fluid mineral leasing but subject to an NSO stipulation. The stipulation would require that surface occupancy be located outside of the ACEC, thereby protecting the rare paleontological resources from potentially new energy development. It would also remain open to locatable minerals; however, a plan of operations would be required because of the ACEC designation. No surface disturbance within the ACEC would be allowed for NEL mineral development.

The Mud Buttes ACEC would be managed as a ROW avoidance area, except for existing land use authorizations along the county road (96th Street West). Compared with Alternative A, this would reduce the potential for impacts from new ROW location.

All OHV use would be limited to existing routes. This would reduce soil erosion impacts and limit the number of people accessing the area, thereby reducing the potential for impacts on rare paleontological resources. Impacts would be the same as those described under Alternative A.

Alternative D

Impacts from designation of the Mud Buttes ACEC would be the same as described for Alternative B. Valid existing rights would be recognized.

Cumulative Impacts

Past and present actions in the cumulative impacts analysis area affecting the potential Mud Buttes ACEC include mineral exploration and development, lands and realty development, recreation, and travel management. Impacts include surface disturbance that affects paleontological resources, which would affect resources within the potential Mud Buttes ACEC.

The resources within the Mud Buttes ACEC may be degraded or contaminated from hazardous materials spills, which are noted in **Appendix I, Table I-1**. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

Based on the nature of the relevant and important values associated with the potential Mud Buttes ACEC, impacts tend to occur quickly but recover slowly and would be irreparable in the case of some impacts on geological and paleontological sites. As such, any impact would result in a cumulative increase in the potential for irreparable damage to relevant and important values.

Under Alternative A, the potential Mud Buttes ACEC would not be designated and impacts from the casual collection of invertebrate or plant fossils would continue. This would result in a direct loss of the resource and the potential scientific knowledge that would be gained.

Under Alternatives B, C, and D, incremental impacts on the potential Mud Buttes ACEC would be limited from minerals, lands and realty, and energy development. Until a withdrawal is approved, the area would remain open to locatable mineral entry, but regulations would require a plan of operations for any

disturbance greater than casual use. This is because the Mud Buttes ACEC would have restrictions, such as managing fluid minerals as NSO and closing the Mud Buttes ACEC area to mineral materials disposal. Incremental impacts would increase under all alternatives from recreation, as public use would continue to increase over time. Alternatives B and D would reduce OHV impacts by limiting or prohibiting this use in the potential ACEC.

Climate changes would continue to impact soil resources described in **Section 3.2.2**, Soil Resources. These impacts would increase exposure of geological and paleontological resources. However, there are no site-specific forecasts available for the potential Mud Buttes ACEC.

3.4.2 Wild and Scenic Rivers

Issues

How would the proposed management actions in each alternative affect the free-flowing condition, water quality, identified outstandingly remarkable values, and tentative classification on eligible wild and scenic river segments in North Dakota?

Affected Environment

There are no designated WSRs in the planning area. The BLM conducted a WSR inventory as part of the planning process for RMP revision. The BLM inventoried the rivers in the planning area to determine their eligibility and suitability for inclusion in the NWSRS (Wild and Scenic Rivers Eligibility and Suitability Report [BLM 2021b]).

Table 3-136 shows the three eligible rivers in the planning area being studied for the suitability analysis. The Proposed RMP and Final EIS will include final suitability determinations on the eligible rivers after considering any public comments received during public review and comment on the Draft RMP/EIS. Congressional action is required for actual designation and final classification of suitable river segments.

As described in **Section 3.2.3**, climate change could affect streams in the planning area through increased stream temperatures and changes to water availability and hydrologic regimes.

Additional information is available in Section 4.2, Wild and Scenic Rivers, of the AMS (BLM 2020b).

Table 3-136
Segments Determined Eligible for Inclusion in the National Wild and Scenic Rivers System

River Segment	Length on BLM-Administered Lands (Miles)	Outstandingly Remarkable Values	Tentative Classification
Little Missouri River (Dunn County)	8.1	Scenic	Scenic
Missouri River (border of McKenzie and Williams Counties)	3.4	Fish populations	Recreational
Yellowstone River	0.1	Fish populations	Recreational

Source: BLM 2021b

Environmental Consequences

This section discusses the impacts on WSRs from proposed management actions for other resources and resource uses. Within the planning area, the BLM has found one segment classified as scenic and two

segments classified as recreational to be eligible for inclusion in the NWSRS. The tentative classification and identified ORVs for each segment are summarized above in **Table 3-136**.

Impacts Common to All Alternatives

The application of BMPs and mitigation measures (**Appendix D**, Design Features and Best Management Practices) for surface-disturbing activities would likely reduce effects on WSRs associated with authorized land uses or activities such as road, pipeline, or power line construction; mineral development; range improvements; and recreational activities. Although the BMPs and mitigation measures cannot be applied to locatable minerals, the regulations under the NWSRS require a plan of operations for any locatable mineral disturbance greater than casual use in designated WSRs. BMPs and mitigation would improve habitat and would protect and prevent irreparable damage to relevant WSR values. Requiring a reclamation plan (**Appendix E**, Reclamation Standards) for all surface-disturbing activities across all alternatives would stabilize disturbed areas in the short term and stabilize landscapes in the long term and would protect and prevent irreparable damage to relevant WSR values.

Alternative A

Under Alternative A, the eligible portions of the Little Missouri, Missouri, and Yellowstone Rivers would continue to be managed to preserve the tentative classification of each eligible segment by protecting its free-flowing condition, water quality, and ORVs, pending suitability determination or congressional action. Development of site-specific mitigation measures during implementation-level planning would reduce the potential for impacts on stream segments listed on the Nationwide Rivers Inventory.

Alternative B

Under Alternative B, the eligible portions of the Little Missouri, Missouri, and Yellowstone Rivers would be determined suitable for inclusion in the NWSRS. For analysis purposes, at least one alternative must consider eligible segments being deemed suitable for inclusion in the NSWRS. Under this alternative, the BLM would apply interim protections until congressional action formally designates these areas as WSRs or releases them from the interim protections.

Little Missouri River

Under this alternative, interim protections along the Little Missouri River include managing the suitable WSR segments as VRM Class II and aboveground ROW exclusion, in addition to applying an NSO stipulation for fluid mineral leasing. The eligible portions would be closed to mineral materials and NEL mineral leasing, and project design features for other surface-disturbing activities would be applied, where applicable. Surface occupancy and use would not be allowed within 0.25 miles of the Little Missouri River segments suitable for inclusion in the NWSRS. The objective of VRM Class II is to retain the landscape's existing character; therefore, the level of change to the characteristic landscape would be low. While VRM Class II is more flexible than VRM Class I, the casual observer would be unlikely to notice any changes to the landscape, so the scenic ORV would be maintained. Therefore, threats to the scenic ORV from utility and transportation corridors are unlikely.

Managing the suitable WSR segments as closed to mineral materials and subjecting fluid mineral leasing to NSO stipulations under this alternative effectively preclude surface occupancy in the study corridor, further helping to maintain the scenic ORV in the area. This protection, however, would only be applicable for new leases; current leases would not be affected by this NSO stipulation. The Little Missouri River is outside the coal potential areas and screened from potential coal leasing; this also applies to Alternative B.1.

Determining the Little Missouri River segments as suitable for inclusion in the NWSRS and managing under the interim protections would provide the most protection of all alternatives to the scenic ORV found along the Little Missouri River.

Missouri River

The WSR segments along the Missouri River are very short or are interspersed with lands not administered by the BLM. Interim protections under this alternative for the suitable segments along the Missouri River include the following allowable uses and restrictions within 0.50 miles of the water's edge of identified pallid sturgeon habitat: managing the WSR segments as NSO for fluid mineral leasing, ROW avoidance, and closed to mineral materials and NEL mineral leasing. Locatable mineral development would be subjected to design features that maintain the functionality of identified pallid sturgeon habitat. The Missouri River segments are outside the coal potential areas and screened from potential coal leasing; this also applies to Alternative B.1.

Management actions would provide varying protections for ORVs that ensure the free-flowing condition of the river remains intact. General impacts on WSRs resulting from oil and gas or ROW development in the planning area would include spills, soil erosion, and habitat fragmentation, which in turn would affect cultural, fish, geologic, recreation, scenic, and wildlife ORVs. The degree of impacts on suitable WSRs would depend on the proximity of development to the river, which would be determined and further analyzed during site-specific, implementation-level planning.

Yellowstone River

Under this alternative, interim protections and potential impacts on the suitable segment along the Yellowstone River would be similar to those described for the Missouri River, but fewer in degree. This is because fewer miles of river segments would be found suitable for inclusion in the NWSRS.

The Yellowstone River is outside the coal potential areas and screened from potential coal leasing; this also applies to Alternative B.1.

Alternative C

The eligible portions of the Little Missouri, Missouri, and Yellowstone Rivers would be determined to be not suitable for inclusion in the NWSRS under this alternative. For analysis purposes, at least one alternative must consider eligible segments not being deemed suitable for inclusion in the NSWRS. Under this alternative, all river segments would be released from interim management protections, and impacts on identified scenic values and fish populations would occur from fluid mineral development. All eligible river segments of the Little Missouri, Missouri, and Yellowstone Rivers are outside the coal potential areas and screened from potential coal leasing. Impacts would include habitat degradation, spills, erosion, runoff, and modifications to the landscape affecting the scenic quality and fish ORVs. However, the rivers would benefit from incidental protection for other resources. Like Alternative B, the Little Missouri River would still be managed as ROW avoidance and closed to mineral materials sales and NEL mineral leasing. The Missouri and Yellowstone Rivers would still be managed with an NSO stipulation and as ROW avoidance, but both would be open to mineral materials disposal and NEL mineral leasing. Mineral materials development is expected to disturb 40 acres annually in the planning area (BLM 2022c). If mineral materials are extracted in the corridor, the impacts described above would be experienced; however, the likelihood of this happening is low.

Alternative D

The eligible portions of the Little Missouri, Missouri, and Yellowstone Rivers would be determined to be not suitable for inclusion in the NWSRS under this alternative. Under this alternative, all river segments would be released from interim management protections, and impacts on identified scenic values and fish populations could occur as a result of fluid mineral development. Impacts could include habitat degradation, spills, erosion, runoff, and modifications to the landscape affecting the scenic quality and fish ORVs. However, Protections for pallid sturgeon habit including fluid mineral NSO, ROW avoidance, and special stipulations/design features for surface-disturbing activities within 0.50 miles of the water's edge of identified pallid sturgeon habitat would protect the ORV characteristics in the Missouri River and Yellowstone River segments. Protections for visual character, including ROW avoidance within 0.50 miles of the Little Missouri River would provide some protection for the ORV characteristics in the Little Missouri River segments. The rivers could also benefit from incidental protection from management decisions to protect other resources in the area. Like Alternative B, the Little Missouri River would still be managed as ROW avoidance and closed to mineral materials sales and NEL mineral leasing. The Missouri and Yellowstone Rivers would still be managed with an NSO stipulation and as ROW avoidance, but both would be open to mineral materials disposal and NEL mineral leasing. Mineral materials development is expected to disturb 40 acres annually in the planning area (BLM 2022c). If mineral materials are extracted in the corridor, the impacts described above would be experienced; however, the likelihood of this happening is low. All eligible river segments of the Little Missouri, Missouri, and Yellowstone Rivers are outside the coal potential areas and screened from potential coal leasing.

Cumulative Impacts

Past and present actions in the cumulative impacts analysis area affecting WSR management include surface-disturbing activities, such as minerals exploration and development, lands and realty development, recreation, and management of fish special status species. Most of the WSR segments are very short or are interspersed with lands not administered by the BLM. Landownership surrounding all segments is very fragmented, making effective management of the ORVs difficult.

Major foreseeable future projects that would affect WSR segments would be from oil and gas development. Impacts on WSRs would be dependent on the proximity of the fluid mineral developments to WSR river corridors. WSRs may be degraded or contaminated from hazardous materials spills, which are noted in **Appendix I, Table I-1**. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

Climate change would affect the fish ORVs by changing the flows through the segments that support the fish habitat and the water-related recreational activities that the segments support. To the extent that climate reduces the in-stream flow, either through evaporation or changes in precipitation, the ORVs would be impacted.

3.4.3 National Scenic and Historic Trails

Issues

- How would the alternatives affect the BLM's ability to protect national scenic and historic trails?

Affected Environment

The most notable long-distance trails in the planning area are the North Country NST and the Lewis and Clark NHT, both administered by the NPS. The North Country NST was established on March 5, 1980, by an amendment to the National Trails System Act (**Map 3-19**, Long Distance Federal Trails, in **Appendix A**). This trail is the longest in the National Trails System, stretching approximately 4,800 miles across eight states. Within North Dakota, the North Country NST consists of 257 constructed miles, and more miles are planned to be constructed. Currently, no segments of the North Country NST cross BLM-administered lands within North Dakota. The Comprehensive Plan for Management and Use of the North Country NST was published in September of 1982. The purpose of the plan is to provide guidance on routing, developing, and managing the trail to the many cooperating public agencies and private trail interests and to provide Congress the information it needs to carry out its oversight responsibility for the North Country NST (NPS 1982).

The Lewis and Clark NHT was established on November 10, 1978, and follows the Missouri and Yellowstone Rivers through 397 miles of North Dakota. Approximately 1.1 miles of the Lewis and Clark NHT cross BLM-administered lands within North Dakota. This trail is best described as a series of interpretive points, rather than a physical trail. In December 2012, the Foundation Document for the Lewis and Clark NHT was published (NPS 2012). The Foundation Document prioritizes future planning products that would be completed for the Lewis and Clark NHT to protect the trail's fundamental resources and values. The purpose of the Lewis and Clark NHT is to commemorate the 1804 to 1806 Lewis and Clark Expedition through the identification, protection, interpretation, public use and enjoyment, and preservation of historic, cultural, and natural resources associated with the expedition and its place in US and Tribal history (NPS 2012).

Additional information is available in Section 3.8, Comprehensive Travel and Transportation Management, of the AMS (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

In accordance with 43 CFR 3400.2, coal leases would not be issued on federal lands within the National System of Trails (**Appendix F**, Coal Screening Process); therefore, the national trails in the planning area would be protected from surface-disturbing impacts of coal leasing. Lands within the National System of Trails are identified as unsuitable, subject to valid existing rights, for all or certain stipulated methods of coal mining involving surface coal mining operations. Coal Screen 2, Criterion 1, Federal Land System, includes the National System of Trails and has an exception in the regulations, but the lands in the BLM coal decision area do not meet the criteria for that exception; therefore, they are treated as without exception. Since the National System of Trails is unsuitable, without exception, the trails are unacceptable to further consideration for coal leasing.

There is very little BLM-administered surface land and mineral estate within the management corridors of the Lewis and Clark NHT and the North Country NST, as a result impacts of management decisions are limited to BLM-administered mineral estate in and surrounding the trail corridors, and BLM-administered surface estate within the surrounding area.

Alternative A

Under Alternative A, the BLM would continue to manage national trail corridors in accordance with BLM Manual 6280—Management of National Scenic and Historic Trails and Trails Under Study or

Recommended as Suitable for Congressional Designation (BLM 2012). The management corridors for both the Lewis and Clark NHT and the North Country NST would continue to be vulnerable to direct and indirect impacts. An inventory identifying trail corridors crossing BLM-administered lands could be done at some point in the future, but the establishment and management would require a plan decision. There would continue to be no ROW or mineral restrictions, and the trail corridors would continue to be managed as an undesignated VRM class. The lack of protection against ROW or mineral developments and visual intrusions under this alternative would allow surface disturbances that result in the loss of integrity or result in a change in the trail corridors' cultural landscape.

Alternative B

Under Alternative B, the BLM would manage trail corridors that extend for 0.50 miles from the ordinary high-water mark of the Missouri and Yellowstone Rivers, Lake Sakakawea, and Lake Oahe for the Lewis and Clark NHT, and 0.50 miles from the centerline of the existing trail for the North Country NST. The Lewis and Clark NHT management corridor would be managed as VRM Class II. Both national trails would have overlapping NSO and CSU stipulations of 0.50 miles (the management corridor) and 3 miles, respectively, for fluid mineral leasing and development, and the trail corridors would be closed to mineral materials disposal. Additional management actions for both national trails under Alternative B include BLM consultation with the NPS regarding proposed fluid minerals leasing, mineral materials disposal, NEL mineral leasing, locatable mineral entry, and realty actions within 3 miles surrounding NPS units (which include the two national trails). For instance, the BLM would consult with the NPS - North Country National Scenic Trail staff regarding any requests for waivers, exceptions, and modifications to the NSO stipulation. Management actions under this alternative would provide protection from surface disturbances that would result in the loss of integrity or destruction of physical remnants of the trail and protect the trail corridors' cultural landscape. Although surface-disturbing activity management directions would not apply to coal or locatable minerals, the trails would be protected from these mineral developments through coal screens, NHPA Section 106 reviews, and locatable minerals performance standards. Management actions would reduce the potential for direct and indirect impacts on the trail corridor by restricting development when compared with Alternative A.

Alternative C

Under Alternative C, the BLM would manage trail corridors that extend for 0.50 miles from the ordinary high-water mark of the Missouri and Yellowstone Rivers, Lake Sakakawea, and Lake Oahe for the Lewis and Clark NHT, and 0.50 miles from the centerline of the existing trail for the North Country NST. Impacts would be similar to those described under Alternative B for both national trails, except the CSU stipulations would be reduced to 2 miles for both national trails, and the Lewis and Clark NHT management corridor would be managed as VRM Class III. This would allow some modifications to the landscape that alter the trail corridor's scenic quality, but it would still provide greater long-term protection against direct and indirect impacts, compared with the undesignated VRM classification under Alternative A.

Similar to Alternative B, additional management actions for both national trails under Alternative C include BLM consultation with the NPS regarding proposed fluid minerals leasing, mineral materials disposal, NEL mineral leasing, locatable mineral entry, and realty actions within 2 miles surrounding NPS units.

Alternative D

Impacts under Alternative D would be similar to those described for Alternative B. However, Alternative D would manage the Lewis and Clark NHT management corridor as VRM Class III. This would allow some modifications to the landscape that alter the trail corridor's scenic quality, but it would still provide

greater long-term protection against direct and indirect impacts, compared with the undesignated VRM classification under Alternative A. Alternative D would include some clarifications to improve implementation, such as clarifying that the CSU is 3 miles from the trail corridor, though these would not change the anticipated impacts. Management of National Scenic and Historic Trails as no surface disturbance for NEL minerals would have the same impacts as under Alternative B in which National Scenic and Historic Trails would be closed; since impacts to the trails would occur from surface disturbance, managing as no surface disturbance would have essentially the same impacts as closure.

Cumulative Impacts

Because less than 1 percent of the national trail mileage in the planning area is on BLM-administered lands, the incremental impact on national trails of implementing each alternative in this RMP would be negligible. Actions on BLM-administered lands and mineral estate would largely serve to protect the physical elements and scenic quality of the trails. Management under the NPS comprehensive plans would provide long-term protection for those portions of the trail corridor on other federal lands in the planning area. Actions on private lands, such as increased development, would impact physical elements of both national trails in the planning area because of the mixed landownership pattern along both trail corridors.

3.5 SOCIAL AND ECONOMIC

3.5.1 Social and Economic Conditions

Issues

- How would the alternatives affect economic activity in the planning area derived from BLM-administered lands?
- How would the alternatives contribute to economic stability in the planning area?
- How would the alternatives affect the supply, demand, and value of goods and services derived from BLM-administered lands?
- How would the alternatives affect the capacity and resiliency of different types of communities in the planning area?

Affected Environment

The socioeconomic analysis area encompasses the following 26 counties: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Divide, Dunn, Emmons, Golden Valley, Grant, Hettinger, McHenry, McKenzie, McLean, Mercer, Morton, Mountrail, Oliver, Renville, Sheridan, Sioux, Slope, Stark, Ward, and Williams (see **Map 3-20**, Socioeconomic Analysis Area, in **Appendix A**). Major populated places in the study area are Williston, Bismarck, Standing Rock, Minot, Watford City, and Dickinson. The Tribal community in the study area is Fort Berthold. The socioeconomic study area was determined based on the geographic distribution of BLM-administered surface lands and subsurface minerals for which the BLM administers the federal mineral leasing program and identifying the area where there is mineral potential. The geographic extent of the study area was further refined to include the counties that contain BLM-administered surface lands and minerals in the area of western North Dakota that represents the most active mineral and energy development. From 2010 to 2022, the analysis area population increased by 26.2 percent. Population growth was unequally distributed throughout the analysis area. For example, McKenzie and Williams Counties experienced the most rapid growth of 134.5 percent and 84.4 percent, respectively. This was due primarily to proportionally high domestic in-migration (US Census 2022a).

Population fluctuations in North Dakota have been linked to cycles of growth and contraction in the state's oil industry, specifically the development of oil resources in the Bakken Formation in northwestern North

Dakota. Oil and gas and the related industrial development have played an important economic role in certain local communities and regional centers, such as Williston. However, much of the planning area was historically based on a rural agricultural economy. Agriculture, livestock grazing, and recreation continue to contribute notably to the analysis area's regional economy, although the contribution from these uses on BLM administered lands is minimal.

The growth in the population seeking employment in the oil industry has led to substantial increases in housing and other related costs. This has occurred in terms of housing rental costs, as well as the cost of owner-occupied dwellings, and increases in housing and apartment rental costs have forced some to relocate to other communities. Energy development has significantly disrupted local housing markets in and in the vicinity of counties where oil drilling and gas exploration have surged.

In 2022, housing costs for owner-occupied housing in the 26-county analysis area were below the North Dakota state average and above the average costs in counties outside the analysis area. Exceptions include Burleigh, McKenzie, Morton, Stark, Ward, and Williams Counties, where housing costs exceeded the state average. Notably, group housing may account for a large amount of total housing for certain populations in the analysis area. The percentage of owner- and renter-occupied dwellings with two or more occupants per room was higher in the analysis area than in the state overall and in all counties outside the analysis area. Counties exhibiting the highest per-room occupancy in the analysis area were McKenzie, Sioux, and Williams (US Census 2022a; 2022b).

Energy and mineral development represent a key economic sector for select counties in the analysis area, particularly those counties in the Bakken region. In 2023, daily production there averaged 1,219,276 barrels of oil and 3,270,507 million cubic feet of natural gas (EIA 2023). **Table 3-137** presents, by category, the number of actively producing oil and gas wells located on both federal and nonfederal lands within the analysis area in 2019. This data year was used to coordinate with RFD data projections. There are an estimated 193 producing gas wells and 17,436 producing oil wells in the analysis area. Based on preliminary estimates from models, production for both oil and gas is anticipated to increase over the next 20 years. In 2023, 127,586,151 cubic feet of natural gas and 42,222,623 barrels of oil were produced from federal minerals in North Dakota (DOI 2024). The BLM-administered federal subsurface fluid mineral estate accounts for approximately 489,300 acres in the state.

Table 3-137
Estimated Actively Producing Oil and Gas Wells[37] in the Socioeconomic Analysis Area (2019)*

County	Gas Wells	Oil Wells
Billings	4	585
Bottineau	—	832
Bowman	167	684
Burke	1	615
Burleigh	—	—
Divide	—	792
Dunn	—	2,382
Emmons	—	—
Golden Valley	—	94

[37] It should be noted that the same surface hole location can contain multiple sidetracks and recompletes off the original vertical wellbore.

County	Gas Wells	Oil Wells
Grant	—	—
Hettinger	—	1
McHenry	—	25
McKenzie	13	4,800
McLean	—	53
Mercer	—	—
Morton	—	—
Mountrail	—	2,981
Oliver	—	—
Renville	—	360
Sheridan	—	—
Sioux	—	—
Slope	—	31
Stark	—	291
Ward	—	20
Williams	8	2,890
Analysis Area Total	**193**	**17,436**

Source: IHS 2019
*2019 data utilized to correspond with RFD data year

For fiscal year 2023, total federal minerals royalty revenue in North Dakota was $462,678,813, all of which was generated in the analysis area. Revenue collected from oil, gas, and coal development in the analysis area includes royalties from oil and gas leases in McKenzie County. In 2023, these royalties totaled $204,201,743 and were notably the highest among all analysis area counties. Revenue from rents was also highest in McKenzie County[38]. In 2023, 4,432,101 short tons of coal were produced from federal minerals in North Dakota (DOI 2024). According to the most recent data available, five surface mines in the coal-producing counties of McLean, Mercer, and Oliver produced a combined 29,643,000 short tons of coal (from both federal and nonfederal lands) in 2018 (BLM 2020b).

Federal oil and gas royalties are collected during production on the lease at a minimum rate of 16.67 percent of the value of production for leases issued after August 16, 2022, following the passage of the Inflation Reduction Act (BLM 2022d). This rate replaced the previous rate of 12.5 percent. The royalty rate for federal coal, which is specific to the Fort Union Coal Region, is 2.2 percent (DOI 2004). Once collected, revenue from the extraction of natural resources from federal mineral estate is distributed to various legislated funds, local governments, and federal agencies. This process is called disbursement. Revenue from extractive activities on federal mineral estate is dispersed biweekly and tracked and managed by the Department of the Interior's Office of Natural Resources Revenue. States other than Alaska receive 50 percent of revenues from extraction operations in those states; Alaska receives 90 percent (CRS 2020).

As described in **Section 3.3.2**, North Dakota contains the single largest deposit of lignite known in the world. The industry contributes substantially to North Dakota's economy, resulting in $5.75 billion in gross

[38] Federal oil and gas leases require annual rental payments until a discovery of oil or gas in paying quantities on the leased lands. Upon the completion of a well capable of producing oil and gas in paying quantities, the lease is transferred into producing status and annual rentals are no longer required. However, thereafter in lieu of rentals, the lessee is required to make a minimum royalty payment of not less than the amount of the annual rental that would otherwise be required prior to the end of each lease year. Actual royalties paid on production obtained on or allocated to the lease during the lease year will be credited against this minimum royalty obligation (Holland and Hart 2018).

business volume, 12,000 jobs (direct and secondary), and $104 million in local and state government revenues (NDSU 2023). Since coal ownership in the planning area is a mixture of federal, state, and private interests, the management of federal coal does not control or have strong influence over the coal market. In 2019, federal coal production accounted for approximately 11 percent of the total tonnage produced in North Dakota. Since most coal production in North Dakota occurs outside federal control, the impacts from the decisions in the RMP would have limited influence on the coal industry.

