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Northern Great Plains Management Plans Revision Final Supplemental Environmental Impact Statement for Oil and Gas Leasing



Forest Service

Dakota Prairie Grasslands

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Cover Photo: View from Maah Daah Hey Trail on the Little Missouri National Grassland

**Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing
Billings, Golden Valley, McKenzie, and Slope Counties, North Dakota**

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Abstract: This document supplements the analysis contained in the 2001 Northern Great Plains Plan Revisions Final Environmental Impact Statement relative to the impacts of oil and gas development on the Little Missouri National Grassland unit of the Dakota Prairie Grasslands, including the area encompassed by the Bakken oil-shale formation, as well as areas outside the Bakken. The pattern of development and type of operations have changed since the final environmental impact statement was written, and the Grasslands Supervisor has determined it to be prudent to review the effects. This supplement considers the changed pattern of oil and gas development and changes to petroleum operations, which are anticipated to continue to occur.

Three alternatives are analyzed in this supplement: (1) continue leasing with current stipulations; (2) no new leasing; and (3) continue leasing with modified stipulations. Alternative 1 would result in no changes, relative to stipulations or lease notices for oil and gas development approved in the 2003 Record of Decision for Oil and Gas Development. Alternative 2 would limit oil and gas production to current valid leases. Alternative 3, the preferred alternative, would modify the stipulations and lease notices for new leases. None of the alternatives will affect the stipulations applied to current valid leases. A variation on the preferred alternative, designated alternative 3B, includes some revisions based on comments received on the draft supplemental environmental impact statement becoming the new preferred alternative. The decision stemming from this analysis may revise the 2003 Record of Decision for Oil and Gas Development.

The decision to authorize leasing and the application of environmental stipulations for oil and gas production are made by the Forest Service responsible official. The Bureau of Land Management then offers leases with the stipulations approved by the Forest Service. These conditions apply only where the Federal Government owns the mineral rights. Further conditions of approval will be applied when the holder of a valid lease applies for a permit to drill. The agencies have no authority for leasing or the imposition of stipulations where minerals are not federally owned, including where the surface is in Federal ownership.

Minor corrections or modifications were made to this document following the pre-decisional objection process. The final analysis in this December 2020 document takes precedence over previous analysis.

Executive Summary

Northern Great Plains Management Plans Revision Final Supplemental Environmental Impact Statement for Oil and Gas Leasing

Purpose and Need

The purpose of this analysis is to determine whether current oil and gas lease stipulations and lease notices are providing adequate protection to resources on the Little Missouri National Grassland on lands previously determined to be administratively available for leasing. The action is needed because the pattern of development and type of operations have changed since the final environmental impact statement was written and since the most recent review in 2008. Other changes include the listing of the Dakota skipper and northern long-eared bat as threatened species under the Endangered Species Act.

In order to provide a basis for analysis for this supplemental environmental impact statement, an updated reasonably foreseeable development scenario was prepared, which gives both long-term and near-term (5 years) estimates for oil and gas development on the Little Missouri National Grassland. This scenario addresses potential oil and gas development in the Bakken and Three Forks formations of the Williston Basin. The analysis includes all available Federal minerals within National Forest System surface on the Little Missouri National Grassland.

The analysis uses information from the updated reasonably foreseeable development scenario, together with other changed resource conditions, to determine the adequacy of the stipulations from the 2003 record of decision for the Northern Great Plains Management Plans Revision to protect natural and social resources while continuing to authorize future oil and gas leasing. The last review of the Final Environmental Impact Statement, a Supplemental Information Report prepared in 2008, determined that the analysis in the Northern Great Plains Final Environmental Impact Statement was adequately displaying the effects of oil and gas development at the time.

Scoping

A notice of intent for the preparation of this supplemental environmental impact statement was originally published in the Federal Register on December 19, 2012. No public comment was solicited at that time (pursuant to 40 CFR 1502.9(c)(4)). A revised notice of intent was published on August 8, 2015 with a request for comments on the project. A scoping letter describing the proposed action was mailed to over 90 organizations, individuals and Native American Tribes. Notice was published in the newspaper of record on September 14, 2015 with a request that comments be submitted by October 5, 2015. A total of eight comment letters and one petition were received.

Issues

The following issues were identified by reviewing comments received during scoping and through internal reviews by Forest Service specialists who work on the Little Missouri National Grassland where oil and gas operations occur. Alternatives were developed around those issues that involve unresolved conflicts concerning alternative uses of available resources.

Reduce Greenhouse Gas Emissions

Oil and gas operations, such as flaring, are regulated by the State of North Dakota and the Environmental Protection Agency. The Forest Service and Bureau of Land Management can allow or prohibit oil and gas leasing and provide stipulations regarding the location of infrastructure and other

stipulations of timing or controlled surface use, but has no authority to restrict flaring, or similar activities. The authority granted to the Forest Service that would reduce future emissions from oil and gas leasing would be to discontinue leasing.

Note that currently held leases that are not yet developed would not be affected by the decision, so some increases in activity would still occur, at least in the near-term, but no new leasing would occur.

Strengthen Protections for Inventoried Roadless Areas

Historically, no surface occupancy has been permitted for mineral estate within inventoried roadless areas, based on lease notices. However, codifying this protection in the lease stipulations strengthens it.

Lease notices are attached to leases to transmit information at the time of lease issuance to assist the lessee in submitting acceptable plans of operation, or to assist in administration of leases. Lease notices do not involve new restrictions or requirements. Any requirements contained in a lease notice must be fully supported in law, regulations, standard lease terms, or onshore oil and gas orders. Lease notices may be revised from time to time to reflect updates in laws, regulation, or other policy.

Specifying no surface occupancy for inventoried roadless areas in a stipulation acknowledges the priorities for protecting these areas from disturbance as found in the Dakota Prairie Grasslands plan.

Insure Protection for Future Developed Recreation Sites

The previous decision listed specific developed recreation sites where no surface occupancy is allowed. The proposed change would prohibit surface occupancy based on the level of recreation site development, thus clearly covering any new sites that may be developed in the future.

Incorporate Updated Management for the Conservation of Greater Sage Grouse

Over the past decade, collaboration between Federal and State agencies resulted in agreements and new management approaches embodied in the Sage Grouse Conservation Strategy. The current stipulations for protecting sage-grouse do not adequately reflect such management.

Insure Persistence of Rare Plants with Narrow Ranges and Limited Populations

Dakota buckwheat (*Eriogonum visheri*), nodding buckwheat (*E. cernuum*), and sand lily (*Leucocrinum montanum*) are sensitive plants with narrow ranges and very few populations on the Little Missouri National Grassland. Impacts from oil and gas surface activities could reduce the capacity to maintain the species within the planning area.

Protect Paleontological Resources Consistent with Current Law and Regulation

The definition of paleontological resources was expanded by the Paleontological Resources Preservation Act of 2009 to include any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust. The current lease notice is applicable only to vertebrate paleontological resources.

Alternatives

The Little Missouri National Grassland Oil and Gas Leasing Draft Supplemental Environmental Impact Statement considered three alternatives:

- Alternative 1 – Continue leasing with current stipulations

- Alternative 2 – No new oil and gas leasing
- Alternative 3 – Continue leasing with revised stipulations

A variation, designated alternative 3B, includes some revisions based on comments received on the draft supplemental environmental impact statement and is now the preferred alternative in the final supplemental environmental impact statement.

The analysis provides the details of the stipulations and lease notices for each alternative, including those specified in management area direction found in the Dakota Prairie Grasslands Land and Resource Management Plan. These alternatives apply to leasing of parcels and persist as long as the lease is held. Once a parcel is leased, it may be held for some time before it is developed. Table S - 1 comparing the alternatives is appended at the end of this summary.

Alternative 1 - Continue Leasing with Current Stipulations

This alternative represents the current situation regarding oil and gas leasing in the Little Missouri National Grassland. This alternative applies to currently unleased and available areas of federally owned minerals within the administrative boundary of the Little Missouri National Grassland. These lands include areas where both the surface and minerals are federally owned. It does not apply to areas where minerals are federally owned but the surface is under non-federal ownership, or to areas where the surface is owned by Little Missouri National Grassland, but the minerals are owned by a non-federal entity.

Of the 893,200 acres of the Little Missouri National Grassland with National Forest System surface lands over Federal minerals, 216,300 acres are currently unleased and available for leasing. Under this alternative, 75,100 acres would have stipulations of no surface occupancy. Oil and gas resources on these acres could be accessed by horizontal drilling, but no surface disturbance would be allowed. The remaining 141,200 acres could see surface developments of some kind. A total of 97,700 acres would have stipulations for timing limitations and/or controlled surface use, and 43,500 acres would have no stipulations, beyond standard lease terms, specified in the lease. When current leases expire, they could be re-offered for lease with updated stipulations and lease notices.

Table S - 2 displays current stipulations applicable to alternative 1.

Alternative 2 – No New Oil and Gas Leasing

This alternative would limit oil and gas leasing on the Little Missouri National Grassland to current valid leases. No currently unleased areas would be offered for lease, and as current leases expire, they would remain unleased. Therefore, leasing stipulations, notices, and conditions of approval are not applicable. This alternative was developed to address reducing greenhouse gas emissions, and eliminates potential effects from new leases to resources of concern.

This alternative applies to unleased areas of federally owned minerals with National Forest System surface ownership within the administrative boundary of the Little Missouri National Grassland. This alternative would add another 216,300 acres to Little Missouri National Grassland lands not currently authorized or administratively available, for a total of 264,000 acres. This alternative would not apply to areas where minerals are federally owned but the surface is under non-Federal ownership, or to areas where the surface consists of National Forest System lands, but the minerals are owned by a non-Federal entity.

Currently held leases would not be affected by this alternative, but would continue to operate under the stipulations and conditions in place when the lease was signed. New oil and gas development would

continue under this alternative for currently authorized, but undeveloped leases. When current leases expire, they would not be offered for lease again.

Alternative 3 - Continue Oil and Gas Leasing with Revised Stipulations and Lease Notices

Alternative 3 was developed to provide new and revised stipulations to comply with current law and to provide additional protections for resources of concern. All existing stipulations and lease notices (as described for alternative 1) would remain in effect, except as indicated below:

Stipulations for sage-grouse display grounds (leks) would be revised from no surface occupancy within 0.25 mile to a timing limitation that limits noise and certain activities within 2 miles of an active lek during the breeding season. (Stipulations for sharp-tailed grouse display grounds would remain as current.) New stipulations for controlled surface use and timing limitations for priority sage-grouse habitat would be added.

New stipulations for no surface occupancy would be added for recreation sites, rare plants, and roadless areas to provide more reliable protections and flexibility to protect new recreation sites that may be developed in the future.

A new controlled surface use stipulation for near-field air quality would be added to protect the public from potential air quality exceedances during fracking operations.

The lease notice for paleontological resources would be revised to comply with current law.

Table S - 3 displays new stipulations that would be added to current stipulations.

Alternative 3B - Continue Oil and Gas Leasing with Revised Stipulations and Lease Notices

Alternative 3B comprises the stipulations and lease notices with revisions or additions that were suggested in comments on the draft supplemental environmental impact statement. Suggestions were reviewed by the interdisciplinary team to determine if the change was already covered by standards and guides in the Dakota Prairie Grasslands Land Management Plan or by other laws or regulations. The changes in alternative 3B result from the recommendations of the interdisciplinary team.

All resource protections from alternatives 1 and 3 that are not revised and replaced by stipulations for the same resource in alternative 3B are carried forward as part of alternative 3B. Alternative 3B, as modified from the draft SEIS, is now the preferred alternative.

A revised stipulation for sage-grouse would require no surface occupancy for all sage-grouse priority habitat, which occurs in the southwest corner of the Little Missouri Grasslands, south of Interstate 94. This stipulation would replace all sage-grouse stipulations in alternative 1 and alternative 3.

Alternatives 1 and 3 both include a timing limitation for bighorn sheep lambing areas which prevents surface use from April 1 through June 15. The revised stipulation would extend the timing limitation to July 15 to provide protection for extended lambing periods. No other changes to the stipulation are proposed.

A new stipulation for inventoried roadless areas would provide a buffer of controlled surface use for one-quarter mile on each side of the center line of existing roads within inventoried roadless areas. This

stipulation would apply to roads with a maintenance level of 3, 4, or 5 that generally accommodate all passenger vehicles. Existing roads would be determined when a parcel is leased.

Well pads and other infrastructure may be located within this buffer, as long as the near edge of the well pad is adjacent to the edge of the road right-of-way. Additionally, the long axis of the well pad must be situated parallel to the road. A stipulation for no surface occupancy in inventoried roadless areas applies to all areas outside of the controlled surface use buffer around existing roads.

A new lease notice would alert the lessee that prior to approval of the permit to develop a lease, additional documentation may be needed to confirm that diesel engines proposed to be used in drilling and completion meet the current NO_x standards of the U.S. Environmental Protection Agency. Current standards mean those standards in place at the time of leasing.

Table S - 4 displays new stipulations that would be added to current stipulations.

Decision Framework

Based on the supplemental environmental impact statement, the responsible official, the Dakota Prairie Grasslands supervisor, will decide whether to authorize the Bureau of Land Management to continue to offer oil and gas leases using current lease stipulations and lease notices, to continue with changed stipulations, or to suspend offering new oil and gas leases, following regulations at 36 CFR 228 Subpart E.

The decision will not affect previously issued valid leases or private mineral rights. Any changes to stipulations or lease notices would apply to future oil and gas leasing and subsequent development on the new leases only. Current and proposed stipulations are described in the analysis. The decision would only apply to lands with federally owned minerals with National Forest System surface ownership; Federal minerals with non-Federal surface ownership are not covered. National Forest System lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision.

The analysis and decision do not cover the actual drilling operations, which would be covered under subsequent site-specific environmental analysis and decisions. However, the standards and guidelines and the design features that may be used are considered in the analysis of effects for this action.

Minor corrections or modifications were made to this document following the pre-decisional objection process. The final analysis in this December 2020 document takes precedence over previous analysis.

Availability of the Final Supplemental Environmental Impact Statement

The Northern Great Plains Management Plans Revision Final Supplemental Environmental Impact Statement for Oil and Gas Leasing is available on the Internet on the Dakota Prairie Grasslands website (<https://www.fs.usda.gov/project/?project=40652>). Paper copies can be obtained from the Dakota Prairie Grasslands Headquarters Office, 2000 Miriam Circle, Bismarck, North Dakota 58501; or by calling (701) 989-7304.

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

Table S - 1. Comparison of alternatives for oil and gas leasing on the Little Missouri National Grassland

Factor Evaluated	Alternative 1: Continue Leasing with Current Stipulations	Alternative 2: No New Leasing	Alternative 3: Continue Leasing with Revised Stipulations	Alternative 3B: Continue Leasing with Revised Stipulations
Total Acres Affected (unleased and available)	216,300	216,300	216,300	216,300
No Surface Occupancy (acres)	75,100	Not applicable	107,800	118,500
Timing Limitations or Controlled Surface Use (acres)	97,700	Not applicable	77,600	60,900
No Added Stipulations (acres)	43,500	Not applicable	30,900	36,900
Total Acres with Potential for Disturbance	141,200	Not applicable	108,500	97,800
Total Available for Leasing (acres)	216,300	0	216,300	216,300
Roadless Area Protections	Provided by Lease Notice	Not applicable	No Surface Occupancy Stipulation	Controlled Surface Use allows well pads for 0.25 miles each side of roads (maintenance level 3-5); No Surface Occupancy outside this area.
No Surface Occupancy and Timing Limitation for Developed Recreation Sites	Applied to specific named sites	Not applicable	Applied to current and future sites of Development Scale 3-5	Applied to current and future sites of Development Scale 3-5
Protections for Rare Plants with Limited Distribution	Provided by Lease Notice	Not applicable	No Surface Occupancy Stipulation	No Surface Occupancy Stipulation
Lease Notice Protection for Paleontological Resources	Covers vertebrate fossils only; does not comply with current law	Not applicable	Covers vertebrate, invertebrate, and plant fossils; complies with current law	Covers vertebrate, invertebrate, and plant fossils; complies with current law
Protections for Greater Sage-Grouse Display Grounds	Timing Limitations prevent surface use within 2 miles 3/1 – 6/15; No Surface Occupancy within 0.25 mile	Not applicable	Timing Limitations 3/1 – 4/30 limiting noise between 6 pm and 9 am; No Surface Occupancy within 0.25 miles	No Surface Occupancy in priority habitat

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

Factor Evaluated	Alternative 1: Continue Leasing with Current Stipulations	Alternative 2: No New Leasing	Alternative 3: Continue Leasing with Revised Stipulations	Alternative 3B: Continue Leasing with Revised Stipulations
Protections for Sage-Grouse Priority and General Habitat	None	Not applicable	Controlled Surface Use specifies infrastructure may be moved over 0.25 miles for leks or dense sagebrush	No Surface Occupancy in priority habitat
Bighorn Sheep Lambing Areas	Timing Limitation for surface use April 1 through June 15 within 1 mile	Not applicable	Timing Limitation for surface use April 1 through June 15 within 1 mile	Timing Limitation for surface use April 1 through July 15 within 1 mile
Air Quality Lease Notice	None	Not applicable	None	Operators using less than Tier 4 equipment required to complete analysis and monitoring to show compliance with Clean Air Act

Table S - 2. Current stipulations and lease notices comprising alternative 1

Resource	Stipulation or Lease Notice	Area or Rationale that the Stipulation (or Lease Notice) Applies
Water/Woody draws	Controlled surface use	Water, wetlands, woody draws, riparian areas, and floodplains
Soil/ Water	No surface occupancy	Slopes > 40 percent
Bald Eagle or Peregrine Falcon	No surface occupancy	Within 1mile line of sight of active bald eagle or peregrine falcon nest
Bald Eagle	No surface occupancy	Within 1mile (line of sight) of bald eagle winter roost
Prairie Falcon/Burrowing Owl Nest	No surface occupancy	Within 0.25 mile (line of sight) of active prairie falcon or burrowing owl nest
Merlin, golden eagle, ferruginous hawk	No surface occupancy	Within 0.5 mile (line of sight) of active Merlin, golden eagle, or ferruginous hawk nest
Sharp-tailed grouse	Timing limitation	Within 1 mile of sharp-tailed grouse display grounds (3/1-6/15)
Sharp-tailed grouse	No surface occupancy	Within 0.25 mile of center of sharp-tailed grouse display grounds
Sage grouse	Timing limitation	Within 2 miles of sage-grouse display grounds (3/1-6/15)
Sage grouse	No surface occupancy	Within 0.25 mile of center of sage-grouse display grounds
Black-footed Ferret	Controlled surface use	Black-footed ferret reintroduction habitat (roaded) (MA 3.63)
Black-footed Ferret	No surface occupancy	Black-footed ferret reintroduction habitat (roadless) (MA 3.63)
Black-footed Ferret	Timing limitation	Within 1/8 mile of prairie dog colonies occupied by black- footed ferrets (3/1-8/31) (Outside MA 3.63)
Black-footed Ferret	Controlled surface use	Within prairie dog colonies occupied by black-footed ferrets (outside MA 3.63)

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

Resource	Stipulation or Lease Notice	Area or Rationale that the Stipulation (or Lease Notice) Applies
Bighorn Sheep	No surface occupancy	Bighorn Sheep Habitat (MA 3.51)
Bighorn Sheep	Timing limitation	Within 1 mile bighorn sheep lambing areas 4/1-6/15 (outside of MA 3.51)
Bighorn Sheep	Controlled surface use	Within 1 mile sight distance of bighorn sheep lambing grounds (outside of MA 3.51)
Bighorn Sheep	Not currently authorized; when leased Controlled surface use and Timing limitation	MA 3.51A Bighorn Sheep with non-Federal mineral ownership
Bighorn Sheep	Controlled surface use and Timing limitation	MA 3.51B Bighorn Sheep with non-Federal mineral ownership
Antelope	Timing limitation	Within mapped antelope winter range (1/1-3/31)
Swift Fox	Timing limitation	Within 0.25 mile of swift fox dens (3/1-7/31)
Threatened, endangered and sensitive species	Lease notice	Threatened, Endangered and Sensitive Plant or Animal Species (Dakota Prairie Grasslands Plan Addendum page 52)
Research natural area	No surface occupancy	Protect MA 2.2 Research Natural Areas
Special Interest Areas - Paleontology or Geologic	Controlled surface use	Special Interest Areas - Paleontology and Geologic Resources - Slope Formation Type Section, Cannonball/Slope Formation Outcrop, Bullion Creek Formation Type Section
Special Interest Areas - Heritage	No surface occupancy	Special Interest Areas - Heritage Resources - Battle of the Badlands, Custer Trail/Davis Creek, and Square Buttes
Special Interest Areas - Botanical	No surface occupancy	Special Interest Areas - Botanical Resource - Aspen Stand, The Bog, Grand River Sand Dunes, Black Butte, Black Cottonwood, Riparian Pools, and Roundtop Butte
Special Interest Areas - Geologic	No surface occupancy	Special Interest Areas - White Buttes, Burning Coal Vein/ Columnar Juniper, and Ice Caves.
Recreation Sites	No surface occupancy	Developed Recreation Sites - Burning Coal Vein, Buffalo Gap, Sather Lake, CCC, Campgrounds; and Summit, White tail Picnic Areas; and 4 Maah Daah Hey Trail overnight camps: Wannagan, Elkhorn, Magpie, and Bennett
Recreation Sites	Timing limitation	Within 0.25 mile of Burning Coal Vein, Buffalo Gap, Sather Lake, CCC, Campgrounds, Summit, and Whitetail Picnic Areas, and 4 Maah Daah Hey Trail overnight camps, Wannagan, Elkhorn, Magpie, and Bennett (5/1-12/1)
Suitable for Wilderness	Not administratively available	MA 1.2A - Long X Divide; Twin Buttes, Bullion Buttes and Kinley Plateau
Nonmotorized	No surface occupancy	MA 1.31 - Back country nonmotorized
Scenic High	Controlled surface use	Areas of High Scenic Integrity, surface occupancy will be subject to operational constraints to maintain landscape character intact including within 1 mile of Theodore Roosevelt National Park

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

Resource	Stipulation or Lease Notice	Area or Rationale that the Stipulation (or Lease Notice) Applies
Scenic Moderate	Controlled surface use	Areas of Moderate Scenic Integrity, surface occupancy will be subject to operational constraints to maintain a landscape character that is no more than slightly altered
Heritage Resources	Not administratively available	MA 2.4 - American Indian traditional use areas
Heritage Resources	No surface occupancy	National Register eligible sites
Scenic	No surface occupancy	MA 4.22 - areas within 0.25 mile of Little Missouri River
Paleontology	Lease notice	Paleontologic resources Federal surface and Federal subsurface
Roadless	Lease notice	The Roadless Area Conservation Rule or subsequent modifications thereof may prohibit operations such as road construction or reconstruction

Table S - 3. New and revised stipulations and lease notices that combine with existing ones to comprise alternative 3*

Resource	Stipulation or Lease Notice	Area or Rationale that the Stipulation (or Lease Notice) Applies
Recreation sites	No surface occupancy	REVISED: No surface occupancy or use is allowed within sites classified as Recreation Site Development scale 3 through 5.
Sage-grouse leks	Timing limitation	NEW: Prohibit surface activities that create noise at 20dB above ambient measured at the perimeter of an active lek and restrict road and trail maintenance within 2 miles from the perimeter of active leks from March 1 to April 30 from 6 pm to 9 am.
Sage-grouse habitat	Controlled surface use	NEW: In Sage-Grouse Priority and General Habitat Management Areas proposed wells and associated disturbance may have to be moved more than ¼ mile in order to provide topographic screening between the disturbance and active leks and reduce impacts to areas of high density sage brush.
Rare Plants	No surface occupancy	NEW: No surface occupancy allowed within 200 feet of mapped populations for Dakota buckwheat (<i>Eriogonum visheri</i>), nodding buckwheat (<i>E. cernuum</i>), and sand lily (<i>Leucocrinum montanum</i>).
Roadless	No surface occupancy	NEW: To comply with the Roadless Rule, no surface occupancy or use is allowed within inventoried roadless areas
Paleontology	Lease notice	REVISED: define "paleontological resource" as any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth, with the exception of those defined as archeological resources under the Archaeological Resources Protection Act of 1979, or cultural items as defined in the Native American Graves Protection and Repatriation Act.

*Stipulations and lease notices marked as REVISED replace the similar stipulation in alternative 1 (Table S - 2)
All other stipulations in alternative 1 carry forward as part of alternative 3.

Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing

Table S - 4. New and revised stipulations and lease notices that combine with existing ones to comprise alternative 3B*

Resource	Stipulation or Lease Notice	Area or Rationale that the Stipulation (or Lease Notice) Applies
Sage-grouse habitat	No surface use occupancy	NEW: Surface occupancy and surface disturbing activities will be prohibited within sage-grouse priority habitat areas, unless waivers, exceptions, or modifications are applied in coordination with North Dakota Game and Fish Department. <i>This stipulation replaces all sage-grouse stipulations in both alternatives 1 and 3.</i>
Bighorn sheep lambing areas	Timing limitation	REVISED: Surface use is prohibited from April 1 through July 15 within 1 mile (line-of-sight) of bighorn sheep lambing areas.
Roadless	No surface use occupancy	NEW: No surface occupancy or use is allowed within inventoried roadless areas outside of 0.25 miles from existing maintenance level 3, 4, and 5 roads. This applies to well pads and roads, but not to pipelines, transmission lines, and other linear construction features
Roadless	Controlled surface use	NEW: Controlled surface use is allowed for constructing a well pad within 0.25 miles from the centerline of all existing maintenance level three, four and five roads at the time of the proposal. The edge of the well pad must be adjacent to the road right-of-way.
Air resources	Lease notice	NEW: Prior to project-specific approval, additional reporting may be required to document that the diesel-fueled non-road engines to be used during drilling or completion activities (with greater than 200 horsepower design rating) meet the current emissions standards required by the EPA for non-road diesel engines (i.e., those standards in place at the time of leasing).

*Stipulations and lease notices marked as REVISED replace protections for the same resource in alternative 1 (Table S - 2) and alternative 3 (Table S - 3). All other stipulations in alternatives 1 and 3 carry forward as part of alternative 3B.

Contents

Executive Summary	i
Chapter 1. Purpose of and Need for Action	1
Introduction.....	1
Background	1
Purpose and Need for Action	5
Decision Framework	6
Public Involvement	6
Tribal Consultation	7
Issues	7
Chapter 2. Alternatives	11
Implementation Intent.....	11
Alternatives Considered in Detail.....	12
Alternatives Considered but Eliminated from Detailed Study	30
Comparison of Alternatives	34
Chapter 3. Affected Environment and Environmental Consequences	37
Introduction.....	37
Oil and Gas	37
Socioeconomics	49
Air Quality.....	56
Greenhouse Gas Emissions and Climate Change	66
Soils.....	74
Surface Water	79
Groundwater	87
Wildlife.....	90
Botanical Resources	111
Rangeland Resources.....	125
Recreation	128
Scenic Resources	144
Heritage Resources	161
Paleontological Resources.....	163
Preparers and Contributors	165
Interdisciplinary Team Members.....	165
Federal, State, and Local Agencies	167
Distribution of the Supplemental Environmental Impact Statement	167
References	169
Appendix A – Stipulations and Lease Notices for Alternative 1, Alternative 3 and Alternative 3B	181
Alternative 1 – Current Lease Stipulations from the 2003 Oil and Gas Record of Decision	183
Alternative 3 – New and Revised Stipulations	211
Alternative 3B – New Stipulations.....	216
Appendix B – Response to Comment	221
Introduction.....	221
Cooperating Agencies	222
Purpose and Need	223
Process/Decision Making.....	223
Alternatives.....	231
Additional Alternative Recommendations	236

Stipulations and Lease Notices.....	239
Design Features.....	240
Oil and Gas.....	241
Socioeconomics.....	243
Air Quality and Greenhouse Gas Emissions.....	245
Soils.....	254
Surface and Groundwater.....	254
Wildlife.....	259
Botanical Resources.....	270
Rangeland Resources.....	274
Recreation.....	274
Special Areas.....	277
Mapping and Technical Edits.....	286
Out of scope.....	287
Attachment A.....	292
Steps to Approving Oil and Gas Production on National Forest System Lands.....	292
Index.....	299

List of Tables

Table 1. Acres available for Federal leasing within the Little Missouri National Grassland.....	3
Table 2. Mineral and surface estate combinations within the Little Missouri National Grassland.....	4
Table 3. Stipulations and lease notices in alternative 1.....	18
Table 4. New and revised stipulations and lease notices that combine with existing ones to comprise alternative 3.....	28
Table 5. New and revised stipulations and lease notices that combine with existing ones to comprise alternative 3B.....	29
Table 6. Comparison of alternatives for oil and gas leasing on the Little Missouri National Grassland.....	34
Table 7. Wells drilled within the Little Missouri National Grassland administrative boundary by surface owner and mineral estate owner.....	39
Table 8. Acreage and surface restrictions for current Federal oil and gas leases.....	39
Table 9. Some of the constituents of typical fracturing operation.....	44
Table 10. Acreage and surface restrictions for unleased available National Forest System lands under alternative 1.....	45
Table 11. Cumulative acres unavailable for leasing under alternative 2.....	46
Table 12. Acreage and surface restrictions for unleased available National Forest System lands under alternative 3.....	46
Table 13. Acreage and surface restrictions for unleased available NFS lands under alternative 3B.....	47
Table 14. Comparison of acres available by level of stipulation for all alternatives.....	49
Table 15. Summary of revenue, royalties, and payments to North Dakota from current and projected oil and gas development on the Little Missouri National Grassland.....	51
Table 16. Demographic characteristics by county.....	53
Table 17. Comparison of Little Missouri National Grassland oil and gas emissions to four county area emissions and statewide emissions from all source categories (McKenzie, Billings, Golden Valley, and Slope Counties).....	58
Table 18. Summary of future (2032) emissions for the 16 oil and gas source categories (tons per year).62	
Table 19. Projected wells by county based on historical well completions in Billings, Golden Valley, McKenzie, and Slope counties.....	67
Table 20. Exploration and production related emissions for counties of interest.....	68
Table 21. Emissions from the transport of crude oil and natural gas.....	69
Table 22. Crude oil refinery and natural gas processing facility emissions.....	69
Table 23. Emissions related to the transport of processed oil and natural gas products (gasoline, diesel, kerosene, processed gas).....	69

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

Table 24. Emissions from the combustion of crude oil and natural gas products	69
Table 25. Summary of estimated life-cycle emissions resulting from oil and gas development.....	70
Table 26. Potential emissions in million metric tons (MMT) of carbon dioxide equivalent for low, expected, and high production scenarios (10 percent increase/decrease in volume) using AR5 100-year GWPs	71
Table 27. Relative yearly contributions of the project to global, national, state, and Forest Service emissions	73
Table 28. Soil resource indicators and measures for alternative 1	76
Table 29. Soil resource indicators and measures for alternative 3	78
Table 30. NatureServe rankings for sensitive plant species	111
Table 31. Number of mapped populations of sensitive species, existing acres, ranking, and current condition within the Little Missouri National Grassland.....	115
Table 32. Sensitive species resource indicators and measures for alternative 1	118
Table 33. Determination of effects to sensitive plants for all alternatives	124
Table 34. Allotment acres within the Little Missouri National Grassland	125
Table 35. Recreation opportunity spectrum acreage by ranger district	131
Table 36. Category 1C Inventoried roadless areas on the Dakota Prairie Grasslands.....	135
Table 37. Summary comparison of environmental effects to recreation resources.....	143
Table 38. Scenic integrity objectives for project area unleased parcels	151
Table 39. Potential mitigation measures for scenic resources	154
Table 40. Preparers and contributors	166

List of Figures

Figure 1. Location of the project area for Little Missouri National Grassland oil and gas leasing	v
Figure 2. Unleased Federal minerals with Forest Service surface ownership in the Little Missouri National Grassland	2
Figure 3. Alternative 1 – continue leasing with current stipulations	15
Figure 4. Alternative 1 stipulations applied to all Forest Service minerals	16
Figure 5. Alternative 3 – continue leasing with revised stipulations	24
Figure 6. Alternative 3 stipulations applied to all Forest Service minerals	25
Figure 7. Alternative 3B – continue leasing with additional revisions	26
Figure 8. Alternative 3B stipulations applied to all Forest Service minerals	27
Figure 9. Percentage of wells drilled on different surface and mineral ownership within the administrative boundary of the Little Missouri National Grassland	38
Figure 10. Status of current oil and gas leases on Little Missouri National Grassland.....	40
Figure 11. Social and economic analysis area	50
Figure 12. Wells drilled on the Little Missouri National Grassland 2003 through mid-2017 (Hanna 2017) ..	51
Figure 13. Population trends in the analysis area (U.S. Dept. of Commerce, Bureau of Economic Analysis 2017)	52
Figure 14. Employment trends in the analysis area (U.S. Dept. of Commerce, Bureau of Economic Analysis 2017).....	52
Figure 15. Personal income trends in the analysis area (U.S. Dept. of Commerce, Bureau of Economic Analysis 2017).....	52
Figure 16. Map depicting Federal Class I areas and Interagency Monitoring of Protected Visual Environments monitors in North Dakota	60
Figure 17. Nitrogen oxide emissions in the vicinity of Class I and Class II areas in alternative 1	62
Figure 18. Locations of potential Little Missouri National Grassland oil and gas nitrogen oxide emissions and Class I area (blue) and sensitive Class II area (purple) 4-kilometer grid cell receptors	63
Figure 19. Potential emissions of carbon dioxide equivalent from low, expected, and high production volumes of crude oil and natural gas	71
Figure 20. Bakken Shale gross flaring (black) and gross flaring percent of production (red) from 2007-2017 (North Dakota Industrial Commission, Department of Mineral Resources/North Dakota Pipeline Authority).....	72
Figure 21. Soil condition ratings for sixth HUC watersheds involved with the Little Missouri National Grassland Oil and Gas SEIS.....	75
Figure 22. Little Missouri River and other perennial streams in project area	80
Figure 23. Streams monitored for proper functioning condition in the project area	83
Figure 24. Recreation opportunity spectrum – McKenzie Ranger District.....	129
Figure 25. Recreation opportunity spectrum – Medora Ranger District	130
Figure 26. Little Missouri National Grassland recreation resources – Medora District.....	133
Figure 27. Little Missouri National Grassland recreation resources – McKenzie District	134
Figure 28. Controlled surface use buffers for existing roads in inventoried roadless areas on McKenzie RD	141
Figure 29. Controlled surface use buffers for existing roads in inventoried roadless areas on Medora RD	142
Figure 30. View from Forest Service road into a badlands landscape type	145
Figure 31. View from Maah Daah Hey Trail into a rolling prairie landscape type	145
Figure 32. Scenic integrity objectives in the northern lease blocks	147
Figure 33. Scenic integrity objectives in the north central lease blocks	148
Figure 34. Scenic integrity objectives in the south-central lease blocks.....	149
Figure 35. Scenic integrity objectives in the southern lease blocks	150
Figure 36. Typical drilling operation and access road with well production operation in the background ..	156
Figure 37. Likelihood of occurrence of paleontological resources in the Northern Region of the Forest Service	163

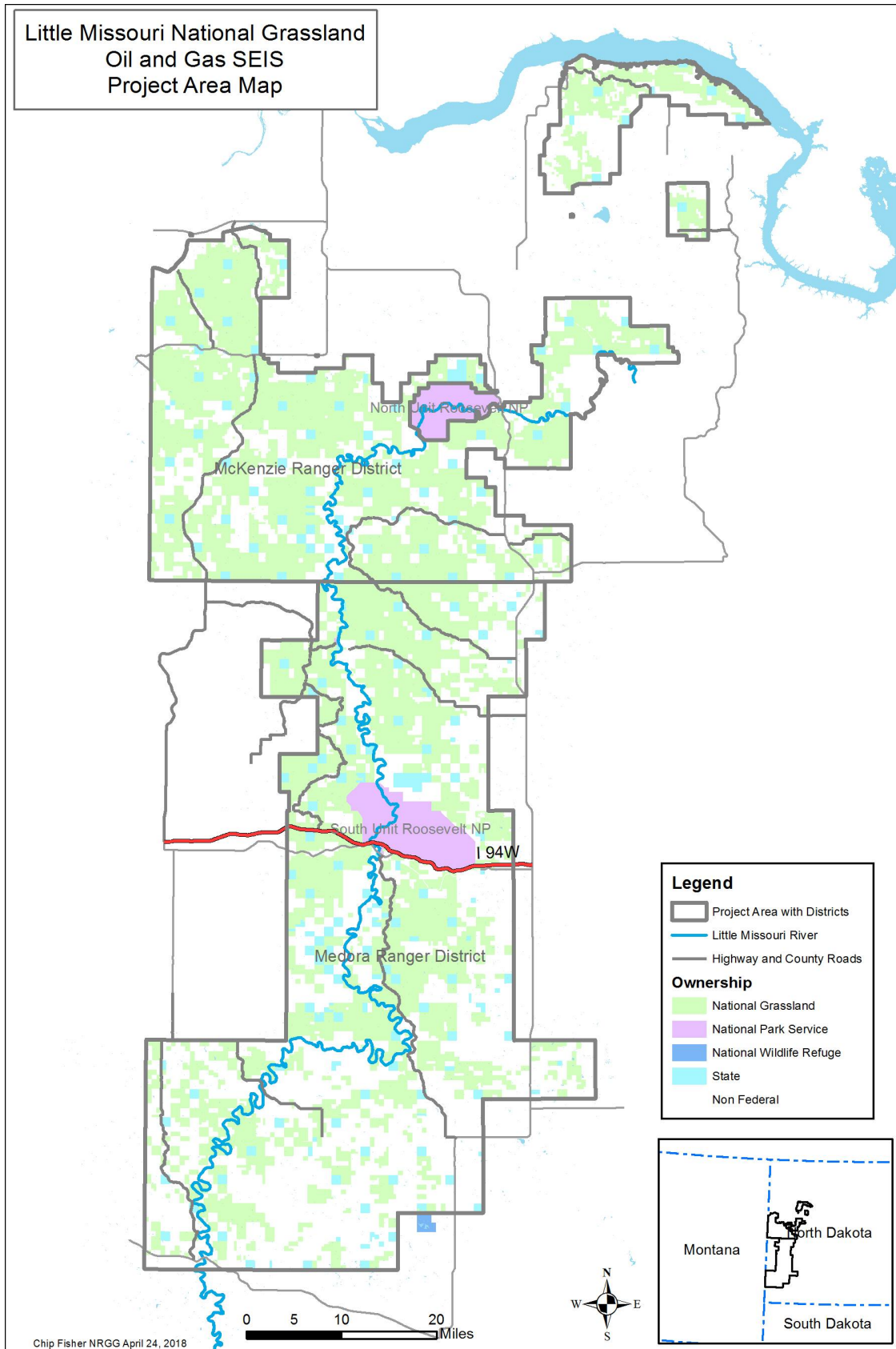


Figure 1. Location of the project area for Little Missouri National Grassland oil and gas leasing

Chapter 1. Purpose of and Need for Action

Introduction

The Forest Service has prepared this environmental impact statement in compliance with the National Environmental Policy Act and other relevant Federal and State laws and regulations. This environmental impact statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. Additional documentation, including more detailed analyses, may be found in specialist reports and supporting documentation available on the project website: <https://www.fs.usda.gov/project/?project=40652>. These reports are incorporated here by reference.

Background

In June of 2003, the Dakota Prairie Grasslands Record of Decision for Oil and Gas Leasing on the Little Missouri and Cedar River National Grasslands (2003 Record of Decision; USDA Forest Service 2003) was signed. This decision spelled out leasing stipulations, consistent with the Revised Dakota Prairie Grasslands Land and Resource Management Plan, based on the 2002 Northern Great Plains Management Plans Revision Final Environmental Impact Statement,¹ which analyzed the impacts relative to the 2001 Reasonably Foreseeable Development Scenario for Oil and Gas for the Little Missouri and Cedar River National Grasslands.

This supplemental environmental impact statement considers the changed pattern of oil and gas development that has occurred, and is anticipated to continue to occur, on lands available for lease of federally owned minerals on the Little Missouri National Grassland unit of the Dakota Prairie Grasslands in North Dakota. The analysis area covers all the National Forest System lands with Federal minerals within the administrative boundary of the Little Missouri National Grassland. Lands with Federal minerals and non-Federal surface ownership fall under the authority of the Bureau of Land Management for leasing decisions and associated stipulations and lease notices.

Project Location

The Little Missouri National Grassland is located in portions of Slope, Billings, Golden Valley, and McKenzie Counties, North Dakota and includes 2,131,000 acres within the administrative boundary, of which 1,027,800 acres are under Forest Service surface ownership.² The Federal mineral estate within the grassland totals 1,000,300 acres, of which 893,200 acres has National Forest System surface over Federal minerals, henceforth referred to as National Forest System minerals. Those lands with National Forest System surface over Federal minerals that are not currently leased and are available for leasing are the subject of this analysis. Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

¹ https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3818959.pdf

² All acreage figures are rounded to the nearest 100 acres.

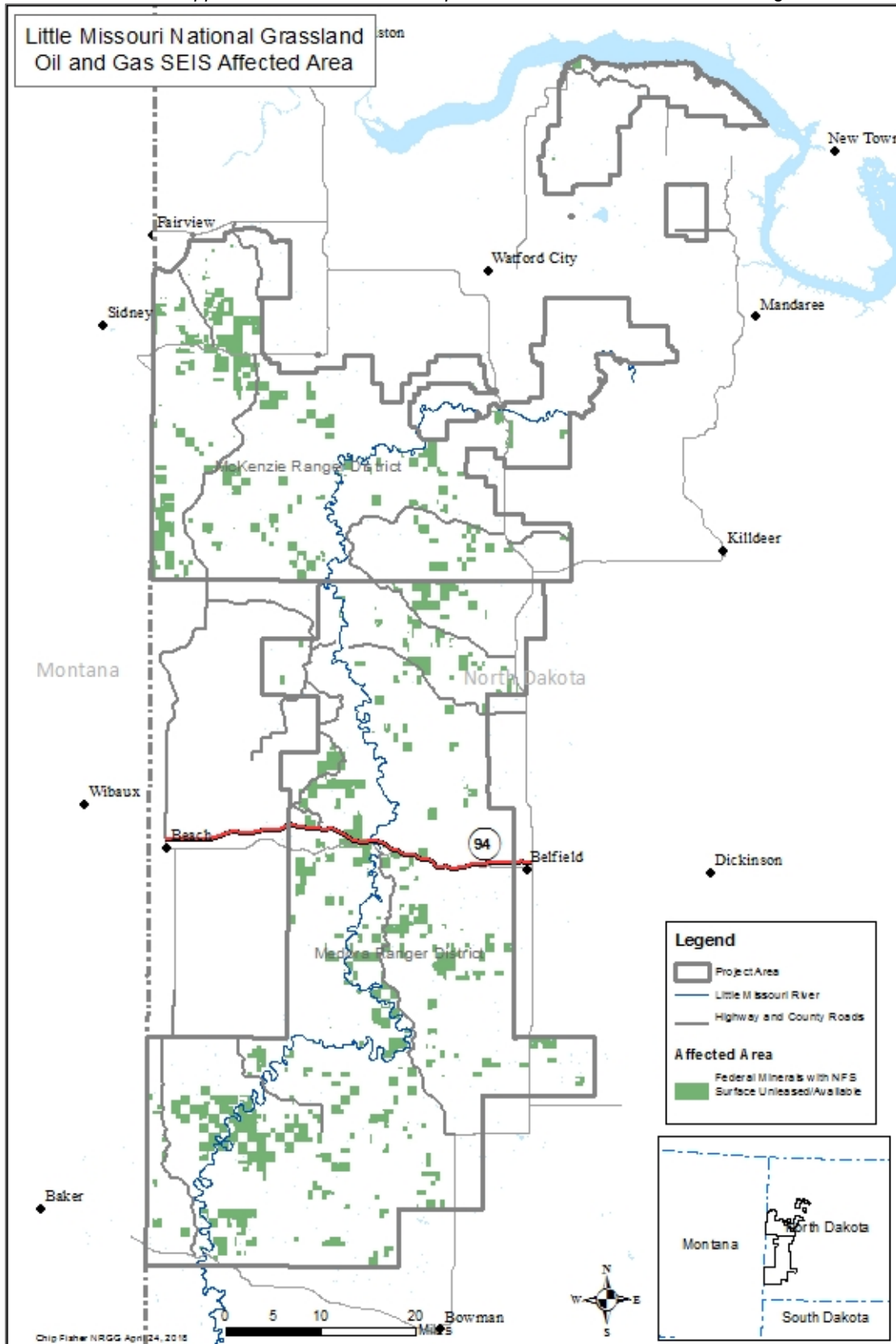


Figure 2. Unleased Federal minerals with Forest Service surface ownership in the Little Missouri National Grassland

A total of 47,700 National Forest System mineral acres are not administratively available or not currently authorized for leasing. These acres occur within two management areas (1.2A-Suitable for Wilderness and MA 2.4-American Indian Traditional Use Area), where oil and gas development is restricted based on law, regulation, and policy. Over 629,000 acres of National Forest System minerals are already leased, leaving 216,300 acres unleased and available for leasing (see table 1). Figure 2 shows the spatial arrangement of the available unleased acres in the analysis area.