North Dakota's severance taxes on coal production are levied at the rate of $0.395 per ton. Oil and gas severance tax is levied by the state at 5 percent of gross value at the wellhead and $0.0405 per Mcf. Funds derived from such taxes fall under the jurisdiction of each state, and each state determines how the funds will be used (DOI 2021). Funds disbursed to North Dakota are allocated under the North Dakota State Treasurer based on North Dakota Century Code (NDCC) section 15.1-27.25. Oil extraction tax distribution is described under NDCC section 57-51.1-07 (North Dakota Office of State Treasurer 2021).

Labor earnings from employment in energy and mineral development, in particular, are higher in the analysis area compared to the state overall. Of the counties for which wages were reported, Mercer County had the highest average wages in the mining sector ($133,217). The average wage for mining sector labor at the state level was $124,505 (BLS 2023).

In terms of educational attainment, from 2018 to 2022, the population in the analysis area, had a slightly lower level of people with bachelor's or higher degrees (28.5 percent) than the state (31.4 percent). Most analysis area residents speak only English; the percentage of those who speak English "less than very well" is below that of the overall state average and the average for counties outside the analysis area (U.S. Census Bureau 2022b).

Compared with the rest of the state, population, employment, and total personal income have increased more rapidly in the analysis area. From 2010 to 2022, the three industry sectors that added the highest numbers of new jobs were mining, including fossil fuels (56.2 percent growth); government (11.3 percent growth); and real estate and health care and social assistance (19.8 percent growth). Employment and personal income outpaced population growth between 2000 and 2022 (BEA 2023).

In the analysis area, per capita personal income in 2022 was highest in Renville County ($113,541) and lowest in Sioux County ($38,785). The largest analysis area employment changes from 2001 to 2022 were in McKenzie, Mountrail, and Dunn Counties (which showed employment growth of 242 percent, 86 percent, and 82 percent, respectively) and in Emmons and Grant Counties (which showed employment declines of 20 percent and 18 percent, respectively). Analysis area unemployment generally followed state trends, with peaks in 2010, 2016, and 2020. In the analysis area, counties with the highest rate of unemployment in 2023 were Emmons and Oliver (4.1 percent and 3.1 percent, respectively), while Dunn County had the lowest unemployment in 2023 (1.1 percent) (U.S. Census Bureau 2022b).

Due to minimal public surface lands in the planning area, land uses other than mineral and energy development have limited contributions to the regional economy. Most BLM-administered surface land is concentrated in Bowman and Dunn Counties. Recreational uses in the planning area are mainly dispersed activities such as camping, hiking, and hunting. Besides the Big Gumbo area in Bowman County and the Schnell Ranch Recreation Area in Stark County, BLM-administered surface lands provide limited public access. Due to low visitation to BLM-administered lands, contributions to regional economies from visitor spending are low. The Schnell Ranch Recreation Area is the only established recreation area; visitor fees collected from overnight visitations to Schnell Ranch Recreation Area totaled approximately $690 in fiscal

year 2019 (BLM 2019b). Additional details regarding current recreation use are included in **Section 3.3.3**, Recreation and Visitor Services.

An AUM provides the approximate amount of forage for a cow-calf pair for 1 month (Eisele et al. 2011). As such, the amount of grazing that would occur from currently permitted forage in the decision area would be relatively small compared with the 1,088,519 cattle within the 26-county socioeconomic analysis area (NASS 2022). Additional details are included in **Section 3.3.4**, Livestock Grazing.

Community and Social Conditions

Much of the planning area was historically based on a rural agricultural economy. In certain local communities and regional centers, such as Williston, oil and gas and related industrial development has played an important economic role. Changes to the social setting are more likely to occur when development and an associated population change are introduced to communities that do not have a long history of natural resource development. With changes in technology, development may affect different portions of the planning area. See further discussion of social and economic conditions specific to Tribal communities in **Section 3.5.3**, Tribal Interests.

Historically, socioeconomic effects of energy development in the Bakken region have been driven by two key factors. First, the scale of industry activity has been enormous, with production rivaling that of any other region of the US. As a result, the population in some cities and counties has doubled, tripled, or quadrupled, leading to rapid growth in government revenues and demand for services. Second, the region is substantially more rural than any other US shale region, and despite a history of oil production over several decades, western North Dakota did not have a preexisting workforce or other infrastructure capable of supporting large-scale industry investment. The effects of energy development have included constraints on the provision of community public services, transportation, and reductions in quality of life in the analysis area (Raimi and Newell 2016).

Climate Change

Changes in temperature-related climate impact drivers, such as mean temperatures, the growing season length, and extreme heat and frost, have occurred. Many of these changes have been attributed to human activities (IPCC 2021). Regional changes in North America include changes in North American wet and dry climate impact drivers, which are largely organized by the northeast (that is, more wet) to southwest (that is, more dry) pattern of mean precipitation change, although heavy precipitation increases are widespread. Increasing evaporative demand will expand agricultural and ecological drought and fire weather (particularly in summertime) in central and western North America and northern Central America. Severe windstorms, tropical cyclones, and dust storms in North America are shifting toward more extreme characteristics, and observations and projections point to strong changes in the seasonal and geographic range of snow and ice conditions in the coming decades (IPCC 2021). These weather and climate disasters are costly, having exceeded over $1 billion dollars in damages spanning 377 events documented from 1980 to 2024 (NOAA 2024). Additional information is available in Section 5.1, Social and Economic Conditions, of the AMS (BLM 2020b).

Environmental Consequences

Nature and Type of Effects

For the purposes of this analysis, the nature and type of effects on social and economic conditions are analyzed under each of the resource areas that management actions would occur. These include fluid mineral development and production, coal production, grazing authorizations, and recreation-related

activities. Because of the planning area's mixed landownership and because only a portion of area mineral development is on federal mineral estate, the magnitude of effects described below would be proportional to only that development on federal mineral estate. Because mineral development on federal mineral estate constitutes a relatively small portion of total mineral development in the planning area overall, the magnitude of these effects would be relatively small.

The effects described below are most relevant to oil and gas-related development. Fluid mineral production is specific to mineral resource extraction and involves different inputs than development, which includes exploration, drilling, and completion. While coal production continues in the planning area, it is not expanding to a great degree, and no additional mines are forecast.

While the RMP would not directly authorize mineral development, it would determine areas open to, and stipulations on, development. This would affect future leasing and development opportunities on federal mineral estate, with associated effects on economic contributions from development and production. Potential economic impacts include changes in jobs, income, and economic output. Specifically, direct employment in the coal and oil and gas sectors, as well as indirect contributions due to spending in these industries, would occur. In addition, tax revenue for local, state, Tribal, and federal governments could change. Though the economic contribution analysis focuses on federal mineral development, impacts and economic contributions would not be constrained to federal mineral estate; instead, they would be dispersed throughout the planning area and the wider region. Impacts could be directly related to proposed management, or they could be secondary to the initial economic impact.

It is important to note that economic contributions described in the analysis make use of a static input-output model, IMPLAN. This model utilizes information on regional economic conditions for the model year and does not include adjustments to these connections for future years. As such, the reliability of forecasts may be decreased for future year impacts, particularly for economic sectors with a high degree of volatility, as can be seen in the energy sector. Additional details related to the model are included in Appendix I, methods.

Additional taxes are collected at the state level on net mineral production revenue, including severance, conservation, and emergency school taxes. The rates are described in the AMS, Section 5.1, Social and Economic Conditions (BLM 2020b).[39] State taxes and the state portion of federal mineral royalties would not be distributed directly to local communities; rather, they would be distributed to the state general fund or to specific use funds. A portion of this revenue may be used in local areas. In contrast, ad valorem production and equipment taxes collected by local governments in the extraction location would represent direct contributions to local communities. The rate of taxation varies by municipality and is adjusted annually. Royalties would fall, or rise, based on changes in production and commodity value, which can be affected by BLM leasing policy.

Closing areas to new leasing and applying NSO and CSU stipulations would require the leaseholder/operator to limit the siting, design, and operations or to use off-site methods, such as directional or horizontal drilling, to access federal mineral estate oil and gas resources. This would occur whether existing stipulations were in effect at a given location or additional stipulations were applied to lands

[39] BLM implementation of Inflation Reduction Act, section 50262, currently sets royalty rates at 16.67 percent for the 10 years following the Act's enactment. This update increases the minimum royalty rate for new onshore fossil fuel leases from 12.5% to 16.6%; eliminates noncompetitive leasing, adjusts rental rates, and establishes a higher minimum bid on federal leases.

currently under existing regulations. This could increase extraction costs for a given well, which could result in a higher per-unit economic contribution. However, if stipulations make some areas economically unfeasible to develop, then this could result in direct and indirect economic impacts, such as reduced jobs, employment, and tax revenue. If development shifted to private lands as a result of increased federal mineral estate stipulations, then federal mineral royalty collection and disbursement would be impacted. The level of economic impacts from stipulations would vary based on site-specific conditions and costs.

Any TL stipulations applied would temporarily close areas to fluid mineral exploration and development. If these limitations make development uneconomical, then the total amount of fluid mineral development in the planning area would be reduced, thereby reducing the economic contributions from production. Overall, any management actions that ultimately result in lower production levels could affect the level of employment, income, taxes, and federal and Tribal mineral royalties.

Changes in employment and income from oil, gas, and coal development could cause other socioeconomic impacts, such as local population changes. This could impact housing, infrastructure, and government services.

Depending on the percentage of labor required from the skilled workforce residing outside the socioeconomic analysis area, proposed management would change the demand for public services and housing. Workers who reside outside the socioeconomic analysis area could reduce the amount of household goods and services consumed and housing investments spent locally, as their incomes would be spent outside the socioeconomic analysis area.

Another secondary impact of increased oil and gas development could be changes to socioeconomic analysis area property values. Property valuations of large land tracts could increase due to potential income from mineral development. Short-term temporary workers have an acute direct effect on temporary housing supply and drive housing costs differently than in-migration from permanent or long-term residents. Thus, any significant influx of workers to the area for jobs in the oil and gas extraction or production sectors would increase demand for and value of rental properties (Bennet 2013).

In contrast, real or perceived concerns about local water quality, air quality, and the visual setting could decrease residential property values in areas of existing and planned mineral development. Mineral development also could affect the ability to sell a property or see a return on investment. A study found that property values can decrease by 3 to 14 percent if the property is near drilling sites and wells (Integra Realty Resources 2010). This study indicated that the decrease in property values dissipates at approximately 1,000 feet from a well site (Integra Realty Resources 2010).

The method of mineral extraction used, such as conventional wells versus hydraulic fracturing, could also have unique impacts on local communities' quality of life. Potential impacts from the mineral extraction method used could include noise increases, traffic increases, ambient air quality effects, water quality effects, and potential induced seismicity. While the impacts would vary depending on specific communities' and user groups' values, impacts would likely be greatest in areas with high well density.

Changes in resource management could also have direct and indirect social implications for residents of and visitors to the planning area. Changing populations and demographic shifts could affect attitudes, opinions, quality of life, crime rates, and established social structures. Potential impacts on public services could also occur as an indirect result of development. An increased temporary or permanent workforce could increase demand for, and associated costs of, community social services, such as education, police

and fire departments, first responders, and local hospitals. Impacts generally depend on the number of temporary workers required to relocate to the area during drilling operations; the higher the level of workers relocating, the greater the strain on local services. Studies centered around crime in oil and gas boomtowns have shown that increases in crime rates and the public perception of increased crime rates may be driven by the rapid population growth associated with oil and gas development (Archbold 2015). The potential crime rate impacts resulting from proposed actions would depend on development timing and anticipated population influx levels. A more detailed description of these effects occurring in the analysis area from the Bakken oil boom in 2013 is provided in the AMS, Section 5.1.3, Community and Social Conditions (BLM 2020b).

Oil and gas development could also conflict with other land uses, including recreation and grazing. Conflicts with other land uses could reduce the economic contributions from these resources, but impacts would likely be site specific. The level of impacts would depend on the exact timing and location of development.

Impacts Common to All Alternatives

Economic impacts from coal and oil and gas development would likely be spread throughout the socioeconomic analysis area. This is because employees would be drawn from the area surrounding current coal production activities in the three coal-producing counties of Mclean, Mercer, and Oliver, or from the 26-county area throughout which oil and gas production is reasonably foreseeable. The local labor force for coal and oil production, as well as for oil and gas well drilling and completion, would likely be drawn from those workers currently employed in the mineral development industry, those unemployed and, potentially, those relocating on a temporary or permanent basis to the planning area.

Impacts that vary based on the distance from a well site or mine would be more directly linked with site-specific development areas. These would include potential impacts from development activities on property values and the social setting. In addition, loss of rental income for owners of surface overlying federal coal mineral estate could occur in cases where federal coal may be bypassed as a result of management direction in the alternatives, and limitations on mineral development could influence rates that consumers pay for natural gas or electrical heating. The location and intensity of these impacts would depend on the exact location and timing of development, which cannot be determined at the planning level.

The oil and gas RFD (BLM 2022a) provides a reasonable estimate of future oil and gas development in the RFD analysis area from 2020 through 2040 based on average annual production and development estimates. Given the density of development and existing infrastructure across the planning area, the potential for additional development is expected to follow oil and gas occurrence potential within the planning area very closely. The level of production and development would vary, however, based on oil and gas market price. For instance, average monthly crude oil prices ranged from $33.35 to $122.45 per barrel from 2000 to 2020 (EIA 2021). Future development and production levels would be more likely to vary due to market conditions than they would in response to this RMP's management decisions.

The potential for localized impacts on quality-of-life indicators due to oil and gas or coal development would also occur depending upon the level of development. Such impacts could result in changes to resource conditions such as water resources, the visual setting, and traffic. In addition, an area's social setting could be affected as a result of an influx of population that affects the traditional or cultural setting.

BLM management actions that change development levels or have population growth-inducing effects could change the social setting and nonmarket contributions for communities and groups of interest.

Increase mineral development could impact adjacent land uses important for recreational users and outfitters, as well as livestock grazing lessees and area ranchers. Similarly, mineral development would impact local traffic, noise, visual setting, and air and water quality. All of these factors could impact local residents' quality of life.

Those who prioritize resource conservation could also experience development impacts on values such as open space, viewshed, and recreational opportunities. In contrast, values important for mineral estate owners and those who prioritize resource use could be supported by increased mineral development. Native American Tribal communities, which include members of the four federally recognized American Indian groups in North Dakota (the Spirit Lake Tribe, Standing Rock Sioux Tribe, Turtle Mountain Band of Chippewa Indians of North Dakota, and Three Affiliated Tribes of the Fort Berthold Indian Reservation) could experience impacts on values associated with traditional cultural and historical uses and ways of life. However, some Tribal populations could have jobs supported by mineral development, or they could receive mineral royalties. These groups or individuals could value opportunities presented by mineral development. The level of impacts for all groups would vary depending on the current setting, level of resultant development, and application of mitigation measures or other measures to reduce impacts, such as BMPs.

The planning area has experienced past oil and gas-induced population growth and, as a result, has social systems and infrastructure in place to accommodate future economic activity cycles. Moreover, the contribution from mineral development on planning area federal mineral estate is relatively small compared with the much larger scale at which development on private lands has occurred and is projected to occur.

Market and nonmarket values can also be discussed in the framework of ecosystem services. These represent goods and services that an ecosystem provides for human use. Impacts on ecosystem services from mineral development activities would include potential impacts on provisioning services[40] of minerals and water; regulating services, such as maintenance of water and air quality; supporting services of habitat for wildlife; and information services related to aesthetic values and recreation opportunities.

Based on the oil and gas RFD (BLM 2022a) and the coal RFD (BLM 2022b), while all communities in the Bakken would be impacted, it is likely that the most concentrated development level for all alternatives would occur in populated cities with existing housing stock where oil and gas and related industrial development has played an important economic role (such as Watford City, Williston, and Dickinson) and in populated centers near where current coal mines are located (such as Beulah, Center, and Underwood). As a result, the described impacts could be concentrated in these areas. There is potential for impacts to occur on all groups of interest; however, where development areas would occur close to communities of environmental justice concerns, development could disproportionately impact these communities. These impacts are discussed in more detail in **Section 3.5.2**, Environmental Justice.

Under all alternatives, continued public use authorization reviews and continued budget prioritization for recreation management in the Big Gumbo area, Schnell Ranch SRMA, and the Figure 4 and Lost Bridge BCAs would result in no measurable changes to local or regional economies in the planning area. Similarly, signage for BLM-administered lands and preparation of activity plans for recreational facilities would not

[40] Provisioning services are the products directly obtained from ecosystems for basic human needs (for example, food, water, minerals, shelter, and fuel).

have economic effects. Overall, recreation management would result in no effects on local or regional economies.

As discussed under the Affected Environment section, federally permitted grazing accounts for less than one percent of total grazing in the planning area. Permitted grazing would have only minor variations by alternatives, therefore, contributions to the regional economy from federally permitted livestock grazing would be negligible under all alternatives.

Alternative A

Under Alternative A, the coal screening results from the 1988 North Dakota RMP (BLM 1988) would continue to be applied. These results identify 435,800 acres as unacceptable for coal leasing and 573,900 acres managed as acceptable for coal leasing. A total of 489,300 acres would be open to fluid mineral leasing; 202,600 of these acres would be subject to an NSO stipulation. Potential impacts on general and sensitive populations (see **Section 3.5.2**, Environmental Justice) close to coal or oil and gas development include those occurring from localized effects on air quality, noise, and vibration, and changes to the landscape's visual character. Under Alternative A, 354,900 acres of federal mineral estate would be open to locatable mineral entry with 0 acres recommended for withdrawal and 7,700 acres not open to locatable mineral entry (existing segregations). A total of 318,100 acres would be open to NEL mineral leasing, and 44,500 acres would be closed to NEL mineral leasing. There is no reasonably foreseeable possibility of development of locatable or NEL minerals, so no impacts on social and economic conditions are anticipated.

Impacts on Employment, Labor Income, and Value Added from Fluid Mineral Development and Production

The effects of Alternative A on employment from foreseeable fluid mineral development would be approximately 1,051 to 1,493 direct full or part time annual jobs between 2021 and 2040. This would represent approximately 5.3 to 7.5 percent of total employment in the mining sector within the socioeconomic analysis area, which was 19,976 jobs in 2022 (BEA 2023). An additional 957 to 1,359 annual jobs would be supported in the regional economy over the same time period. As shown in **Table 3-138**, total direct annual labor income[41] would range from approximately $163 to approximately $232 million. Total annual value added[42] under Alternative A would range from $337 to $479 million.

The effects of Alternative A on employment from foreseeable fluid mineral production would be approximately 929 to 3,143 direct full or part time annual jobs between 2021 and 2040. This would represent approximately 4.7 to 15.7 percent of total employment in the mining sector within the socioeconomic analysis area. An additional 818 to 2,767 annual jobs would be supported in the regional economy over the same time period. As shown in **Table 3-139**, total direct annual labor income would range from approximately $81 million to approximately $275 million. Total annual value added under Alternative A would range from $433 million to $1.4 billion.

[41] Labor Income is defined as the sum of Employee Compensation (wages and benefits) and Proprietor Income. It represents the total value of all forms of employment income paid throughout a defined economy during a specified period of time.

[42] Value added is equivalent to the industry's contribution to gross domestic product. It represents the difference between output and the cost of intermediate inputs throughout a defined economy during a specified time period. It equals gross output (sales or receipts and other operating income, plus inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported). Total value added over the 20-year period is the sum of value added for each 5-year increment.

Table 3-138
Alternative A Average Annual Economic Effects 2021–2040 (from Fluid Mineral Development) (2024$)

Impact Period and Type	Employment[43]	Labor Income	Value Added
2021–2025			
Direct Effect	1,051	104,477,059	243,406,514
Indirect Effect	480	34,645,001	53,516,167
Induced Effect	477	24,326,464	40,590,278
Total Effect	2,008	163,448,524	337,512,959
2026–2030			
Direct Effect	1,276	126,836,864	295,499,502
Indirect Effect	583	42,059,600	64,969,504
Induced Effect	579	29,532,726	49,277,264
Total Effect	2,437	198,429,190	409,746,271
2031–2035			
Direct Effect	1,384	137,576,888	320,521,186
Indirect Effect	632	45,621,034	70,470,855
Induced Effect	628	32,033,436	53,449,860
Total Effect	2,644	215,231,358	444,441,901
2036–2040			
Direct Effect	1,493	148,393,886	345,722,199
Indirect Effect	682	49,207,992	76,011,634
Induced Effect	677	34,552,069	57,652,361
Total Effect	2,852	232,153,947	479,386,194

Source: IMPLAN 2018

Table 3-139
Alternative A Average Annual Economic Effects 2021–2040 (from Fluid Mineral Production) (2024$)

Impact Period and Type	Employment	Labor Income	Value Added
2021–2025			
Direct Effect	929	81,338,070	433,584,012
Indirect Effect	447	40,528,993	72,271,252
Induced Effect	371	18,937,132	31,601,595
Total Effect	1,748	140,804,195	537,456,859
2026–2030			
Direct Effect	1,996	174,739,918	931,475,681
Indirect Effect	961	87,069,104	155,261,523
Induced Effect	797	40,682,952	67,890,227
Total Effect	3,754	302,491,973	1,154,627,430
2031–2035			
Direct Effect	2,710	237,214,806	1,264,506,850
Indirect Effect	1,304	118,198,983	210,772,286
Induced Effect	1,082	55,228,357	92,163,068
Total Effect	5,097	410,642,146	1,567,442,204

[43] Increases in employment over the plan timeframe are a function of reasonably foreseeable development and production.

Impact Period and Type	Employment	Labor Income	Value Added
2036–2040			
Direct Effect	3,143	275,130,525	1,466,621,918
Indirect Effect	1,512	137,091,562	244,461,510
Induced Effect	1,255	64,055,896	106,894,143
Total Effect	5,911	476,277,982	1,817,977,571

Source: IMPLAN 2018

Impacts on Employment, Labor Income, and Value Added from Coal Production

The effects of Alternative A on employment from foreseeable coal production would range from approximately 298 to 315 direct full or part time annual jobs between 2021 and 2040. This would represent approximately 1.5 to 1.6 percent of total employment in the mining sector within the socioeconomic analysis area, which was 19,976 jobs in 2022. An additional 449 to 475 annual jobs would be supported in the regional economy over the same time period. As shown in **Table 3-140**, total direct annual labor income would range from approximately $52 million to approximately $55 million annually. Total annual value added under Alternative A would range from $137 to $147 million.

Table 3-140
Alternative A Average Annual Economic Effects 2021–2040 (from Coal Production) (2024$)

Impact Period and Type	Employment	Labor Income	Value Added
2021–2025			
Direct Effect	309	$53,930,467	$93,336,436
Indirect Effect	164	$14,051,747	$24,212,377
Induced Effect	302	$15,570,732	$24,849,355
Total Effect	775	$83,552,946	$142,398,168
2026–2030			
Direct Effect	315	$54,977,661	$95,148,794
Indirect Effect	167	$14,324,597	$24,682,520
Induced Effect	308	$15,873,076	$25,331,866
Total Effect	790	$85,175,333	$145,163,180
2031–2035			
Direct Effect	298	$52,010,612	$90,013,780
Indirect Effect	158	$13,551,523	$23,350,447
Induced Effect	291	$15,016,434	$23,964,750
Total Effect	748	$80,578,569	$137,328,977
2036–2040			
Direct Effect	298	$52,010,612	$90,013,780
Indirect Effect	158	$13,551,523	$23,350,447
Induced Effect	291	$15,016,434	$23,964,750
Total Effect	748	$80,578,569	$137,328,977

Source: IMPLAN 2018

Impacts on Tax Revenue from Fluid Mineral and Coal Production

Estimated annual tax payments and revenues from reasonably foreseeable oil and gas and coal development under Alternative A are provided in **Table 3-141**.

Table 3-141
Alternative A Estimated Annual Tax Payments and Revenues (2018$)

Industry and 5-Year Increments	Federal Royalty Payments Collected[1]	State Severance Taxes Collected[2]
Oil and Gas		
2021–2025	$79,857,144	$23,877,994
2026–2030	$172,620,319	$51,686,402
2031–2035	$234,887,246	$70,378,023
2036–2040	$272,946,748	$81,814,840
Coal		
2021–2025	$1,757,960	$2,332,870
2026–2030	$1,673,554	$2,479,020
2031–2035	$1,579,892	$2,347,090
2036–2040	$1,630,037	$2,344,720

Sources: North Dakota Office of State Treasurer 2021; BLM GIS 2021
[1] For federal royalty payments, gross revenue from oil and gas production is taxed at 6.67 percent for leases issued after August 16, 2022, replacing the previous rate of 12.5 percent (BLM 2022). 50 percent of this is directed back to the state of North Dakota (CRS 2020).
[2] In North Dakota, a 5 percent oil and gas gross production tax is imposed on oil and gas-producing properties. A 5 percent oil extraction tax is also levied on the extraction of oil (North Dakota 2022).

Impacts from Mineral Materials Authorizations

Demand within the planning area for mineral materials (such as clinker, sand, and gravel primarily used for road construction, with lesser amounts of fill or soil and building stone) is anticipated to increase at a moderate but steady rate over the short and long term (BLM 2022c). However, development of oil fields that produce from the Bakken Formation could cause a localized increase in demand for surfacing material where deposits of mineral materials are near oil development areas. This demand could be met by making federally owned mineral materials available by competitive sale, where competitive interest exists. It is assumed that mineral materials permits (most likely for clinker, sand, or gravel) would be issued per year in the short and long term.

Competitive permit sales could result in direct and indirect contributions to the regional economy.[44] The level of contributions would depend on the current market value for the product sold and the quantity of sale granted in the permit, which would vary by location and be based on market conditions. Direct economic contributions would not accrue from the extraction of mineral materials by local government agencies. That is because they are disposed of free of charge to local government agencies, as stated above; however, indirect benefits to local economies could result from the use of mineral materials to support road and other infrastructure construction.