Table 1. Acres available for Federal leasing within the Little Missouri National Grassland

Type of Acreage	Acres
Total Area within Little Missouri National Grassland	2,131,000
Total Acres of National Forest System Surface	1,027,800
Total National Forest System Mineral Acres (NFS surface over Federal mineral estate)	893,200
Acres Not Administratively Available (Management Areas 1.2A and 2.4)	47,700
Total Little Missouri National Grassland Mineral Estate Available for Leasing	845,500
Currently Leased or Held by Production	629,200
Little Missouri National Grassland Mineral Estate Available and Unleased	216,300

Existing leases are subject to the terms in place at the time the parcel was leased and cannot be changed for the life of the leases. Therefore, leasing that has occurred since the 2003 Record of Decision includes stipulations and lease notices consistent with that document. Refer to chapter 2, alternative 1 for the stipulations and lease notices currently in place. Currently almost 75 percent of National Forest System mineral acres available for leasing are already leased, and many of the leased acres are held by production. Any current leases which expire before being developed and held by production would be offered for lease again with the stipulations determined by this decision.

Split Estate Considerations

Of over 2 million acres within the administrative boundary of the Little Missouri National Grassland, less than half is National Forest System lands. The majority of Federal mineral estate coincides with National Forest System surface. However, 107,100 acres of Federal minerals have split estate, wherein the surface is owned by private parties or by the State of North Dakota. The Bureau of Land Management (BLM) has authority for oil and gas operations on such lands, and follows stipulations and lease notices from 2003 Record of Decision for Oil and Gas Leasing, which was signed by both agencies. The BLM is a cooperating agency for this environmental analysis, as they have the authority to offer National Forest System minerals for lease and apply the stipulations and conditions of approval specified in Forest Service decisions.

The split estate lands under the authority of the BLM will continue to be managed according to the 2003 ROD for Oil and Gas Leasing and the 2015 ROD for Greater Sage-Grouse. When the BLM revises the North Dakota Resource Management Plan, it will consider the current, applicable oil and gas stipulations on National Forest System minerals when analyzing stipulations for split estate, with the goal of achieving consistency within the Grasslands boundary. For instance, if there is a no-surface occupancy stipulation for a specific wildlife habitat, the goal would be to be consistent across federal mineral ownership; however, not all stipulations for FS surface would be applicable to split estate, such as inventoried roadless areas, because such federal allocations apply only to federally owned surface.

The opposite also occurs: 134,600 acres of National Forest System land overlay non-Federal mineral estate. In both cases, the owner of the mineral estate (Federal or non-Federal) has authority to determine lease stipulations and notices governing oil and gas production. These split estate acres are displayed in table 2.

Table 2. Mineral and surface estate combinations within the Little Missouri National Grassland

Type of Acreage	Acres
Total area within Little Missouri National Grassland	2,131,000
Total Federal mineral acres (includes Federal and non-Federal surface)	1,000,300
Federal minerals with NFS surface ownership	893,200
Federal minerals with other (non-NFS) surface ownership	107,100
Total other (non-Federal mineral) acres	1,130,700
Other minerals with NFS surface ownership	134,600
Other minerals with non-NFS surface ownership	996,100

The significance of mixed mineral and surface estate, for the purpose of this analysis, is that oil and gas operations on the 1,130,700 acres of non-Federal mineral within the grassland administrative boundary are governed solely by regulations imposed by the State of North Dakota. For the 134,600 acres of National Forest System land underlain by non-Federal mineral estate, the Forest Service negotiates with leaseholders, based on direction contained in the land management plan, but cannot compel compliance. Mineral estate rights override surface estate rights.

Federal Mineral Leasing Process

For Federal mineral leasing on National Forest System lands, the process includes several levels of approval and decision-making. Different types of resource protection measures, such as stipulations, lease notices, and conditions of approval, are considered during different phases of the leasing process, as described below.

The 2002 Revised Dakota Prairie Grasslands Land and Resource Management Plan determined which areas of Federal minerals would be available for leasing. The plan also provides standards and guidelines for the management of grassland resources. Standards and guidelines are applied to all activities authorized to occur on National Forest System lands within the Dakota Prairie Grasslands, including Federal mineral leasing. The decision to allow new oil and gas leases within the Little Missouri National Grassland is the next level of environmental analysis (and the focus of this analysis). It is during this phase that stipulations, including timing limitations, no surface occupancy, and controlled surface occupancy, and lease notices, are applied to certain locations or conditions within the grassland. The resulting leasing of the land grants the lease holder certain rights to extract oil and gas. Subsequent operations must comply with the terms of the lease, and the Federal Government must allow access to the oil and gas per the terms and stipulations of the lease. The decision to lease Federal minerals within National Forest System surface ownership and the application of environmental stipulations for oil and gas production are made by the Forest Service responsible official, and the BLM then offers leases with the stipulations approved by the Forest Service. No Federal permits are needed for the BLM to implement the leasing decision.

The second level of environmental analysis occurs when a lease holder wishes to develop a lease. The lessee must apply for a permit to drill, describing how the lease holder will comply with the stipulations attached to the lease and the details of development for well pads and supporting infrastructure. Any such

application is subject to environmental analysis. During this process, specific conditions of approval are included in the permit. These conditions are design criteria, which are required to ensure compliance with standards and guidelines of Dakota Prairie Grasslands Land and Resource Management Plan and the requirements of regulations at 36 CFR 228 subpart E. Such design criteria mitigate any potential site-specific impacts that cannot be anticipated prior to submission of a lease development plan. Depending on the specific development plan, additional Federal permits may be required in order to implement the drilling decision. Obtaining such permits would be the responsibility of the operator.

The conditions of approval evolve, as necessary, in response to changes in technology, or to address new conflicts as they arise. Operators must comply with all conditions specified in a permit to drill.

Once an application for a permit to drill and a surface use plan of operations is approved, construction, drilling, and completion can begin, followed by ongoing extraction. Once such development occurs, the lease term is superseded, and the lease is said to be “held by production.” Leases may be held by production for many years, even decades, before extraction and final reclamation are completed.

Additional details of the oil and gas leasing and production process are presented in a document, available under the analysis tab on the project website: <https://www.fs.usda.gov/project/?project=40652>.

Purpose and Need for Action

The purpose of this analysis is to determine whether current oil and gas lease stipulations and lease notices (see chapter 2) are providing adequate protection to resources on the Little Missouri National Grassland while allowing oil and gas development on those lands previously determined to be administratively available for leasing. It is a site-specific analysis for leasing, which conveys a right to develop the lease, but does not determine or authorize the details of development, such as the location of well pads and other infrastructure within a spacing unit. That analysis is completed when a lessee applies for a permit to drill and proposes a surface use plan of operations.

The action is needed because the pattern of development and type of operations have changed since the horizontal drilling became prevalent in the area, resulting in greatly increased development. Because of these changes in development and operations, the assumptions for the basis of the analysis that was conducted in 2001 need updating. Other changes that have occurred include the listing of the Dakota skipper and northern long-eared bat as threatened species under the Endangered Species Act.

In order to provide a basis for updated analysis for this supplemental environmental impact statement, an updated reasonably foreseeable development scenario (Hanna 2017) has been prepared, which gives both long-term and near-term (5 years) estimates for oil and gas development on the Little Missouri National Grassland. This scenario addresses potential oil and gas development in the Bakken and Three Forks formations of the Williston Basin (see figure 2). The analysis disclosed in this document includes all available Federal minerals with National Forest System surface for the Little Missouri National Grassland, and represents a baseline for comparison of the alternatives derived from current geologic information and industry capacity. The reasonably foreseeable development scenario does not differ between alternatives.

We will use information from the updated reasonably foreseeable development scenario, together with changes in laws and other resource conditions, to determine the adequacy of the stipulations from the 2003 Record of Decision (see alternative 1) to protect natural and social resources while continuing to authorize future oil and gas leasing. The last review of the Final Environmental Impact Statement, a Supplemental Information Report prepared in 2008, determined that the analysis in the Northern Great

Plains Final Environmental Impact Statement was adequately displaying the effects of oil and gas development at the time.

Decision Framework

Based on the supplemental environmental impact statement, the responsible official, the Grasslands Supervisor, will decide whether to authorize the Bureau of Land Management to continue to offer oil and gas leases using current lease stipulations and lease notices, to continue with changed stipulations, or to suspend offering new oil and gas leases, following regulations at 36 CFR 228 Subpart E. Chapter 2, Alternatives, lists current and proposed stipulations. The decision will not affect previously issued valid leases, nor will it affect private mineral rights. Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

The decision would only apply to operations on lands with federally owned minerals within National Forest System surface ownership (see Project Location). Any changes to stipulations or lease notices resulting from the decision would apply to future oil and gas leasing and subsequent development on the new leases only. Terms of existing leases would not be changed. However, any existing lease that expires would be re-offered with the stipulations and lease notices resulting from this decision.³ The parcels which may be available for leasing have been determined in the Dakota Prairie Grasslands Land and Resource Management Plan (USDA Forest Service 2002), as per (36 CFR 228.102(d)). That decision is referred to in the regulations as the “area-wide leasing decision,” or the “lands administratively available for leasing.” The action alternatives differ in the manner in which leasing may occur (the stipulations and lease notices applied), including whether surface occupancy is allowed, but not where it may occur or how many new wells are expected.

The decision whether to continue to allow new oil and gas leases within the Little Missouri National Grassland and the stipulations that would accompany new leases is a leasing decision for specific lands, as per 36 CFR 228.102(e). Subsequent environmental analysis would occur for site-specific development activities when proposed in an application for a permit to drill and surface use plan of operations.

Minor corrections or modifications were made to this document following the pre-decisional objection process. The final analysis in this December 2020 document takes precedence over previous analysis.

Public Involvement

A notice of intent for the preparation of this supplemental environmental impact statement was originally published in the Federal Register on December 19, 2012. No public comment was solicited at that time (pursuant to regulations at 40 CFR 1502.9(c)(4)). A revised notice of intent was published on August 8, 2015 with a request for comments on the project. We mailed a scoping letter describing the proposed action to over 90 organizations and individuals, and published notice in the newspaper of record on

³ Leases are valid for a 10-year term. If the lease is not developed within that 10-year term, it expires at the end of the term. Any existing leases that later expire can be offered again for lease. Market forces, fiscal conditions, and other factors will determine the number of existing leases that may expire without being developed; the number and location of such leases is purely speculative, but is expected to be a very small percentage of the existing leases. In addition, all leases with less than 10 years remaining in their terms would have been leased under the stipulations described in alternative 1, and, therefore, if alternative 1 were chosen, the terms applied to such parcels would not change. Currently very few undeveloped leases exist on the Little Missouri National Grassland (Hays 2018, personal communication).

September 14, 2015 with a request that comments be submitted by October 5, 2015. We received a total of eight comment letters and one petition.

The draft supplemental environmental impact statement was released to interested members of the public, Native American Tribes, and local, State, and Federal agencies with the publication of the notice of availability in the Federal Register on November 2, 2018. The original 45-day comment period was extended an additional 30 days. During this extension, a five-week federal government-wide furlough ensued. The Grasslands supervisor therefore further extended the comment period to compensate for furlough period. We received a total of 34 comment letters between November 2, 2018 and February 21, 2019 when the comment period closed.

Tribal Consultation

We mailed the same scoping letter that was mailed to the public to one or more officials of the following Native American Tribes: Standing Rock Sioux Tribe, Three Affiliated Tribes, Turtle Mountain Band of Chippewa, Spirit Lake Sioux Tribe, and Lower Brule Sioux Tribe. No written comments were received from the Tribes.

In addition to scoping, the Dakota Prairie Grasslands archaeologist has coordinated with Tribal Historic Preservation officers for the Standing Rock Sioux, the Three Affiliated Tribes, and the Spirit Lake Sioux for consideration of the management of the Blue Buttes area relative to oil and gas leasing (Fetterman 2018, personal communication). Letters and additional correspondence were initiated with these Native American Tribes formally requesting government-to-government consultation in August 2018. The Northern Cheyenne Tribe has requested formal government-to-government consultation.

Issues

Issues serve to highlight effects or unintended consequences that may occur from the proposed action or alternatives, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the decision maker and public to understand. We identified issues by reviewing scoping comments received and through internal reviews by Forest Service specialists who work on the Little Missouri National Grassland where oil and gas operations occur. Issues identify potential effects that are directly or indirectly caused by implementing the proposed action and can be meaningfully addressed and reasonably evaluated within the scope of this proposal. Issues may involve potentially significant effects. We developed alternatives around those issues that involve unresolved conflicts concerning alternative uses of available resources.⁴

Many issues brought forward in scoping did not necessarily drive the formation of alternatives, but will be addressed through effects analysis in this document. Those issues included general effects on wildlife; effects to hydrologic resources of ground and surface water, wetlands, and riparian areas; erosion and sedimentation; scenery and noise levels; air quality and greenhouse gas emissions; socio-economic effects and environmental justice; and cumulative effects. All of these topics are addressed in chapter 3 and individual specialist reports. Resource indicators and measures, where appropriate, are provided in the analysis sections of chapter 3.

Alternatives to the proposed action were designed to address issues raised in scoping, or to address instances where stipulations are inconsistent with current regulation or policy.

⁴ (40 CFR 1500.2(e))

Issues Addressed through Alternative 2 – No New Leasing

Reduce Greenhouse Gas Emissions

Oil and gas operations, such as flaring and emission controls, are regulated by the State of North Dakota and the Environmental Protection Agency. The Forest Service can allow or prohibit oil and gas leasing and provide stipulations regarding the location of infrastructure and other stipulations of timing or controlled surface use, but has no authority to restrict flaring, or similar activities. The authority granted to the Forest Service that would reduce future emissions from oil and gas leasing would be to discontinue leasing. This issue is embodied in Alternative 2 – No New Leasing.

Note that currently held leases that are not yet developed would not be affected by the decision, so some increases in activity would still occur, at least in the near-term, but no new leasing would occur.

This alternative would also address issues of general disturbance to wildlife, scenery, noise, and the general level of development by not adding to previously authorized development.

Issues Addressed through Alternative 3 – Revised Stipulations

Inventoried Roadless Areas

Historically, no surface occupancy has been permitted for mineral estate within inventoried roadless areas, based on lease notices. However, codifying this protection in the lease stipulations clarifies the requirements for lease holders and strengthens the protection.

Lease notices are attached to leases to transmit information at the time of lease issuance to assist the lessee in submitting acceptable plans of operation, or to assist in administration of leases. Lease notices do not involve new restrictions or requirements. Any requirements contained in a lease notice must be fully supported in law, regulations, standard lease terms, or onshore oil and gas orders. Lease notices may be revised from time to time to reflect updates in laws, regulation, or other policy.

By specifying no surface occupancy for inventoried roadless areas in a stipulation, the protection acknowledges the priorities for protecting these areas from disturbance as found in the Dakota Prairie Grasslands plan in compliance with the 2001 Roadless Area Conservation Rule.

Insure Protection for Future Developed Recreation Sites

The previous decision listed specific developed recreation sites where no surface occupancy is allowed. The proposed change would prohibit surface occupancy based on the level of recreation site development, thus clearly covering any new sites that may be developed in the future.

Incorporate Updated Management for the Conservation of Greater Sage-grouse

Over the past decade, collaboration between Federal and State agencies resulted in agreements and new management approaches embodied in the Sage-grouse Conservation Strategy (Stiver et al. 2006). The current stipulations for protecting sage-grouse do not adequately reflect such management. New and revised stipulations for timing limitations and controlled surface use were developed in alternative 3 for operations near sage-grouse leks and in priority sage-grouse habitat.

Insure Persistence of Rare Plants with Narrow Ranges and Limited Populations

Dakota buckwheat (*Eriogonum visheri*), nodding buckwheat (*E. cernuum*), and sand lily (*Leucocrinum montanum*) are sensitive plants with narrow ranges and very few populations on the Little Missouri National Grassland. Impacts from oil and gas surface activities could reduce the capacity to maintain the

species within the planning area. We developed a new stipulation for no surface occupancy near populations of these species in alternative 3.

Protect Paleontological Resources Consistent with Current Law and Regulation

The definition of paleontological resources was expanded by the Paleontological Resources Preservation Act of 2009 to include any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust. The current lease notice is applicable only to vertebrate paleontological resources. A new lease notice would comply fully with the 2009 Act.

All of these issues are addressed by new stipulations or lease notices included in alternative 3. See the description in chapter 2.

Issues from Comments Addressed in Alternative 3B

A number of comments on the draft SEIS included suggestions for additional revisions or new stipulations. All such comments were vetted with the Dakota Prairie Grasslands interdisciplinary team to assess whether existing laws, regulations, Forest Service policy, and direction in the Land and Resource Management Plan currently provide adequate protections, or if new or revised stipulations were needed. The issues addressed through changes or additions to alternative 3 include the following.

Insure Consistency with Interagency Sage-Grouse Management

Alternative 3 has a stipulation for timing limitations, controlled surface use, and no surface occupancy for elements of greater sage-grouse habitat. However, these stipulations differ from those currently used by the Bureau of Land Management and recommended by North Dakota Game and Fish Department. A single stipulation for no surface occupancy in priority sage-grouse habitat addresses this issue.

Prevent Disturbance of Bighorn Sheep During Lambing Periods

Wildlife advocates and the North Dakota Game and Fish Department noted that bighorn sheep lambing periods and areas may vary from year to year. This issue is addressed in alternative 3B by extending the timing limitation for bighorn sheep lambing areas by an additional month. Increased coordination with the state will ensure that the stipulations will be applied in the appropriate areas.

Insure Consistency with the 2001 Roadless Rule

Agency interpretation and legal opinion has established the precedent that construction of well pads and other infrastructure associated with oil and gas development is allowed in inventoried roadless areas, if no new roads are constructed. There are some instances of existing roads suitable for passenger vehicles within or adjacent to inventoried roadless areas. A stipulation for controlled surface use adjacent to existing roads in inventoried roadless areas addresses this issue.

Insure Consistency with Air Quality Modeling Assumptions

Air quality modeling was completed in conjunction with the Bureau of Land Management, following guidelines of the Environmental Protection Association. The near-field modeling assumed the use of "Tier 4" off-road diesel engines that are used in hydraulic fracturing. Commenters raised a concern that if operators used less efficient engines, the emissions would be higher than modeled. A lease notice for air resources analyzed in alternative 3B addresses this issue.

Chapter 2. Alternatives

Implementation Intent

The contractual nature of oil and gas leasing dictates that stipulations must be attached to specific geographically and legally defined parcels. Lease notices are used when the specific locations of resources, such as fossils, are difficult to ascertain in advance. Notice is therefore provided for all parcels that inventories or field studies may be required, and mitigations imposed if the resource in question is found to be present.

The complex nature of natural resources and the need to mitigate environmental impacts requires multiple stipulations, which may overlap on any given parcel. Where stipulations overlap, the most limiting (no surface occupancy) takes precedence over lesser restrictions (controlled surface use or timing limitations). Under all action alternatives, at least 80 percent of acres available for leasing have associated stipulations.

Mixed ownership within the administrative boundary of the Little Missouri National Grassland adds another level of complexity. Under the current development pattern of multiple wells on one pad and extensive horizontal fracturing, development typically encompasses an entire spacing unit of 1280 acres. Such spacing units often contain a mix of Federal, state, and private surface and mineral estate. The Bureau of Land Management administers oil leasing sales and issues permits to drill for all Federal minerals on both National Forest System and non-federal (state or private) surfaces.

Forest Service lease stipulations are intended to be applied only to National Forest System lands overlying Federal minerals and do not extend to other ownership combinations. They are also intended to be applied only to those parcels to which the stipulation is explicitly attached. For instance, if a parcel with no surface occupancy will be impacted only by a horizontal leg drilled thousands of feet below the surface, the stipulation is met and would not apply to other parts of the spacing unit. The geodatabase of stipulations for the Little Missouri National Grassland includes separate layers for each stipulation (not just the use categories), allowing one to determine the specific requirements and the circumstances for the waivers, exceptions, and modifications which may apply.