Alternative B

Under Alternative B, new coal screening criteria would be applied, as described in **Appendix F**, Coal Screening Process. Under these criteria, 1,042,000 acres would be managed as unacceptable for coal leasing, and 54,400 acres would be managed as acceptable for coal leasing. This is a 90.5 percent reduction in acreage that could be leased for coal production, compared with Alternative A. The reduction in area

[44] Within the context of this discussion, the term regional economy refers to the 26-county socioeconomic analysis area.

managed as acceptable for coal leasing would result in a reduced potential for impacts on general populations and on sensitive populations (see **Section 3.5.2**, Environmental Justice) close to coal development, with possible quality of life improvements from enhanced local air quality and lower noise and vibration from new development. This reduction could also lead to an increase in rates for consumers, but the magnitude of such changes would be speculative.

Under Alternative B.1, 16,400 acres would be managed as acceptable for coal leasing, a 97.1 reduction compared with Alternative A. This alternative would result in the greatest reduction of potential impacts on the general and sensitive populations located close to coal development (see **Section 3.5.2**, Environmental Justice). To the extent federal coal is replaced by non-federal coal produced in the vicinity of the general and sensitive populations, socioeconomic effects under Alternative B.1 would be comparable to the impacts described under Alternatives A, B and C.

Impacts on Employment, Labor Income, and Value Added from Fluid Mineral Development and Production

A total of 276,200 acres would be open to fluid mineral leasing, 180,200 acres (65.2 percent) of which would be subject to an NSO stipulation. A total of 213,100 acres would be closed to fluid mineral leasing in Alternative B, compared with 0 acres closed in Alternative A. Compared with Alternative A, this would represent an 11 percent decrease in acreage subject to NSO stipulations, which would not appreciably affect local and regional economies. Under Alternative B, 362,600 acres of federal mineral estate would be open to locatable mineral entry, with 8,300 acres recommended for withdrawal. A total of 279,600 acres would be open to NEL mineral leasing, and 83,000 acres would be closed to NEL mineral leasing. There is no reasonably foreseeable possibility of development of locatable or NEL minerals, so no impacts on social and economic conditions are anticipated.

Economic impacts from fluid mineral development under Alternative B would be similar to those described under Alternative A. As shown in **Table 3-142**, Alternative B would result in employment from foreseeable fluid mineral development ranging from 1,048 to 1,488 direct full or part time annual jobs between 2021 and 2040. This alternative would result in a 0.3 percent decrease in direct employment compared with Alternative A.

Table 3-142
Alternative B Average Annual Economic Effects 2021–2040 (from Fluid Mineral Development) (2024$)

Impact Period and Type	Employment	Labor Income	Value Added
2021–2025			
Direct Effect	1,048	104,167,447	242,685,192
Indirect Effect	478	34,542,332	53,357,574
Induced Effect	476	24,254,374	40,469,991
Total Effect	2,002	162,964,153	336,512,758
2026–2030			
Direct Effect	1,273	126,460,758	294,623,265
Indirect Effect	581	41,934,881	64,776,852
Induced Effect	577	29,445,154	49,131,143
Total Effect	2,430	197,840,793	408,531,260

Impact Period and Type	Employment	Labor Income	Value Added
2031–2035			
Direct Effect	1,380	137,159,901	319,549,705
Indirect Effect	630	45,482,759	70,257,262
Induced Effect	626	31,936,345	53,287,857
Total Effect	2,636	214,579,005	443,094,824
2036–2040			
Direct Effect	1,488	147,878,157	344,520,673
Indirect Effect	679	49,036,974	75,747,462
Induced Effect	675	34,431,986	57,451,996
Total Effect	2,842	231,347,118	477,720,131

Source: IMPLAN 2018

The effects of Alternative B on the economy from foreseeable fluid mineral production would be very similar to those described for Alternative A. As shown in **Table 3-143**, employment would be approximately 927 to 3,134 direct full or part time annual jobs between 2021 and 2040. This would represent approximately 4.6 to 15.7 percent of total employment in the mining sector within the socioeconomic analysis area. An additional 816 to 2,760 annual jobs would be supported in the regional economy over the same time period. Total direct labor income would range from approximately $81 million to $274 million. Total annual value added under Alternative B would range from $432 million to $1.4 billion.

Table 3-143
Alternative B Average Annual Economic Effects 2021–2040 (from Fluid Mineral Production) (2024$)

Impact Period and Type	Employment	Labor Income	Value Added
2021–2025			
Direct Effect	927	81,097,029	432,299,109
Indirect Effect	446	40,408,887	72,057,080
Induced Effect	370	18,881,012	31,507,945
Total Effect	1,742	140,386,929	535,864,134
2026–2030			
Direct Effect	1,991	174,222,045	928,715,089
Indirect Effect	958	86,811,059	154,801,378
Induced Effect	795	40,562,381	67,689,022
Total Effect	3,743	301,595,485	1,151,205,489
2031–2035			
Direct Effect	2,702	236,508,981	1,260,744,349
Indirect Effect	1,300	117,847,286	210,145,140
Induced Effect	1,079	55,064,027	91,888,840
Total Effect	5,081	409,420,293	1,562,778,329
2036–2040			
Direct Effect	3,134	274,287,493	1,462,128,019
Indirect Effect	1,508	136,671,498	243,712,452
Induced Effect	1,252	63,859,621	106,566,607
Total Effect	5,893	474,818,612	1,812,407,078

Source: IMPLAN 2018

Impacts on Employment, Labor Income, and Value Added from Coal Production

With continuing coal production, economic impacts under Alternative B and B.1 would be the same as those described under Alternative A. Although a reduction in the level of federal coal production is anticipated under Alternative B1, total economic contributions would not be impacted, as it is anticipated that the reduction in federal coal production would be replaced by an increase in nonfederal coal production so that coal mines could meet existing contract requirements.

Impacts on Tax Revenue from Fluid Mineral and Coal Production

Estimated annual tax payments and revenues under Alternative B are provided in **Table 3-144**. Royalty payments and severance taxes from oil and gas production would be slightly lower under Alternative B than under Alternative A. Payments and taxes for coal production would remain the same as Alternative A for Alternative B. For Alternative B.1, a reduction in federal royalty payments would occur due to the anticipated shift from federal to non-federal minerals. As it is anticipated that the reduction in federal coal production would be replaced by an increase in nonfederal coal production, state severance taxes would remain the same as under Alternative A.

Impacts from Mineral Materials Authorizations

Effects on socioeconomics from mineral materials authorizations under Alternative B would be the same as those described under Alternative A.

Table 3-144
Alternatives B and B.1 Estimated Annual Tax Payments and Revenues (2018$)

Industry and 5-Year Increments	Federal Royalty Payments[1]	State Severance Taxes[2]
Oil and Gas		
2021–2025	$79,620,492	$23,807,233
2026–2030	$172,108,729	$51,533,221
2031–2035	$234,188,347	$70,168,616
2036–2040	$272,110,393	$81,564,145
Coal Alternative B		
2021–2025	Same as Alternative A	Same as Alternative A
2026–2030		
2031–2035		
2036–2040		
Coal Alternative B.1[3]		
2021–2025	$1,694,034	Same as Alternative A
2026–2030	$1,614,928	
2031–2035	$1,312,425	
2036–2040	$498,238	

Sources: North Dakota Office of State Treasurer 2021; BLM GIS 2021
[1] For federal royalty payments, gross revenue from oil and gas production at 6.67 percent for leases issued after August 16, 2022, replacing the previous rate of 12.5 percent (BLM 2022). 50 percent of this is directed back to the state of North Dakota (CRS 2020).
[2] In North Dakota, a 5 percent oil and gas gross production tax is imposed on oil and gas-producing properties. A 5 percent oil extraction tax is also levied on the extraction of oil (North Dakota 2022).
[3] Federal royalties based on predicted federal production by year. It is anticipated that the reduction in federal coal production under Alternative B.1 would be replaced by an increase in nonfederal coal production so that coal mines could

meet existing contract requirements, as a result the total production of coal in North Dakota is not expected to change and the total severance taxes would remain the same as under Alternative A.

Alternative C

Under Alternative C, new coal screening criteria would be applied, as described in **Appendix F**, Coal Screening Process. Under these criteria, 542,800 acres would be managed as unacceptable for coal leasing, and 553,600 acres would be managed as acceptable for coal leasing. This is a decrease in total acreage that could be leased for coal production, compared with Alternative A.

A total of 489,300 acres, the same amount as under Alternative A, would be open to fluid mineral leasing. However, 250,100 of these acres would be subject to NSO stipulations. Compared with Alternative A, this would represent a 23 percent increase in acreage subject to NSO stipulations. This decrease in leasable area and surface occupancy could impact general and sensitive populations (see **Section 3.5.2**, Environmental Justice) close to mineral development. This would affect quality of life by diminishing local air quality, increasing noise and vibration, and changing the landscape's visual character due to new development. Under Alternative C, 362,600 acres would be open to locatable mineral entry with 0 acres recommended for withdrawal. A total of 302,900 acres would be open to NEL mineral leasing, and 59,700 acres would be closed to NEL mineral leasing. There is no reasonably foreseeable possibility of development of locatable or NEL minerals, so no impacts on social and economic conditions are anticipated.

Impacts on Employment, Labor Income, and Value Added from Fluid Mineral Development and Production

Economic impacts from fluid mineral development under Alternative C would be the same as those described under Alternative A. Alternative C would result in employment from foreseeable fluid mineral development ranging from 1,051 to 1,493 direct full or part time annual jobs between 2021 and 2040. An additional 957 to 1,359 annual jobs would be supported in the regional economy over the same time period. This would represent no change from Alternative A. As shown in **Table 3-145**, total direct labor income $163 to approximately $232 million. Total annual value added[45] under Alternative A would range from $337 to $479 million. Employment gains would constitute 5.3 to 7.5 percent of total employment in the mining sector within the socioeconomic analysis area, which suggests there are many factors beyond BLM's control driving impacts from increased employment.

Table 3-145
Alternative C Average Annual Economic Effects 2021–2040 (from Fluid Mineral Development) (2024$)

Impact Period and Type	Employment	Labor Income	Total Output
2021–2025			
Direct Effect	1,051	104,477,059	243,406,514
Indirect Effect	480	34,645,001	53,516,167
Induced Effect	477	24,326,464	40,590,278
Total Effect	2,008	163,448,524	337,512,959

[45] Value added is equivalent to the industry's contribution to gross domestic product. It represents the difference between output and the cost of intermediate inputs throughout a defined economy during a specified time period. It equals gross output (sales or receipts and other operating income, plus inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported). Total value added over the 20-year period is the sum of value added for each 5-year increment.

Impact Period and Type	Employment	Labor Income	Total Output
2026–2030			
Direct Effect	1,276	126,836,864	295,499,502
Indirect Effect	583	42,059,600	64,969,504
Induced Effect	579	29,532,726	49,277,264
Total Effect	2,437	198,429,190	409,746,271
2031–2035			
Direct Effect	1,384	137,576,888	320,521,186
Indirect Effect	632	45,621,034	70,470,855
Induced Effect	628	32,033,436	53,449,860
Total Effect	2,644	215,231,358	444,441,901
2036–2040			
Direct Effect	1,493	148,393,886	345,722,199
Indirect Effect	682	49,207,992	76,011,634
Induced Effect	677	34,552,069	57,652,361
Total Effect	2,852	232,153,947	479,386,194

Source: IMPLAN 2018

Effects on the economy from foreseeable fluid mineral production under Alternative C are detailed in **Table 3-146**. Impacts would be the same as those described under Alternative A.

Table 3-146
Alternative C Average Annual Economic Effects 2021–2040 (from Fluid Mineral Production) (2024$)

Impact Period and Type	Employment	Labor Income	Output
2021–2025			
Direct Effect	929	81,338,070	433,584,012
Indirect Effect	447	40,528,993	72,271,252
Induced Effect	371	18,937,132	31,601,595
Total Effect	1,748	140,804,195	537,456,859
2026–2030			
Direct Effect	1,996	174,739,918	931,475,681
Indirect Effect	961	87,069,104	155,261,523
Induced Effect	797	40,682,952	67,890,227
Total Effect	3,754	302,491,973	1,154,627,430
2031–2035			
Direct Effect	2,710	237,214,806	1,264,506,850
Indirect Effect	1,304	118,198,983	210,772,286
Induced Effect	1,082	55,228,357	92,163,068
Total Effect	5,097	410,642,146	1,567,442,204
2036–2040			
Direct Effect	3,143	275,130,525	1,466,621,918
Indirect Effect	1,512	137,091,562	244,461,510
Induced Effect	1,255	64,055,896	106,894,143
Total Effect	5,911	476,277,982	1,817,977,571

Source: IMPLAN 2018

Impacts on Employment, Labor Income, and Value Added from Coal Production

With continuing coal production, economic impacts under Alternative C would be the same as those described under Alternative A.

Impacts on Tax Revenue from Fluid Mineral and Coal Production

Estimated annual tax payments and revenues under Alternative C are provided in **Table 3-147**. Compared with Alternative A, royalty payments and severance taxes from coal and oil and gas production would remain unchanged.

Table 3-147
Alternative C Estimated Annual Tax Payments and Revenues (2018$)

Industry and 5-Year Increments	Federal Royalty Payments[1]	State Severance Taxes[2]
Oil and Gas		
2021–2025	$79,857,144	$23,877,994
2026–2030	$172,620,319	$51,686,402
2031–2035	$234,887,246	$70,378,023
2036–2040	$272,946,748	$81,814,840
Coal		
2021–2025	Same as Alternative A	Same as Alternative A
2026–2030		
2031–2035		
2036–2040		

Sources: North Dakota Office of State Treasurer 2021; BLM GIS 2021
[1] For federal royalty payments, gross revenue from oil and gas production is taxed at 6.67 percent for leases issued after August 16, 2022, replacing the previous rate of 12.5 percent (BLM 2022). 50 percent of this is directed back to the state of North Dakota (CRS 2020).
[2] In North Dakota, a 5 percent oil and gas gross production tax is imposed on oil and gas-producing properties. A 5 percent oil extraction tax is also levied on the extraction of oil (North Dakota 2022).

Impacts from Mineral Materials Authorizations

Effects on socioeconomics from mineral materials authorizations under Alternative C would be the same as those described under Alternative A.

Alternative D

Impacts on Employment, Labor Income, and Value Added from Fluid Mineral Development and Production

Economic impacts from fluid mineral development under Alternative D would be similar to those described under Alternative A and the same as those under Alternative B. As shown in **Table 3-148**, Alternative D would result in employment from foreseeable fluid mineral development ranging from 1,048 to 1,488 direct full or part time annual jobs between 2021 and 2040. This alternative would result in a 0.3 percent decrease in direct employment over the 20-year timeframe compared with Alternative A.

Table 3-148
Alternative D Average Annual Economic Effects 2021–2040 (from Fluid Mineral Development) (2024$)

Impact Period and Type	Employment	Labor Income	Value Added
2021–2025			
Direct Effect	1,048	104,167,447	242,685,192
Indirect Effect	478	34,542,332	53,357,574
Induced Effect	476	24,254,374	40,469,991
Total Effect	2,002	162,964,153	336,512,758
2026–2030			
Direct Effect	1,273	126,460,758	294,623,265
Indirect Effect	581	41,934,881	64,776,852
Induced Effect	577	29,445,154	49,131,143
Total Effect	2,430	197,840,793	408,531,260
2031–2035			
Direct Effect	1,380	137,159,901	319,549,705
Indirect Effect	630	45,482,759	70,257,262
Induced Effect	626	31,936,345	53,287,857
Total Effect	2,636	214,579,005	443,094,824
2036–2040			
Direct Effect	1,488	147,878,157	344,520,673
Indirect Effect	679	49,036,974	75,747,462
Induced Effect	675	34,431,986	57,451,996
Total Effect	2,842	231,347,118	477,720,131

Source: IMPLAN 2018

The effects of Alternative D on the economy from foreseeable fluid mineral production would be very similar to those described for Alternative A and the same as those described under Alternative B. As shown in **Table 3-149**, employment would be approximately 927 to 3,134 direct full or part time annual jobs between 2021 and 2040. This would represent approximately 4.6 to 15.7 percent of total employment in the mining sector within the socioeconomic analysis area. An additional 816 to 2,760 annual jobs would be supported in the regional economy over the same time period. Total direct labor income would range from approximately $81 million to $274 million. Total annual value added under Alternative D would range from $432 million to $1.4 billion.

Table 3-149
Alternative D Average Annual Economic Effects 2021–2040 (from Fluid Mineral Production) (2024$)

Impact Period and Type	Employment	Labor Income	Value Added
2021–2025			
Direct Effect	927	81,097,029	432,299,109
Indirect Effect	446	40,408,887	72,057,080
Induced Effect	370	18,881,012	31,507,945
Total Effect	1,742	140,386,929	535,864,134

Impact Period and Type	Employment	Labor Income	Value Added
2026–2030			
Direct Effect	1,991	174,222,045	928,715,089
Indirect Effect	958	86,811,059	154,801,378
Induced Effect	795	40,562,381	67,689,022
Total Effect	3,743	301,595,485	1,151,205,489
2031–2035			
Direct Effect	2,702	236,508,981	1,260,744,349
Indirect Effect	1,300	117,847,286	210,145,140
Induced Effect	1,079	55,064,027	91,888,840
Total Effect	5,081	409,420,293	1,562,778,329
2036–2040			
Direct Effect	3,134	274,287,493	1,462,128,019
Indirect Effect	1,508	136,671,498	243,712,452
Induced Effect	1,252	63,859,621	106,566,607
Total Effect	5,893	474,818,612	1,812,407,078

Source: IMPLAN 2018

Impacts on Employment, Labor Income, and Value Added from Coal Production

With continuing coal production, economic impacts under Alternative D would be the same as those described under Alternative A.

Impacts on Tax Revenue from Fluid Mineral and Coal Production

Estimated annual tax payments and revenues under Alternative D are provided in **Table 3-150**. Royalty payments and severance taxes from oil and gas production would be slightly lower under than under Alternative A and the same as under Alternative B. Payments and taxes for coal production would remain unchanged from Alternative A.

Table 3-150
Alternative D Estimated Annual Tax Payments and Revenues (2018$)

Industry and 5-Year Increments	Federal Royalty Payments[1]	State Severance Taxes[2]
Oil and Gas		
2021–2025	Same as Alternative B	Same as Alternative B
2026–2030		
2031–2035		
2036–2040		
Coal		
2021–2025	Same as Alternative A	Same as Alternative A
2026–2030		
2031–2035		
2036–2040		

Sources: North Dakota Office of State Treasurer 2021; BLM GIS 2021
[1] For federal royalty payments, gross revenue from oil and gas production is taxed at 6.67 percent for leases issued after August 16, 2022, replacing the previous rate of 12.5 percent (BLM 2022); 50 percent of this is directed back to the state of North Dakota (CRS 2020).
[2] In North Dakota, a 5 percent oil and gas gross production tax is imposed on oil and gas-producing properties. A 5 percent oil extraction tax is also levied on the extraction of oil (North Dakota 2022).

Impacts from Mineral Materials Authorizations

Effects on socioeconomics from mineral materials authorizations under Alternative D would be the same as those described under Alternative A.

Cumulative Impacts

Economic impacts from employment, labor income, economic output, and social setting changes could be compounded when considered with other concurrent or future projects in the planning area and surrounding area. Such current and future projects are not limited to federal projects and include potential development on private, Tribal, and state lands.

Reasonably foreseeable future projects that could contribute to cumulative impacts include, but are not limited to, coal mining on approximately 1,560 acres that are leased for coal development in the planning area and that are expected to be mined before 2040, and ongoing production and development of wells as shown in the oil and gas RFD (BLM 2022a). The RFD estimates that 43,000 new oil and gas production and support wells could be drilled in the planning area from 2020 through 2040, with an estimated surface disturbance of 56,000 acres. Coal development is estimated to disturb 13,204 acres from existing and pending leases prior to 2040. Mineral materials disposal is estimated to disturb 40 acres per year. In addition to this federal mineral development, oil, gas, and coal development of state and private minerals would continue. The level to which federal mineral development would contribute to cumulative impacts would vary by alternative, based on the area open for development and the restrictions applied.

A quantitative analysis of the impacts on jobs, income, economic output, or demands on public services, as well as changes to the social setting, is not feasible due to uncertainties in the specific timing and location of development. The greatest level of impacts would occur if the development of reasonably foreseeable future projects were to occur concurrently with the development of oil and gas wells described for this RMP.

Over the next 20 years, approximately 43,000 new production and support wells and 56,000 acres of new disturbance are expected across the planning area. Of that total, 72 acres of BLM-administered surface estate could be disturbed due to oil and gas development. Federal mineral estate would be developed by approximately 1,106 wells under Alternatives A and C and approximately 1,103 wells under Alternative B. The contribution to cumulative impacts from development would follow the level of federal development. Given the similar level of development across alternatives (a difference of three wells), there would be no measurable difference in the level of cumulative contributions occurring among alternatives.

Areas classified as acceptable for coal leasing would include 573,900 acres under Alternative A, 54,400 acres under Alternative B, 553,600 acres under Alternative C, and 58,600 acres under Alternative D. However, the number of acres of federal coal leased, and total production of coal, is not expected to vary by alternative. Additionally, under Alternative B.1, production of federal coal would be reduced and production of non-federal coal would increase to replace it.

While economic impacts of concurrent development projects would likely result in a net economic gain for the region, pressures on community resources, such as available housing, education, and emergency services, could increase and cause a further strain on already-limited community services in the mostly rural planning area. In addition, increased development could affect other land uses and the market and nonmarket values associated with them. The level of contributions to these impacts would follow the level of federal mineral development, as described above.

Due to the reduced requirements for employment and ground-disturbing activities during the production phase, cumulative economic contributions, as well as impacts on the social setting and other resource uses, would be less than the impacts from drilling and development activities.

3.5.2 Environmental Justice

Issues

- Would the alternatives result in environmental justice impacts (disproportionately high and adverse effects on minority, low-income, or Tribal populations or communities)

Affected Environment

Within the analysis area for environmental justice, which considers minority, low-income, and Tribal populations within the geographic area of analysis described in **Section 3.5.1** for social and economic conditions, communities may face varying levels of vulnerability to potential impacts. These environmental justice populations have historically endured disproportionate impacts of air pollution resulting from fossil fuels (Greenpeace 2024). Tribes are environmental justice populations, and access to Tribal resources and interests are analyzed in this chapter under **Section 3.5.3**, Tribal Interests. Counties identified for further consideration are identified below, based on CEQ 1997 and guidance provided in BLM IM 2022-059, Environmental Justice Implementation (BLM 2022b). To identify communities of potential environmental justice concern within the analysis area, US Census Bureau data were used to determine whether the populations in each county met at least one of the following criteria:

The minority population in the affected area exceeds 50 percent or is meaningfully greater than the minority population percentage in the general population or other relevant geographic unit. For this analysis, "meaningfully greater" is defined as more than 110 percent of the minority population in the reference population of the state of North Dakota.

Low-income populations are defined as populations with 50 percent or more of the population in the affected area with individuals with income below 200 percent of the poverty level, or with a percent of individuals with income below 200 percent of the poverty level equal to or higher than that of the reference population (the state of North Dakoka).

Federally recognized Tribes automatically qualify as environmental justice populations. In addition, for the purposes of this analysis, tribal environmental justice populations are considered present when the percentage of tribal individuals in county is greater than or equal to 50 percent or greater than or equal to the percentage of tribal individuals in the reference area (the state of North Dakota). Tribal individuals are defined as those who identify as American Indian and Alaska Native alone or in combination with one or more races.

Low-Income and Minority Populations

Table 3-151 presents information on the percentage of the population classified as low income and the percentage of minorities in each North Dakota county within the analysis area.

Within the analysis area, 12 county populations meet the criteria for environmental justice populations, following CEQ guidance and BLM implementation direction. Based on the percentage of the population identified as one or more racial or ethnic minority, Dunn, McKenzie, Mountrail, Sioux, and Williams Counties qualify as having minority populations that meet the criteria to be considered environmental justice populations. When Native American populations were specifically examined, Dunn, McKenzie, McLean, Mountrail, and Sioux Counites meet the criteria to be considered environmental justice

Table 3-151
Populations for Environmental Justice Consideration

	Total Minority Population as a Percent of Total Population[1]	Native American Population as Percentage of Total Population[2]	Low Income Population as Percentage of Total Population[3]	Meets one or more Environmental Justice Threshold
North Dakota	17.0	6.5	24.7	-
Counties in the Study Area				
Adams	7.9	2.7	**26.9**	Yes
Billings	1.4	0	20.0	-
Bottineau	9.9	6.3	19.4	-
Bowman	8.1	4.6	19.5	-
Burke	7.1	1.7	16.1	-
Burleigh	13.6	5.1	17.7	-
Divide	14.3	2.8	19.4	-
Dunn	**21.7**	**12.5**	18.5	Yes
Emmons	4.7	1.3	**26.7**	Yes
Golden Valley	14.2	4.4	23.8	-
Grant	8	2.1	**34.7**	Yes
Hettinger	7.8	4.3	**29.5**	Yes
McHenry	5.3	1.4	22.7	-
McKenzie	**24.7**	**12.7**	**32.3**	Yes
McLean	12.3	**7.8**	17.4	Yes
Mercer	9.2	4.1	**24.8**	Yes
Morton	12.2	4.9	20.9	-
Mountrail	**43**	**32.1**	**31.3**	Yes
Oliver	9	3.4	**28.7**	Yes
Renville	4.3	0.3	18.9	-
Sheridan	4.3	3.2	22.6	-
Sioux	**87.9**	**87.1**	**63.2**	Yes
Slope	4.4	3.8	**26.6**	Yes
Stark	13.8	2.8	23.6	-
Ward	**18.7**	3.8	21.1	Yes
Williams	**23.2**	6.1	21.1	Yes

Source: US Census Bureau 2022a, 2022b, 2022c

[1] Total minority population defined as total population minus those identifying as non-Hispanic, and white alone. Minority population percentages were compared to the "meaningfully greater" reference of 18.7 percent, which is 110 percent of the total minority population statewide.

[2] Native American defined as those identifying as native American or Alaskan native alone or in combination with other races. Per BLM policy in IM 2022-059, these individuals need not be a member of a federally recognized tribe.

[3] Low income population defined as individuals with income at 200 percent of the poverty level and below.

populations. Based on an examination of low income statistics, Adams, Emmons, Grant, Hettinger, McKenzie, Mercer, Mountrail, Oliver, Sheridan, Sioux, and Slope Counties were identified as having populations meeting criteria to be considered low-income populations. Thus, Adams, Dunn, Emmons, Grant, Hettinger, McKenzie, McLean, Mercer, Mountrail, Oliver, Sioux, McKenzie, Mountrail, Sheridan,

Sioux, Slope, Ward, and Williams counties are considered environmental justice populations for the purpose of this analysis.

Tribal Populations

Individuals who identify as Native American may or may not be affiliated with federally recognized tribes. Thus, to further refine the analysis, Tribal populations were also examined. Tribal populations are concentrated in Dunn, McKenzie, McLean, Mercer, Mountrail, Sioux, and Ward counties. These counties include lands of the Standing Rock Sioux Tribe and the Fort Berthold Indian Reservation, as well as the federally recognized Mandan, Hidatsa, and Arikara Nation (Three Affiliated Tribes). Details regarding Native American populations and major Tribal affiliations can be found in **Section 3.5.3,** Tribal Interests.

Environmental justice effects are not confined to the boundaries of identified tribal reservations or counties. Changes outside these areas can also affect environmental justice communities. Tribal communities historically used numerous places in the planning area for habitation, natural resources foraging, subsistence hunting, and cultural practices. Practices that continue today involve Tribal groups visiting areas for plant and mineral gathering, rock art sites, burial areas, and traditional camp and ceremonial sites. The boundaries of these resources and impact areas are often difficult to assess and are typically identified through confidential government-to-government consultation. Traditional lifeways may include uses of certain waters, plants, animals, and earth resources; particular locations or features of the landscape may have ceremonial or religious importance.

Further screening at the census tract level identified a total of 44 tracts meeting environmental justice criteria, as detailed in **Table 3-152**.

Table 3-152
Census Tracts Identified as Containing Environmental Justice Populations

County	Tract	**EJ Criteria Met[4]** Minority Population[1]	**EJ Criteria Met[4]** Native-American Population[2]	**EJ Criteria Met[4]** Low-Income Population[3]
Adams	Census Tract 9656	-	-	X
Bottineau	Census Tract 9523	-	X	X
Burleigh	Census Tract 101	X	-	X
Burleigh	Census Tract 102	X	-	X
Burleigh	Census Tract 106	-	X	-
Burleigh	Census Tract 108	X	X	X
Burleigh	Census Tract 111.01	-	X	-
Burleigh	Census Tract 111.03	X	-	X
Burleigh	Census Tract 113	-	X	-
Dunn	Census Tract 9622	X	X	-
Emmons	Census Tract 9665	-	-	X
Grant	Census Tract 9659	-	-	X
Hettinger	Census Tract 9647	-	-	X
Hettinger	Census Tract 9648		-	X
McKenzie	Census Tract 9401	X	X	X
McKenzie	Census Tract 9623.1	X	-	X
McKenzie	Census Tract 9624	X	-	X
McLean	Census Tract 9610	-	X	-
Mercer	Census Tract 9618	-	-	X
Morton	Census Tract 201	-	X	X

County	Tract	EJ Criteria Met[4] Minority Population[1]	EJ Criteria Met[4] Native-American Population[2]	EJ Criteria Met[4] Low-Income Population[3]
Mountrail	Census Tract 9403	X	X	X
Mountrail	Census Tract 9404	X	X	X
Oliver	Census Tract 9612	-		X
Sheridan	Census Tract 9602		X	X
Sioux	Census Tract 9408	X	X	X
Sioux	Census Tract 9409	X	X	X
Slope	Census Tract 9650	-	-	X
Stark	Census Tract 9636	-	X	X
Ward	Census Tract 102	X	X	-
Ward	Census Tract 103.1	X	-	-
Ward	Census Tract 104	X	-	X
Ward	Census Tract 106.1	-	-	X
Ward	Census Tract 106.2	X	-	-
Ward	Census Tract 107.1	X	-	X
Ward	Census Tract 107.2	X	X	X
Ward	Census Tract 108	-	-	X
Ward	Census Tract 109.1	X	X	X
Ward	Census Tract 109.2	X	-	X
Williams	Census Tract 9535	X	X	-
Williams	Census Tract 9537.1	X	-	X
Williams	Census Tract 9537.2	X	-	-
Williams	Census Tract 9538	X	X	X
Williams	Census Tract 9539	-	X	-
Williams	Census Tract 9541	-	X	-

Source: US Census Bureau 2022a, 2022b, 2022c

[1]The total minority population(defined as total population minus that identifying as white of non-Hispanic descent) exceeds 50 percent or is greater than that of the reference area [2] The native American or Alaskan Native alone or in combination with other races percent of the population exceeds 50 percent or is greater than that of the reference area.[3]The low-income population (percent of people with income 200 percent or less of the federal poverty level) exceeds 50 percent or is greater than or equal to the low-income population in the reference area. [4]Census tracts that meet thresholds for environmental justice criteria are marked with an 'X.'

The distribution of environmental justice populations identified throughout the 26-county analysis area is illustrated in **Map 3-20**, Socioeconomic Analysis Area, in **Appendix A**. **Map 3-21**, Minority Populations by Census Tract, and **Map 3-22**, Low Income Populations by Census Tract (**Appendix A**), depict US Census tracts by corresponding percentages of minority (including Hispanic) residents or residents with incomes meeting poverty thresholds.

Specific issues of concern for this analysis are the potential for localized impacts on quality-of-life indicators due to oil and gas or coal development. Such impacts could disproportionately affect environmental justice populations if those populations are close to, or are affected by, changes in resource conditions. In addition, an area's social setting could be affected should there be an influx of population or if the traditional or cultural setting is affected. The analysis of the alternatives examines the potential for disproportionate or adverse impacts on identified environmental justice populations in the decision area. Due to the uncertainty in specific development locations, a further site-specific analysis would be required at the project-implementation level. This analysis would include an additional examination of the site-specific impacts of management actions on low-income, minority, and Tribal populations.

Environmental Consequences

Impacts Common to All Alternatives

Impacts common to all alternatives on identified environmental justice populations could include those on human health, air quality, water quality, and traditional cultural ways of life, as well as social and economic impacts. These impacts would be the same as those described under the relevant analysis for those resources for the general population; they are summarized in the discussions above and below.

Environmental justice populations could be impacted should a sudden influx of transient workers be needed to support oil and gas development (Forest Service 2010). An increase in transient workers could make affordable housing less available in some areas. A decrease in housing availability could disparately affect low-income families if housing costs (such as property taxes and rents) rise as a share of their income more than they rise for the rest of the population. In addition, other disparate impacts on low-income families could occur in areas with low housing vacancies. In these areas, travel time to work for low-income families could increase if they are displaced as a result of increased housing costs from increased oil and gas development. Consequently, disparate impacts on environmental justice populations are possible. These impacts are contingent on mineral development activity and its effect on housing markets, which cannot be projected at the RMP stage. Thus, these scenarios may not be an accurate portrayal of actual impacts. In addition, these are potential impacts not associated with the actual leasing decision under this EIS. Site-specific consideration of environmental justice implications will be considered during subsequent environmental analyses for oil and gas development.

Not all impacts stemming from federal minerals-related management decisions would result in adverse effects on environmental justice populations. For example, minerals development could provide employment and a source of income from leasing subsurface minerals on tribal lands, resulting in beneficial effects on local economies. Fiscal impacts to the state and counties could also provide revenue to support social and other services, thereby benefiting environmental justice populations.

The extent to which existing environmental justice populations are disproportionately affected by high and adverse human health or environmental impacts depends on whether environmental justice populations are more likely to be exposed to such impacts or are more vulnerable to them. The exact level and intensity of impacts cannot be determined in the context of this RMP. This is because information on future site-specific factors (for example, additional oil and gas well locations and their proximity to potential environmental justice populations) is not currently available at this planning level of analysis. The degree to which any implementation impacts would disproportionately or adversely affect environmental justice populations would be determined at the site-specific scale in future NEPA analyses.

It is possible to analyze which locations in the planning area have the highest potential and likelihood for development and to examine their proximity to existing environmental justice populations. Impacts on these populations might include long-term impacts on water resources, the visual setting, increased noise, traffic from drilling and production operations, or potential changes to the area's social setting should population demographics change as a result of development.

Similarly, populations living or working near drilling and development could be exposed to hazardous materials or be affected by local air quality. For instance, as stated in **Section 3.2.1**, Air Quality and Climate, when considering the four AQRVs, the Fort Berthold Indian Reservation is modeled to experience the highest impact across the five areas of interest. BMPs that could be applied at the site-specific level as

stipulations to future development under any alternative could mitigate some of these impacts on affected populations (see **Appendix D**, Design Features and Best Management Practices).

No development of locatable or NEL minerals is reasonably foreseeable during the planning period, so analysis of potential impacts on environmental justice populations from any possible future development of these resources is not possible at this time. If a development of locatable or NEL minerals were to be proposed, analysis of impacts on environmental justice populations would be evaluated as part of the NEPA process associated with the development proposal.

According to the oil and gas RFD (BLM 2022a), the area with the highest development potential is in the northwestern portion of the planning area surrounding the community of Williston and generally occupying large portions of Dunn, McKenzie, Mountrail, and Williams Counties. Environmental justice populations in this area would face a greater chance of exposure to impacts than populations that live outside the area.

With regard to potential coal development, it should be noted that the three coal-producing counties contain census tracts that have low percentages of minority residents or residents with incomes at or below low income thresholds, as illustrated in **Map 3-21**, Minority Populations by Census Tract, and **Map 3-22**, Low Income Populations by Census Tract, in **Appendix A**. As noted in Section 5.1.1 of the AMS (under Community Indicators; BLM 2020b), some analysis area residents rely on coal to heat their homes, particularly in Oliver and Mercer Counties, which contain coal mines and where coal provides a source for home heating for a comparably high percentage of homes. Consequently, management decisions that affect availability or access to coal supplies in the analysis area could result in disproportionate impacts on these individuals and communities.

The BLM NDFO has considered all input from persons or groups regardless of age, income status, race, or other social and economic characteristics. The BLM has also consulted with Tribal populations identified as having interest or TCPs in the planning area. Consultation history is detailed in **Chapter 4**, Consultation and Coordination. The BLM took into consideration any suggestions made to mitigate the impacts on these populations.

In all future site-specific analyses, the BLM would continue to ensure opportunities for the participation of potentially affected low-income, minority, or Tribal populations. If specific disproportionately high and adverse impacts are identified in subsequent NEPA analyses, the NDFO would encourage members of affected populations to provide input on appropriate modifications to avoid or mitigate effects.

Alternative A

The types of impacts on environmental justice populations under Alternative A would be the same as those described in other resource analyses in this RMP for the general population. As discussed previously under *Impacts Common to All Alternatives*, the extent and severity of impacts on specific environmental justice populations would be identified when site-specific proposed actions are analyzed under NEPA and other authorities.

Under Alternative A, the coal screening results from the 1988 North Dakota RMP would continue to be applied. It identifies 435,800 acres as unacceptable for coal leasing, and 573,900 acres as acceptable for coal leasing. A total of 489,300 acres would be open to fluid mineral leasing; of these, 202,600 acres would be subject to an NSO stipulation, and 0 acres would be closed to fluid mineral leasing. Potential impacts on environmental justice populations, including Tribal communities, close to coal or oil and gas development

include those resulting from localized effects on local air quality, noise, vibration, and changes to the visual character of the landscape.

Alternative B

Compared with Alternative A, Alternative B would result in an additional reduction in acreage for leasable mineral development. Approximately 1,042,000 acres (95 percent of the decision area) would be managed as unacceptable for further consideration for coal leasing. A total of 270,600 acres would be open to fluid mineral leasing; of these acres, 180,200 would be subject to an NSO stipulation, and 213,100 acres would be closed to fluid mineral leasing. The reduction in area managed as acceptable for coal leasing and increase in acres closed to oil and gas leasing would result in a reduced potential for adverse impacts on environmental justice communities close to coal and oil and gas development, including Tribal communities. Possible beneficial effects on quality of life from enhanced local air quality and reductions in noise and vibration from new development could occur.

Under Alternative B.1 1,080,100 acres (98 percent of the decision area) would be managed as unacceptable for coal leasing. Alternative B.1 would result in largest reduction of potential adverse impacts on populations with environmental justice concerns, compared with Alternative A. As discussed previously under *Impacts Common to All Alternatives*, the extent and severity of impacts on specific environmental justice populations would be identified when site-specific proposed actions are analyzed under NEPA and other authorities. To the extent that federal coal is replaced by non-federal coal produced in the vicinity of populations with environmental justice concerns, localized impacts under Alternative B.1 would be comparable to those described under Alternative A.

Alternative C

Compared with Alternative A, Alternative C would manage approximately 542,800 acres (50 percent of the decision area) as unacceptable for further consideration for coal leasing. This decrease in leasable area would result in fewer potential impacts on communities of environmental justice concern, including Tribal communities, located close to coal compared with Alternative A. A total of 489,300 acres would be open to fluid mineral leasing; of these acres, 250,100 would be subject to an NSO stipulation, and 0 acres would be closed to fluid mineral leasing. This alternative would keep the same acreage open to fluid mineral leasing as under Alternative A, but the increase in area subject to the NSO stipulation could result in a reduction in impacts on communities of environmental justice concern, including Tribal communities, located in NSO areas.

Alternative D

Compared with Alternative A, Alternative D would manage approximately 1,037,800 acres as unacceptable for further consideration for coal leasing. This decrease in leasable area would result in fewer potential impacts on communities of environmental justice concern, including Tribal communities located close to coal, as compared with Alternative A. A total of 276,300 acres would be open to fluid mineral leasing; of these acres, 130,000 would be subject to an NSO stipulation. In addition, 213,100 acres would be closed to fluid mineral leasing. The increase in area closed to leasing and those subject to the NSO stipulation could result in a reduction in impacts on communities of environmental justice concern, including Tribal communities, located in NSO areas. Conversely, beneficial impacts on local economies occurring as a result of minerals development-related employment, such as income from leasing subsurface minerals on tribal lands, would also be reduced compared to Alternative A as a result of the decrease in leasable area.

Cumulative Impacts

The cumulative impacts of past, current, and reasonably foreseeable oil and gas and coal development projects, when combined with other industrial projects in the planning area, could cumulatively affect identified environmental justice populations throughout the planning area. For instance, climate change may disproportionately affect environmental justice populations (Donohoe 2003; Frumkin et al. 2008). Due to the uncertainty in specific development locations, the level of contributions to cumulative impacts under each alternative is uncertain. Further site-specific analysis would be required at the project level. This analysis would include an additional examination of the site-specific impacts of management actions on low-income, minority, and Tribal populations.

3.5.3 Tribal Interests

Issues

- How would the alternatives affect Indian Tribal assets, interests, and uses?
- How would land management actions affect neighboring tribally managed lands?

Affected Environment

Native American Tribal treaty rights, uses, and interests in the planning area include both the exercise of economic and resource rights and those uses and resources that are tied to traditional cultural practices. Issues and concerns could include treaty rights and trust resources, such as land, water, minerals, and natural resources; sacred sites, traditional uses, and areas of traditional cultural and religious importance; and any other areas of concern to Native Americans.

There are three American Indian reservations located entirely in North Dakota: Fort Berthold Indian Reservation, Turtle Mountain Reservation, and Spirit Lake Reservation. Two reservations, Standing Rock Indian Reservation and Lake Traverse Indian Reservation, span the border with South Dakota. In addition, 25 Tribes have historically or currently had interests in the planning area (BLM 2020b). The BLM has the responsibility to ensure that meaningful consultation and coordination concerning Tribal treaty rights and trust resources are conducted on a government-to-government basis with federally recognized Tribes. Under the federal government's trust responsibilities to Tribes, the BLM and other federal agencies have an obligation to exercise statutory and other legal authorities in a manner that protects Tribal resources and rights. The RMP is not making decisions applicable to Indian lands or minerals, however RMP decisions have the potential for indirect impacts on adjacent lands and resources, including Tribal interests.

The BLM may not know the extent of current Tribal practices and trends involving natural resource uses and spiritual and religious ceremonies in the planning area. For Tribes, maintaining confidentiality and customs regarding traditional knowledge could take precedence over publicly identifying and evaluating these resources, unless the resources are in imminent danger of damage or destruction. In some cases, the potential concerns can be at the landscape scale, where the visual setting is considered essential or where major landforms and locations have defined place names and are described in the oral traditions. There are Tribal interests associated with reservation lands, including subsurface mineral resources that the BLM administers, and social, economic, and traditional concerns about BLM decisions.

American Indian Tribes historically used numerous places in the planning area for habitation, natural resource foraging, subsistence hunting, and spiritual and religious ceremonies. Many of these locations of past use are considered cultural resources or historic properties (see **Section 3.2.8**). The BLM has documented many cultural resources within the planning area and there is the potential for numerous other locations to exist. Where these locations occur, there is a corresponding potential for Tribal interests and

concerns regarding natural and cultural resources. Tribal practices that continue within the planning area today include Tribal groups visiting areas for plant and mineral gathering, rock art sites, burial areas, and traditional camp and ceremonial sites. Some of these locations may correspond with known cultural resources.

The Mandan, Hidatsa, and Arikara (MHA) Nation has expressed interest to the BLM in a transfer of certain BLM-administered lands adjacent to and near lands acquired by the Tribe in the Buffalo Ranch area (Township 148N Range 95W and Township 148N Range 96W). The parcels of interest to the MHA Nation are BLM-administered lands that are, in some cases, surrounded by Tribal lands. Pointing to access issues, MHA feels it could more effectively manage and develop these lands as a consolidated unit. Transfer of these lands to the Tribe would be outside the scope of RMP decisions; however, such a transfer at a later time would not be precluded by RMP decisions.

Additional information is available in Section 5.2, Treaty and Tribal Interests, of the AMS (BLM 2020b).

Environmental Consequences

Impacts Common to All Alternatives

Historical use of the planning area has likely altered resources and locations important to Tribes. While the BLM has consulted with Tribes on undertakings within the planning area, the specifics of impacts on Tribal interests may not be entirely known to the BLM due to confidentiality regarding Tribal uses. The BLM does not know the extent of current Tribal practices involving natural resource uses in the planning area or what effect oil and gas leasing and development has had during the life of the current plan. Under all alternatives, the BLM would continue to consult with Tribes on actions that have the potential to impact resources and uses important to Tribes in an effort to identify and minimize potential impacts.

The BLM issues mineral materials (sand and gravel, clinker, and other materials) sales contracts to companies and individuals as well as free use permits to local governments. The sales and permits are discretionary and issued where the use is in compliance with the RMP and is compatible with other resource values and uses. Decisions and implementation of actions from any of the RMP alternatives would be in compliance with all valid existing rights, federal regulations, BLM policies, and other requirements. There is currently little data on the impacts of mineral material permits on locations and resources important to Tribes, highlighting the importance of ongoing consultation under all alternatives. However, mineral materials permits would include stipulations for protection of other resource values, which could include Tribal resources such as natural resources and culturally important locations, regardless of alternative.

The BLM would continue to work with Tribes on federal and Indian mineral development. Development and production of oil and gas provides an important source of income to Tribal communities. Tribes have initiated other economic development enterprises, including alternative energy, commercial facilities, gaming, and tourism, which could be relevant to BLM planning (BLM 2020b).

Alternative A

Under Alternative A, protections from surface-disturbing activities would protect cultural and other sensitive resources and locations, many of which could be important to Tribes. These measures can protect Tribal interests and uses by reducing or avoiding erosion, vandalism, and unauthorized collection of cultural resources. However, some activities or surface occupancy restrictions, particularly those that limit motorized access to certain areas, could impact traditional cultural by restricting access to those areas.

Developing fluid minerals, coal, locatable minerals, NEL minerals, mineral materials, and other land use authorizations could disturb areas containing natural and cultural resources, locations, and landscapes significant to Tribes. This disturbance can directly impact resources by removing them from the area, such as surface disturbance that removes important vegetation, as well as impact the setting of these areas over larger area and duration. Under Alternative A, the BLM would continue to avoid historic properties and areas identified by Tribes as sacred or important for traditional or cultural use, whenever feasible.

Under Alternative A, the BLM would not designate any BCA in the area that the MHA Nation has expressed interest in transferring to Tribal ownership. These parcels are considered Category 1 - Retention and Category 2 - Available for disposal through methods other than sale. While not available for direct sale, a transfer to the Tribe would not be precluded under this alternative. These areas would be managed as open for fluid mineral leasing, disposal of mineral materials and leasing of NEL minerals. Development, access, and operation of oil and gas facilities and other mineral development in these areas could impact Tribal interests.

Potential impacts resulting from the development, access, and operation of oil and gas facilities without federal involvement would continue (BLM 2020b). Coal mining has the potential to impact historic properties and locations important to Tribes as well as tribal uses of areas. In some cases, coal mining could permanently remove an area of interest or use, causing long-term impacts on Tribes. Consultation would assist in identifying locations and uses and minimizing potential impacts, where possible.

Alternative B

Management under Alternative B would provide more protective measures for NRHP-listed properties and other historic properties, including TCPs, than Alternative A. Additionally, Alternative B protects sites that meet the criteria for allocation for designation for scientific use, conservation use, traditional use, public use, and experimental use, some of which may also be important to Tribes. Alternative B would prohibit surface occupancy within a 300-foot restriction zone surrounding the historic property if an undertaking could impact the setting, character, feeling, or integrity. Therefore, minimizing impacts on historic properties, areas, and resources important to Tribes compared with Alternative A.

The BLM would prioritize avoidance of historic properties and locations identified by Tribes as important for traditional or cultural use. Additionally, activities would be prohibited in and around cultural resources determined to be of particular importance to Tribes, TCPs, or locations of traditional use (such properties include, but are not limited to, burial locations, pictograph and petroglyph sites, vision quest locations, plant-gathering locations, and areas considered sacred or used for religious purposes [BLM 2020b].) This would provide increased protection of Tribal interests compared with Alternative A.

Similar to Alternative A, impacts on landscapes, resource areas, or historic properties important to Tribes could increase as new oil and gas development occurs. Potential impacts resulting from the development, access, and operation of oil and gas facilities would continue (BLM 2020b). However, under Alternative B, areas with a low development potential rating would be closed to fluid mineral leasing and development. This would reduce the likelihood of impacts in these areas.

Management under Alternative B would include a fluid mineral NSO stipulation, and closure to mineral materials disposal and NEL minerals for visible areas within 3 miles of several important NRHP-listed historic sites, which would increase protections of locations important to Tribes (see **Section 3.2.8**, Cultural Resources). Additionally, under Alternative B, 213,100 more acres of BLM-administered federal mineral estate would be closed to fluid mineral leasing than under Alternative A (BLM GIS 2021), reducing the

potential for impacts on locations important to Tribes and Tribal uses in these areas. These constraints would slightly reduce the potential for effects on areas significant to Tribes resulting from discretionary actions, compared with Alternative A, which would have significantly fewer constraints and more federal mineral estate open to fluid mineral leasing. This alternative also addresses tribal concerns with the addition of an NSO lease stipulation within a half mile of the Missouri River, Lake Sakakawea, and Lake Oahe, consistent with the MHA Nation's Tribal Resolution, and recognizing the regional importance of the Missouri River as a state Class I river used as a major supply of drinking water.

Under Alternative B, the BLM would designate the Figure 4 BCA, which encompasses parcels of land that the MHA Nation has expressed interest in transfer to Tribal ownership. These parcels are considered Category 2 – Retention/Limited Disposal; while not available for direct sale, a transfer to the Tribe would not be precluded under this alternative. Under Alternative B, the 3,500-acre Figure 4 BCA would be managed as NSO for fluid minerals, and closed to disposal of mineral materials and leasing of NEL minerals. This would provide increased protections of tribal interests and uses of locations within parcels in the BCA.

Coal mining is a practice that can disturb large tracts of land potentially containing resources and landscapes significant to Tribes and adversely affect the setting of these areas over a great distance and duration. Alternative B would make 1,042,000 acres unacceptable for coal leasing in the coal decision area, which is a substantial increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This reduction in acreage of federal coal acceptable for coal mining would reduce the likelihood of impacts on potentially important Tribal resources that could be discovered during coal strip mining.

Alternative B.1 would reduce areas managed as acceptable for coal leasing by 38,000 acres compared with Alternative B, further reducing potential adverse impacts on Tribal resources.

Under Alternative B, more areas would be closed to mineral materials disposal, including some sensitive habitat, and special management areas such as the Figure 4 BCA, and restriction zone areas surrounding some historic properties, comparted to Alternative A. These additional closures could protect areas and uses that are important to Tribes. The development of additional gravel pits in the planning area would increase the chance of incidental discovery of cultural or tribally significant resources. With proper tribal consultation and the issuance of permits in compliance with all existing rights, federal regulations, and BLM polices, the continued use and further development of federally reserved mineral materials are not anticipated to impact Tribal interests.

Alternative C

Alternative C would include more protective measures for NRHP-listed properties and other historic properties, including TCPs and sites that meet the criteria for allocation for designation for scientific use, conservation use, traditional use, public use, and experimental use, compared with Alternative A. Under Alternative C, the same total acreage of federal mineral estate would be open to fluid mineral leasing as Alternative A (BLM 2022a). However, Alternative C would prohibit surface occupancy within NRHP-listed properties and other historic properties, including TCPs. There would be an additional 100-foot restriction zone surrounding each historic property when an undertaking could have a potential effect on the historic property's setting, character, feeling, or integrity. Because Alternative C would include this 100-foot restriction zone, impacts on historic properties and potentially locations of Tribal importance would be minimized compared with Alternative A. New oil and gas plays discovered in areas of low

development potential could be developed under this alternative, which may result in some increased impacts to locations and uses important to Tribes.