An overarching principle for the implementation of oil and gas development will be to, whenever possible, use existing disturbance and minimize new disturbance. Examples include adding a new well to an existing active well pad, thus reducing the need for new roads, pipelines, and transmission lines, or siting pipelines and transmission lines within or adjacent to an existing road prism or utility corridor. In general, development designs should be sought which minimize disturbance and conserve the highest quality natural resources and habitat for the spacing unit as a whole. Many stipulations have been designed to include waivers, exceptions, and modifications that will support this principle, allowing disturbance to occur on National Forest System lands when more valuable habitat exists on non-federal lands within the development area.

To best accomplish such trade-offs, the Grassland is committed to coordinating with state agencies, counties, other landowners, the operators, and other federal agencies. State agencies may include the Department of Environmental Quality, the Department of Mineral Resources, and the Game and Fish Department. Federal agencies may include Theodore Roosevelt National Park, U.S. Fish and Wildlife Service, and the Army Corps of Engineers. The Bureau of Land Management must always be involved, as the Federal entity that authorizes drilling. County governments have an important role to play in granting

road use permits and controlling the spread of noxious weeds and generally represent the interests of local citizens.

Alternatives Considered in Detail

This supplemental environmental impact statement considers three alternatives:

- Continue leasing with current stipulations
- No new oil and gas leasing
- Continue leasing with revised stipulations (preferred alternative)

The preferred alternative now includes the revisions and the additional lease notice from alternative 3B that replace stipulations in alternative 3. The new and revised stipulations in alternative 3B include:

1. replacing sage-grouse timing, controlled surface use, and no surface occupancy stipulations with a single no surface occupancy stipulation for sage-grouse priority habitat;
2. extending the timing limitation for bighorn sheep lambing areas to July 15th;
3. a controlled surface use buffer extending 0.25 miles from existing major roads in inventoried roadless areas;
4. a lease notice that additional air quality modeling may be required for equipment that does not meet current state standards.

Similarly, stipulations from alternative 1 that are not revised and replaced are carried forward in alternatives 3 and 3B.

The responsible official may choose elements (i.e., stipulations and lease notices) from any of the alternatives analyzed in detail in crafting the decision for future leasing on the Little Missouri National Grassland. Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

This section provides the details of the stipulations and lease notices for each alternative, including those specified in management area direction found in the Dakota Prairie Grasslands Land and Resource Management Plan. These alternatives apply to leasing of parcels, and persist as long as the lease is held. Once a parcel is leased, it may be held for 10 years before it is developed, and once developed, may be held for many years, as long as production is maintained in economic quantities.

The decision arising from this environmental analysis will cover only whether future oil and gas leasing will occur and, if so, what stipulations would be attached to such leases. The analysis and decision do not cover the actual drilling operations, which would be covered under subsequent site-specific environmental analysis and decisions. However, the standards and guidelines and the design features that may be used will be considered in the analysis of effects for this action.

The targeted resource, the type of stipulation or lease notice, and the circumstance for its application are summarized in table 3 for alternative 1 and table 4 for alternative 3. Figure 3 and figure 4 illustrate the location of these stipulations for alternatives 1 and 3, respectively. The full text of stipulations and lease notices, including the objectives, application, waivers, exceptions, and modifications is presented in appendix A.

Additional protections, known as conditions of approval, are typically applied during lease development. Conditions of approval are design features that would be applied through a future site-specific decision to authorize an application for a permit to drill on a parcel held by a valid lease. These protections include applicable management area direction, standards, and guidelines found in the Dakota Prairie Grasslands Land and Resource Management Plan (also referred to as the “grasslands plan”). Conditions of approval are designed to ensure that implementation of oil and gas development is consistent with the grasslands plan. These conditions become part of the permit for development. Such proposals from valid lease holders may be modified by these conditions, but the permit may not be denied, as the lease conveys a legally binding operating right (36 CFR 228.101).

Some examples of conditions of approval are listed below. In addition, the project website includes a reference document listing additional environmental protections that may be applied as conditions of approval, depending on the respective lease location, resources present, or other factors.

- Botany - Any sensitive or watch plant species found at a later date in the project area should be protected and their habitats should be managed to protect the species. This will be coordinated with the Forest Service Botanist.
- Cultural Resources - If, prior to or during any disturbance activity, items of archaeological, paleontological, or historic value are reported or discovered, or an unknown deposit of such items is disturbed, the Operator will immediately cease disturbance activities in the affected area and notify the Forest Service. Disturbance activities will not resume until the District Ranger gives approval.
- Erosion Control - The Operator shall prevent and control soil erosion and landslides. Soils and topsoil stockpiles shall be stabilized and vegetated with approved native species. The Operator shall take prompt action to stabilize, repair, and re-vegetate eroded or washed areas and prevent gullyng. Forest Service approval is required prior to any earth disturbing activity.
- Animal Protection - All facilities shall be designed and maintained to ensure that livestock, wildlife, domestic animals, flying mammals, and both migratory and non-migratory birds cannot get into nor can be harmed from facilities and/or equipment.

Alternative 1 - Continue Leasing with Current Stipulations

This alternative applies to currently unleased and available areas of federally owned oil and gas minerals within the administrative boundary of the Little Missouri National Grassland and any future leases. These lands include areas where both the surface and minerals are federally owned. It does not apply to areas where minerals are federally owned but the surface is under non-Federal ownership, or to areas where the surface is owned by Little Missouri National Grassland, but the minerals are owned by a non-Federal entity.

Of the 893,200 acres of the Little Missouri National Grassland with National Forest System surface ownership over Federal minerals, 216,300 acres are currently unleased and available for leasing. Under this alternative, 75,100 acres would have stipulations of no surface occupancy. Oil and gas resources on these acres could be accessed by horizontal drilling, but no surface disturbance would be allowed. The remaining 141,200 acres could see surface developments of some kind. A total of 97,700 acres would have stipulations for timing limitations and/or controlled surface use, and 43,500 acres would have no stipulations, beyond standard lease terms, specified in the lease.

Stipulations from the 2002 Dakota Prairie Grasslands Land and Resource Management Plan and the 2003 Oil and Gas Record of Decision

Stipulations (as determined by location), lease notices, and standard lease terms are a condition of each new lease. The current stipulations applied to oil and gas leases were designed to be consistent with grasslands plan standards and guidelines and were formalized in the 2003 Dakota Prairie Grasslands Oil and Gas Leasing Record of Decision, as mandated by the oil and gas regulations.⁵

The stipulations and lease notices are summarized in this section and in table 3. Appendix A provides the full text of the stipulations and lease notices, including the objectives, application, waivers, exceptions, and modifications, and the circumstances under which they may be granted. Figure 3 shows the locations of these current stipulations. Figure 4 shows the location of alternative 1 stipulations, as applied to all Forest Service minerals, should any currently leased parcels become unleased in the future. For definitions of terms, please see appendix A.

Waivers, exceptions, or modifications will be considered in accordance with the requirements of 36 CFR 228.104. Environmental analysis meeting National Environmental Policy Act requirements will be conducted in considering a request for a waiver, exception, or modification. The responsible official will make a determination based on this information.

Lease Stipulations

Lease stipulations constrain the rights granted with the lease and form the essence of the alternative to continue oil and gas leasing. Three types of stipulations are used:

- Stipulations for no surface occupancy provide opportunities to extract oil resources that may be accessed through horizontal drilling, but generally allow no surface disturbance.
- Stipulations for controlled surface use may limit the locations of site facilities, access roads, or other infrastructure, or may require designs or placement to render facilities less obtrusive.
- Stipulations for timing limitations prohibit certain activities during specified times or seasons.

Stipulations for timing limitations for disturbance or surface activities apply only to those activities related to the construction, drilling, and completion of oil and gas facilities and supportive infrastructure (e.g., roads). Operations and maintenance include activities such as site monitoring, product retrieval, inspections, etc. and are not subject to timing limitations. They will continue, as needed, to maintain and operate the production facilities to ensure sites remain safe and functioning properly.

Stipulations are developed based on resource concerns that may be found in a variety of locations across the grassland (such as slopes over 40 percent) or to support management area direction found in the Dakota Prairie Grasslands Land and Resource Management Plan. As such, stipulations occur on specific parcels, as illustrated in figure 3.

Stipulations based on management area direction apply only to leases within the specified management area. Management areas are geographically defined in the grasslands plan where certain resources, activities, or values are emphasized. Examples include big horn sheep habitat, areas within 0.25 miles of the Little Missouri River, or non-motorized backcountry areas. They specify restrictions to protect the priority resources and specific areas identified in the management area.

⁵ 36 CFR 228.102 (c)(1)(ii)

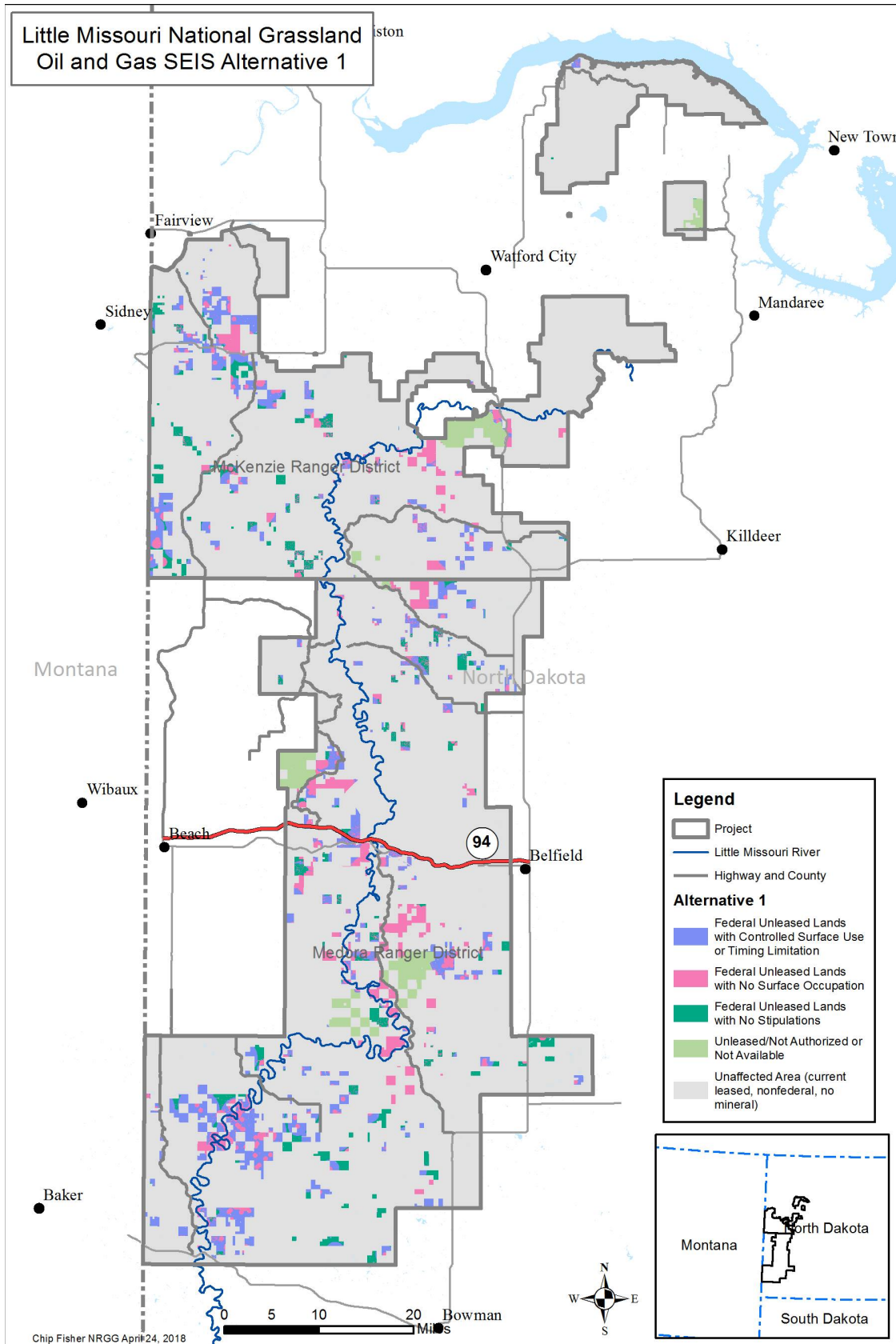


Figure 3. Alternative 1 – continue leasing with current stipulations

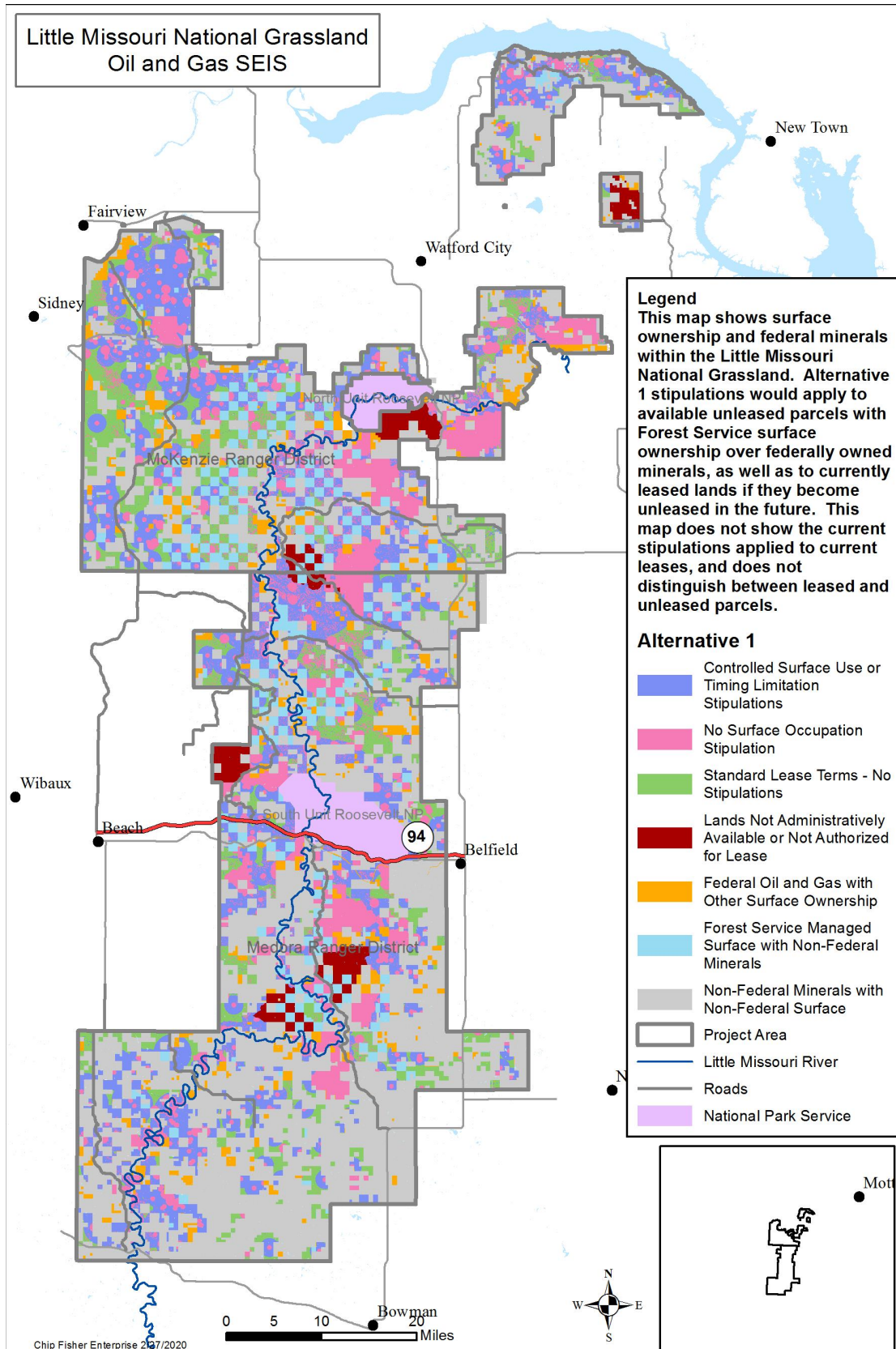


Figure 4. Alternative 1 stipulations applied to all Forest Service minerals

Lease Notices

Lease notices are attached to leases to transmit information at the time of lease issuance to assist the lessee in submitting acceptable plans of operation, or to assist in administration of leases.

Lease notices are attached to leases in the same manner as stipulations; however, they do not involve new restrictions or requirements. Rather, they provide additional information with the lease that development may be subject to certain constraints. The potential for species listed under the Endangered Species Act, the presence of cultural or paleontological resources, or the presences of riparian areas are examples of lease notices.

Requirements contained in a lease notice must be fully supported in law, regulations, standard lease terms, or onshore oil and gas orders. The lessee does not sign a lease notice. Guidance in the use of lease notices is found in Bureau of Land Management Manual 3101 and Federal regulations at 43 CFR 3101.1-3.

Lease notices, together with stipulations, define the alternative.

Standard Lease Terms

All leases are subject to standard lease terms imposed by the BLM through its leasing authority. Leases that have no stipulations or notices besides the standard lease terms are the least restrictive allowed for Federal minerals. With the exceptions noted below, standard lease terms allow year-round occupancy of leased lands. Therefore, unless there are additional special restrictions, they provide full access and the highest potential for discovery and development of oil and gas resources.

Standard lease terms require an operator to minimize adverse impacts to air, water, and land, visual, cultural, and biological resources, and to other land uses or users. They are included on BLM's lease form 3100-11. They require that the lessee comply with all applicable laws, regulations, and formal orders. Standard lease terms require minimizing adverse impact to land, air, and water and other resources. They also ensure protection and legal compliance for previously unknown resources, such as threatened or endangered species or cultural resources, which may be identified during pre-drilling inspections. Effects to such resources can usually be mitigated but may substantially increase the operator's costs.

Standard lease terms do not vary between alternatives and are not affected by the decision that will result from this analysis.

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

Table 3. Stipulations and lease notices in alternative 1

Resource	Stipulation or Lease Notice	Area or Rationale that the Stipulation (or Lease Notice) Applies
Water/Woody draws	Controlled surface use	Water, wetlands, woody draws, riparian areas, and floodplains
Soil/ Water	No surface occupancy	Slopes greater than 40 percent
Bald Eagle or Peregrine Falcon	No surface occupancy	Within 1-mile line of sight of active bald eagle or peregrine falcon nest
Bald Eagle	No surface occupancy	Within 1 mile (line of sight) of bald eagle winter roost
Prairie Falcon/Burrowing Owl Nest	No surface occupancy	Within 0.25 miles (line of sight) of active prairie falcon or burrowing owl nest
Merlin, golden eagle, ferruginous hawk	No surface occupancy	Within 0.5 miles (line of sight) of active Merlin, golden eagle, or ferruginous hawk nest
Sharp-tailed grouse	Timing limitation	Within 1 mile of sharp-tailed grouse display grounds (3/1-6/15)
Sharp-tailed grouse	No surface occupancy	Within 0.25 miles of center of sharp-tailed grouse display grounds
Sage-grouse	Timing limitation	Within 2 miles of sage-grouse display grounds (3/1-6/15)
Sage-grouse	No surface occupancy	Within 0.25 miles of center of sage-grouse display grounds
Black-footed Ferret	Controlled surface use	Black-footed ferret reintroduction habitat (roaded) (MA 3.63)
Black-footed Ferret	No surface occupancy	Black-footed ferret reintroduction habitat (roadless) (MA 3.63)
Black-footed Ferret	Timing limitation	Within 0.125 miles of prairie dog colonies occupied by black-footed ferrets (3/1-8/31) (Outside MA 3.63)
Black-footed Ferret	Controlled surface use	Within prairie dog colonies occupied by black-footed ferrets (outside MA 3.63)
Bighorn Sheep	No surface occupancy	Bighorn Sheep Habitat (MA 3.51)
Bighorn Sheep	Timing limitation	Within 1 mile of bighorn sheep lambing areas 4/1-6/15 (outside of MA 3.51)
Bighorn Sheep	Controlled surface use	Within 1-mile sight distance of bighorn sheep lambing grounds (outside of MA 3.51)
Bighorn Sheep	Not currently authorized; when leased Controlled surface use and Timing limitation	MA 3.51A Bighorn Sheep with non-Federal mineral ownership
Bighorn Sheep	Controlled surface use and Timing limitation	MA 3.51B Bighorn Sheep with non-Federal mineral ownership
Antelope	Timing limitation	Within mapped antelope winter range (1/1-3/31)
Swift Fox	Timing limitation	Within 0.25 miles of swift fox dens (3/1-7/31)
Threatened, endangered and sensitive species	Lease notice	Threatened, Endangered and Sensitive Plant or Animal Species (Dakota Prairie grasslands plan addendum page 52)
Research natural area	No surface occupancy	Protect MA 2.2 Research Natural Areas

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

Resource	Stipulation or Lease Notice	Area or Rationale that the Stipulation (or Lease Notice) Applies
Special Interest Areas - Paleontology or Geologic	Controlled surface use	Special Interest Areas - Paleontology and Geologic Resources - Slope Formation Type Section, Cannonball/Slope Formation Outcrop, Bullion Creek Formation Type Section
Special Interest Areas - Heritage	No surface occupancy	Special Interest Areas - Heritage Resources - Battle of the Badlands, Custer Trail/Davis Creek, and Square Buttes
Special Interest Areas - Botanical	No surface occupancy	Special Interest Areas - Botanical Resource - Aspen Stand, The Bog, Grand River Sand Dunes, Black Butte, Black Cottonwood, Riparian Pools, and Roundtop Butte
Special Interest Areas - Geologic	No surface occupancy	Special Interest Areas - White Buttes, Burning Coal Vein/ Columnar Juniper, and Ice Caves.
Recreation Sites	No surface occupancy	Developed Recreation Sites - Burning Coal Vein, Buffalo Gap, Sather Lake, CCC, and Summit Campgrounds; Whitetail Picnic Area; and six Maah Daah Hey Trail overnight camps: Wannagan, Roosevelt, Elkhorn, Magpie, Beicegel, and Bennett
Recreation Sites	Timing limitation	Within 0.25 miles of Burning Coal Vein, Buffalo Gap, Sather Lake, CCC, and Summit Campgrounds, Whitetail Picnic Area, and six Maah Daah Hey Trail overnight camps: Wannagan, Roosevelt, Elkhorn, Magpie, Beicegel, and Bennett (5/1-12/1)
Suitable for Wilderness	Not administratively available	MA 1.2A - Long X Divide; Twin Buttes, Bullion Buttes and Kinley Plateau
Non-motorized	No surface occupancy	MA 1.31 - Back country non-motorized
Scenic High	Controlled surface use	Areas of High Scenic Integrity, surface occupancy will be subject to operational constraints to maintain landscape character intact including within 1 mile of Theodore Roosevelt National Park
Scenic Moderate	Controlled surface use	Areas of Moderate Scenic Integrity, surface occupancy will be subject to operational constraints to maintain a landscape character that is no more than slightly altered
Heritage Resources	Not administratively available	MA 2.4 - American Indian traditional use areas
Heritage Resources	No surface occupancy	National Register eligible sites
Scenic	No surface occupancy	MA 4.22 - areas within 0.25 miles of Little Missouri River
Paleontology	Lease notice	Paleontological resources Federal surface and Federal subsurface
Roadless	Lease notice	The Roadless Area Conservation Rule or subsequent modifications thereof may prohibit operations such as road construction or reconstruction

Alternative 2 - No New Oil and Gas Leasing

This alternative would limit oil and gas leasing on the Little Missouri National Grassland to current valid leases. No currently unleased areas would be offered for lease, and as current leases expire, they would remain unleased. Therefore, leasing stipulations, notices, and conditions of approval are not applicable.

This alternative applies to unleased areas of federally owned minerals with National Forest System surface ownership within the administrative boundary of the Little Missouri National Grassland. This alternative would add another 216,300 acres to Little Missouri National Grassland lands not currently authorized, for a total of 264,000 acres. This alternative would not apply to areas where minerals are federally owned but the surface is under non-Federal ownership, or to areas where the surface consists of National Forest System lands, but the minerals are owned by a non-Federal entity.

Currently held leases would not be affected by this alternative, but would continue to operate under the stipulations and conditions in place when the lease was signed. New oil and gas development would continue under this alternative for currently authorized, but as yet undeveloped leases. When current leases expire, they would not be offered for lease again.

For the area affected by this alternative, please see figure 2 on page 2.

Alternative 3 - Continue Leasing with Revised Stipulations and Lease Notices

New and revised stipulations in alternative 3 were developed to comply with current law and to provide additional protections for resources of concern. All existing stipulations and lease notices (as described for alternative 1) would remain in effect, except as indicated below:

- New stipulations for sage-grouse display grounds (leks) would include a timing limitation that limits noise at the lek perimeter and road and trail maintenance within 2 miles of an active lek during the breeding season. (Stipulations for sharp-tailed grouse display grounds would remain as current.) New stipulations for controlled surface use would limit disturbance to leks and reduce impacts to areas of high-density sagebrush.
- New stipulations for no surface occupancy would be added for recreation sites, rare plants, and roadless areas to provide more reliable protections and flexibility to protect new recreation sites that may be developed in the future.
- The lease notice for paleontological resources would be revised to comply with current law.
- The general wording for exceptions, where allowed, for stipulations carried forward from alternative 1 would be revised to say:
The authorized officer may grant an exception to this stipulation if an environmental analysis determines that the impacts of the plan submitted by the operator are acceptable or can be adequately mitigated.

The new and revised stipulations and lease notices are summarized in this section and in table 4. Appendix A lists the new and revised stipulations in detail, including the objectives, the manner of application, and the guidelines by which waivers, exceptions, or modifications may be granted. Figure 5 shows the locations of the three categories of stipulations for alternative 3. Figure 6 shows the location of alternative 3 stipulations, as applied to all Forest Service minerals, should any currently leased parcels become unleased in the future.

For this alternative, of the 216,300 acres of the Little Missouri National Grassland that are currently available and unleased, 107,800 acres would have no surface occupancy stipulations. Of the remaining 108,500 acres where surface development could occur, 77,600 would have stipulations for timing limitations and/or controlled surface use, and 30,900 acres would have no stipulations beyond the standard lease terms.

Alternative 3B - Continue Leasing with Additional Revisions

Alternative 3B comprises the stipulations and lease notices with revisions or additions that were suggested in comments on the draft supplemental environmental impact statement. Suggestions were reviewed by the interdisciplinary team to determine if the change was already covered by standards and guides in the Dakota Prairie Grasslands Land Management Plan or by other laws or regulations. The changes in alternative 3B result from the recommendations of the interdisciplinary team.

The resources covered by new or revised stipulations include sage-grouse habitat, inventoried roadless areas, and bighorn sheep lambing areas. An additional lease notice is proposed for air resources. All resource protections from alternatives 1 and 3 that are not revised and replaced by stipulations for the same resource in alternative 3B are carried forward as part of alternative 3B. Alternative 3B, as modified from the draft SEIS, is now the preferred alternative. See table 5, figure 7 and figure 8.

Sage-Grouse Priority Habitat

A revised stipulation for sage-grouse would require no surface occupancy for all sage-grouse priority habitat, which occurs in the southwest corner of the Little Missouri Grasslands, south of Interstate 94. This stipulation would replace all sage-grouse stipulations in alternative 1 and alternative 3.

This stipulation is designed to be consistent with guidance from the Interagency Sage-Grouse Working Group, the 2014 North Dakota Game and Fish Department conservation strategy (Robinson 2014), and current stipulations adopted by the Bureau of Land Management resource management plan amendments (USDI BLM 2015). Priority sage-grouse habitat was derived from the Montana/Dakotas Bureau of Land Management geodatabase. See Robinson 2014 (p. 33-36) for the methods used to delineate priority sage-grouse habitat.

Much of the known sage-grouse habitat on the Grassland has been unoccupied for many years. Therefore, the stipulation may be waived, modified, or excepted if, in coordination with North Dakota Game and Fish, the responsible official determines that the federal lease land holds limited value for sage-grouse compared to adjacent surface and sage-grouse would benefit more by avoiding development on adjacent land. The intention is to best protect sage-grouse priority habitat by encouraging development in the least favorable habitat. Coordination with the state wildlife agency is critical to implementation of this stipulation.

Bighorn Sheep Lambing Areas

Alternatives 1 and 3 both include a timing limitation for bighorn sheep lambing areas which prevents surface use from April 1 through June 15. The revised stipulation would extend the timing limitation to July 15 to provide protection for extended lambing periods. No other changes to the stipulation are proposed.

Inventoried Roadless Areas

Controlled Surface Use

A new stipulation for inventoried roadless areas would provide a buffer of controlled surface use for one-quarter mile on each side of the center line of existing roads within inventoried roadless areas. This stipulation would apply to roads with a maintenance level of 3, 4, or 5 that generally accommodate all passenger vehicles. Existing roads would be determined when a parcel is leased.

Well pads and other infrastructure may be located within this buffer, as long as the near edge of the well pad is directly adjacent to the existing road right-of-way. Additionally, the long axis of the well pad must be situated parallel to the road.

The buffer width was determined by using estimates of well pad size developed by the Bureau of Land Management, examination of existing multi-well pads within the project area, and discussion with the Grasslands minerals management staff. This width represents the maximum extent of disturbance allowed. When feasible, disturbance should be less than the buffer width.

The intent of this stipulation is to more closely conform to the 2001 Roadless Rule. Roads may currently exist within inventoried roadless areas because either:

1. they were present prior to the 2001 Rule, or
2. they were built after 2001 in order to access legal mineral rights that pre-dated the Rule.

In the first case, such roads are grandfathered under the Rule; in the second case, the road must be removed and rehabilitated once the mineral development use is completed. In the situation where a road exists that will later be removed, a new lessee could place a well pad along the road, and would then take over responsibility for removing the road if their production persisted longer than the original operator that built the road.

By applying the buffer based on existing roads when a parcel is leased, as opposed to roads that currently exist when this leasing decision is signed, we ensure that roads that are reclaimed when production ends will not be artificially held over. Our current analysis, however, is based on existing ML 3-5 roads, because the end of the term of production is unknown and we cannot predict which roads may be reclaimed prior to a lease being sold.

This stipulation and the 2001 Roadless Rule do not allow construction of new roads in inventoried roadless areas for mineral leases obtained after 2001.

No Surface Occupancy

The stipulation for no surface occupancy in inventoried roadless areas applies to all areas outside of the controlled surface use buffer around existing roads. The application methodology clarifies that, based on agency interpretations affirmed in case law (*Wilderness Workshop v. United States Bureau of Land Management* (513 F.3d 1220 (2008))), pipelines and transmission lines are considered to be linear construction features and are allowed in inventoried roadless areas.

Air Resources

A new lease notice would alert the lessee that prior to approval of the permit to develop a lease, additional documentation may be needed to confirm that diesel engines proposed to be used in drilling and

completion meet the current NO_x standards of the U.S. Environmental Protection Agency. Current standards mean those standards in place at the time of leasing.

If not using such engines, the lessee may be required to conduct additional analysis and near-field air quality monitoring to demonstrate compliance with the National Ambient Air Quality Standards, and additional project-specific control measures may be imposed.

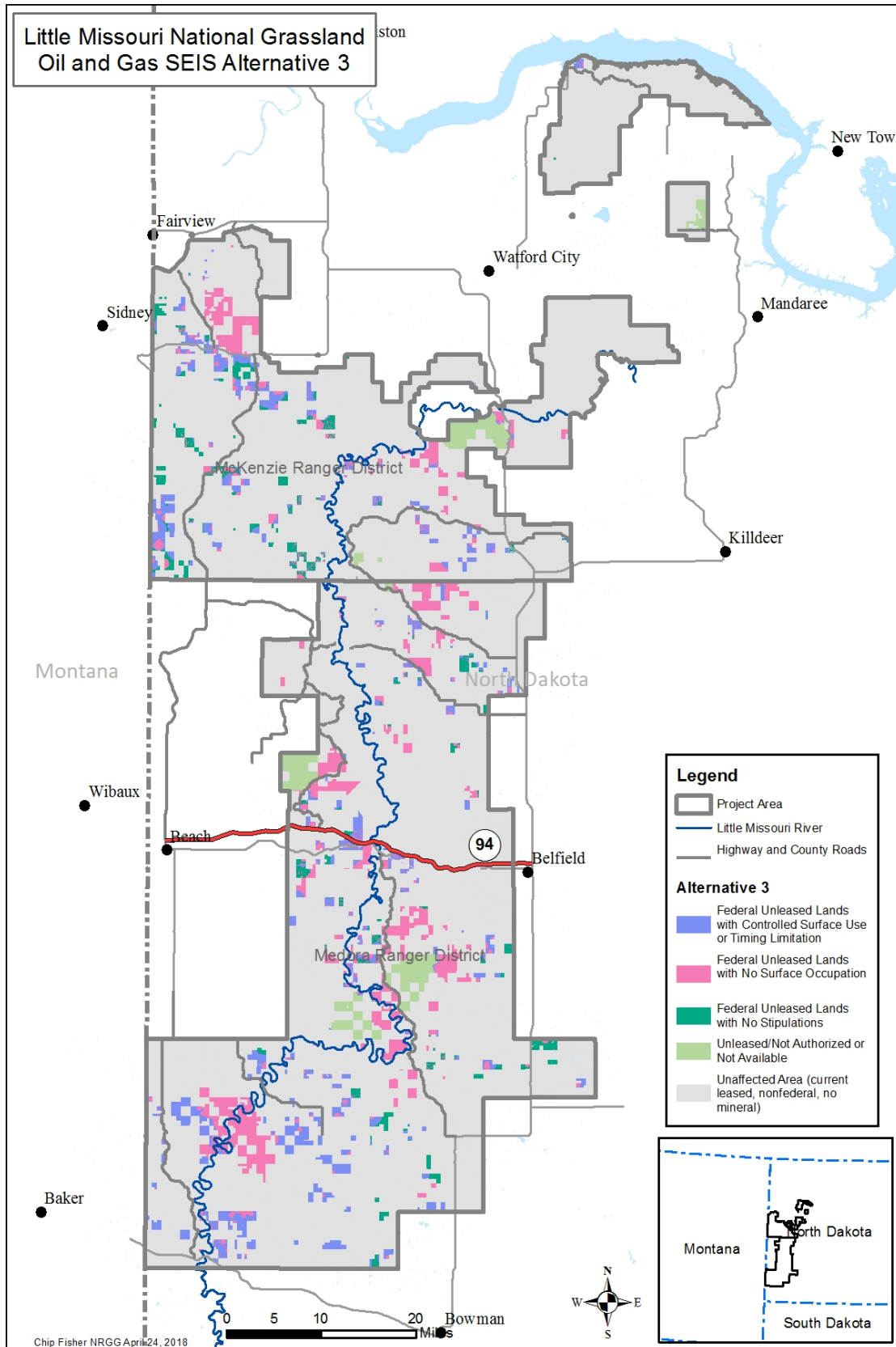


Figure 5. Alternative 3 – continue leasing with revised stipulations

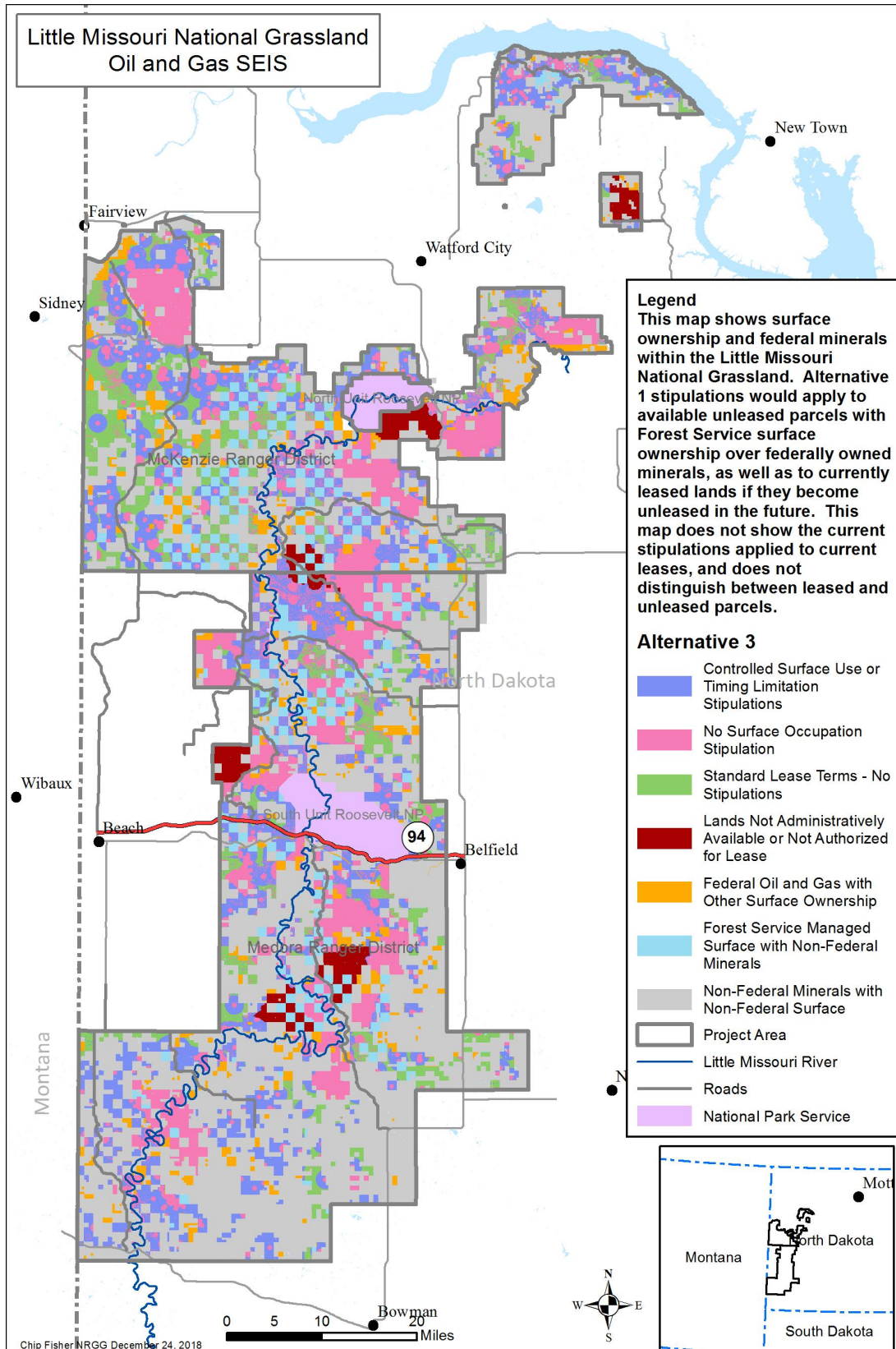


Figure 6. Alternative 3 stipulations applied to all Forest Service minerals

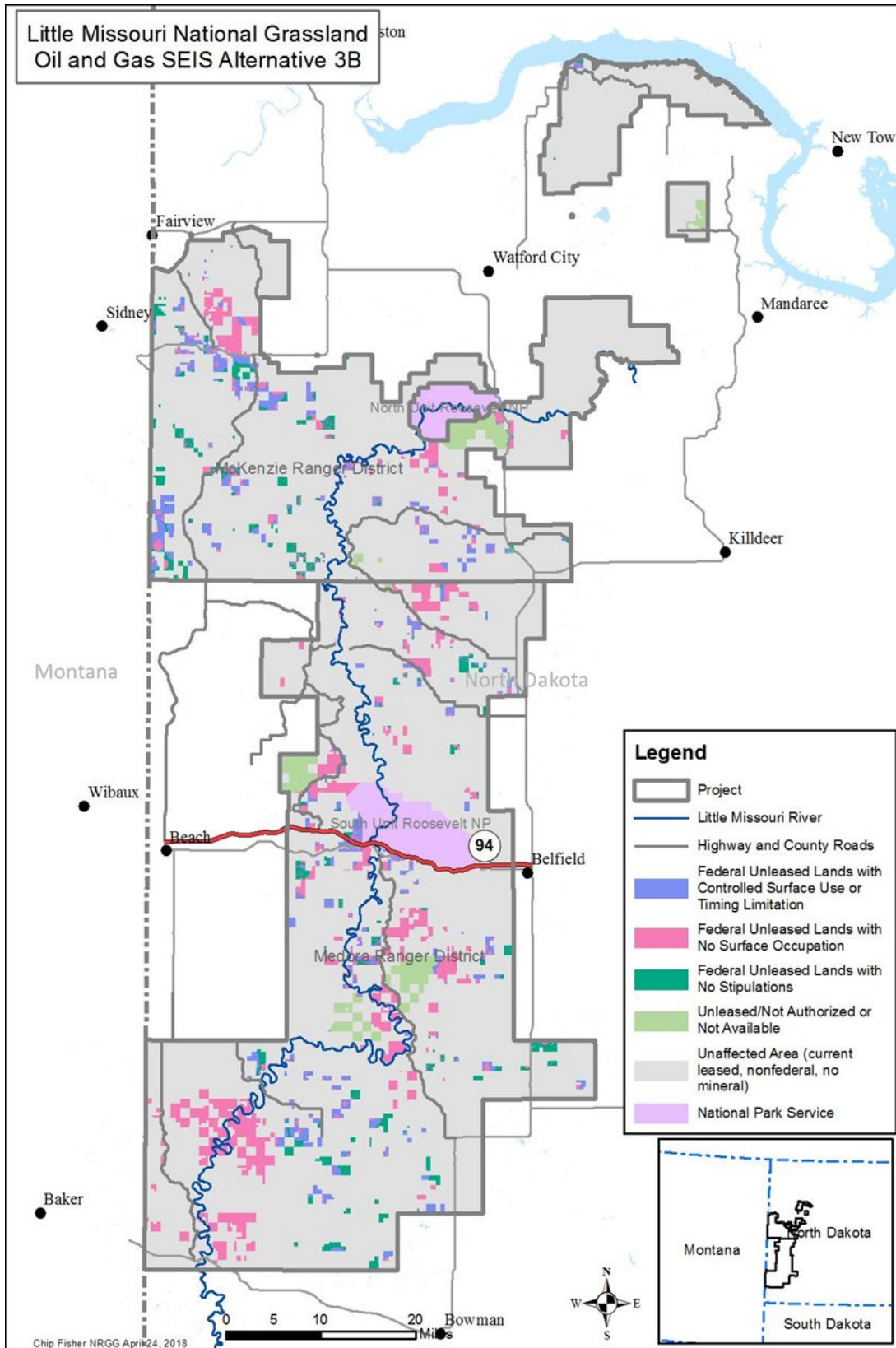


Figure 7. Alternative 3B – continue leasing with additional revisions

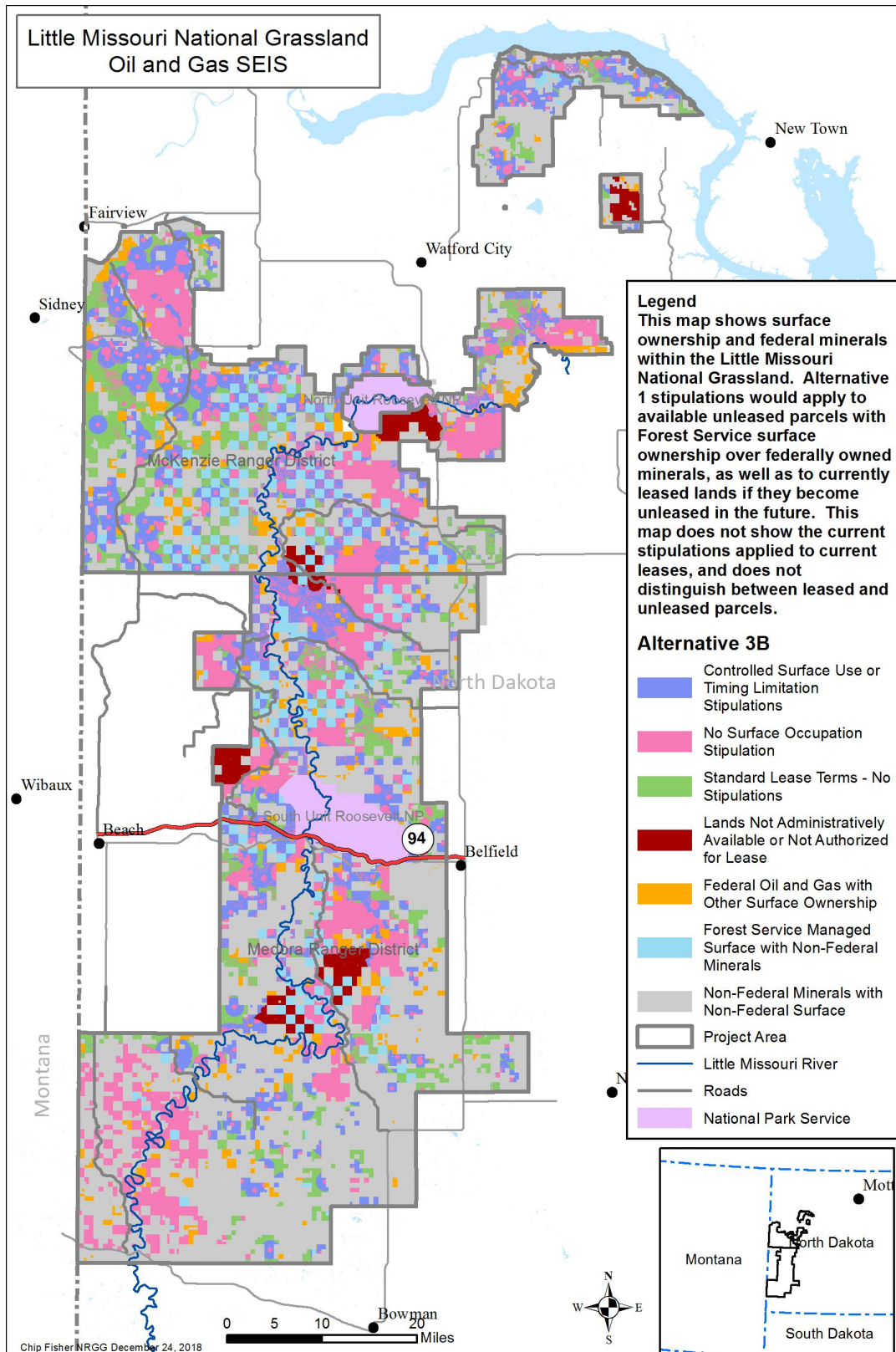


Figure 8. Alternative 3B stipulations applied to all Forest Service minerals

Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing

Table 4. New and revised stipulations and lease notices that combine with existing ones to comprise alternative 3