Alternative C would include a CSU stipulation for visible areas within 2-miles of several important NRHP-listed historic sites (see **Section 3.2.8**, Cultural Resources). Compared with Alternative A, which would not have this CSU stipulation, Alternative C would reduce the potential for impacts on areas significant to Tribes resulting from discretionary actions. Alternative C, like Alternative A, would not close land surrounding historic properties to mineral materials disposal or NEL mineral development, therefore, impacts are anticipated to be similar to Alternative A.

Under Alternative C, the BLM would designate the Figure 4 BCA, which encompasses parcels of land that the MHA Nation has expressed interest in transfer to Tribal ownership. These parcels are considered Category 2 – Retention/Limited Disposal; while not available for direct sale, a transfer to the Tribe would not be precluded under this alternative. Under Alternative C, the 3,100-acre Figure 4 BCA would be managed as NSO for fluid minerals, and closed to disposal of mineral materials and leasing of NEL minerals. This would provide increased protections of tribal interests and uses of locations within parcels in the BCA.

Alternative C would make 542,800 acres unacceptable for coal leasing in the coal decision area; this is an increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This increase in acreage of federal coal unacceptable for coal mining would decrease the likelihood of impacts on potentially important Tribal resources, which could be discovered during coal strip mining and the associated development.

Under Alternative C, similar acreage as Alternative A would be closed to mineral materials disposal, areas closed would include some sensitive habitat and special management areas such as the Figure 4 BCA. These closures could protect areas and uses that are important to Tribes. The development of additional gravel pits in the planning area would increase the chance of incidental discovery of cultural or tribally significant resources. With proper Tribal consultation and the issuance of permits in compliance with all existing rights, federal regulations, and BLM polices, the continued use and further development of federally reserved mineral materials are not anticipated to impact Tribal interests.

Alternative D

Alternative D would have similar management actions and impacts as described under Alternative B. Compared with Alternative A, management actions under Alternative D would include more protective measures for NRHP-listed properties and other historic properties, including TCPs and sites that meet the criteria for allocation for designation for scientific use, conservation use, traditional use, public use, and experimental use. Under Alternative D, 213,100 more acres of BLM-administered federal mineral estate would be closed to fluid mineral leasing than under Alternative A (BLM GIS 2021). These constraints under Alternative D could slightly reduce the potential for impacts on locations and uses important to Tribes resulting from discretionary actions, compared with Alternative A. This alternative also addresses tribal concerns with the addition of a NSO lease stipulation within a half mile of the Missouri River, Lake Sakakawea, and Lake Oahe, consistent with the MHA Nation's Tribal Resolution, and recognizing the regional importance of the Missouri River as a state Class I river used as a major supply of drinking water.

Similar to Alternative B, Alternative D would prohibit surface occupancy within Fort Union Trading Post National Historic Landmark. For the other NRHP-listed historic properties, impacts would be the same as described under Alternative C (see **Section 3.2.8**, Cultural Resources) due to application of a CSU

stipulation. Compared with Alternative A, which would not have this CSU stipulation, Alternative D would reduce the potential for impacts on locations and uses important to Tribes resulting from discretionary actions. Alternative D, like Alternative C, would not close land surrounding historic properties to mineral materials disposal and NEL leasing.

Under Alternative D, the BLM would designate the Figure 4 BCA, which encompasses parcels of land that the MHA Nation has expressed interest in transfer to Tribal ownership. These parcels are considered Category 2 – Retention/Limited Disposal; while not available for direct sale, a transfer to the Tribe would not be precluded under this alternative. Under Alternative D, the 3,500-acre Figure 4 BCA would be managed as NSO for fluid minerals, and closed to disposal of mineral materials and leasing of NEL minerals. This would provide increased protections of tribal interests and uses of locations within parcels in the BCA.

Alternative D would make 1,037,800 acres unacceptable for coal leasing in the coal decision area; this is an increase from the 435,800 acres currently unacceptable for coal leasing in the coal decision area under Alternative A. This increase in acreage of federal coal unacceptable for coal mining would decrease the likelihood of impacts on potentially important Tribal resources, which could be discovered during coal strip mining and the associated development.

Under Alternative D, more areas would be closed to mineral materials disposal, including some sensitive habitat, and special management areas such as the Figure 4 BCA, comparted to Alternative A. These additional closures could protect areas and uses that are important to Tribes. The development of additional gravel pits in the planning area would increase the chance of incidental discovery of cultural or tribally significant resources. With proper tribal consultation and the issuance of permits in compliance with all existing rights, federal regulations, and BLM polices, the continued use and further development of federally reserved mineral materials would not be anticipated to adversely affect Tribal interests.

Cumulative Impacts

The cumulative impacts analysis area for Tribal interests and uses includes the entire planning area regardless of surface or mineral ownership. Past and present actions that have had, or are having, physical impacts (for example, damaging or destroying the physical integrity of certain resources) and visual, auditory, or vibratory impacts (for example, reducing a property's historic integrity or reducing the ability of a Tribe to use a certain area or resource) on Tribal interests and uses include activities such as mineral and infrastructure development (including oil, gas, and coal), natural forces such as erosion and wildfire, and recreation. Reasonably foreseeable future actions with the potential to affect Tribal interests and uses are similar to the past and present actions.

Management under all alternatives would contribute to cumulative impacts on Native American interests and uses in the planning area. Oil and gas exploration, leasing, and development or ROW authorization in the decision area could result in potential physical, visual, auditory, or vibratory impacts on areas or resources important to Tribes. This is because increased traffic, dust, noise, and light pollution would affect the physical integrity or setting and feeling. Loss of access to ancestral sites, Tribal resource areas, sacred locations, and cultural landscapes, and changes to visual and aural setting, have likely occurred and could increase as new plays[46] are developed. New plays could be developed without a plan amendment.

[46] A group of oil fields or prospects in the same region that are controlled by the same set of geological circumstances.

Proposed management under Alternative B would be the most restrictive toward coal and oil and gas development, which would reduce the contribution to cumulative impacts on Tribal interests and uses in the planning area. The potential contribution to cumulative impacts on Tribal interests and uses would be increased under Alternatives C and D; however, the highest potential contributions to impacts on Tribal interests and uses would occur under Alternative A. This is due to the lack of special management actions and plan components to protect certain historic properties and areas potentially important to Tribes.

Under Alternative A, the effects of surface-disturbing undertakings, coupled with the increased frequency and intensity of droughts, wildfires, and wind and water erosion caused by anthropogenic climate change, could continue to significantly increase adverse, local, and long-term impacts on areas and resources important to Tribes. When coupled with other impacts from ground-disturbing activities, impacts on cultural resources from climate change would likely be exacerbated. Alternative A has fewer restrictions on ground-disturbing activities and less mitigation for visual impacts on historic properties than the four action alternatives; therefore, Alternative A could be less effective in mitigating impacts that could be caused, at least in part, by climate change.

Because surface-disturbing undertakings would be more restricted under Alternatives B and B.1, impacts compounded by climate change could be less than they would be under Alternative A. Because more oil and gas leasing stipulations and objectives designed to manage resources important to Tribes would exist under Alternatives C and D, impacts compounded by climate change could be less than they would be under Alternative A.

Changes in the landscape character of the planning area will likely occur as a result of climate change, with effects potentially extending to areas of Tribal interest. Warmer year-round temperatures, combined with an increase in seasonal wildfire duration and fire frequency, will continue to change the appearance of the landscape within the planning area. Wildfires could result in direct disturbance or loss of Tribal resources through the destruction or modification of structures, features, artifacts, rock art sites, cultural use areas, plant species used for traditional cultural use, and culturally modified trees (Buenger 2003; Greer and Greer 2001; Tratebas et al. 2004). Organic materials are especially vulnerable to heat damage.

3.5.4 Public Health and Safety

Issues

- How would the alternatives address public health concerns, such as accidental releases of oil and gas waste materials, hazardous materials associated with hydraulic fracturing, and the burning of fossil fuels (coal, oil, and gas) from the planning area?

Affected Environment

Hydraulic Fracturing

Since the advent of hydraulic fracturing, more than 1 million hydraulic fracturing treatments have been conducted. Public concern about the use of hydraulic fracturing has been focused on the potential for contamination of freshwater aquifers and impacts on domestic and municipal water wells. An associated concern has involved the potential for mini-earthquakes caused by the creation of enough pressure in the formation to cause fractures. For decades, oil and gas companies and independent geophysicists have used state-of-the-art equipment to monitor microseismic activity—defined as a faint or very slight tremor—during hydraulic fracturing to optimize well completions and to gather information about fracture dimensions and propagation (Warpinski 2011). These data give an indication about the magnitude of

seismic activity associated with hydraulic fracturing, the dimensions of resultant fractures in geologic formations, and the probability for induced fractures to extend into nearby aquifers, if present.

Research indicates that microseismic activity created by hydraulic fracturing occurs at Richter magnitude 1.0 or less (Warpinski and Zimmer 2012). In comparison, a magnitude 3.0 earthquake is the threshold that can be felt at the ground surface. The Richter magnitude scale is base-10 logarithmic, meaning that a magnitude 1.0 tremor is 1/10th the energy of a magnitude 2.0 tremor.

Under some circumstances, injection of fluids into the subsurface can trigger earthquakes. Study is ongoing but, it is generally understood that short-term injection of fluids to stimulate oil and gas production by hydraulic fracturing is relatively unlikely to produce significant earthquakes, while injection used to dispose of waste fluids for prolonged periods can increase the potential for damaging earthquakes (Congressional Research Service 2016). The probability of induced seismicity is connected to the geology in the injection area; areas with a history of damaging earthquakes can be susceptible to severe induced quakes. North Dakota experiences occasional earthquakes but does not have a history of severe or damaging earthquakes. The strongest recorded earthquake in the state was a 4.4 magnitude in 1968 near the town of Huff (Grand Forks Herald 2012). In addition, the State of North Dakota has implemented rules to help ensure that fluids are not injected near known or suspected faults, that wells are constructed to prevent the migration of fluids, and that seismic monitoring occurs at sites where deemed necessary (Kurz et al. 2016). The USGS produces projections of the annual probability of an induced ground-shaking event across the country, the most recent update from the 2018 One-Year Induced Seismicity Model indicates that the chance of a potentially minor-damage ground-shaking event in the planning area is less than 1 percent annually (USGS 2018).

The rapid increase in use of well stimulation techniques to obtain oil and gas from tight formations or from depleted fields has triggered public demand for more assurances that the methods are safe and will not affect groundwater and the environment in general. Better understanding of the causes of past environmental problems associated with well stimulation, improved drilling and well construction techniques, and increased regulatory oversight have led to a lower risk of releases; however, the field is rapidly changing. While state regulatory agencies have gradually increased their levels of oversight and standards, the BLM has also proposed additional, more stringent requirements for lessees. This is to ensure minimum standards are upheld and to reassure the public. This trend is likely to continue.

The primary drinking water aquifers in North Dakota include unconfined surficial aquifers, and several confined aquifers including the Fort Union aquifer, the Fox Hills-Hell Creek aquifer, and the Dakota aquifer. Surficial aquifers in North Dakota are discontinuous, and range from tens to hundreds of feet thick, and are more common east of the Missouri River, these aquifers are primarily susceptible to contamination by surface spills and well casing failure. Confined aquifers are contained between confining units[47] which prevent the flow of contaminants into the aquifer in the event of a surface spill. Confined aquifers in North Dakota exist at a depth ranging from near 0 to over 5,300 feet below ground (DEQ 2021c). The primary hydraulic fracturing targets, the Bakken and Three Forks Formations, are located approximately 6,500 to 11,100 feet below ground (NDGS 2008). Because of the vertical separation between the hydraulic fractured formations and drinking water aquifers migration from fracture target formations to drinking water aquifers is unlikely, the primary risk of contamination for confined drinking water aquifers comes from the possibility for failure of the well casing(s) where wells pass through the aquifer.

[47] Units of a rock type with low permeability that impedes the movement of water.

The BLM and North Dakota Oil and Gas Division has casing, cementing, and inspection requirements in place to limit the potential for groundwater reservoirs and shallow aquifers to be impacted by fracking or the migration of hydrocarbons on leased parcels. Prior to approving an APD for a well over which BLM has jurisdiction, a BLM geologist identifies all potential subsurface formations that will be penetrated by the wellbore including groundwater aquifers and any zones that will present potential safety or health risks that will need special protection measures during drilling, or that could require specific protective well construction measures. Casing programs and cement specifications are submitted to the BLM and North Dakota Oil and Gas Division for approval to ensure that well construction design will be adequate to protect the subsurface environment, including known or anticipated zones with potential risks or zones identified by the geologist. Surface casing will be set to an approved depth, and the well casing and cementing will stabilize the wellbore and provide protection to any overlying freshwater aquifers by isolating hydrocarbon zones from overlying freshwater aquifers. Before hydraulic fracturing takes place, all surface casings and intermediate zones are required to be cemented from the bottom of the cased hole to the surface.

The cemented well will be pressure tested to ensure there are no leaks, and a cement bond log will be run to confirm that the cement has bonded to the steel casing strings and to the surrounding formations. The BLM requires operators to comply with the regulations at 43 CFR 3160. These regulations require oil and gas development to comply with directives in the Onshore Orders (found at 43 CFR 3171 through 3177) and the orders of the BLM Authorized Officer. The requirements of 43 CFR 3172 and the regulations at 43 CFR 3162.3-3 provide regulatory requirements for hydraulic fracturing, including casing specifications, monitoring and recording, and management of recovered fluids, making contamination of groundwater resources highly unlikely There have not been any documented past instances of groundwater contamination attributed to well drilling in North Dakota.

Complying with the aforementioned regulations requires producers and regulators to verify the integrity of casing and cement jobs. Casing specifications are designed and submitted to the BLM together with an APD. The BLM petroleum engineer independently reviews the drilling plan and, based on site-specific geologic and hydrologic information, ensures that proper drilling, casing, and cementing procedures are incorporated in the plan in order to protect usable groundwater. This isolates usable water zones from drilling, completion/hydraulic fracturing fluids, and fluids from other mineral bearing zones, including hydrocarbon bearing zones. COAs could be attached to the APD if necessary to ensure groundwater protection. Installations of the casing and cementing operations are witnessed by certified BLM Petroleum Engineering Technicians. At the end of the well's economic life, the operator must submit a plugging plan. The plugging plan is reviewed by the BLM petroleum engineer prior to well plugging and ensures permanent isolation of usable groundwater from hydrocarbon bearing zones. BLM inspectors ensure planned procedures are properly followed in the field.

Surface casing and cement will be extended beyond usable water zones. Production casing will be extended and adequately cemented within the surface casing to protect other mineral formations, in addition to usable water bearing zones. These requirements ensure that drilling fluids, hydraulic fracturing fluids, and produced water and hydrocarbons remain within the well bore and do not enter groundwater or any other formations. Since the advent of hydraulic fracturing, more than 1 million hydraulic fracturing treatments have been conducted, with perhaps only one documented case of direct groundwater pollution resulting from injection of hydraulic fracturing chemicals used for shale gas extraction (Gallegos and Varela 2015).

No single list of chemicals currently used in hydraulic fracturing exists for the planning area, and the exact combinations and ratios used by operators are considered proprietary; however, the general types of

compounds and relative amounts used are well known and relatively consistent (see **Table 3-153**). Since fracture jobs are tailored to the down-hole environment and companies are aware of the concerns involving hydraulic fracturing, the chemicals listed in **Table 3-153** may or may not be used, and the information is provided solely as general information.

Table 3-153
Typical Hydrofracturing Chemical Additives

Additive Type[1]	Typical Example[1]	Percent by Volume[2]	Function[1]	Common Use of Example Compound
Acid	Hydrochloric acid	0.123	Dissolves minerals and initiates cracks in the rock	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	0.001	Eliminates bacteria in the water that produces corrosive by-products	Disinfectant; sterilizer for medical and dental equipment
Breaker	Ammonium persulfate	0.010	Allows delayed breakdown of the gel	Used in hair coloring, as a disinfectant, and in manufacture of household plastics
Clay stabilizer	Potassium chloride	0.060	Creates a brine carrier fluid that prohibits fluid interaction with formation clays	Used in low-sodium table salt substitutes, medicines, and intravenous fluids
Corrosion inhibitor	Formic acid	0.002	Prevents corrosion of the pipe	Used as a preservative in livestock feed and as a lime remover in toilet bowl cleaners
Crosslinker	Borate salts	0.007	Maintains fluid viscosity as temperature increases	Used in laundry detergents, hand soaps, and cosmetics
Friction reducer	Polyacrylamide	0.088	“Slicks” the water to minimize friction	Used as a flocculent in water treatment and manufacture of paper
Gelling agent	Guar gum	0.056	Thickens the water to help suspend the sand	Used as a thickener, binder, or stabilizer in foods
Iron control	Citric acid	0.004	Prevents precipitation of metal oxides	Used as flavoring agent or preservative in foods
Surfactant	Lauryl sulfate	0.085	Increases the viscosity of the fracture fluid	Used in soaps, shampoos, and detergents and as a foaming agent
pH adjusting agent	Sodium hydroxide, acetic acid	0.011	Adjusts pH of fluid to maintain the effectiveness of other components, such as crosslinkers	Sodium hydroxide used in soaps and drain cleaners; acetic acid used as a chemical reagent and main ingredient of vinegar
Scale inhibitor	Sodium polycarboxylate	0.043	Prevents scale deposits in the pipe	Used in dishwashing liquids and other cleaners
Winterizing agent	Ethanol, isopropyl alcohol, methanol	—	Added as a stabilizer, drier, and anti-freezing agent	Various cosmetic, medicinal, and industrial uses

Additive Type[1]	Typical Example[1]	Percent by Volume[2]	Function[1]	Common Use of Example Compound
Total Additives	—	**0.49**	—	—
Total Water and Sand	—	**99.51**	—	—

Sources: [1] FracFocus.com 2022; [2] US Department of Energy 2009

Although a variety of chemical additives may be used in hydraulic fracturing, the vast bulk of fluid injected into the formation during the process is water, mixed with sand. This represents 99.51 percent of the total by volume in the typical mixture shown in **Table 3-153**. The sand is used as a propping agent to help keep the newly formed fractures from closing.

Following completion of fracturing activities, the pressure differential between the formation and the borehole (a result of the weight of thousands of feet of rock above the formation) causes most of the injected fluids to flow toward the borehole. Then it flows upward to the surface, along with the hydrocarbon fluids released from the formation. The composition of this mixture, called flowback water, gradually shifts over several days to a few months, as injected fluids that have not yet migrated back to the wellbore or reacted with the native rock are carried out of the formation.

The conclusions that the EPA made in Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States (EPA 2016b) about the more severe impacts that could occur during the hydraulic fracturing process are as follows:

- Water withdrawals for hydraulic fracturing in times or areas of low water availability, particularly in areas with limited or declining groundwater resources
- Spills during the management of hydraulic fracturing fluids and chemicals or produced water that result in large volumes of high concentrations of chemicals reaching groundwater resources
- Injection of hydraulic fracturing fluids into wells with inadequate mechanical integrity, allowing gases or liquids to move to groundwater resources
- Injection of hydraulic fracturing fluids directly into groundwater resources
- Discharge of inadequately treated hydraulic fracturing wastewater to surface water resources
- Disposal or storage of hydraulic fracturing wastewater in unlined pits, resulting in contamination of groundwater resources

If impacts from the hydraulic fracturing water cycle occur, depending on the severity of the impact, drinking water resources could become unusable for consumption by humans or wildlife, and could negatively affect fish and vegetation.

Measures that the BLM currently requires for protecting groundwater aquifers, water wells, and surface waters include isolating deeper, hydrocarbon-producing horizons from shallower bedrock and alluvial layers that communicate with surface waters and within which freshwater wells are completed. Examples are to require the following:

That casings be set to a depth below the deepest freshwater aquifer encountered and water wells in the vicinity

That the casing be cemented to prevent flow of saline waters, natural gas, and associated fluids moving up the borehole from encountering the freshwater zones

Naturally occurring radioactive materials (NORM) are common constituents in water from oil and gas production. Radioactive elements such as uranium, radium, and radon are dissolved in very low concentrations during normal reactions between water and rock or soil. During production of hydrocarbons the associated waters carry the radioactive isotopes to the surface where they can precipitate out of solution and build up in barium sulfate/calcium scale or sludge inside casing, pipes, tanks, processing equipment, and other equipment. NORM is not produced in significant amounts during drilling and is more of a phenomenon associated with production and processing at central facilities. Radioactive materials are managed as required by federal and state regulations, which include disposal requirements to protect public health.

Closed-loop systems during drilling use steel bins to contain all drilling mud and waste, and the drill cuttings and other wastes produced are removed from the location and disposed of properly. Even if flowback or produced water is recycled and reused, it is used for other down-hole activities and eventually will be disposed of through injection. This is because there is no other approved method to dispose of produced water in the basin; hence any risk to the public is from unintentional spills, for which the BLM has established procedures to deal with.

An EPA report on the impacts of hydraulic fracturing on drinking water (EPA 2016b) found that although impacts are slight and have a low probability, such impacts can still be considered a risk. The Inspection and Enforcement Department of the BLM and the North Dakota Oil and Gas Division have created safeguards to prevent such situations from occurring. These agencies' requirements limit the potential for groundwater reservoirs and shallow aquifers to be affected by hydraulic fracturing or migration of hydrocarbons.

The steps taken to avoid such impacts include planning for casing and cementing to protect all usable water zones; performing inspections of oil and gas operations to ensure that there is adequate isolation of subsurface fluids and that all casing meets proper standards; and ensuring that drilling operations do not contaminate freshwater aquifers and other subsurface and surface resources (see the BLM Inspection and Enforcement Handbook, H-3160-5 [2009] and 43 CFR 3172).

Under the authority of the Mineral Leasing Act of 1920, as amended, and 43 CFR 3160, the BLM implements other safeguards and regulations for the prevention of harm to the environment, health, and human safety, specifically surface and groundwater resources, as identified below.

- 43 CFR 3171: This subpart describes the APD approval process, specifically that an approved APD will contain COAs that reflect necessary mitigation measures. Such mitigation measures could include water quality monitoring projects as appropriate or deemed necessary at the site-specific level. It requires drilling plans to be submitted with APDs. Drilling plans identify geologic information, including estimated depth and thickness of zones potentially containing usable water and the operator's plans for protecting such resources. An approved APD will contain COAs that reflect necessary mitigation measures, such as water quality monitoring projects, deemed appropriate at the site-specific level. In addition, Onshore Order 1 requires a Surface Use Plan of Operations to include a description of safe operations and adequate protection of surface resources, groundwater, and other environmental components.
- 43 CFR 3172: This lists regulatory requirements for hydraulic fracturing, including casing specifications, monitoring and recording, and management of recovered fluids. Importantly, this subpart defines usable water as anything that is 10,000 ppm total dissolved solids or below.

- 43 CFR 3162.3-3(e)(i): This requires monitoring protocols for the cement casing of an oil or gas well to ensure that it is designed to sufficiently protect and isolate groundwater.
- 43 CFR 3162.5-1: This requires operators to "conduct operations in a manner which protects the mineral resources, other natural resources, and environmental quality." Additionally, this section requires all spills or leakages to be controlled and removed.
- 43 CFR 3162.5-2(d): This gives the BLM the authority to require an operator to monitor water resources to ensure that the isolation procedures used to protect water and other resources were effective.

In addition to these regulations, the operator must comply with other applicable laws and regulations for ground and surface water protection. The State of North Dakota's regulations for drilling, casing and cementing, completion, and plugging to protect freshwater zones can be found at North Dakota Administrative Code Chapter 43-02-03.

In the event of a spill or release of hydraulic fracturing chemicals or fluids, lessees and operators are obligated by the standard terms of the lease, the approved APD, and BLM Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases NTL-3A (Reporting of Undesirable Events) to report, respond to, and mitigate the spill or release. Site-specific mitigation tools would be developed as appropriate and could include surface or groundwater quality monitoring studies. For example, the BLM could require drilling operators to test water resources before, during, and after operations.

Finally, protection of ground and surface water is enforced in concert with the State of North Dakota and any other applicable entities with jurisdiction (for example, Tribal entities, the US Army Corps of Engineers, and the EPA). In addition to the enforcement of the regulations described above, operators would be required to remediate impacts from any contamination events.

Oil and Gas Production and Potential for Spills

Oil and gas production poses the risk of spills or accidental release of contaminants during the production and transport of natural gas, oil, condensate, and produced water. Companies are responsible for understanding and abiding by all applicable hazardous materials transportation laws and regulations contained in 49 CFR 100-180. There is a potential for a pipeline carrying natural gas, liquid condensate, crude or refined oil, or produced water to develop leaks or ruptures during extraction, transport, and processing. Data from the US Department of Transportation indicate that an average of one rupture annually should be expected for every 5,000 miles of pipeline (Office of Pipeline Safety 2005). In addition to pipelines, there is a risk of ruptures of and releases from storage tanks and barrels.

More than 50 percent of pipeline ruptures occur as a result of heavy equipment striking the pipeline. Such ruptures could cause a fire or explosion if a spark or open flame were to ignite the natural gas escaping from the pipeline. Pipeline design, materials, maintenance, and abandonment procedures are required to meet the standards set forth in US Department of Transportation regulations (49 CFR 192, Transportation of Natural Gas by Pipelines). Oil owners and operators are required to maintain and implement spill prevention, control, and countermeasure plans, including cleanup and mitigation measures as required by the BLM or the state.

Oil and gas development and production at the surface and belowground can affect water quality. At the surface, activities at a drill site or production facility, such as road and well pad construction, leaks from pits or tanks, chemical spills, and discharge of wastewater, can affect surface water and shallow groundwater quality. Spills associated with oil and gas development could reach surface water directly during the spill event. Spills could also reach surface waters indirectly when the spill has occurred and

either a rain event or snowmelt moves contaminants into nearby surface water bodies through surface water flow or even subsurface groundwater flow into springs that discharge into a surface water body. Belowground activities can affect shallow and deep groundwater quality. Examples of this are leaks during or following hydraulic fracturing, failed casing seals, pipeline breaks, abandoned wells, deep-well disposal of flowback or produced wastewater, and induced subsurface migration pathways (USGS 2012).