Resource	Stipulation or Lease Notice	Area or Rationale that the Stipulation (or Lease Notice) Applies
Recreation Sites	No surface occupancy	REVISED: Within sites classified as Recreation Site Development Scale 3 through 5.
Recreation Sites	Timing limitation	REVISED: Surface use prohibited from 5/1 – 12/1 within 0.25 miles of the established boundaries of sites classified as Recreation Site Development Scale 3 through 5
Sage-grouse leks	Timing limitation	NEW: Prohibit surface activities that create noise at 20 dBA above ambient measured at the perimeter of an active lek and restrict road and trail maintenance within 2 miles from the perimeter of active leks from March 1 to April 30 from 6 pm to 9 am.
Sage-grouse habitat	Controlled surface use	NEW: In sage-grouse priority and general habitat management areas proposed wells and associated disturbance may have to be moved more than 0.25 miles in order to provide topographic screening between the disturbance and active leks and reduce impacts to areas of high-density sage brush.
Rare Plants	No surface use occupancy	NEW: No surface occupancy allowed within 200 feet of mapped populations for Dakota buckwheat (<i>Eriogonum visherii</i>), nodding buckwheat (<i>E. cernuum</i>), and sand lily (<i>Leucocrinum montanum</i>).
Roadless	No surface use occupancy	NEW: No surface occupancy or use is allowed within inventoried roadless areas
Paleontology	Lease notice	REVISED: define “paleontological resource” as any fossilized remains, traces, or imprints of organisms, preserved in or on the earth’s crust, that are of paleontological interest and that provide information about the history of life on earth, with the exception of those defined as archeological resources under the Archaeological Resources Protection Act of 1979, or cultural items as defined in the Native American Graves Protection and Repatriation Act. Not limited to vertebrates.

Stipulations and lease notices marked as REVISED replace the similar stipulation in alternative 1 (table 3).

All other stipulations in alternative 1 carry forward as part of alternative 3.

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

Table 5. New and revised stipulations and lease notices that combine with existing ones to comprise alternative 3B

Resource	Stipulation or Lease Notice	Area or Rationale that the Stipulation (or Lease Notice) Applies
Sage-grouse habitat	No surface use occupancy	NEW: Surface occupancy and surface disturbing activities will be prohibited within sage-grouse priority habitat areas, unless waivers, exceptions, or modifications are applied in coordination with North Dakota Game and Fish Department. <i>This stipulation replaces all sage-grouse stipulations in both alternatives 1 and 3.</i>
Bighorn sheep lambing areas	Timing limitation	REVISED: Surface use is prohibited from April 1 through July 15 within 1 mile (line-of-sight) of bighorn sheep lambing areas.
Roadless	No surface use occupancy	NEW: No surface occupancy or use is allowed within inventoried roadless areas outside of 0.25 miles from existing maintenance level 3, 4, and 5 roads. This applies to well pads and roads, but not to pipelines, transmission lines, and other linear construction features
Roadless	Controlled surface use	NEW: Controlled surface use is allowed for constructing a well pad within 0.25 miles from the centerline of all existing maintenance level three, four and five roads at the time of the proposal. The near edge of the pad must be directly adjacent to the existing road right-of-way.
Air resources	Lease notice	NEW: Prior to project-specific approval, additional reporting may be required to document that the diesel-fueled non-road engines to be used during drilling or completion activities (with greater than 200 horsepower design rating) meet the current emissions standards required by the EPA for non-road diesel engines (i.e., those standards in place at the time of leasing).

Stipulations and lease notices marked as REVISED replace protections for the same resource in alternative 1 (table 3) and alternative 3 (table 4). All other stipulations in alternatives 1 and 3 carry forward as part of alternative 3B.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by the National Environmental Policy Act to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14).

Several comments on the draft SEIS suggested additional or revised stipulations. All such comments were vetted with the Dakota Prairie Grasslands interdisciplinary team to assess whether or not existing laws, regulations, Forest Service policy, and direction in the Land and Resource Management Plan currently provide adequate protections, or if new or revised stipulations were needed.

Alternative 3B comprises the stipulations and lease notices where current revisions or additions recommended by the interdisciplinary team. Recommendations that were not adopted constitutes alternatives that were considered but eliminated from detailed study. Such recommendations, and the reason for not including them in alternative 3B are detailed below.

Reduce Acres Available for Leasing

Several commenters requested an additional alternative that reduces acres available for leasing, and suggested that a diverse stakeholder group should develop such an alternative.

Any alternative that changes the acres available for leasing would require meeting the guidance provided in 36 CFR 228.102(c). Therefore, such an alternative could substantially change the scope of the analysis and the decision. We have determined through this analysis, reducing acres available for leasing was not necessary to provide the necessary protections for DPG resources.

Collaborative Implementation of Development

Oil and gas spacing units of 1280 acres typically include multiple surface and mineral ownerships. Both industry and environmental groups expressed frustration that environmental protections on federal mineral estate often result de facto in the siting of a well pad, pipeline, road, or transmission line on non-federal surface, even though the most environmentally benign design would dictate otherwise. Both groups expressed a desire to work collaboratively at the permitting stage to develop the most beneficial plan for the spacing unit in question.

This analysis and decision is specific to authorizing oil and gas leasing. The analysis and decision specific to development will entail further public involvement. Given that leasing will not occur immediately, and eventual development may not occur for up to 10 years after a lease is sold, the formation of an ad hoc group for development of any given spacing unit is not timely.

Formal, officially recognized collaborative implementation groups have been authorized through the Collaborative Forest Landscape Restoration Program, established by Congress in 2009. The program solicits collaboratively developed proposals for landscape-scale ecological restoration projects that are socially and economically viable, focused primarily on vegetation management and wildfire management (Butler et al 2015). Projects are chosen and funded by the Secretary of Agriculture.

Resource Advisory Committees are another type of collaborative group authorized under the Secure Rural Schools Act and established by the Secretary. Information regarding these committees is available at: <https://www.fs.usda.gov/main/pts/specialprojects/racs>. No Resource Advisory Committees have been established in North Dakota.

In general, all such formal collaborative or advisory groups must be authorized at the Department level, and thus forming such a group is outside the Grasslands supervisor's authority and beyond the scope of this decision.

Collaborative working groups may be established by community initiative, and the Forest Service will work with such groups, as with any stakeholder. The National Forest Foundation is a not-for-profit group that provides facilitation, assistance, and training in developing and designing collaborative processes. Information is available on the foundation's website: <https://www.nationalforests.org/collaboration-resources>.

We recognize the advantage of communication and collaboration among all interested parties when determining the specifics for oil and gas surface operations. The Grasslands is committed to working with state agencies, such as North Dakota Game and Fish Department, with other mineral and surface estate owners, industry, and other stakeholders to site facilities for maximum efficiency and to minimize environmental impacts.

See also the section above on Intent for Implementation.

Surface Water Protection

The Environmental Protection Agency recommended that minimum setback distances for a variety of categories of surface waters be added to the stipulation for water, wetlands, and woody draws. These recommendations included 100 feet for intermittent and ephemeral streams, 500 feet from flowing water or lakes, 750 feet from streams listed as impaired, and 1000 feet for state or federally designated exceptional waters. They also recommended considering the BLM surface water recommendations from the 2015 Miles City Resource Management Plan.

We assessed the recommended minimum setbacks in the context of existing stipulations, standard lease terms, and the standards and guidelines of the Dakota Prairie Grasslands Land and Resource Management Plan, and other guidelines. Existing stipulations include no surface occupancy for one-quarter mile from the Little Missouri River and a controlled surface use stipulation to place infrastructure away from the water's edge and outside riparian areas, wetlands, and floodplains. A lease notice specifies that activities within riparian areas "may be highly restricted" to comply with Executive Orders 11988 for floodplain management and 11990 for wetland protection.

The BLM stipulations prohibit surface occupancy and use within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas. They also specify conditional use within 300 feet of riparian or wetland areas.

Our review found that the proposed protections were found to be adequately covered by existing stipulations, lease notice, required best management practices, and land management plan standards and guidelines that are implemented through conditions of approval and required best management practices. The surface water report provides a complete list of the plan standards and guidelines which must be followed, best management practices, and the federal laws enforced through standard lease terms. The existing controlled surface use stipulation allows proposed infrastructure to be relocated more than 600 feet from the water's edge, thus providing flexibility for greater protections, where needed, than predetermined setback distances.

Protections for Wildlife Habitat

The North Dakota Game and Fish Department suggested additional or revised stipulations for a number of more widely distributed species, including sharp-tailed grouse, grassland birds, and pronghorn and mule deer fawning areas. They also suggested changed stipulations for woody draws.

The interdisciplinary team noted two difficulties with suggested new stipulations. The first is the difficulty in effectively mapping habitat for these widely distributed species. Stipulations are, by definition, tied to specific lease parcels. Habitat modeling seems unreliable in this regard. Complete inventory is unattainable, given limits in personnel, and the use and suitability of habitat may change greatly over time, especially where private land is interspersed with federal land.

The second concern is that preferences for one species may create impacts for another. For instance, a preference for siting well pads in more open locations one-quarter mile from the edge of woody draws to avoid mule deer fawning areas then creates the potential for greater impacts to grassland birds or pronghorn. Rather than trying to pre-determine protections for widely distributed species, based on modeled or mapped habitat, assessing the habitat for various species and deciding on the placement of infrastructure to minimize impacts within a spacing unit will be best accomplished at the permitting stage.

The Department suggested that no development (well-pads or roads) be allowed within one-quarter mile of a woody draw. The interdisciplinary team rejected this suggestion out of concern that by completely avoiding woody draws, total disturbance could greatly increase. The rationale is that a short, perpendicular crossing of a draw by a road would be preferable to a long detour around it. Well-pads generally are not allowed within woody draws by the current controlled surface use stipulation.

The Grasslands is committed to coordinating with North Dakota Game and Fish to help determine surface uses that will maximize the conservation of the best available habitat for species found in a given area at the time development is proposed. See further discussion in the section on Intent for Implementation.

Increase Golden Eagle Buffers

North Dakota Game and Fish Department suggested increasing the no surface occupancy around golden eagle nest sites from one-half mile to one mile, matching the current stipulation for bald eagles.

The current stipulations for both bald eagles and golden eagles exceed the guidelines under the Bald and Golden Eagle Protection Act for avoiding disturbance around nest sites. Those guidelines specify a distance of 660 feet for oil and gas activity (USFWS 2007). The Grasslands has found that current stipulations are working well and sees no reason to further exceed recommendations by the US Fish and Wildlife Service.

Increased Buffers for Developed Recreation Sites

A number of commenters feel that the recreation experience is not adequately protected by the timing limitation stipulation for no surface activity from May 1 to December 1 within one-quarter mile of developed recreation sites. They suggested that this buffer be extended to one-half mile to reduce disturbance from the sights and sounds of oil development and production.

Staff on the Little Missouri National Grassland have received few, if any, complaints from the public regarding well-pad activity near developed recreation areas. An active well-pad is present within 0.25 miles of the Birnt Hills recreation site on the McKenzie Ranger District, and no complaints have been registered. The recreation program manager noted complaints regarding oil field traffic, but not for well-pads. The interdisciplinary team therefore concluded that the current timing limitation for surface use within one-quarter mile of developed recreation areas is adequate to mitigate sound and site disturbances to recreationists using these sites.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 6. Comparison of alternatives for oil and gas leasing on the Little Missouri National Grassland

Factor Evaluated	Alternative 1: Continue Leasing with Current Stipulations	Alternative 2: No New Leasing	Alternative 3: Continue Leasing with Revised Stipulations	Alternative 3B: Continue Leasing with Revised Stipulations
Total Acres Affected (unleased and available)	216,300	216,300	216,300	216,300
No Surface Occupancy (acres)	75,100	Not applicable	107,800	118,500
Timing Limitations or Controlled Surface Use (acres)	97,700	Not applicable	77,600	60,900
No Added Stipulations (acres)	43,500	Not applicable	30,900	36,900
Total Acres with Potential for Disturbance	141,200	Not applicable	108,500	97,800
Total Available for Leasing (acres)	216,300	0	216,300	216,300
Roadless Area Protections	Provided by Lease Notice	Not applicable	No Surface Occupancy Stipulation	Controlled Surface Use allows well pads for 0.25 miles each side of roads (maintenance level 3-5); No Surface Occupancy outside this area.
No Surface Occupancy and Timing Limitation for Developed Recreation Sites	Applied to specific named sites	Not applicable	Applied to current and future sites of Development Scale 3-5	Applied to current and future sites of Development Scale 3-5
Protections for Rare Plants with Limited Distribution	Provided by Lease Notice	Not applicable	No Surface Occupancy Stipulation	No Surface Occupancy Stipulation
Lease Notice Protection for Paleontological Resources	Covers vertebrate fossils only; does not comply with current law	Not applicable	Covers vertebrate, invertebrate, and plant fossils; complies with current law	Covers vertebrate, invertebrate, and plant fossils; complies with current law

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

Factor Evaluated	Alternative 1: Continue Leasing with Current Stipulations	Alternative 2: No New Leasing	Alternative 3: Continue Leasing with Revised Stipulations	Alternative 3B: Continue Leasing with Revised Stipulations
Protections for Greater Sage-Grouse Display Grounds	Timing Limitations prevent surface use within 2 miles 3/1 – 6/15; No Surface Occupancy within 0.25 mile	Not applicable	Timing Limitations 3/1 – 4/30 limiting noise between 6 pm and 9 am; No Surface Occupancy within 0.25 miles	No Surface Occupancy in priority habitat
Protections for Sage-Grouse Priority and General Habitat	None	Not applicable	Controlled Surface Use specifies infrastructure may be moved over 0.25 miles for leks or dense sagebrush	No Surface Occupancy in priority habitat
Bighorn Sheep Lambing Areas	Timing Limitation for surface use April 1 through June 15 within 1 mile	Not applicable	Timing Limitation for surface use April 1 through June 15 within 1 mile	Timing Limitation for surface use April 1 through July 15 within 1 mile
Air Quality Lease Notice	None	Not applicable	None	Operators using less than Tier 4 equipment required to complete analysis and monitoring to show compliance with Clean Air Act

Chapter 3. Affected Environment and Environmental Consequences

Introduction

This chapter summarizes the physical, biological, social, and economic environment of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter. Additional documentation, including more detailed descriptions of methodologies and analyses of project area resources, may be found in specialist reports, available on the project website:

<https://www.fs.usda.gov/project/?project=40652>.

Leasing represents a commitment of resources and an expectation of future development, generally within 10 years. Environmental effects from the decision to lease oil and gas parcels occur when the lessee decides to develop the parcel and applies for a permit to drill. The exact timing of such development is a function of market conditions and other factors that vary by lessee. The assumption for these future effects is based on the updated Reasonably Foreseeable Development Scenario (Hanna 2017) for the Little Missouri National Grassland, which predicts an average development of 62 oil wells per year on Forest Service minerals with Forest Service surface.

Oil and Gas

The project area for proposed oil and gas leasing is geologically located within the Williston Basin in western North Dakota. The U.S. Geological Survey has identified this area as having high potential for the occurrence of energy resources in “National Assessment of United States Oil and Gas Resources” (Gautier et al. 1996). Both the Bakken and Three Forks formations have individual assessments published as Bakken Resource Assessment (Bohrer et al. 2008) and Three Forks Assessment (Nordeng and Helms 2010). This potential is demonstrated by existing production from these formations. This analysis focuses on Federal leasing availability and constraints for National Forest System surface with Federal mineral estate and the differences between three alternatives.

The purpose of this analysis is to describe the effects of the proposed leasing decisions on the overall minerals program while focusing on the oil and gas resource. The reasonably foreseeable development scenario (Hanna 2017) looked at the geology, past drilling trends, recent technological advances, and equipment availability projecting future oil and gas development. These reports were used to assess the effects of the proposed leasing decision.

The Forest Service cooperates with the Bureau of Land Management (BLM) to administer lawful exploration and development of leasable minerals. The regulations (USDA at 36 CFR 228 and DOI at 43 CFR 3100) provide the procedures by which the Forest Service and the BLM will carry out their statutory responsibilities in the issuance of oil and gas leases. The development of energy resources (oil and gas) on National Forest System lands involves a staged decision process (Federal Onshore Oil and Gas Leasing Reform Act of 1987). The first stage analyzes which lands are to be available for leasing, based on current trends in development, and determines supplemental stipulations, as needed to protect other resources.

Forest Service policy (Forest Service Manual 2820) states that the agency considers mineral exploration and development to be important parts of its management program. It recognizes that mineral exploration and development are ordinarily in the public interest and can be compatible in the long term, if not

immediately, with the purposes for which the National Forest System lands are managed. This policy and the statutory responsibility given to the Forest Service and the BLM drive the purpose for oil and gas development.

Affected Environment

Regional Context

Oil was discovered in the Williston Basin in Montana in 1936 and in Manitoba in 1950, and since 1951 several significant cycles of exploration and production have been completed in North Dakota (Anderson and Bluemle 1983). The Three Forks Assessment prepared by the North Dakota Geologic Survey and North Dakota Department of Mineral Resources estimate the original oil in place (20 billion barrels) and ultimate recovery of oil reserves (2 billion) in the Three Forks portion of the Bakken pool (Nordeng and Helms 2010). The Bakken Formation Assessment estimates original oil in place at 149.2 billion barrels (Bohrer et al. 2008). Acceleration of drilling activity has coincided with periods of increasing oil prices and technological and equipment advances that enhanced economic feasibility. The more recent acceleration since 2007 is primarily due to technical advances in horizontal drilling capacity, in combination with hydraulic fracturing.

Project Area Context

The graph below displays the number of wells drilled in the Little Missouri National Grassland by surface and mineral ownership. The majority of wells drilled occur on non-National Forest System lands and non-Federal mineral estate. Leasing and drilling on such parcels is governed by the laws of the State of North Dakota, with no Federal involvement.