Spills must be reported to the DEQ, or other appropriate authority. Following a spill or accidental discharge, the DEQ may require the owner or operator to: take immediate remedial measures, determine the extent of pollution to waters of the state, provide alternate water sources to water users impacted, and other actions deemed necessary to protect human health and the environment. The Department sets cleanup standards and monitors cleanup and reclamation of spills. Many oil and gas facilities require secondary containment which is designed to trap and hold spilled contaminants to allow for easier and more effective cleanup. Cleanup and remediation are required for all spills and accidental discharges, the rate of recovery varies by spill type and environmental conditions but, in general, spills are not entirely recovered. The BLM works with the DEQ and North Dakota Oil and Gas Division to remediate spills on BLM-administered lands.

Spills in North Dakota associated with petroleum resource development include Ammonia, Bentonite, Benzene, brine and produced water, calcium chloride, condensate, crude oil, cyanides, drilling mud, engine and transmission oils, ethylene glycol, fuel, hydrochloric acid, hydrogen sulfide, mineral oil, natural gas, natural gas condensate, sodium hydroxide, sodium hypochlorite, and solvents.

Table 3-154 shows the number and volume of spills of crude oil and produced water and brine spills (the largest spill types by number and volume) in North Dakota. The table also shows production rates; as a general trend spill volume per barrel of oil produced has decreased over time and total production has increased, but the number and volume of spills is variable year to year.

Table 3-154
Summary of Spills in North Dakota 2011–2021

Year	Reported spill count	Crude oil spilled (barrels)	Produced water/brine spilled (barrels)	Oil production (barrels)	Gas production (thousands of cubic feet)
2021	1,069[a]	11,256[a]	30,542[a]	408,692,881	1,075,497,947
2020	624	5,152	19,907	438,546,730	985,813,000
2019	919	10,372	84,108	524,444,348	1,061,091,000
2018	1,011	8,044	42,414	466,374,565	860,817,000
2017	1,187	7,297	23,958	394,705,431	688,600,000
2016	1,253	11,727	30,119	380,386,098	608,849,000
2015	1,641	18,564	111,377	432,537,689	584,632,000
2014	2,171	17,650	70,861	397,209,257	463,216,000
2013	1,865	51,787	125,775	314,043,621	345,787,000
2012	1,342	14,840	35,324	243,363,503	258,568,000
2011	1,214	14,022	48,685	153,075,204	157,025,000

Sources: EIA 2021; *New York Times* 2014; DEQ 2021a, 2021b; North Dakota Department of Mineral Resources 2021; Industrial Commission of North Dakota 2022a, 2022b

[a] Full annual data not available at time of publication; totals were created by calculating daily averages from available dates and multiplying by 365 days

Environmental Consequences

Impacts Common to All BLM Alternatives

Under all BLM alternatives, risks to public health and safety would increase from current levels. This is due to the increased oil and gas development projected to occur in the planning area (BLM 2022a). The number or quantity of spills and releases of air emissions and hazardous chemicals, such as H_2S and benzene, could increase with increased drilling and production. Exposure to H_2S primarily occurs through inhalation, and symptoms of acute exposure can include irritation of the nose and throat, shortness of breath, nausea, headaches, delirium, disturbed equilibrium, tremors, convulsions, and skin and eye irritation (ATSDR 2014). Repeated or prolonged exposure has been reported to cause low blood pressure, headache, nausea, loss of appetite, weight loss, ataxia, eye-membrane inflammation, and chronic cough (ATSDR 2014).

Acute benzene exposure can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, coma, and death, while long-term exposure is known to cause certain types of cancer (ATSDR 2014). As a result, the Occupational Safety and Health Administration has set regulations related to limiting and monitoring H_2S exposure (OSHA 2018). Alternatives that result in increased production compared with the Alternative A are expected to result in increased risks to public health and safety.

Unconventional oil and gas activities have been associated with a multitude of health impacts related to pregnancy, such as increases in pre-term births (McKenzie et al 2014; Stacy et al 2015; Casey et al.2016; Tran et al. 2020; Cushing et al. 2020). Further links have been made between unconventional oil and gas activities and poor infant and childhood health including low birth weights and increased risk of infant mortality, pediatric asthma, and attention deficit disorder (Rasmussen et al. 2016; Webb et al 2016; Currie et al. 2017; Willis et al. 2018). Additionally, the onset of nasal and sinus, migraine headache and fatigue symptoms have been reported in association with exposure to unconventional oil and gas activities (Tustin et al. 2016).

A study modeling cumulative health impacts of HAPs originating from oil and gas production in Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming, calculated the population-weighted exposure for two locations in North Dakota; New Town and Fort Berthold Indian Reservation. The study found a low likelihood of noncancerous health issues resulting from exposure to single or cumulative HAPs in both locations and calculated the cumulative cancer risk from new and existing federal production and all non-federal production, from the combination of benzene, ethylbenzene, and formaldehyde, to be 51 in a million for New Town and 41 in a million for Fort Berthold Indian Reservation. Non-federal sources were noted to be a larger contributor to health impacts (Ramboll 2023). See **Section 3.2.1** for more information on this study, And **Section 3.5.2** for information regarding the potential for health impacts to be distributed unequally.

Based on the data shown in **Table 3-155** showing historic trends of spills per unit of production from the oil and gas RFD (BLM 2022a), an average of 1,323 spills connected to oil and gas development occurred annually, with annual average totals of 15,946 barrels of oil and 59,253 barrels of produced water and brine spilled. A majority of these spills would be cleaned up with much of the spilled material recovered.

As described in Section 2.1 of the AMS (BLM 2020b), climate change has caused an increase in temperatures, precipitation, and risk of flooding, and wildfires are projected to increase in midsummer through early fall. High interannual variability in water availability could lead to an increase in droughts (USGCRP 2018). These changes could impact human health and safety in the planning area by exposing

more populations to these severe weather patterns. Increases in precipitation, wildfires and extreme weather events could increase the risk of flooding or other damage to oil and gas production and storage facilities, potentially resulting in the release of pollutants to the environment. Effects on climate-related public health from the contribution of GHG emissions were accounted for in the disclosure of the social cost of GHG emissions from federal coal, oil, and gas produced in the planning area (see **Section 3.2.1**, Air Quality and Climate).

Under all alternatives, combustion of the federal coal, oil, and gas produced in the planning area was evaluated for its potential to contribute to impacts on public health in the areas where the fuels may be combusted. Any differences in health effects among the alternatives would be related to differences in air pollutants emissions and in combustion (see **Section 3.2.1**).

As described in **Section 3.2.1**, Air Quality and Climate, all of the federal coal produced in the planning area is used in North Dakota by power plants and industrial users (EIA 2020); thus, the downstream combustion emissions from coal are known to occur within the state. Coal-powered electrical generating units—located primarily in central North Dakota—combust most of the coal, while other coal combustion facilities such as cement plants, industrial boilers, and iron ore processing, combust the rest. Pollutant emissions from electrical generating units and other industrial uses are shown in Tables 3.2-2 and 3.3-2, respectively, of the AQTSD (Ramboll 2024). Potential health effects from the primary pollutants that are emitted by these and other sources are described in **Table 3-155**. Emissions from combustion of coal in power plants and other stationary industrial uses are regulated by the EPA and state agencies; this regulatory process dictates emission-control technologies and emissions limits from each source to avoid significant impacts on regional air quality and public health. In addition, as described in **Section 3.2.1**, Air Quality and Climate, and the AQTSD (Ramboll 2024), air modeling does not indicate that the contribution of federal produced and combusted coal, in combination with other federal, nonfederal, and natural sources, would lead to exceedances of the NAAQS.

Table 3-155
Potential Public Health Effects of Downstream Emissions from Combustion of Federal Coal and Oil and Gas Produced in North Dakota

Pollutant	Potential Health Effects
Ozone	Ozone is a gas that occurs both in the Earth's upper atmosphere and at ground level where it is a key component of urban smog. Elevated ozone levels are most common on hot summer days. Most ground-level ozone is the result of reactions of humanmade VOC and NOx. Significant sources of VOCs are chemical plants, gasoline pumps, oil-based paints, autobody shops, and print shops. Nitrogen oxides result primarily from high-temperature combustion of coal, oil, and gas; significant sources are power plants, industrial furnaces and boilers, and motor vehicles. Thus, federal fossil fuel sources all contribute to some degree in the formation of ozone and its associated health effects. There is extensive scientific evidence spanning many decades that demonstrates there are short- and long-term health effects from exposure to ozone. The strongest evidence supports a relationship between ozone exposure and respiratory health effects. There is also some evidence that ozone exposure can affect the cardiovascular and nervous systems, reproduction and development, and mortality, although there are more uncertainties associated with interpretation of the evidence for these effects (EPA 2020e). People most at risk include people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers. People with certain genetic characteristics and people with reduced intake of certain nutrients, such as vitamins C and E, are also at greater risk from ozone exposure. Children have a high risk because their lungs are still developing and they are more likely to be active outdoors when ozone levels are high, which increases their exposure; they are also more likely than adults to have asthma (EPA 2021b).
Nitrogen Dioxide (NO_2)	NO_2 is one of a group of highly reactive gases known as oxides of nitrogen (NOx) for which NO_2 is used by EPA as the indicator for the larger body of gases. NO_2 forms quickly from emissions from vehicles, power plants, and off-road equipment. Thus, combustion of all federal fossil fuels generate NOx, which result in NO_2 to some degree and can contribute to associated health effects. In addition to contributing to the formation of ground-level ozone, and fine particle pollution, NO_2 is linked with a number of adverse effects on the respiratory system. There is strong evidence that the respiratory effects of short-term NO_2 exposure are independent of the effects of many other traffic-related pollutants. There is also strong evidence for a relationship between long-term exposure to NO_2 and respiratory effects, particularly the development of asthma in children. Results suggest that short-term exposure to NO_2 may be associated with cardiovascular effects and premature mortality and that long-term exposure may be associated with cardiovascular effects, diabetes, poorer birth outcomes, premature mortality, and cancer; however, it is uncertain whether NO_2 exposure has an effect on these health outcomes that is independent from the effects of other traffic-related pollutants (EPA 2016c).

Pollutant	Potential Health Effects
Particulate Matter ($PM_{2.5}$ and PM_{10})	Particulate matter is a complex mixture of small particles and liquid droplets found in the air. $PM_{2.5}$ poses the far greater health risk. $PM_{2.5}$ consists of both primary PM, generated mostly from combustion-related activities, and secondary PM, which is formed from atmospheric chemical reactions of precursor emissions. All federal fossil fuel combustion contributes $PM_{2.5}$ to some degree. $PM_{2.5}$ is associated with health effects such as nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and premature death. Studies show causal links between short- and long-term $PM_{2.5}$ exposure and cardiovascular effects and mortality. Studies show likely causal links between short- and long-term $PM_{2.5}$ exposure and respiratory health effects. Studies also show likely causal links between long-term exposure and nervous system and cancer health effects (EPA 2019b, 2022). Some studies have suggested that particulates from fossil fuel combustion emissions are the dominant contributors to adverse health effects associated with $PM_{2.5}$ exposures due to the presence of trace metals in fossil fuels and because the acidic nature of sulfur compounds in fossil fuels makes metal particulates more bioavailable, enhancing the potential of the fossil fuel combustion-related $PM_{2.5}$ to cause systemic health effects (Maciejczyk et al. 2021).
CO	Carbon monoxide (CO) is a colorless, odorless gas emitted from combustion processes. The majority of CO emissions to ambient air come from mobile sources, particularly in urban areas. Thus, end uses of federal oil are a contributor of CO emissions. CO can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues (EPA 2010). At very high levels, CO can cause dizziness, confusion, unconsciousness, and death; such levels are not likely to occur outdoors. People with some types of heart disease can be sensitive to elevated outdoor CO levels due to a reduced ability for getting oxygenated blood to their hearts in situations where the heart needs more oxygen than usual, such as when exercising or under increased stress (EPA 2010).
SO_2	Sulfur dioxide (SO_2) is one of a group of reactive gases known as sulfur oxides. Coal-fired power plants are the dominant anthropogenic source of SO_2 emissions. Smaller sources include industrial processes, such as extracting metal from ore, petroleum refining, and chemical processing. There is strong evidence that there is a causal relationship between short-term SO_2 exposure and respiratory effects, particularly in individuals with asthma. Studies suggest that children have a stronger response to SO_2 exposure than adults and thus are more sensitive to exposure. Some evidence suggests a possible relationship between long-term SO_2 exposure and the development of asthma. There is more uncertainty regarding relationships between SO_2 exposure and health effects outside of the respiratory system (EPA 2017).
HAPS	Hazardous air pollutants (HAPs) are chemicals or compounds that are known or suspected to cause cancer or other serious health effects. The most common HAPs in natural gas systems are n-hexane and benzene, toluene, ethylbenzene, and xylenes (CRS 2020), while motor vehicles emit pollutants such benzene and other hydrocarbons such as 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, and naphthalene. Mercury is the primary HAP of concern in coal combustion. Emissions of HAPs are regulated to be controlled at the source through such mechanisms as the National Emissions Standards for Hazardous Air Pollutants and the Mobile Source Air Toxics rules.

The combustion of the federal oil and gas produced in the planning area would have potential end-use impacts on public health depending on where and how the fuels are combusted. Unlike coal, these exact end uses and downstream combustion locations are unknown. Therefore, a qualitative discussion of the potential effects of the combustion of federal oil and gas is provided below.

While the exact uses and locations of federal gas produced in the planning area are not known, most natural gas extracted from the Bakken is distributed for use in Illinois, Michigan, Minnesota, Iowa, Montana, Wyoming, and South Dakota (Kringstad 2021). Based on EIA data (2022a), approximately 37 percent of natural gas in the United States is used for electric power generation, 33 percent is used by the industrial sector, 15 percent is used by the residential sector, 11 percent is used by the commercial sector, and 3 percent is used by the transportation sector. Emissions from combustion of natural gas include the same criteria pollutants as described for coal, though generally in lesser quantities, as well as trace amounts of HAPs, which could potentially contribute to the public health impacts described in **Table 3-155** in some locations during certain times. As described for coal-burning stationary sources, natural gas-fired power plants and larger industrial sources are regulated by the EPA and state agencies to limit their effects on air quality and public health. In addition, natural gas products used in commercial transportation have fewer emissions than gasoline- or diesel-powered options, which can also help reduce public health impacts in some instances where they are employed, such as for public transportation in urban areas.

Federal oil produced in the planning area and other crude oil from the Bakken is transported primarily to refineries in North Dakota, the Great Lakes Region, the Midwest, and Canada (Kringstad 2021), where it is refined into various petroleum products. According to the EIA (2022b), in 2021, approximately 45 percent of crude oil was refined into gasoline, 28 percent into distillate, 8 percent into jet fuel, 4 percent into hydrocarbon gas liquids, 1 percent into fuel oil, and the rest into other products. Due to shipping costs, widely used products such as gasoline and diesel are typically distributed in the areas nearer the refineries and to areas with no local petroleum resources, while less widely used products such as petrochemical feedstocks used in petroleum-based products are shipped directly to end users. Because pipelines and petroleum refineries typically receive crude oil from multiple sources, and because distribution can shift based on demand, the specific locations where end products are combusted and the level of combustion in different areas are not known.

Based on the location of refineries and distribution networks for crude oil and refined products, most Bakken oil is assumed to be consumed in North Dakota and surrounding states, the Great Lakes Region, Midwest, Pacific Northwest, and central Canada (EIA Data Viewer 2022). In the US, approximately 62 percent of petroleum is used in transportation, 27 percent is used by the industrial sector, 3 percent is used by the residential sector, 2.5 percent is used by the commercial section, and 0.5 percent is used for electric power generation (EIA 2022c). Petroleum products can be combusted by a variety of sources, such as on-road and off-road vehicles and stationary sources, and the combustion results in emissions of criteria and hazardous pollutants (**Table 3-155**). As described above, many of these sources are regulated by EPA and state agencies, including motor vehicles, a primary combustion end use for refined crude oil.

Alternative A

Fluid Minerals

Under this alternative, approximately 86,800 acres would be open to fluid mineral leasing, subject to STC; 202,600 acres would be open and subject to NSO stipulations; 15,800 acres would be open and subject to CSU stipulations; and 328,600 acres would be open and subject to TLs.

Persons residing in or near closed and NSO areas would be protected from some health and safety impacts, such as noise and light impacts from surface facilities, but would be exposed to other impacts. For instance, populations living or working near drilling and development could be exposed to hazardous materials or be affected by local air quality. Additionally, these populations could be exposed to increased noise, traffic, and other hazards resulting from an increased worker population. Where localized impacts are reduced,

people would still be exposed to impacts that spread over a wider area, such as potential air and water pollution. BMPs that could be applied at the site-specific level as stipulations to future development under any alternative could mitigate some of these impacts on affected populations.

Alternative B

Fluid Minerals

Under this alternative, approximately 14,600 acres would be open to fluid mineral leasing, subject to STC; 180,200 acres would be open and subject to NSO stipulations; 211,000 acres would be open and subject to CSU stipulations; and 179,200 acres would be open and subject to TLs. Approximately 213,100 acres would be closed to leasing; however, the majority of closure would be in areas not likely to be developed. Impacts on populations near areas open to leasing would be similar to those described under Alternative A.

However, compared with Alternative A, Alternative B would seek to concentrate development in areas with existing development. Concentrating development in areas with existing development could have possible beneficial effects on quality of life from enhanced local air quality and reductions in noise and traffic outside of peak development areas. A slight reduction in production of oil and gas under this alternative would reduce public exposure to hazardous chemicals and air emissions.

Compared with Alternative A, Alternative B would provide additional protections for public drinking water by closing state designated SWPAs to fluid mineral leasing, and prohibiting fluid mineral surface occupancy and use within 0.50 miles of the Missouri River. This would reduce the risk from sedimentation and potential spills from impacting water quality in this waterbody.

Alternative B would also incorporate more measures to reduce the potential degradation of air quality that could affect public health, such as reducing air quality degradation from venting and flaring, developing COAs to reduce air quality impacts, and promoting the design of field systems that reduce air emissions.

Alternative C

Fluid Minerals

Under this alternative, approximately 41,500 acres would be open to fluid mineral leasing, subject to STC; 250,100 acres would be open and subject to NSO stipulations; 348,900 acres would be open and subject to CSU stipulations; and 337,100 acres would be open and subject to TLs. Impacts on populations near areas open to leasing would be similar to those described under Alternative A.

Alternative C would also incorporate measures to reduce the potential degradation of air quality that could affect public health; these would be similar to, but slightly less stringent than those proposed under Alternative B.

Although oil and gas development would be the same as under Alternative A, incorporating air quality measures under Alternative C would reduce impacts on public health and safety compared with Alternative A.

Alternative D

Fluid Minerals

Under this alternative, approximately 15,100 acres would be open to fluid mineral leasing, subject to STC; 130,000 acres would be open and subject to NSO stipulations; 213,100 acres would be open and subject to CSU stipulations; and 183,000 acres would be open and subject to TLs. Approximately 213,100 acres

would be closed to leasing. Impacts on populations near areas open to leasing would be similar to those described under Alternative A.

Alternative D would also incorporate more measures to reduce the potential degradation of air quality that could affect public health, such as reducing air quality degradation from venting and flaring, developing COAs to reduce air quality impacts, and promoting the design of field systems that reduce air emissions.

Due to the fact that other fluid minerals management would be close to the same as under Alternative B, impacts on public health and safety under Alternative D would be approximately the same as under Alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions contributing to cumulative impacts on public health and safety include public health and safety concerns relating to exploration and extraction of fluid minerals on private or state fluid minerals in the planning area. Drilling, stimulation, and production would expose the public to air, noise, and light emissions from generators and drilling equipment; spills of hazardous chemicals; fires and equipment explosions; and heavy equipment travel and traffic. Incremental impacts would include an increased potential for exposure to public health and safety hazards in areas identified as open to development. There would be fewer public health and safety issues for areas that restrict leasing or surface facilities.

Hazardous materials spills may occur, as noted in **Appendix I, Table I-1**. The locations of resources at risk and anthropogenic hazards were further characterized for the Souris, Red River, Lake Sakakawea, and Mid-Missouri River Watersheds in North Dakota (Research Planning, Inc. 2022a, 2022b). The potential impacts cannot be characterized without knowing the location or severity of a given spill.

Climate change could result in impacts on public health and safety including those from increases in temperature, changes in precipitation patterns, and increased extreme weather events. The actions proposed under this plan would not have a measurable impact on climate change (see **Section 3.2.1**, Air Quality and Climate), the so anticipated trajectory of impacts on public health and safety from climate change is also not expected to change due to the management decisions in this plan.

Chapter 4. Consultation and Coordination

4.1 INTRODUCTION

This chapter describes the public outreach and participation opportunities associated with developing this RMP/EIS. As part of the process, the BLM consulted and coordinated with Tribes, government agencies, and other stakeholders.

The BLM conducts land use planning in accordance with NEPA requirements, Council on Environmental Quality regulations, and Department of the Interior and BLM policies and procedures for implementing NEPA. NEPA and associated laws, regulations, and policies require the BLM to seek public involvement early in and throughout the planning process. This is to develop a reasonable range of alternatives to the proposed actions and to prepare environmental documents that disclose the potential impacts of proposed actions and alternatives.

The BLM involved the public and other agencies by way of *Federal Register* notices, public and informal meetings, individual contacts, letters, emails, postcards, media releases, and the North Dakota RMP/EIS ePlanning website.[1]

4.2 CONSULTATION AND COORDINATION

Federal laws require the BLM to consult with certain federal and state agencies and entities and Native American Tribes (40 CFR 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 1500.4-5). The BLM has implemented a collaborative outreach and public involvement process that has included public scoping and coordinating directly with Tribes and cooperating agencies. The BLM continued to meet with interested agencies and organizations throughout the development of the Proposed RMP.

4.2.1 Tribal Relationships and Indian Trust Assets

The BLM has the responsibility to ensure that meaningful consultation and coordination concerning Tribal treaty rights and trust resources are conducted on a government-to-government basis with federally recognized Tribes. The BLM has legal obligations to identify, protect, and conserve the trust resources of federally recognized Tribes and Tribal members, and to consult with Tribes on a government-to-government basis whenever plans or actions affect Tribal trust resources, trust assets, or Tribal health and safety. BLM coordination or consultation with Native Americans, as it pertains to treaty rights and trust responsibility, is conducted in accordance with FLPMA; NEPA; BLM Handbook H-1780-1, Improving and Sustaining BLM-Tribal Relations; Executive Order 13084; Consultation and Coordination with Indian Tribal Governments (May 13, 1998); and Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (May 6, 2000).

For the North Dakota RMP/EIS, informal consultation began early in the planning process with a request to area Tribes for early input in November 2019. This request included letters to tribal officials and follow-up phone calls to Tribal Historic Preservation Officers (THPO). More formal consultation began in April

[1] https://eplanning.blm.gov/eplanning-ui/project/1505069/510

2020 when letters were sent to tribal governments providing opportunities for recipients to partner with the BLM as a cooperating agency. While no tribes became an official cooperating agency, consultation has continued throughout the process.

The BLM has reached out to area Tribes through a variety of formats. In June 2020, letters were sent extending an invitation for a meeting, offering a community presentation, and requesting information to help BLM understand pertinent Tribal issues. These letters were followed by further invitations (letters, email, and postcards) to participate in scoping and by personal phone calls from the NDFO Field Manager and Authorized Officer to Tribal Chairs and Presidents.

In December 2021, Tribes were provided the opportunity to participate in an early review of the Administrative Draft RMP/EIS. During this time, BLM also participated in regular meetings with Mandan, Hidatsa, and Arika (MHA) Nation, also known as the Three Affiliated Tribes, due to the BLM's trust responsibility related to the Bakken oil development. As a part of these standing meetings (MHA Energy Committee and Fort Berthold Federal Partners Meetings) BLM provided regular RMP updates and requests for input on Tribal issues.

In addition to those described above, **Table 4-1**, Meetings with Tribal Governments and Officials about the North Dakota RMP, lists the meetings that have taken place to date.

Table 4-1
Meetings with Tribal Governments and Officials about the North Dakota RMP

Date	Meeting Details
February 27, 2020	In response to the request for early input, NDFO met with the Fort Peck Tribal Historic Preservation Officer to discuss the North Dakota RMP planning process and cultural resources.
January 8, 2021	NDFO met with the MHA Chairman and MHA tribal representatives and provided a PowerPoint presentation, including the purpose and need for the plan revision, the BLM decision area, and a summary of draft alternatives. The discussion included scoping comments, the socioeconomic importance of Indian mineral development, and the fluid and solid mineral decision areas within Fort Berthold. The discussion also included the Tribe's recent acquisition of lands near the Buffalo Ranch area and the adjacent proposed fluid mineral lease stipulations for federal minerals. The Tribe indicated their interest in acquiring the federal land in this area, noting the potential for access issues if the lands remain under BLM management.
December 17, 2021	NDFO met with the MHA Chairman and MHA tribal representatives and provided a PowerPoint presentation on the preliminary Administrative Draft RMP/EIS. The discussion focused on leased versus unleased minerals, minerals held by production, and proposed fluid mineral lease stipulations.
June 13, 2022	NDFO presented RMP information at the "Strengthening Government to Government Partnerships and Relationships" regional meeting, organized by the North Dakota Indian Affairs Commission. The event included representatives from all five of the federally recognized tribes in North Dakota. The presentation included a PowerPoint on the Administrative Draft RMP/EIS, a question-and-answer session, and comment forms.

Date	Meeting Details
June 27, 2022	NDFO met with the MHA Executive Tribal Council and Chairman and provided a PowerPoint presentation with a summary of the key changes to the Administrative Draft RMP/EIS since the December meeting. The discussion included contested lands and minerals, alternatives for open and closed fluid minerals, the oil and gas Reasonably Foreseeable Development (RFD) scenario, and identification of a preliminary preferred alternative. The Tribe reiterated their ongoing interest in acquiring the federal land and minerals around the Buffalo Ranch area.

The BLM has consulted with the following state and federally recognized Native American Tribes: Crow Tribe, Assiniboine and Gros Ventre Tribes (Fort Belknap Reservation), Assiniboine and Sioux Tribes (Fort Peck Reservation), Northern Cheyenne Tribe, Three Affiliated Tribes, Spirit Lake Sioux Tribe, Turtle Mountain Band of Chippewa, Cheyenne River Sioux Tribe, Crow Creek Sioux Tribe, Flandreau Santee Sioux Tribe, Lower Brule Sioux Tribe, Rosebud Sioux Tribe, Oglala Sioux Tribe, Sisseton-Wahpeton Oyate, Yankton Sioux Tribe, Santee Sioux Tribe, Northern Arapaho, Lower Sioux, Red Lake Nation of Chippewa, Little Shell Tribe of Chippewa, and White Earth Nation Ojibwe.

Government-to-government consultation will continue throughout the RMP development process.

4.2.2 Intergovernmental and Interagency

The BLM is the lead agency for the North Dakota RMP/EIS. On April 21, 2020, the NDFO sent 91 letters to local, state, federal, and Tribal representatives, inviting them to participate as cooperating agencies. An agency or Tribe has the option of signing on as a cooperator at any time during the RMP revision process. The following 12 agencies expressed interest in participating as cooperating agencies:

1. North Dakota Parks and Recreation
2. North Dakota Governor's Office, including the North Dakota Industrial Commission, North Dakota Department of Trust Lands, North Dakota Public Service Commission, and North Dakota Department of Water Resources
3. Billings County
4. Bowman County
5. McKenzie County
6. Mountrail County
7. US Army Corps of Engineers
8. US Environmental Protection Agency
9. USFWS
10. US Forest Service, Dakota Prairie Grasslands
11. US National Park Service
12. Office of Surface Mining Reclamation and Enforcement

The BLM sent scoping postcards, letters, and emails to cooperating agencies between July 30 and 31, 2020. These provided information on the scoping period and scoping meetings. As a result, several cooperating agencies provided written scoping comments to more fully identify issues related to their mandates and special expertise. The BLM invited cooperators to the alternatives development workshops held in July, September, and October 2020. A number of these cooperators attended.

4.2.3 North Dakota State Historic Preservation Office Consultation

The Draft RMP/EIS was provided to the State Historic Preservation Office (SHPO) concurrently with its release to the public in support of Section 106 consultation under the National Historic Preservation Act.

4.2.4 US Fish and Wildlife Coordination

To comply with Section 7(c) of the ESA of 1973, the BLM consulted with the USFWS to identify ESA issues within the planning area. The USFWS provided input on planning issues, data collection and review, and alternatives development. The BLM has prepared a biological assessment for the USFWS, which was formally submitted to the agency on April 24, 2024. The BLM received a concurrence letter from the USFWS on May 14, 2024. A copy of the biological assessment and the concurrence letter from the USFWS will be provided with the Approved RMP/Record of Decision.

4.2.5 Resource Advisory Council Collaboration

A Resource Advisory Council (RAC) is a committee of local citizens appointed by the Secretary of the Interior to provide advice or recommendations to the BLM on management of public lands. In 2021, a new regional committee, the Missouri Basin RAC, was established for all of North Dakota, South Dakota, and eastern/central Montana.

The Missouri Basin RAC held its first meeting on January 12, 2022, at which time the NDFO provided information on the RMP Revision, including on project scoping and preliminary draft alternatives. During this meeting the RAC also formed a RMP subcommittee to assist the RAC in developing a written recommendation letter. On February 14, 2023, the subcommittee met to discuss the Draft RMP/EIS. On May 3rd, 2023, NDFO provided the subcommittee with an overview of the comments received from the public on the Draft RMP/EIS. The subcommittee met two additional times (in June and August) to discuss the Draft RMP/EIS, ask questions, and begin drafting recommendations. On September 18-19, the RMP subcommittee presented their recommendations to the RAC for vote. BLM received this information in a formal recommendation letter dated October 18, 2023. The BLM will continue to provide the RAC with RMP updates at its regularly scheduled meetings.

4.3 Public Collaboration and Outreach

Public involvement is a vital and legal component of both the RMP and EIS processes. Public involvement vests the public in the decision-making process and provides full environmental disclosure. Guidance for implementing public involvement under NEPA is codified in 40 CFR 1506.6, thereby ensuring federal agencies make a diligent effort to involve the public in the NEPA process.

The public scoping phase has been completed and is described below; the public outreach and collaboration phases are ongoing throughout the RMP/EIS process. The public can obtain information on the RMP/EIS from the BLM's ePlanning website.

4.3.1 Public Scoping

The formal public scoping process for the North Dakota RMP/EIS began on July 28, 2020, with the publication of the notice of intent in the *Federal Register* (2020 *Federal Register* 16276). The notice of intent notified the public of the BLM's intent to develop a RMP for the NDFO; it also initiated the formal public scoping period, which closed on August 28, 2020. The notice of intent also requested public nominations for ACECs.

ePlanning Website

The BLM is maintaining the project's ePlanning website (https://eplanning.blm.gov/eplanning-ui/project/1505069/510) with information related to the development of the North Dakota RMP/EIS. The BLM included the ePlanning website location in the scoping press release; it also made available

background documents, maps, project updates, and contact information during the scoping period. The ePlanning website will be updated as the BLM moves through the planning process.

Media Advertisements

The BLM advertised the public scoping period (July 28 to August 28, 2020) in nine newspapers across the planning area. The advertisements were also published in some of the newspapers' online editions. A complete list of media outlets where the BLM sent press releases is included in Chapter 1 of the Scoping Report. The BLM also distributed public notices via the project's ePlanning website and a press release. Additionally, through letters, postcards, and emails, the BLM distributed the public notices to a project mailing list of over 3,500 addresses (Appendix D in BLM 2020a).

Scoping Meetings

Due to COVID-19 precautions, the BLM hosted two live, moderated, virtual public meetings using video conferencing technology on August 18 and 20, 2020. Information on how to join the virtual public meetings was posted to the BLM ePlanning website when the originally scheduled in-person scoping meetings were canceled due to the pandemic. Attendees were able to join via computer or phone to participate in the virtual meetings. The virtual public scoping meetings included a PowerPoint presentation describing the purpose of the RMP/EIS, the project approach, and opportunities for public involvement. Materials presented and additional information can be found in the Scoping Report (BLM 2020a).

Additionally, the BLM offered a virtual open house website on July 24, 2020, which was open to the public until August 28, 2020. The BLM modeled the website to replicate the format of an open house public scoping meeting. Virtual open house attendees were able to scroll from station to station to learn about the planning process and important issues, to download meeting materials, and to review frequently asked questions.

4.3.2 Draft RMP/EIS Public Comment Process

A notice of availability announcing the release of the Draft RMP/EIS was published in the Federal Register on January 20, 2023, initiating the start of a 90-day public comment period. In response to public comments, the comment period was officially extended 30 days, ending on May 22, 2023. During the public comment period, the BLM held two in-person public meetings on February 28, 2023, and March 1, 2023, in Bowman and Dickinson, respectively. The BLM also hosted one virtual public meeting on March 29, 2023. The public meetings provided opportunities for the public to ask questions and submit comments. BLM managers, resource specialists, and other representatives of the BLM were present during these public meetings to discuss the RMP/EIS and answer questions. As was done for the scoping period, the BLM offered a virtual open house website on January 20, 2023, which was open to the public until May 22, 2023.

The BLM received comment submissions by mail, fax, email, online comment form via the project website in ePlanning (https://eplanning.blm.gov/eplanning-ui/project/1505069/510), and hard copy. During the public comment period, BLM received a total of 27 comment letter submissions. These documents resulted in 535 unique substantive comments received on the Draft RMP/EIS. These substantive comments from individual submissions, as well as BLM's responses to those comments, are in **Appendix M**, Public Comments and BLM Response. **Section M.1** of **Appendix M** summarizes the public comment process, provides a detailed description of the comments received during the public comment period, and explains the comment analysis methodology used.

4.3.3 Coal Screening

Between April and November 2020, the BLM sent letters to all identifiable surface owners with lands overlying BLM-administered federal coal within coal development potential, outside of active oil and gas areas. These letters requested that the surface owners confirm they are qualified to express their preference on mining federal coal (see 43 CFR 3400.0-5(gg)(1) and (2)). These letters requested confirmation of surface owner qualification and asked surface owners to respond with their preference for, against, or undecided to mining by other than underground methods (that is, surface mining) on the BLM-administered federal coal beneath their land. See **Appendix F** for additional details. The BLM also consulted with the North Dakota Public Service Commission in developing coal screens to help determine which lands should be available for leasing and development within the State per 43 CFR 3461.5(s).

In response to public comments on the Draft RMP/EIS (**Appendix M**), BLM re-evaluated the results of coal screen 4 under Alternative D, the proposed plan alternative, to only consider areas as "no" for surface owner preference where a significant number of surface owners in an area created a large tract of not-in-favor responses. Because no significant clusters of surface owners responded "against", the application of this screen has been updated so that no areas are found unsuitable due to not-in-favor responses. Qualified surface owner agreement is a requirement prior to leasing, per 30 CFR 1304(c). Upon receiving a lease application, the BLM will survey surface owners again prior to issuing a lease.

4.3.4 Socioeconomic Workshop

In September 2020, the BLM hosted a virtual workshop to provide an opportunity for state and local government officials, community leaders, and other stakeholders to discuss regional economic conditions, trends, and strategies. Participants were asked to provide any insight or recommendations that would help to formulate a more complete picture of socioeconomic conditions and interests in the planning area. The BLM identified a diverse list of area stakeholders based on geographic areas with BLM-administered lands and mineral estate and identified issues. In total, the BLM sent invitations to 120 stakeholders. The results of the workshop helped the BLM identify key issues driving the social and economic analysis and formalize the analysis approach for the RMP/EIS.

4.4 List of Preparers

The RMP/EIS was prepared by an interdisciplinary team of staff from the BLM and AECOM, with their supporting subcontractor, Ramboll. **Table 4-2** is a list of people that prepared or contributed to the development of the RMP/EIS.

Table 4-2
RMP/EIS Preparers

Name	Role	Qualifications
	BLM Management Team	
Wendy Warren	Eastern Montana Dakotas District Manager	Wendy holds a Bachelor of Science in Mechanical Engineering from Montana State University in Bozeman. She has over 23 years of experience with the BLM.
Ruth Miller	Acting Division Chief, Division of Forestry, Rangeland, and Vegetation Resources	Ruth has a Bachelor of Science in Forestry Recreation Resources, and has 30 years of experience in various natural resource programs and management.

Name	Role	Qualifications
Dan Brunkhorst	Montana Dakotas Planning and Environmental Specialist	Dan has a Bachelor of Science in Resource Conservation from the University of Montana. He has over 25 years of professional experience working in wildlife, vegetation, fisheries, recreation, range and planning with Montana/Dakota BLM, US Forest Service and the state of Montana.
Loren Wickstrom	Field Manager, Indian Trust Issues	Loren holds a Bachelor of Science degree in Geology from San Jose State University. He has over 30 years of experience working in public lands management.
Edward Kraft	Field Manager	Eddy has a Bachelor of Arts degree in Environmental Studies from the University of Minnesota (Duluth) and a Master of Science degree in Natural Resource Management from North Dakota State University. He has 10 years of experience in managing oil and gas-related work on public lands.
Greg Morel	Assistant Field Manager Resources, Assistant Project Manager, Visual Resources, Travel Management, Recreation and Visitor Services (including BCAs), Special Designations (ACECs, wild and scenic rivers, national trails, and wilderness characteristics), Public Health and Safety	Greg has a Bachelor of Science degree in Natural Resource Management with a minor in Zoology from North Dakota State University. He has 13 years of experience working in public lands management.
Andrew Hamilton	Assistant Field Manager Minerals	Andrew holds a Bachelor of Science degree in Construction Engineering from the State University of New York College of Environmental Science and Forestry and a master's degree in Civil Engineering from Norwich University. He has 11 years of experience in Oil and Gas, including experience in upstream, midstream and downstream.
BLM Interdisciplinary Team		
Kristine Braun	Project Manager, Public Health and Safety	Krissie has a Bachelor of Science degree in Geography, geographic information systems management from Northern Arizona University. She has a Master of Science degree in Community and Regional Planning, environmental planning concentration from the University of Oregon. She has 15 years of experience in planning and natural resource management.
Paul Barnhart	Wildlife (including nonnative, invasive species and special status species), Fish and Aquatic Species (including nonnative, invasive species and special status species)	Paul has a PhD from North Dakota State University in Environmental and Conservation Science. He has over 15 years of experience researching and managing wildlife populations in North Dakota.

Name	Role	Qualifications
Josh Buckmaster	Soil Resources	Josh has a Master of Science in Range Management from Montana State University and a Bachelor of Arts degree in Sustainable Natural Resource Management from the University of Montana Western. He has 9 years of experience in resource management.
Tyler Croft	Petroleum Engineer	Tyler holds a Bachelor of Science degree in Geology from University of Washington and a Master of Science degree in Geologic Engineering from Montana Tech. He has 15 years of experience in Petrophysics/ Petroleum Engineering/Geology.
Peter Davis	Acting Division Chief (North Central Montana District – Division of Oil & Gas)	Peter holds a Bachelor of Science degree in Petroleum Engineering from Louisiana State University. He has 10 years of Petroleum Engineering/Oil & Gas experience.
Craig Howells	Wildland Fire Ecology and Management	Craig graduated from Technical Fire Management and has over 20 years of wildland fire experience.
Mieke Bruch	Rangeland and Grazing	Mieke has 7 years of experience as a Range Specialist and holds Bachelor of Science degrees in Rangeland Management and Animal Science from the University of Nebraska-Lincoln.
Seth Jackson	Lands and Realty (includes authorizations [and renewable energy], tenure, access, withdrawals, and ROWs)	Seth has 15 years of experience managing realty actions on federal lands.
Greg Liggett	Paleontological Resources	Greg has a Master of Science in Geology and 30 years of experience in paleontology.
Christopher Morris	Water Resources, Vegetation (including wetlands and riparian areas; nonnative, invasive species; special status species; and vegetation products), Public Health and Safety	Christopher has a Bachelor of Science degree in Geography (physical sciences) from Oregon State University. He has 30 years of experience working in hydrology, natural resource, mine reclamation, riparian/wetland vegetation, and resource management.
Carissa Shilling	Energy and Minerals (including solid, locatable, and mineral materials)	Carissa has a Master of Science degree in Geology from the University of Tennessee and a Bachelor of Science degree with a major in geology and a minor in geography from Bloomsburg University of Pennsylvania. She has 11 years working in geology and mineral resource management with the BLM.
Chelsie McKenzie	Lands and Realty (includes authorizations [and renewable energy], tenure, access, withdrawals, and ROWs)	Chelsie has an Associates degree in Business Administration. She has 3 years of experience managing realty actions for the BLM in North Dakota.
Amy Stillings	Social and Economic Conditions (including environmental justice and social cost of greenhouse gases)	Amy has a Master of Science degree in Agriculture and Resource Economics. She has 15 years of experience in socioeconomic issues.

Name	Role	Qualifications
Bill Stevens	Socioeconomics and Environmental Justice	Bill has Ph.D., MBA, and CPA degrees. He has worked for the BLM for 28 years.
Wendy Velman	Vegetation (including wetlands and riparian areas; nonnative, invasive species; special status species; and vegetation products)	Wendy has a Bachelor of Science degree in Botany from Idaho State University. She has 22 years of experience in vegetation management with the BLM.
Corinne Walter	GIS	Corinne has a Bachelor of Science degree in Business Administration from Dickinson State University. She has 40 years of experience working in public lands management and more than 30 years of experience working as a GIS specialist.
Gideon Maughan	Cultural and Historic Resources	Gideon has a Master of Science degree in Anthropology with a focus in Cultural Resource Management Archaeology from Utah State University
Erik Vernon	Air Quality and Climate	Erik has a Bachelor of Science degree and Master of Science degree in Meteorology from the University of Utah. He has 25 years of experience working in atmospheric sciences and climate.
John Zeise	Energy and Minerals (coal)	John has a Bachelor of Science in Geological Engineering and has worked on coal issues with BLM for 5 years.
	AECOM	
Amy Lewis	Project Manager	Amy has a Master of Science degree in environmental science from Alaska Pacific University. She has more than 20 years of experience managing large-scale resource management plans and NEPA projects in the western US.
Francis Craig	Assistant Project Manager; Energy and Minerals (including fluid, solid, locatable, and salable)	Francis has a Bachelor of Science degree in geoscience and psychology with a minor degree in environmental studies from Hobart College and a Master of Science degree in environmental remote sensing and GIS at Boston University. He has more than 7 years of experience as a NEPA planner.
Kate Krebs	Alternatives Development Lead	Kate has a Bachelor of Science degree in environmental science, Spanish, and political science from the University of Colorado Boulder. She has more than 15 years of experience practicing NEPA and managing large-scale EISs.
Amanda Biedermann, JD	Visual Resources, Public Involvement	Amanda has a Bachelor of Science degree in environmental science from Baylor University and a Juris Doctorate degree from the University of Colorado Boulder with an energy, environmental, and natural resources law and policy certificate. She has more than 3 years of experience as a NEPA planner.

Name	Role	Qualifications
Lindsay Chipman, PhD	Fish and Aquatic Species (including nonnative, invasive species and special status species), Wildlife (including nonnative, invasive species and special status species)	Lindsay has a Bachelor of Science degree in physics from the College of William and Mary, a Master of Science degree in oceanography from Florida State University, and a PhD in oceanography from Florida State University. She has more than 10 years of experience as a biologist and NEPA planner.
Amy Cordle	Air Quality and Climate	Amy has a Bachelor of Science degree in civil engineering from Virginia Polytechnic Institute and State University. She has more than 25 years of experience as a technical specialist and project manager for resource management plans and other NEPA projects.
Sean Cottle	Special Designations (ACECs, wild and scenic rivers, national trails, and wilderness characteristics)	Sean has a Bachelor of Science degree in ecohydrology from the University of Nevada-Reno. He has more than 8 years of experience as a NEPA planner.
Kirstin Davis	Soil Resources	Kirsti has a Bachelor of Science degree in environmental science with a geology emphasis from the University of Nevada-Reno. She has more than 3 years of experience as a NEPA planner.
Kevin Doyle	Cultural and Historic Resources, Paleontological Resources, Tribal Interests	Kevin has a Bachelor of Arts degree in sociology from the University of California, Santa Barbara. He has more than 35 years of overseeing cultural resources analyses for NEPA documents and Tribal engagement experience for projects on public and Tribal lands.
Zoe Ghali	Social and Economic Conditions, Environmental Justice	Zoe has a Bachelor of Science degree in biology from the University of California Santa Barbara and a Master of Science degree in environmental physiology and a certificate in environmental policy from the University of Colorado Boulder. She has more than 12 years of experience as a NEPA planner leading socioeconomic analyses for BLM projects.
Derek Holmgren	Visual Resources	Derek has a Master of Public Affairs degree in environmental policy and natural resources management and a Master of Science degree in environmental science from Indiana University. He has more than 20 years of experience as a NEPA planner.
Jenna Jonker	GIS	Jenna has a Bachelor of Arts degree in geography from Calvin University with a minor in geology. She has more than 10 years of experience as a GIS specialist.

Name	Role	Qualifications
Rob Lavie	GIS	Rob has a Bachelor of Arts degree in anthropology from the University of Colorado, Boulder with a minor in business administration. He also has a Master of Science degree in applied geography and geospatial science from the University of Colorado, Denver. He has more than 3 years of experience as a GIS specialist.
Meredith Linhoff	Vegetation Communities (including wetlands and riparian areas; nonnative, invasive species; special status species; and vegetation products), Wildlife (including nonnative, invasive species and special status species), Wildland Fire Ecology and Management	Meredith has a Bachelor of Science degree in biology and environmental science from SUNY Binghamton and a Master of Arts degree in biology from Boston University. She has more than 15 years of experience as a biologist and NEPA planner.
Clayton McGee	Lands and Realty (includes authorizations [and renewable energy], tenure, access, withdrawals, and ROWs)	Clayton has a Bachelor of Arts degree in environmental studies with a minor in political science from the University of Colorado, Boulder. He has more than 2 years of experience as a NEPA planner.
Holly Prohaska	Livestock Grazing, Quality Assurance/Quality Control	Holly has a Bachelor of Arts degree in marine science and biology from the University of San Diego and a Master of Science degree in environmental management from the University of San Francisco. She has more than 20 years of experience in managing large-scale resource management plans and NEPA projects.
Marcia Rickey, GISP	GIS, Alternatives Development	Marcia has a Bachelor of Science degree in biology from the University of Dayton and a Master of Science degree in biology from Illinois State University. She has more than 20 years of experience working as a GIS specialist.
Josh Schnabel	Recreation and Visitor Services (including BCAs), Social and Economic Conditions, Environmental Justice	Josh has a Bachelor of Arts degree in sociology from the University of Northern Colorado and a Master of Science degree in natural resource management and environmental planning from San Francisco State University. He has more than 15 years of experience as a NEPA planner.
Matthew Smith	Water Resources, Public Health and Safety	Matthew has a Bachelor of Arts degree in environmental biology from Fort Lewis College, and a Master of Science degree in ecology from the University of Alaska, Anchorage. He has more than 16 years of experience as a NEPA planner.
Andy Spellmeyer	Livestock Grazing	Andy has a Bachelor of Science degree in biology and a Master of Science degree in biology from Wichita State University. He has more than 5 years of experience as a NEPA planner.

Name	Role	Qualifications
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Ross Beardsley, PhD	Air Quality and Climate	Ross has a Doctorate degree in environmental engineering sciences from the University of Florida. He has over 10 years of experience in atmospheric modeling and analysis. His NEPA expertise includes air quality, greenhouse gas, and climate change impact assessments for mineral development projects and resource management plans.
John Grant	Air Quality and Climate	John received his Bachelor of Science degree in environmental resources engineering from Humboldt State University. He has over 15 years of experience in emission inventory and controls modeling and analysis. He has over 10 years expertise related to air quality and greenhouse gas impact assessments under NEPA for resource management plans and mineral development projects.
Krish Vijayaraghavan	Air Quality and Climate	Krish has a Master of Science degree in environmental engineering from the Georgia Institute of Technology and a Master of Science degree in chemical engineering from the University of Kansas. He has over 25 years of experience in air quality modeling and analysis, with an expertise in air resource and greenhouse gas/climate change analysis for NEPA documents.

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Glossary

Acquisition. The BLM can pursue the acquisition of lands to facilitate various resource management objectives. Acquisitions, including easements, can be completed through exchange, purchase, or donation.

Active well. A well that is actively producing oil or gas, or both.

Activity plan. A program- or area-specific detailed plan that usually describes multiple projects and the specific management direction that will be applied to meet specific land use plan objectives. Examples of activity plans include habitat management plans, recreation area management plans, wild and scenic river management plans, monument management plans, ACEC management plans, herd management plans, and allotment management plans.

Administrative access. Motorized, wheeled, cross-country travel for lessees and permittees is limited to the administration of a federal lease or permit. Persons or corporations having such a permit or lease could perform administrative functions on public lands within the scope of the permit or lease; however, this would not preclude modifying permits or leases to limit motorized, wheeled, cross-country travel during a further site-specific analysis to meet resource management objectives or standards and guidelines (BLM 2003).[1]

Air pollution. The addition of any material to the atmosphere that may have a deleterious effect on life on earth.

Allotment. An area of land designated and managed for livestock grazing. Allotments generally consist of BLM-administered lands but may include other federally managed, state-owned, and private lands, as well as Tribal lands. An allotment may include one or more separate pastures. Livestock numbers and periods of use are specified for each allotment.

Alluvium. Clay, silt, sand, gravel, or other rock material transported by moving water. Alluvium is 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 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, and they 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 1 month.

[1] US Department of the Interior, Bureau of Land Management. 2003. Off-Highway Vehicle Record of Decision and Proposed Plan Amendment for Montana, North Dakota, and Portions of South Dakota. Montana State Office, Billings. June 2003.

Anthropogenic disturbances. Those caused by human actions. Examples are 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). An area within the public lands where special management attention 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 (43 CFR 1601.0-5(a)). The BLM evaluates and designates ACECs as part of the land use planning process.

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, it comes from sulfur oxides and nitrogen oxides, products of burning coal and other fuels, and 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.

Authorized/authorized use. Typically, a commercial activity, facility placement, or event occurring on the public lands that is 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, or another appropriate authority, has issued a formal authorization document. These formally authorized uses are often spatially or temporally limited, unless constrained or bounded by statute, regulation, or an approved land use plan decision.

Avoidance/avoidance area. An area identified through resource management planning to be avoided; however, it may be available for right-of-way location with special stipulations.

Backcountry conservation area (BCA). BLM-administered lands in a specific planning area that promote public access to support wildlife-dependent recreation and hunting opportunities and facilitate the long-term maintenance of big game wildlife populations. These areas are primarily contiguous and intact. Management of BCAs includes activities such as active forest and rangeland management, grazing, motorized access on designated routes and other areas for game retrieval, fluid and solid leasable minerals, and other actions consistent with the BLM's multiple-use, sustained-yield mission.

Badlands. A type of dry terrain where softer sedimentary rocks and clay-rich soils have been extensively eroded. They are characterized by steep slopes, minimal vegetation, a lack of a substantial regolith,[2] and high drainage density. Ravines, gullies, buttes, hoodoos, and other such geologic forms are common in badlands.

Base property. Land that has the capability to produce crops or forage that can be used to support authorized livestock for a specified period of the year when the livestock are not on public lands.

[2] Unconsolidated residual or transported material that overlies or covers the solid rock in place

Baseline. The preexisting condition of a defined area or resource that can be quantified by appropriate metrics. During environmental reviews, the baseline is considered the affected environment that exists at the time of the review's initiation. The baseline is used to compare predictions of the effects of the proposed action or a reasonable range of alternatives.

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.

Casual use. Activities ordinarily resulting in no or negligible disturbance of the public lands, resources, or improvements. For examples of ROWs' casual uses, see 43 CFR 2801.5. For examples of locatable minerals' casual uses, see 43 CFR 3809.5.