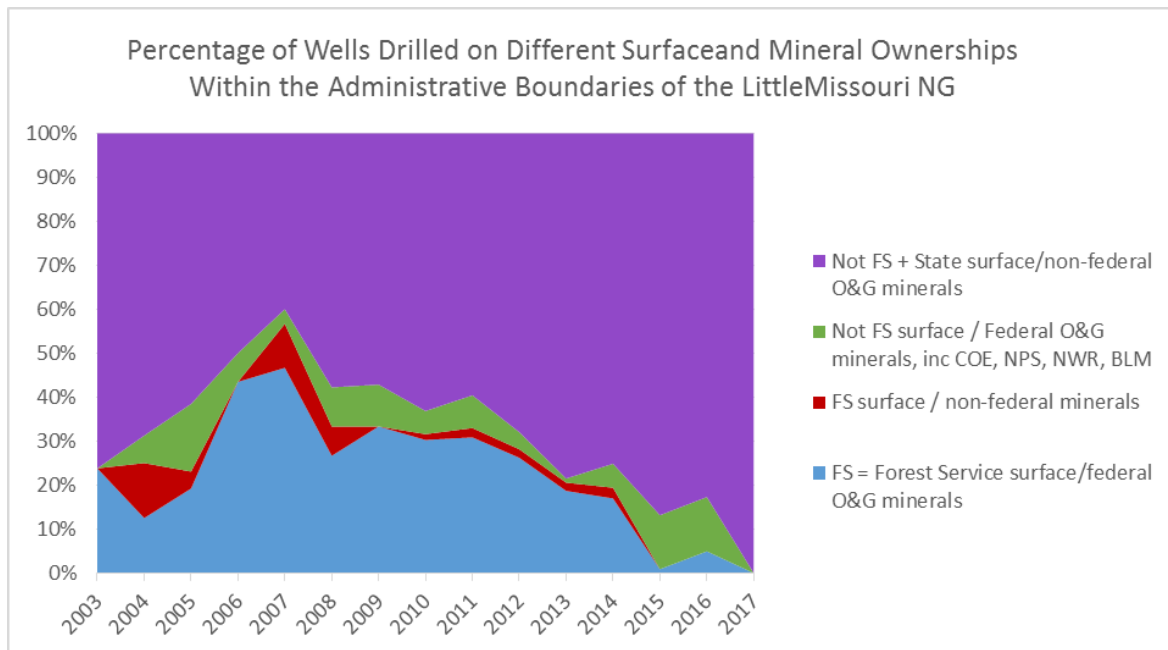


Figure 9. Percentage of wells drilled on different surface and mineral ownership within the administrative boundary of the Little Missouri National Grassland

Table 7, taken from the reasonably foreseeable development update, shows new wells by year that have been drilled since the 2003 oil and gas leasing decision. This drilling data was a combination of North Dakota Oil and Gas Division well drilling records, Bureau of Land Management’s leasing layer, and Forest Service maps.

Table 7. Wells drilled within the Little Missouri National Grassland administrative boundary by surface owner and mineral estate owner

Year	Forest Service Federal/Federal	Forest Service Federal/ non-Federal	Not Forest Service*/Federal	Not Forest Service + State/non-Federal	Total
2003	5	0	0	16	21
2004	2	2	1	11	16
2005	5	1	4	16	26
2006	20	0	3	23	46
2007	14	3	1	12	30
2008	12	3	4	26	45
2009	14	0	4	24	42
2010	22	1	5	48	76
2011	29	2	7	56	94
2012	27	2	4	70	103
2013	20	2	1	84	107
2014	28	4	9	124	165
2015	1	0	14	99	114
2016	4	0	10	67	81
2017	0	0	0	29	29
Total	204	20	66	705	995
Average/Year over 12 yrs.	13.6	1.3	4.4	47	66.3

* Category includes wells on Army Corps of Engineers and U.S. Fish and Wildlife Service lands, in addition to the private surface over Federal minerals, which BLM manages.

The administrative boundary of the Little Missouri National Grassland encompasses approximately 2.1 million acres, of which 1,000,300 acres have Federal minerals ownership, with 893,200 also having National Forest System surface; 1,130,700 acres have non-Federal minerals ownership. Of the total Federal mineral estate, 47,700 acres are not administratively available and 699,600 are currently under leases. Table 8 shows current stipulations for currently leased acres. There are 216,300 acres of National Forest System surface with Federal mineral estate that are currently available and unleased.

Table 8. Acreage and surface restrictions for current Federal oil and gas leases

Stipulations	Acres
No Surface Occupancy Stipulations	215,200
Timing Limitations/Conditional Surface Use Stipulations	293,700
No Stipulations	190,700
Total Leased	699,600

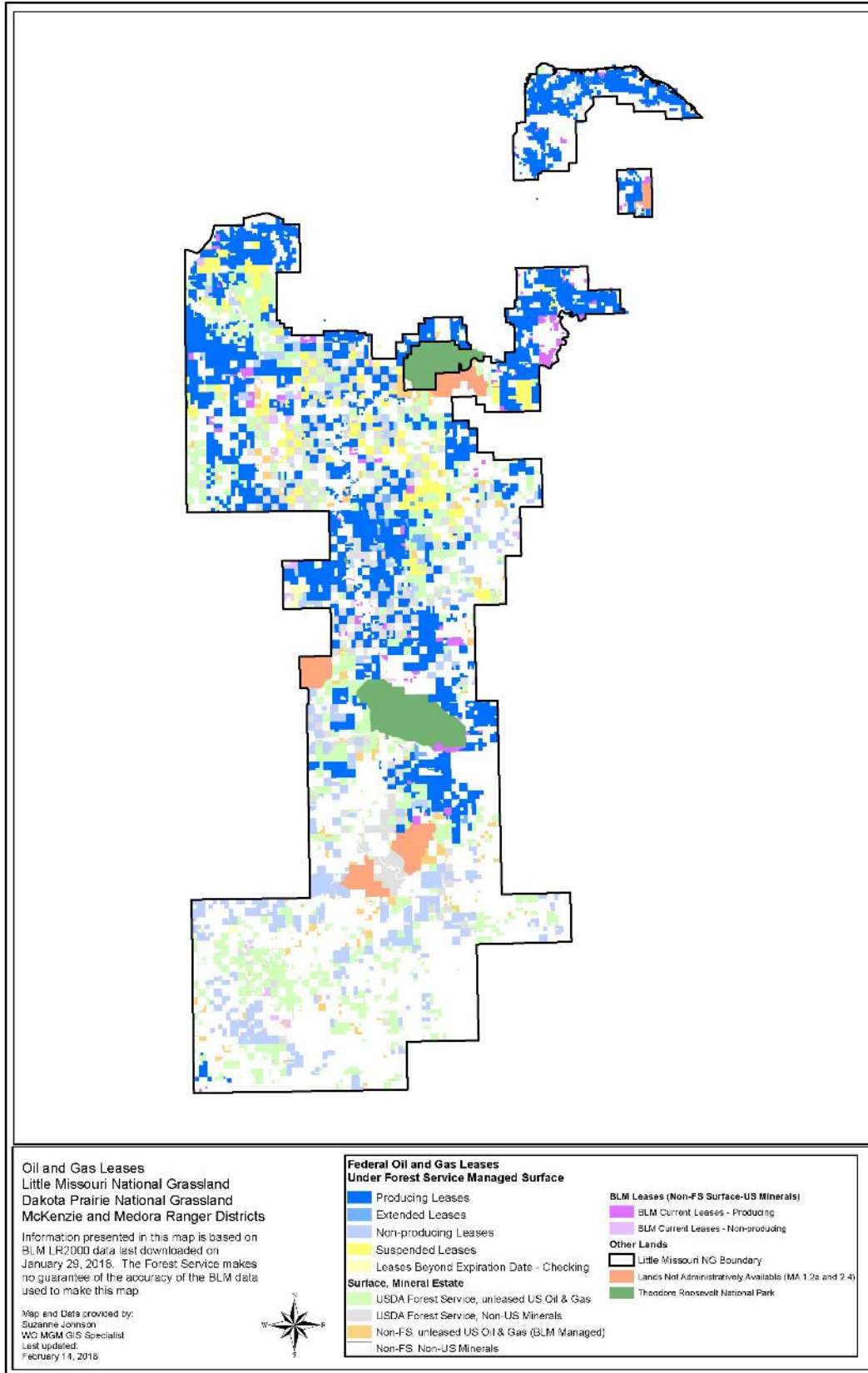


Figure 10. Status of current oil and gas leases on Little Missouri National Grassland

Hydraulic Fracturing of Oil and Gas Wells

Federal review and approval or denial of drilling plans included with applications for permit to drill is under the sole purview and authority of the Bureau of Land Management (BLM). The BLM administers hydraulic fracturing, as well as other aspects of downhole operations associated with exploration and development of fluid material leases. The Forest Service has no authority regarding downhole operations.

Background

Hydraulic fracturing (known as “fracking”) has been used by the industry for more than 50 years to enhance the recovery of oil and gas hydrocarbons from bedrock by artificially creating small fractures that function as preferential flowpaths of fluids toward the borehole. A variety of State and Federal regulations applicable to permitting individual wells are designed to avoid impacts to air, water, soils, and public health associated with drilling and hydraulic fracturing and to mitigate impacts if they do occur.

Hydraulic fracturing is only one step involved in drilling, completing, and producing oil and gas wells. Protection of public health and safety is addressed in a drilling plan required to be submitted with each application for permit to drill. The information required in a drilling plan is identified in regulations at 43 CFR 3162.3-1 “Drilling operations” and 43 CFR 3162.3-2 “Subsequent well operations.” This includes information needed by the BLM in reviewing the adequacy of the drilling plan and required additional protections where needed.

Key requirements are BLM’s regulations, 43 CFR 3160, pertaining to baseline and post-well-completion water sampling requirements, proper handling of drilling and completion fluids, proper wellbore design to protect surface waters and freshwater and usable waters, reduction of air polluting emissions, and reporting of spills and releases. While this analysis broadly addresses potential impacts of oil and gas activity, site-specific surface and downhole concerns are addressed in the future technical and environmental reviews required prior to approval or denial of lease operations.

Many aspects of oil and gas development require the use of water, including drilling, cementing, completion activities, dust abatement on roads and pads, and hydrostatic testing of pipelines. The amount of water needed in the drilling and completion process depends on the geology of the target formation, well depth, and lateral reach. Specifics of water use, limits, and availability for oil and gas development is covered in the Dakota Prairie Grasslands plan, more detailed information on each can be found on page 1-11 of the plan.

Fresh water is generally used for drilling through freshwater formations, and for cementing, water pressure testing of pipelines, and dust suppression. Produced water is used to drill the majority of the well, beyond the freshwater formations. Produced water is saline water naturally contained within the hydrocarbon-bearing formation and flowing into the well bore with the natural gas. Flowback water is water forced into the formation during hydraulic fracturing but returning to the well bore when the pressure gradient reverses.

Potential Public Health Risks from Hydraulic Fracturing

Fractures created by hydraulic fracturing are generally more permeable to fluid flow than the pore spaces within sedimentary rocks containing the targeted hydrocarbons. Recent advances in hydraulic fracture technology have opened reserves of domestic natural gas reserves that previously could not be extracted from the rock. This advance has been realized primarily in tight formations, such as deep marine shales and marlstones that have very low permeability due to very small grain size of components clay minerals and the pressure from thousands of feet of overlying strata. Public concern about the use of hydraulic fracturing has been focused on potential for contamination of freshwater aquifers and impacts to domestic

and municipal water wells, the occurrence of induced earthquakes, and the chemical constituents of fracking fluids.

Induced Earthquakes

For decades, oil and gas companies and independent geophysicists have used state of the art equipment to monitor micro seismic activity – defined as “faint” or “very slight tremor” – during hydraulic fracturing to optimize well completions and gather information about fracture dimensions and propagation (Warpinski 2011).

Research indicates that micro seismic activity created by hydraulic fracturing occurs at Richter magnitude of 1 or less (Warpinski et al. 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 magnitude 1.0 tremor is 1/100th the amplitude of a magnitude 3.0 tremor.

The National Research Council (2013) found that “although only a very small fraction of injection and extraction activities at hundreds of thousands of energy development sites in the United States have induced seismicity at levels that are noticeable to the public, seismic events caused by or likely related to energy development have been measured and felt in Alabama, Arkansas, California, Colorado, Illinois, Louisiana, Mississippi, Nebraska, Nevada, New Mexico, Ohio, Oklahoma, and Texas.” In a catalogue of known events of induced seismicity, oil and gas extraction (but not hydraulic fracturing) and secondary recovery accounted for the most incidents (65 worldwide; 38 in the U.S.). Hydraulic fracturing was implicated in only two instances worldwide and one in the U.S. Wastewater injection was the third most frequent cause of induced earthquakes (9) in the U.S. (National Research Council 2013).

Nonetheless, the central United States has undergone a dramatic increase in seismicity over the past 6 years rising from an average of 24 earthquakes per year of magnitude 3 or greater in the years 1973–2008 to an average of 193 in 2009–2014, with 688 occurring in 2014 alone (Rubenstein and Mahani 2015). The increased seismicity is limited to a few areas, most prominently central Oklahoma, and the evidence is mounting that the seismicity in many of these locations is induced by the deep injection of wastewater from nearby oil and gas operations. In Oklahoma, less than 10 percent of the injected water is spent fracking fluids, while 90 percent is produced water. The vast majority of the fluid that is disposed of in disposal wells in Oklahoma is produced water. Produced water is the salty brine from ancient oceans that was entrapped in the rocks when the sediments were deposited. This water is trapped in the same pore space as oil and gas, and as oil and gas is extracted, the produced water is extracted with it (Rubenstein and Mahani 2015).

North Dakota has shown no increase in seismic events with increased oil production from horizontal drilling and hydraulic fracturing, even though saltwater disposal injection wells are allowed on both Federal and non-Federal lands. Such injections wells may be allowed for both produced water and flowback water. See additional discussions in the Surface Water and Groundwater reports for this project.

Potential for Aquifer Contamination

The magnitude of induced fractures has been measured with field monitoring equipment, micro seismic geophones, and in laboratory tests and compared to three-dimensional hydraulic fracture models. Researchers have successfully validated these models for fracturing in “tight gas” reservoirs. Results of the analyses show that fractures resulting from completions of oil and gas well can be predicted (Zhai and Sharma 2005, Jabbari 2013, Palisch et al. 2012) and that the length of induced fractures can be estimated.

Hydraulically induced fracture orientation in relation to wellbore depends on downhole environment (rock mechanics, minimum and maximum principle stress directions, and rock physical properties) and the wellbore trajectory. In horizontal wells, used to develop deep marine shales, fracture growth from the wellbore is mainly determined by the orientation of the wellbore in relation to the principal stresses of the rock.

Fracture growth toward the surface is limited by barriers, such as variations in stress and lithology, as is also the case in vertical wells. Analysis of data from thousands of wells indicates fracture extent (length) of less than 350 feet in vast majority of cases, with outliers of 1,000 to 2,000 feet (Maxwell 2011). The greater lengths noted in the previous sentence are outliers associated with fractures in thick deposits of lithologically uniform marine shales. Based on review of available information on micro seismic monitoring and fracture dimensions, Warpinski (2011) concluded that fractures from deep horizontal wells are not a threat to propagate across the long distances (thousands of feet) needed to reach freshwater aquifers.

In addition to vertical separation of several thousand feet between the upper extent of fractures and freshwater aquifers are requirements by the BLM and North Dakota Oil and Gas Division for proper casing and cementing of wellbores to isolate the aquifers penetrated by a wellbore. BLM petroleum engineers review well and cement design and final drilling and cementing logs to ensure that cement has been properly placed. When penetration of groundwater and fresh-water aquifers is anticipated, BLM inspectors may witness the cementing of surface casing and subsequent pressure testing to ensure that the annular space between the casing and borehole wall is properly sealed.

Chemical Constituents of Hydraulic Fracturing Fluids

The general types of compounds and relative amounts used in hydraulic fracturing are well known and relatively consistent. FracFocus website is a voluntary registry where industry lists many of the additives used in hydraulic fracturing and many of the compounds are listed in table 9. This is not a complete list recognizing that some compounds or amounts are listed as proprietary. Since fracture jobs are tailored to the downhole environment and companies are aware of concerns involving hydraulic fracturing, the chemicals listed in the table may or may not be used, and the information is provided solely as general information. The bulk of fluid injected into the formation during the process is water mixed with sand, representing 99.5 percent of the total by volume in a typical mixture shown in the table. The sand is used as a propping agent keeping the newly formed fractures from closing.

Following completion of hydraulic fracturing activities, the pressure differential causes most of the injected fluids to flow toward the borehole and then upward to the surface along with the hydrocarbon fluids released from the formation. The pressure differential is a result of the weight of thousands of feet of rock above the formation. The composition of this mixture, called flowback water, gradually shifts over a period of 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.

Water Use

The drilling of vertical, horizontal, or directional oil or gas wells requires up to 6,000 gallons of fresh water, of which 50 percent is treated and reused. Total consumption of fresh water, including all uses, averages 6,000 gallons. Hydraulic fracturing operations require much larger volumes of water. Average fracking process in North Dakota requires about 25 acre-feet of water (approximately 8.13 million gallons). In 2018, records indicate that 38,961 acre-feet of surface and ground water were used for fracking purposes which amounts to 10.1 percent of North Dakota's consumptive water use (North

Dakota State Water Commission 2019). See the Surface Water Report and the Groundwater Report for additional discussion of water use.

Table 9. Some of the constituents of typical fracturing operation⁶

Additive Type	Typical Example	Function	Common Use of Compound
Acid	Hydrochloric acid	Dissolves mineral cement in rocks and initiates cracks	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	Eliminates bacteria in the water	Disinfectant; sterilizer for medical and dental equipment
Breaker	Ammonium persulfate	Allows delayed breakdown of the gel	Used in hair dye, as a disinfectant, and manufacture of household plastics
Clay stabilizer	Potassium chloride	Creates a brine carrier fluid that prohibits fluid interaction with formation clays	Used in low-sodium table salt substitutes, medicines, and IV fluids
Corrosion inhibitor	Formic acid	Prevents corrosion of the well casing	Used as preservative in livestock feed; used as lime remover in toilet bowl cleaners
Crosslinker	Borate salts	Maintains fluid viscosity as temperature increases	Used in laundry detergents, hand soaps, and cosmetics
Friction reducer	Polyacrylamide	"Slicks" the water to minimize friction	Used as a flocculent in water treatment and manufacture of paper
Gelling agent	Guar gum	Thickens water to help suspend the sand propping agent	Used as a thickener, binder, or stabilizer in foods
Iron control	Citric acid	Prevents precipitation of metal oxides	Used as flavoring agent or preservative in foods
Surfactant	Lauryl sulfate	Increases the viscosity of the fluid	Used in soaps, shampoos, detergents, and as foaming agents
pH adjusting agent	Sodium hydroxide, acetic acid	Adjusts pH of fluid to maintain the effectiveness of other components	Sodium hydroxide used in soaps, drain cleaners; acetic acid used as chemical reagent, main ingredient of vinegar
Scale inhibitor	Sodium polycarboxylate	Prevents scale deposits in the pipe	Used in dishwashing liquids and other cleaners
Winterizing agent	Ethanol, isopropyl alcohol, methanol	Added as necessary as stabilizer, drier, and anti-freezing agent	Various cosmetic, medicinal, and industrial uses

Effects of Alternative 1 (continue current leasing and stipulations)

This alternative applies to currently unleased and available areas of federally owned minerals within the administrative boundary of the Little Missouri National Grassland (see figure 3). It also applies to current leases, should they become available for leasing in the future. These lands include areas where both the surface and minerals are federally owned. It does not apply to areas where minerals are federally owned but the surface is under non-Federal ownership, or to areas where the surface is owned by Little Missouri National Grassland, but the minerals are owned by a non-Federal entity.

Of the 893,200 acres of the Little Missouri National Grassland with National Forest System surface over Federal minerals, there are 216,300 acres that are currently unleased and available for leasing. Under this

⁶ FracFocus Chemical Disclosure Registry: <http://fracfocus.org/chemical-use/what-chemicals-are-used>

alternative, 75,100 acres would have stipulations of no surface occupancy. Oil and gas resources on these acres could be accessed by horizontal drilling, but no surface disturbance would be allowed. The remaining 141,200 acres could see surface developments of some kind. A total of 97,700 acres would have stipulations for timing limitations and/or controlled surface use, and 43,500 acres would have no stipulations, beyond standard lease terms, specified in the lease.

Table 10. Acreage and surface restrictions for unleased available National Forest System lands under alternative 1

Resource Indicator	Alternative 1
Acres available for leasing without stipulations	43,500
Acres available constrained by no surface occupancy	75,100
Acres available constrained by timing limitation or conditional use	97,700
Total acres available for leasing	216,300

Direct and Indirect Effects – Alternative 1

Under alternative 1, the Forest Service would authorize the Bureau of Land Management (BLM) to offer specific lands for lease, subject to current stipulations. A direct effect of authorizing the BLM to offer specific lands for lease subject to current stipulations would facilitate new oil and gas leasing for the 216,300 acres. Environmental protections comprised of the lease stipulations, regulations, and grasslands plan standards would condition access to mineral resources, and in some areas directional drilling and emerging technologies would be necessary to gain that access. Timing limitations applied to 97,700 acres may affect the scheduling of operations or increase the overall costs of development. This alternative would likely result in the greatest amount of economic recovery of the mineral estate.

Effects of Alternative 2 (no new oil and gas leasing)

This alternative would limit oil and gas leasing on the Little Missouri National Grassland to current valid permits. No currently unleased areas would be offered for lease. Therefore, leasing stipulations, notices, and conditions of approval are not applicable.

This alternative applies to unleased areas of federally owned minerals with Forest Service ownership within the administrative boundary of the Little Missouri National Grassland (see figure 2 on page 2). This alternative would add another 216,300 acres to Little Missouri National Grassland lands not currently authorized or administratively available for a total of 264,000 acres. This alternative would not apply to areas where minerals are federally owned but the surface is under non-Federal ownership, or to areas where the surface is owned by Little Missouri National Grassland, but the minerals are owned by a non-Federal entity.

Currently held leases would not be affected by this alternative, but would continue to operate under the stipulations and conditions in place when the lease was signed. Any current leases that expired would not be leased again.

Direct and Indirect Effects - Alternative 2

Under alternative 2, the Forest Service would not authorize the Bureau of Land Management (BLM) to offer specific lands for lease. By not authorizing leases, there would be no transfer of property rights and no exploration, development, or recovery of mineral resources on 216,300 acres. Those resources would remain unavailable from adjacent lands under this alternative due to well spacing requirements and lease boundary offsets. Since there would be no extraction of oil and gas resources from National Forest

System lands, contributions to the local economy would be limited to recreation, grazing, and other uses of the national grassland. This alternative would remove 216,300 acres from leasing availability and would reduce the number of new wells developed in future years to areas already under lease. Once current leases were all developed, no new wells would occur on parcels where Federal minerals underlay National Forest System lands.