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 the following:

- 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 (for example, changes in ocean circulation)
- Human activities that change the atmosphere's composition (for example, driving motor vehicles) and the land surface (for example, deforestation, reforestation, urbanization, and desertification)

Closed area. An area where off-road vehicle (that is, OHV) use is prohibited. Use of off-road vehicles in closed areas may be allowed for certain reasons; however, such use shall be made only with the approval of the BLM Authorized Officer (43 CFR 8340.0-5(h)).

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 (CTTM). The proactive interdisciplinary planning, on-the-ground management and administration of travel networks (both motorized and nonmotorized) to ensure that 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 those that are recreational, traditional, casual, agricultural, commercial, and educational; it also includes landing strips).

Controlled surface use (CSU). A category of moderate constraint stipulations that allows some use and occupancy of public land while protecting identified resources or values. It is applicable to fluid mineral leasing and all activities associated with fluid mineral leasing (for example, truck-mounted drilling and geophysical exploration equipment off designated routes, and construction of wells and 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 656 feet to protect the specified resource or value.

Cooperating agency. Assists the lead federal agency in developing an EA or EIS. A cooperating agency may be any agency that has special jurisdiction by law or special expertise for proposals covered by NEPA (40 CFR 1501.68; 43 CFR 1601.0-5(d)). Any federal, state, Tribal, or local government jurisdiction with such qualifications may become a cooperating agency by agreement with the lead agency. Cooperating agencies must enter into a written agreement with the BLM establishing cooperating agency status in the planning and NEPA processes and participate in the various steps of the BLM's planning process as feasible given the constraints of their resources and expertise (43 CFR 1601.0-5(e)).

Criteria pollutant. The Environmental Protection Agency uses six criteria pollutants as indicators of air quality. It 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.

Cultural resource use allocation categories. Categorizing cultural resources according to their potential uses is the culmination of the identification process and the bridge to protection and utilization decisions. Use categories establish what needs to be protected, and when or how use should be authorized. All cultural resources have uses, but not all should be used in the same way (BLM 8110 Manual, 2004). The BLM will assess all recorded cultural resources according to six use categories: scientific use, public use, conservation for future use, experimental use, traditional use, and discharged from management. Some sites will fall under more than one use category. In such cases, the highest level of protection indicated within the relevant categories is applied.

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 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. The decision area includes only those BLM-administered lands within a planning area for which the BLM has authority to make land use management decisions. In general, the BLM has jurisdiction over all BLM-administered lands (surface and subsurface) and over the subsurface minerals in areas of split estate (areas where the BLM administers federal subsurface minerals, but the surface is owned by someone other than the BLM).

Desired future condition (DFC). 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 the 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, DFC is a portrayal of the land or resource conditions that are expected to result if goals and objectives are fully achieved.

Direct impact. Caused by an action or implementation of an alternative; a direct impact takes place at the same time and place.

Disposal lands. The transfer of public land out of federal ownership to another party through sale or exchange, or through the Recreation and Public Purposes Act of 1926, Desert Land Entry, or other land law statutes.

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.

Eligible river. A river or river segment found to meet criteria in Sections 1(b) and 2(b) of the Wild and Scenic Rivers Act of being free flowing and possessing one or more outstandingly remarkable value.

Endangered species. Any species that is in danger of extinction throughout all or a significant portion of its range (BLM 2008a). Under the Endangered Species Act in the US, endangered is the more protected of two categories; the other is "threatened." Designation as endangered or threatened is determined by the 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 the USFWS and the National Oceanic and Atmospheric Administration. Its purpose is to protect species and the ecosystems that they depend on (16 USC 1531–1544).

Enhance. The improvement of habitat by increasing missing or modifying unsatisfactory components or attributes of the plant community to meet greater sage-grouse objectives.

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 2001).[3]

Environmental Justice (EJ). The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

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 NEPA 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 identified through resource management planning that is not available for ROW location under any conditions.

Existing routes. The roads, trails, or ways that are used by motorized vehicles (such as jeeps, all-terrain vehicles, and motorized dirt bikes), mechanized uses (such as mountain bikes, wheelbarrows, and game carts), pedestrians (hikers), and horseback riders and are, to the best of the BLM's knowledge, in existence at the time of the RMP/EIS publication.

Exploration. Active drilling and geophysical operations to determine the presence of the mineral resource or the extent of the reservoir or mineral deposit.

Extensive Recreation Management Area (ERMA). Administrative units that require specific management consideration to address recreation use, demand, or recreation and visitor services program investments. ERMAs are managed to support and sustain the principal recreational activities and the associated qualities and conditions of the ERMAs. ERMA management is commensurate and considered in context with the management of other resources and resource uses (BLM 2014).[4]

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 its legislated authority, direction policy, and basic management guidance.

Federal mineral estate. Subsurface mineral estate owned by the United States and administered by the BLM. It is the mineral estate underlying BLM-administered land, privately owned lands, and state-owned lands.

[3] US Department of the Interior, Bureau of Land Management. 2001. National Management Strategy for Motorized Off-Highway Vehicle Use on Public Lands. Washington, DC. January 19, 2001.
[4] US Department of the Interior, Bureau of Land Management. 2014. Handbook H-8320-1—Planning for Recreation and Visitor Services. Rel. 8-85. Washington, DC. August 22, 2014. Internet website: https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.36142.File.dat/H-8320-1%20Recreation%20and%20Visitor%20Services%20Planning.pdf.

Fee/Fee/Fed. Well bores that produce federal minerals from well pads that are located on entirely nonfederal land.

Fen. A type of wetland with moderate or low fertility that is fed by surface runoff and groundwater; usually has peaty alkaline soil and characteristic flora.

Fire frequency. A general term referring to the recurrence of fire in a given area over time.

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.

Forest health. The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence, or unusual levels of insects and disease, and resilience to disturbance.

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.

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.

Goal. A broad statement of a desired outcome addressing resource and resource use characteristics within a planning area, or a portion of the planning area, toward which management of resources is directed.

Grant. Any authorization or instrument (for example, easement, lease, license, or permit) that the BLM issues under Title V of FLPMA (43 USC 1761 et. seq.) and those authorizations and instruments that the BLM and its predecessors issued for like purposes before October 21, 1976, under the existing statutory authority. Grants are issues under 43 CFR 2800 and 43 CFR 2920.

Grazing preference. Grazing preference or preference means a superior or priority position against others for the purpose of receiving a grazing lease. This priority is attached to base property owned or controlled by the lessee (43 CFR 4100.0-5).

Grazing retirement. Ending livestock grazing on a specific area of land.

Grazing system. Scheduled grazing use and nonuse of an allotment to reach identified goals or objectives by improving the quality and quantity of vegetation. This includes, but is not limited to, developing pastures, utilization levels, grazing rotations, timing and duration of use periods, and necessary range improvements.

Greater sage-grouse general habitat management area (GHMA). Greater sage-grouse-occupied (seasonal or year-round) habitat outside of priority habitat. The BLM has identified these areas in coordination with respective state wildlife agencies.

Greater sage-grouse priority habitat management area (PHMA). Areas that have been identified as having the highest conservation value to maintaining sustainable greater sage-grouse populations. These areas would include breeding, late brood-rearing, and winter concentration areas. The BLM has identified these areas in coordination with respective state wildlife agencies.

Greenhouse gas (GHG). A gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in the earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

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.

High-voltage transmission lines. Transmission lines with 100 or more kilovolts.

Historic properties. According to the National Register of Historic Places (NRHP), historic properties are defined as districts, sites, buildings, structures, and objects significant in American history, archaeology, engineering, and culture.

Impact. The effect, influence, alteration, or imprint caused by an action.

Impairment. The degree to which a distance of clear visibility is degraded by human-made pollutants.

Implementation decisions. Decisions that authorize on-the-ground action to implement the RMP. These decisions are generally appealable to the Interior Board of Lands Appeals under 43 CFR 4.410.

Indicators. Factors that describe the resource condition and change and can help the BLM determine trends over time.

Indirect impact. Results from implementing an action or alternative, but it usually occurs later in time or is removed in distance and is reasonably certain to occur.

Invasive species. A species that is not native to the region or area and whose introduction does or is likely to cause economic or environmental harm or harm to human health.

Invertebrate. An animal lacking a backbone or spinal column, such as insects, snails, and worms. The group includes 97 percent of all animal species.

Land tenure adjustments. Landownership 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. The BLM completes these land pattern improvements primarily through the use of land exchanges but also through land sales, jurisdictional transfers to other agencies, and the use of cooperative management agreements and leases.

Land use plan. A set of decisions that establishes 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 resource management plans and management framework plans (BLM 2005).[5]

Large pipelines. Those that are 24 inches in width and over.

Leach. In relation to soils, to drain away from the soil by the action of a percolating liquid (usually water).

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 nonenergy 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 FLPMA provides the BLM with the authority to issue leases for the use, occupancy, and development of public lands. Leases are issued for such purposes as 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 non-irrigation 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.

Lessee. (Grazing) a lessee generally refers to a person or company permitted to graze livestock on public land. (Minerals) a lessee refers to a person or company permitted the right to explore, drill, and produce oil, gas, or other minerals subject to the terms and conditions of the lease.

[5] US Department of the Interior, Bureau of Land Management. 2014. Handbook H-8320-1—Planning for Recreation and Visitor Services. Rel. 8-85. Washington, DC. August 22, 2014. Internet website: https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.36142.File.dat/H-8320-1%20Recreation%20and%20Visitor%20Services%20Planning.pdf.

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. An effect that could occur for an extended period after implementation of the alternative. The effect could last several years or more.

Management decision. A decision made by the BLM to manage public lands. Management decisions include both land use plan decisions and implementation decisions.

Mineral. Any naturally formed inorganic material, any solid or fluid inorganic substance that can be extracted from the earth, any of various naturally occurring homogeneous substances (such as stone, coal, salt, sulfur, sand, petroleum, water, or natural gas) obtained usually from the ground. Under federal laws, minerals are considered as locatable (subject to the general mining laws), leasable (subject to the Mineral Leasing Act of 1920), or mineral materials (that is, 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.

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.

Mineralize. The process where a substance is converted from an organic substance to an inorganic substance.

Mining Law of 1872. Provides for claiming and gaining title to locatable minerals on public lands. Also referred to as the General Mining Law or Mining Law.

Mitigation. 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, rehabilitating, 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 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, such as jeeps, all-terrain vehicles (for example, four-wheelers and three-wheelers), trail motorcycles or dirt bikes, and aircraft.

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 2008).[6]

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.

National Historic Trail (NHT). A congressionally designated trail that is an extended, long-distance trail, not necessarily managed as continuous, that follows as closely as possible and practicable the original trails or routes of travel of national historic significance. The purpose of a NHT is the identification and protection of the historic route and the historic remnants and artifacts for public use and enjoyment. A NHT is managed in a manner to protect the nationally significant resources, qualities, values, and associated settings of the areas that such trails may pass through, including the primary use or uses of the trail (BLM 2012).[7]

National Register of Historic Places (NRHP). A listing of architectural, historic, archaeological, and cultural sites of local, state, or national significance, established by the National Historic Preservation Act of 1966 and maintained by the National Park Service.

Native vegetation. Plant species that were found in an area prior to Euro-American settlement. They 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 that existed prior to Euro-American settlement and that shaped the vegetation composition and structure.

Nonenergy leasable minerals. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. Nonenergy minerals include resources such as phosphate, sodium, potassium, and sulfur.

[6] US Department of the Interior, Bureau of Land Management. 2008. Manual 6840—Special Status Species Management. Rel. 6-125. Washington, DC. December 12, 2008. Internet website: https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.43545.File.dat/6840.pdf.

[7] US Department of the Interior, Bureau of Land Management. 2012. Manual 6280—Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation. Rel. 6-139. Washington, DC. September 14, 2012. Internet website: https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.1039.File.dat/M6280%20NSHT%20Management_Final_091212%20(2).pdf.

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 (for example, truck-mounted drilling and geophysical exploration equipment off designated routes, and construction of wells and 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 United States.

Objective. A description of a desired outcome for a resource. Objectives can be quantified and measured and, where feasible, have established time frames for achievement.

Occupancy. Full-time or part-time residence on public lands. It also means activities that involve residence; the construction, presence, or maintenance of temporary or permanent structures that may be used for such purposes; or the use of a watchman or caretaker to monitor activities. Residences or structures include barriers to access, fences, tents, motor homes, trailers, cabins, houses, buildings, and storage of equipment or supplies (43 CFR 3715.0-5).

Off-highway vehicle (OHV; also off-road vehicle). Any motorized vehicle capable of or designated for travel on or immediately over land, water, or other natural terrain. OHV does not include the following:

- Any non-amphibious registered motorboat
- Any military, fire, emergency, or law enforcement vehicle while being used for emergencies
- Any vehicle whose use is expressly authorized by the BLM Authorized Officer or otherwise officially approved
- Any vehicle in official use
- 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 the law, regulations, or policy guidance for application to individual programs. For example, 43 CFR 8340.0-5 defines 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 such products 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 Environmental Protection Agency established National Ambient Air Quality Standards. Particulate matter is defined as two

categories: fine particulate with an aerodynamic diameter of 10 micrometers or less (PM_{10}), and fine particulate with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$).

Percolate. Of a liquid or gas, to filter gradually through soil.

Perennial stream. One that flows continuously. Perennial streams are generally associated with a water table in the localities that they flow through.

Permitted use. For the purposes of this RMP, a permitted use generally refers to 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 animal unit months (43 CFR 4100.0-5). Other types of permits/permitted activities include realty minimum impact permits (such as for film or apiaries), temporary use permits (for example, ROW construction), Federal Energy Regulatory Commission-issued and other hydroelectric permits, state-issued water right permits, special recreation/recreation use permits, mineral prospecting, mineral use (such as phosphate and sodium), geophysical exploration, vegetation sales (firewood, Christmas trees, boughs, greenery, mushrooms, etc.), cultural resource permits, paleontological permits, fire prevention activity, state-issued air quality permits, concessionaire permits, etc.

Permittee. A person or company permitted to graze livestock on public land, although the correct term is lessee.

Physiography. The study and classification of the earth's surface features.

Planning area. The geographic area within which the BLM will make decisions during the planning process. A planning area boundary includes all lands regardless of jurisdiction; however, the BLM does not make decisions for non-BLM-administered lands in the planning area (*see decision area*).

Policy. This is a statement of guiding principles or procedures designed and intended to influence planning decisions, operating actions, or other BLM affairs. Policies are established interpretations of legislation, executive orders, regulations, or other presidential, secretarial, or management directives.

Pre-contact resources (prehistoric resources). Any material remains, structures, and items used or modified by people before Euro-Americans established a presence in the region.

Prescribed fire. A wildfire 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 before ignition.

Proper functioning condition (PFC). 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 land. Land or interest in land owned by the United States and administered by the Secretary of the Interior through the BLM without regard to how the United States acquired ownership (BLM 2005).[8]

Range improvement. An authorized physical modification or treatment that is designed to improve the production of forage, change the vegetation composition, control patterns of use, provide water, and stabilize soil and water conditions to restore, protect, and improve the condition of rangeland ecosystems to benefit livestock, wild horses and burros, and fish and wildlife. The term includes structures, treatment projects, and use of mechanical devices or modifications achieved through mechanical means (43 CFR 4100.0-5).

Reasonably foreseeable development scenario (RFD). 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.

> **Unconstrained RFD.** The baseline RFD. No management prescriptions or restrictions are applied when projecting future activities. Where legislatively imposed restrictions are applied to analyzed lands, those restrictions are considered when projecting future activities.
>
> **Constrained RFD.** An RFD where management prescriptions or restrictions are considered when projecting future activities under the alternative. Where legislatively imposed restrictions are applied to analyzed lands, those restrictions are considered when projecting future activities.

Reclamation. The suite of actions taken within an area affected by human disturbance; the outcome of reclamation is intended to change the condition of the disturbed area to meet predetermined objectives or to make it acceptable for certain defined resources (for example, wildlife habitat, grazing, and ecosystem function).

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 Management Area (RMA). Includes SRMAs and ERMAs; see *Special Recreation Management Area (SRMA)* and *Extensive Recreation Management Area (ERMA)*.

Recreation opportunities. Favorable circumstances enabling visitors' engagement in a leisure activity to realize immediate psychological experiences and to 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.

[8] US Department of the Interior, Bureau of Land Management. 2005. Handbook H-1601-1—Land Use Planning Handbook. Rel. 1-1693. Washington, DC. March 11, 2005. Internet website: https://www.blm.gov/style/medialib/blm/ak/aktest/planning/planning_general.Par.65225.File.dat/blm_lup_handbook.pdf.

Renewable energy. Energy resources that constantly renew themselves or that are regarded as practically inexhaustible. These include solar, wind, geothermal, hydropower, and biomass. Although particular geothermal formations can be depleted, the natural heat in the earth is a virtually inexhaustible reserve of potential energy.

Resource management plan (RMP). A set of decisions that establish management direction for land within an administrative area, as prescribed under the planning provisions of FLPMA of 1976, as amended (P.L. 94-579, 90 Stat. 2743); a document containing an assimilation of planning decisions developed through the planning process outlined in 43 CFR 1600, regardless of the scale at which the decisions were developed. Synonyms include land use plans and management framework plans.

Restore/restoration. Implementation of passive or active management actions designed to increase or maintain perennial herbaceous species and landscape cover of sagebrush so that plant communities are 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. A short-term goal may be to restore the landform, soils, and hydrology and to 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 they most commonly apply to certain types of vehicle use, temporal or spatial constraints, or certain authorizations.

Revision. The process of completely rewriting the land use plan due to changes in the planning area that affect major portions of the plan or the entire plan.

Right-of-way (ROW). Federal lands that the BLM authorizes a holder to use or occupy under a grant pursuant to Title V of the FLPMA; examples are roads, pipelines, power lines, and fiber-optic lines.

> *Major right-of-way.* In the context of this EIS, major ROWs are high-voltage transmission lines (100 kilovolt and over) and large pipelines (24 inches in width and over).
>
> *Minor right-of-way.* In the context of this EIS, anything that is not considered a major ROW, as defined above, is a minor ROW.

Right-of-way (ROW) 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 (ROW) 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, next 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.

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.

Sale (public land). A method of land disposal pursuant to Section 203 of the FLPMA, whereby the United States receives a fair-market payment for the transfer of land from federal ownership. Public lands determined suitable for sale are offered on the BLM's initiative. The lands must be identified in the RMP. Any lands to be disposed of by sale that are not identified in the current RMP, or that do not meet the disposal criteria identified in the RMP, require a plan amendment before a sale can occur.

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.

Seeding. A vegetation treatment that includes the application of grass, forb, or shrub seed, either by air 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 a 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.

Sensitive soils. Sensitive soils have a high risk of degradation from surface uses, such as the soils poorly suited to reclamation, badlands, soils with severe erosion hazard, soils on steep slopes, and hydric soils. Criteria used to determine soil sensitivity to surface uses are continually adapted as conditions change or as new information or technology becomes available.

Short-term effect. Occurs only during or immediately after implementation of an 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, or distinctiveness, especially as compared with other areas used for recreation (BLM 2014).[9]

Special recreation permit (SRP). An authorization that allows specified recreational uses of the public lands and related waters. Special recreation permits are issued as a means to manage visitor use and to protect natural and cultural resources. They are also used as a mechanism to authorize commercial, competitive, and vending use; organized group use and events; and individual or group use of special areas.

[9] US Department of Interior, Bureau of Land Management. 2014. Handbook H-8320-1—Planning for Recreation and Visitor Services. Rel. 8-85. Washington, DC. August 22, 2014. Internet website: https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.36142.File.dat/H-8320-1%20Recreation%20and%20Visitor%20Services%20Planning.pdf.

Special status species. BLM special status species that are listed, candidate, or proposed for listing under the Endangered Species Act. BLM sensitive species are also those requiring special management consideration to promote their conservation and to reduce the likelihood and need for future listing under the Endangered Species Act that are designated as BLM sensitive by a BLM State Director. All federally listed candidate species, proposed species, and delisted species in the 5 years following delisting are conserved as BLM sensitive species.

Split-estate. The circumstance where the surface of a particular parcel 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 (for example, 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 an RMP; 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. 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.

Steep slopes. Those that are 30 percent or greater.

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 are NSO, timing limitations (TL), and CSU. Lease stipulations are developed through the RMP process.

Surface disturbance. Surface-disturbing activities result from land uses and affect soils and vegetation to varying degrees depending on the amount, location, and type of disturbance; soil type; time of year; climate; and surface hydrology. Surface-disturbing activities remove the protective vegetation cover and soil crusts, Surface-disturbing activities can alter the soil's physical, chemical, and biological properties, which increases the soil's susceptibility to water and wind erosion and decreases its quality and site productivity.

Surface-disturbing activities. An action that alters the vegetation, surface and near-surface soil resources, or surface geologic features beyond natural site conditions and on a scale that affects other public land values. Examples of surface-disturbing activities are the operation of heavy equipment to

construct well pads, roads, pits and reservoirs; installation of pipelines and power lines; and conducting several types of vegetation treatments (for example, prescribed fire). Surface-disturbing activities may be either authorized or prohibited.

Surface uses. All the various activities that may be present on the surface or near surface (for example, pipelines) of the public lands. The term does not refer to those subterranean activities (for example, underground mining) on public lands or federal mineral estate. When administered as a use restriction (for example, no surface use), 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 (for example, a plant community study exclosure) and administrative sites (for example, a government yard) where only authorized agency personnel are admitted.

Temporary/temporary use. The opposite of 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 uses and activities 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 in the foreseeable future throughout all or a significant portion of its range (BLM 2008a). Under the Endangered Species Act in the United States, threatened is less protected than endangered. Designation as threatened or endangered is determined by the USFWS, as directed by the Endangered Species Act.

Timber. Standing trees, downed trees, or logs that are capable of being measured in board feet.

Total maximum daily load (TMDL). An estimate of the total quantity of pollutants (from all point, nonpoint, and natural sources) that may be allowed into waters without exceeding applicable water quality criteria.

Traditional cultural property (TCPs; National Park Service definition). A property that is eligible for inclusion in the NRHP based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community, as defined in National Park Service *Bulletin 38* (Parker and King 1998). TCPs are rooted in a traditional community's history and are important in maintaining the continuing cultural identity of the community. The cultural practices or beliefs that give a TCP its significance are, in many cases, still observed at the time a TCP is considered for inclusion in the NRHP. Because of this, it is sometimes perceived that the practices or beliefs themselves, not the property, make up the TCP. While the beliefs or practices associated with a TCP are of central importance, the NRHP does not include intangible resources. The TCP must be a physical property or place—that is, a district, site, building, structure, or object.

Trail. A linear route managed for human power (for example, hiking or bicycling), stock (for example, horseback riding), or OHV 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 where 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.

Tribal interests. Native American or Alaska Native economic rights, such as Indian trust assets, resource uses, access guaranteed by treaty rights, and subsistence uses.

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 proceed in the most efficient and economical manner.

Utility corridor. Tract of land varying in width and forming a 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 fee title ownership, mineral rights, ROWs, easements, permits, and licenses. Such rights may have been reserved, acquired, leased, granted, permitted, or otherwise authorized over time.

Visibility (air quality). A measure of the ability to see and identify objects at different distances.

Visual resources. The visible physical features on a landscape, (topography, water, vegetation, animals, structures, and other features) that comprise the scenery of the area.

Watershed. Topographical region or area delineated by water draining to a particular watercourse or body of water.

Wild and Scenic Study River. Rivers identified for study by Congress under Section 5(a) of the Wild and Scenic Rivers Act or identified for study by the Secretary of Agriculture or the Secretary of the Interior under Section 5(d)(1) of the Wild and Scenic Rivers Act. These rivers are studied under the provisions of Section 4 of the Wild and Scenic Rivers Act (BLM 2012).[10]

[10] US Department of the Interior, Bureau of Land Management. 2012. Manual 6400—Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, Planning, and Management. Rel. 6-136. Washington, DC. July 13, 2012. Internet website: https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.76771.File.dat/6400.pdf.

Eligible river. A river or river segment found to meet criteria found in Sections 1(b) and 2(b) of the Wild and Scenic Rivers Act of being free flowing and possessing one or more outstandingly remarkable value.

Suitable river. An eligible river segment found through administrative study to meet the criteria for designation as a component of the National Wild and Scenic Rivers System, as specified in Section 4(a) of the Wild and Scenic Rivers Act.

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 has the following characteristics:

- Generally appears to have been affected mainly by the forces of nature, with human imprints substantially unnoticeable
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation
- Has at least 5,000 acres or is large enough to make practical its preservation and use in an unimpaired condition
- May also contain ecological, geological, or other features of scientific, educational, scenic, or historical value

The definition is contained in Section 2(c) of the Wilderness Act of 1964 (78 Stat. 891).

Wilderness characteristics. Wilderness characteristics attributes are 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, such as ecological, geological, or other features of scientific, educational, scenic, or historical value. Lands with wilderness characteristics have been inventoried and determined by the BLM to contain wilderness characteristics, as defined in Section 2(c) of the Wilderness Act, as follows:

- Naturalness—The degree to which an area generally appears to have been affected primarily by the forces of nature with the imprint of people's work substantially unnoticeable
- Opportunity—A situation or condition favorable for attainment of a goal
- Outstanding—1) Standing out among others of its kind, conspicuous, or prominent; 2) Superior to others of its kind, distinguished, and excellent
- Primitive and unconfined recreation—Nonmotorized, nonmechanized (except as provided by law), and undeveloped types of recreation
- Solitude—The state of being alone or remote from others (isolation); a lonely or secluded place

Wilderness Study Area (WSA). An area inventoried, found to have wilderness characteristics, and managed to preserve those characteristics under authority of the review of public lands required by Section 603 of FLPMA.

Wildfire. A general term describing any non-structure fire that occurs in the wild. Wildfires are categorized into two distinct types (USDA and DOI 2009):[11]

- Wildfires—Unplanned ignitions or prescribed fires that are declared wildfires
- Prescribed fires—Planned ignitions

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.

Woody draw. Small, upland deciduous woodlands typically dominated by green ash scattered throughout the Badlands region of North Dakota.

[11] US Department of Agriculture and US Department of the Interior. 2009. Guidance for Implementation of Federal Wildland Fire Management Policy. Wildland Fire Leadership Council. Internet website: https://www.nifc.gov/policies/policies_documents/GIFWFMP.pdf. February 2009.

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