This alternative does not stop drilling or mineral development on adjacent lands, nor does this alternative mean no new wells or occupancy on National Forest System surface for private mineral development. Under this alternative private mineral development and private surface development would continue.

Table 11. Cumulative acres unavailable for leasing under alternative 2

Resource Indicator	Acres
Acres proposed as unavailable for leasing	216,300
Acres currently unavailable or not currently authorized	47,700
Cumulative acres unavailable for leasing	264,000

Effects of Alternative 3 (continue leasing with revised stipulations)

All existing stipulations and lease notices would remain in effect, except where a revision is indicated below. No surface occupancy stipulations for recreation sites constitute revisions to existing stipulations. Timing limitations for sage-grouse leks (aka display grounds) and controlled surface use for sage-grouse habitat would be new stipulations. No surface occupancy stipulations for rare plants and roadless areas constitute new stipulations. The lease notice for paleontological resources would be revised to comply with current law.

For this alternative, of the 216,300 acres of the Little Missouri National Grassland that are currently available and unleased, 107,800 acres would have no surface occupancy stipulations. Of the remaining 108,500 acres where surface development could occur, 77,600 would have stipulations for timing limitations and/or controlled surface use, and 30,900 acres would have no stipulations beyond the standard lease terms. See figure 5.

Table 12. Acreage and surface restrictions for unleased available National Forest System lands under alternative 3

Resource Indicator	Alternative 3
Acres available for leasing without stipulations	30,900
Acres available constrained by no surface occupancy	107,800
Acres available constrained by timing limitation or conditional use	77,600
Total acres available for leasing	216,300

Direct and Indirect Effects – Alternative 3

Under alternative 3, the Forest Service would authorize the Bureau of Land Management to offer up to 216,300 acres for lease with revised stipulations and lease notices. The lease stipulations, regulations, and grasslands plan standards would allow access to mineral resources, although in some areas directional drilling and emerging technologies would be necessary to gain that access. Timing limitations applied to 77,600 acres may affect the scheduling of operations or increase the overall costs of development. Development would be constrained by no surface use on 107,800 acres. Constraining the surface use on 107,800 acres could increase the development on land adjacent to no surface occupancy, increase

development costs, or diminish the recovery of mineral resources. This is an increase of 32,700 acres from alternative 1.

An analysis of unleased no surface occupancy (NSO) lands was completed to determine access using horizontal drilling from adjacent lands. Two assumptions were made for this analysis. First subsurface horizontal drilling could go up to two miles. Second adjacent lands (private, state, BLM, or Forest Service) with no stipulations or controlled surface use/timing restrictions could be potential access areas to unleased no surface occupancy lands. Areas with slopes greater than 40 percent, national park surface ownership or Forest Service ownership with no surface occupancy, not administratively available areas were excluded from the analysis. Of the total 107,800 acres under no surface occupancy, 94,700 acres were accessible within one mile and 13,100 were accessible within two miles. No areas required a distance of greater than two miles.

Development under this alternative would rely more heavily on directional drilling and emerging technologies to gain access. The reach associated with directional drilling in this area is two miles, which would result in some resource recovery for the additional acres constrained by surface occupancy. This alternative would likely result in the economic recovery of the mineral estate, but even with directional drilling and emerging technologies some loss, or at least a diminished recovery of mineral resources, is likely.

Effects of Alternative 3B (continue leasing with revised stipulations and lease notices)

All existing stipulations and lease notices would remain in effect, except where a revision is indicated below. No surface occupancy in priority habitat for sage-grouse would be a new stipulation, replacing stipulations in alternative 1 and alternative 3. Timing limitations for bighorn sheep lambing constitute a revised stipulation increasing the timing limit by 30 days from June 15 to July 15. Controlled surface use for inventoried roadless areas allows well pads for 0.25 miles each side of roads with maintenance levels 3-5 and no surface occupancy outside this area. No surface occupancy for rare plants and the lease notice for paleontological resources would be carried forward from alternative 3. See figure 7.

For this alternative, of the 216,300 acres of the Little Missouri National Grassland that are currently available and unleased, 118,500 acres would have no surface occupancy stipulations. Of the remaining 108,500 acres where surface development could occur, 60,900 would have stipulations for timing limitations and/or controlled surface use, and 36,900 acres would have no stipulations beyond the standard lease terms.

Table 13. Acreage and surface restrictions for unleased available NFS lands under alternative 3B

Resource Indicator	Alternative 3B
Acres available for leasing without stipulations	36,900
Acres available constrained by no surface occupancy	118,500
Acres available constrained by timing limitation or conditional use	60,900
Total acres available for leasing	216,300

Direct and Indirect Effects – Alternative 3B

Under alternative 3B, the Forest Service would authorize the Bureau of Land Management to offer up to 216,300 acres for lease with revised stipulations and lease notices. The lease stipulations, regulations, and

grasslands plan standards would allow access to mineral resources, although in some areas directional drilling and emerging technologies would be necessary to gain that access. Timing limitations applied to 60,900 acres may affect the scheduling of operations or increase the overall costs of development. Timing limitations are decreased by 36,800 acres from alternative 1. Development would be constrained by no surface use occupancy on 118,500 acres. No surface occupancy would increase by 43,400 acres from alternative 1. Constraining the surface use on 60,900 acres could increase the development on land adjacent to no surface occupancy or diminish the recovery of mineral resources. This is an increase of 36,800 acres from alternative 1. Of the total 107,800 acres under no surface occupancy, 94,700 acres were accessible within one mile and 13,100 were accessible within two miles. No areas required a distance of greater than two miles.

Development under this alternative would rely more heavily on directional drilling and emerging technologies to gain access. The reach associated with directional drilling in this area is two miles, which would result in some resource recovery for the additional acres constrained by surface occupancy. This alternative would likely result in the economic recovery of the mineral estate, but even with directional drilling and emerging technologies some loss, or at least a diminished recovery of mineral resources, may be likely.

The major increase in no surface occupancy in alternative 3B results from the new stipulation for priority sage-grouse habitat. This area occurs in the southwest portion of the Medora Ranger District, south of Interstate 94. It is within the Williston Basin, but outside the Bakken formation, and has seen little of the current increase in horizontal drilling and oil well development. In contrast, this alternative decreases the no surface occupancy in inventoried roadless areas, improving accessibility to areas which are available for lease but do not allow surface occupancy.

Cumulative Effects

This analysis relies on the reasonably foreseeable development scenario for the potential 62 gas wells per year average over the time period 2013 to 2032. This projection does not differ between alternatives 1, 3, and 3B, and all these alternatives will provide continued oil and gas development opportunities, consistent with economic demand and reasonable environmental protections.

The schedule of proposed actions includes eight oil and gas projects for McKenzie Ranger District and one for Medora. Total wells drilled per year on all types of land ownership may reach the 105 well average over the time period 2013 to 2032. This additional development of the mineral resources would further assist in reaching the greatest economic recovery of the mineral estate.

Leasing and potential future development are not expected to cause effects to geologic resources, landforms or bedrock exposures, because of the nature of development projected. Leasing and potential future development are not expected to affect development of locatable minerals. This is because the potential of developing locatable minerals is low or unknown in the areas proposed as administratively available for oil and gas leasing.

Summary

Making lands available for oil and gas leasing and the subsequent leasing of available lands does not involve any immediate effects on geology and minerals. Indirect effects from leasing and development to minerals would be the potential amount of oil and gas produced and the potential amount of oil and gas foregone. The amount, type, and acreage of stipulations that would be attached to new leases could affect the potential for oil and gas production. Table 14 shows each alternative's estimated acreage that are unconstrained by no surface occupancy stipulations. We assume that the no surface occupancy

stipulations would decrease accessibility to the mineral resource, and thus require more directional drilling and emerging technology to reach full economic recovery of the mineral resources.

Alternative 1 would be the most responsive to current demands for oil, making lands available for oil and gas leasing with somewhat fewer constraints than alternative 3 and 3B. Alternative 2 would remove 216,300 acres from oil and gas leasing, presumably for at least five years. Those lands could be made available in the future after another environmental analysis and decision. Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

Table 14. Comparison of acres available by level of stipulation for all alternatives

Indicator/Measure	Currently Leased	Alternative 1	Alternative 2	Alternative 3	Alternative 3B
Acres available for leasing without stipulations	190,700	43,500	-	30,900	36,900
Acres available constrained by no surface occupancy	215,200	75,100	-	107,800	118,500
Acres available constrained by timing limitations or conditional use	293,700	97,700	-	77,600	60,900
Total acres	699,600	216,300	(216,300)	216,300	216,300

Socioeconomics

Oil and natural gas leasing will take place on the Little Missouri National Grassland, which is located in western North Dakota within Billings, Golden Valley, McKenzie, and Slope counties. The only local active oil refinery is in Mandan, ND (Marathon Petroleum 2019), within Morton County, and is connected to the Little Missouri National Grassland via Stark County, where another refinery is set to be operational by 2020 (Meridian Energy Group Inc. 2017). As a result, the social and economic analysis area for this report will cover the sum of these counties (Billings, Golden Valley, McKenzie, Morton, Slope, and Stark counties) shown in figure 11.

Affected Environment

Oil and Gas Trends, Production and Demographics

Oil and gas production are heavily reliant on both crude oil and natural gas prices, though the production levels of both oil and gas remain more sensitive to fluctuations in the price of oil than fluctuations in the price of gas. The peak oil prices of 2014 were met with a significant increase in both oil and gas production levels in North Dakota (NDDMR 2017a). As oil prices dropped after 2014, so did production of both oil and gas. Figure 12 shows that these national trends were indeed reflected in the drilling activity taking place on the Little Missouri National Grassland. During the oil boom, the total number of wells drilled on the Little Missouri National Grassland spiked from 42 in 2009 to a high of 165 in 2014. Following the oil boom, this total dropped to 81 wells in 2016, four of which were on federally owned mineral estates. By 2018, the numbers had rebounded to 2014 levels with a total of 166 wells drilled on

all ownerships, 34 on Forest Service mineral estate. The trend continued in 2019, but is expected to drop, at least temporarily, with the recent drop in oil prices.

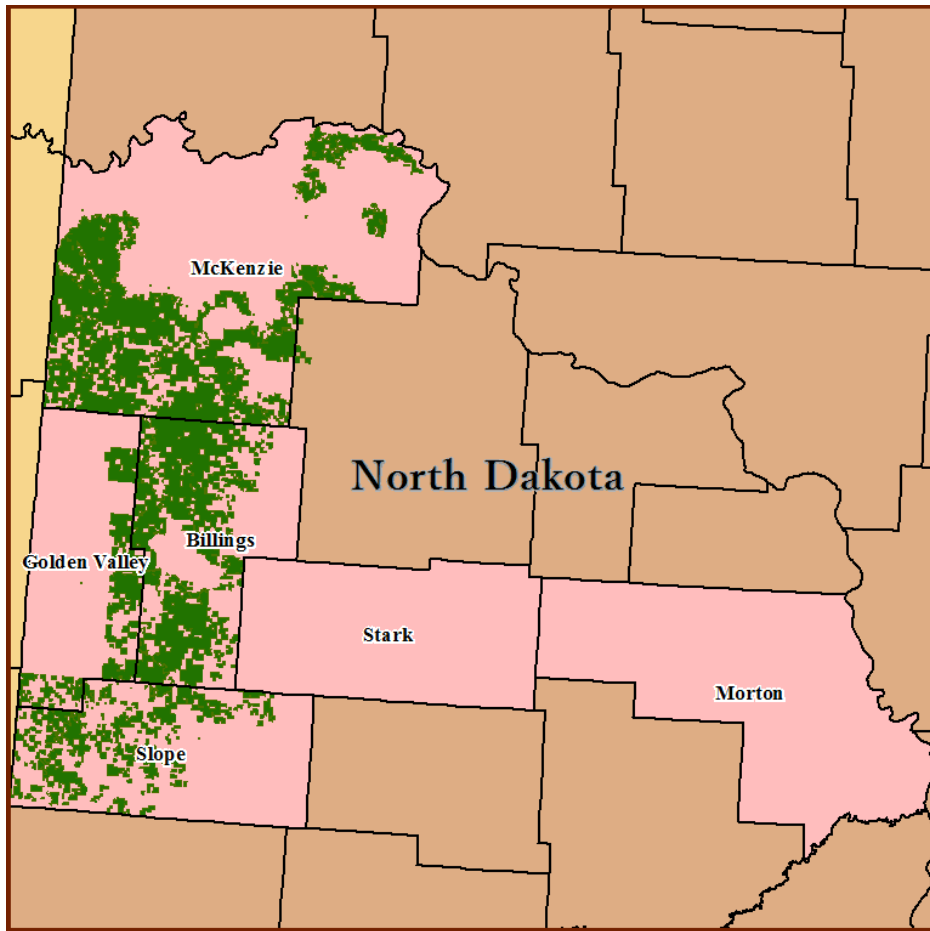


Figure 11. Social and economic analysis area

In fiscal year 2016, the 699,600 acres of total federally leased land on the Little Missouri National Grassland yielded a total of \$414,189,240 in oil and gas sales, a total of \$47,386,258 in royalty revenue, and a total of \$321,113 in rent revenue (USDI ONRR 2016). Twenty-five percent of these royalties and rent payments, totaling \$11,846,565, were then returned to the state of North Dakota by the Forest Service for use towards public schools and roads (Hoover 2015). These royalties make up 0.18 percent of the fiscal year 2016 North Dakota State Government Budget (North Dakota State Government 2017).

Projections of future oil and gas prices and production levels remain highly uncertain. The reasonably foreseeable development scenario predicts the drilling of 62 new wells per year, on average, on federally owned mineral estates within the Little Missouri National Grassland from 2015 to 2034, if supported by the chosen alternative (Hanna 2017). To accompany this prediction, this report will estimate an average annual production of 44,536 barrels in oil and 39,272 thousand cubic feet in sellable natural gas per well (NDDMR 2017c, 2017d). Additionally, projections made by the U.S. Department of Energy, Energy Information Administration (EIA) will be used to estimate oil and gas prices of \$69.50 per barrel and \$4.06 per thousand cubic feet. Specifically, these figures are the average projected Brent and Henry Hub spot prices respectively, in 2016 dollars, from 2017 to 2022 (EIA 2017a, 2017b, 2017c).

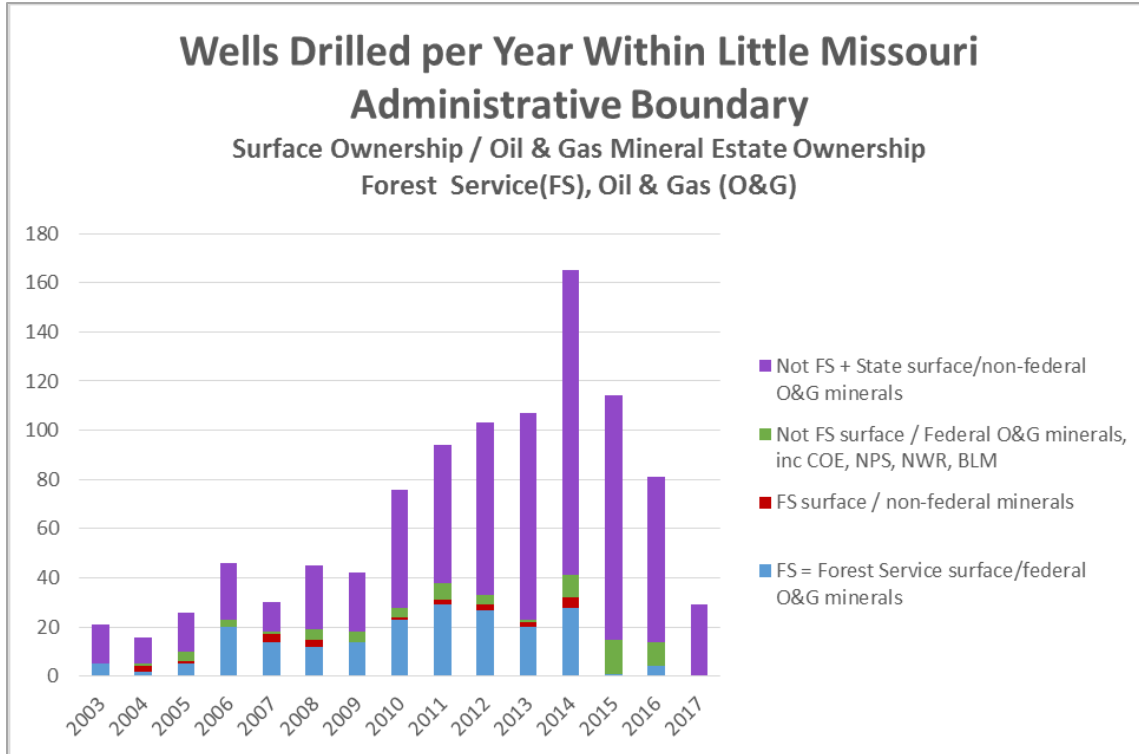


Figure 12. Wells drilled on the Little Missouri National Grassland 2003 through mid-2017 (Hanna 2017)

The end result of these estimates is an annual production potential of \$191,906,486 in oil and \$9,885,602 in gas, in 2016 dollars, over the course of the analysis period. At a royalty rate of 12.5 percent (Federal Register 2015), this result would yield \$25,224,011 in total royalty payments. In turn, the remaining 253,000 acres of unleased land on the Little Missouri National Grassland would yield \$379,500 in annual rent payments at a price of \$1.50 per acre (Federal Register 2015), and 25 percent of these rent and royalty payments, totaling \$6,400,878, would be returned to the state of North Dakota for use towards public roads and schools (Hoover 2015). Table 15 shows a summary of these potential projections, as compared to the fiscal year 2016 values.

Table 15. Summary of revenue, royalties, and payments to North Dakota from current and projected oil and gas development on the Little Missouri National Grassland

Revenues, Royalties and Payments	Current, as of 2016 (\$)	Maximum Projected Increase (\$)	Maximum Projected Increase (percentage)
Oil Revenue	\$377,808,377	\$191,906,486	50.8 percent
Gas Revenue	\$36,380,863	\$9,885,602	27.2 percent
Total Royalties	\$47,386,258	\$25,224,011	53.2 percent
Total Rent	\$321,113	\$379,500	118.2 percent
Payments to North Dakota	\$11,926,843	\$6,400,878	53.7 percent

Demographic Trends

Given the high oil dependency of the analysis area, much of the area’s population changes are driven by domestic migration to support local oil and gas extraction opportunities. The population, employment, and personal income trends of the area closely mirror the trends in oil pricing over time.

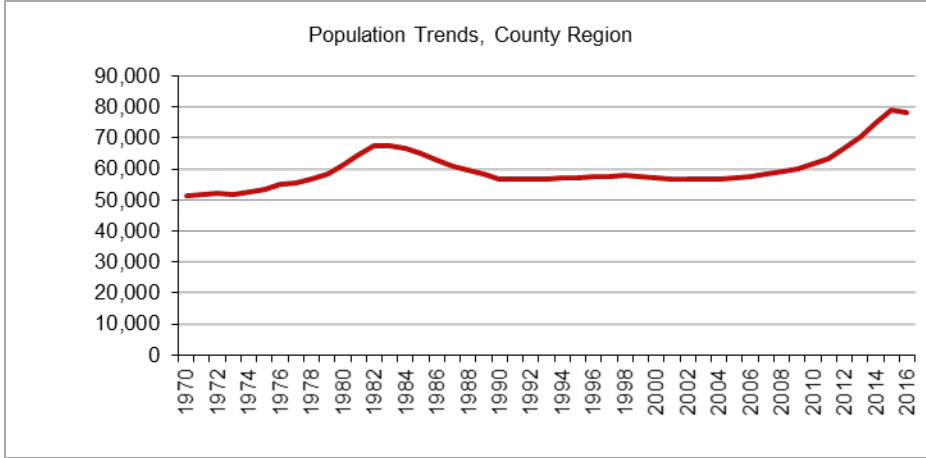


Figure 13. Population trends in the analysis area (U.S. Dept. of Commerce, Bureau of Economic Analysis 2017)

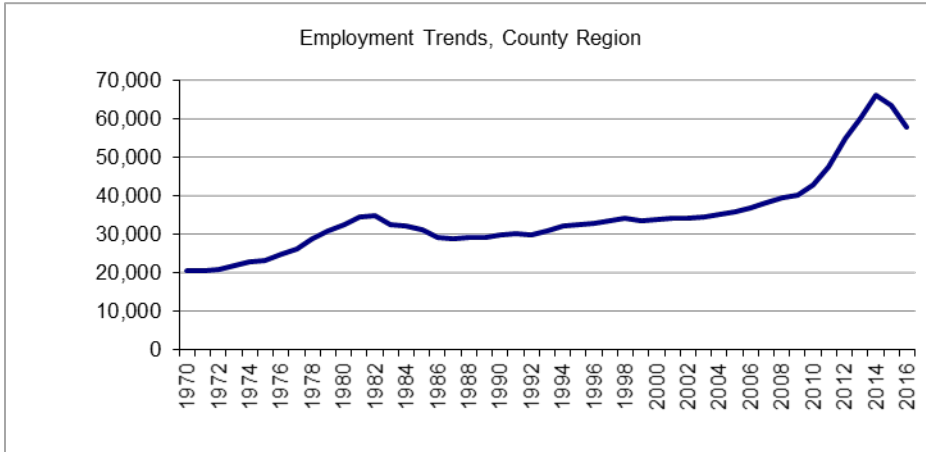


Figure 14. Employment trends in the analysis area (U.S. Dept. of Commerce, Bureau of Economic Analysis 2017)

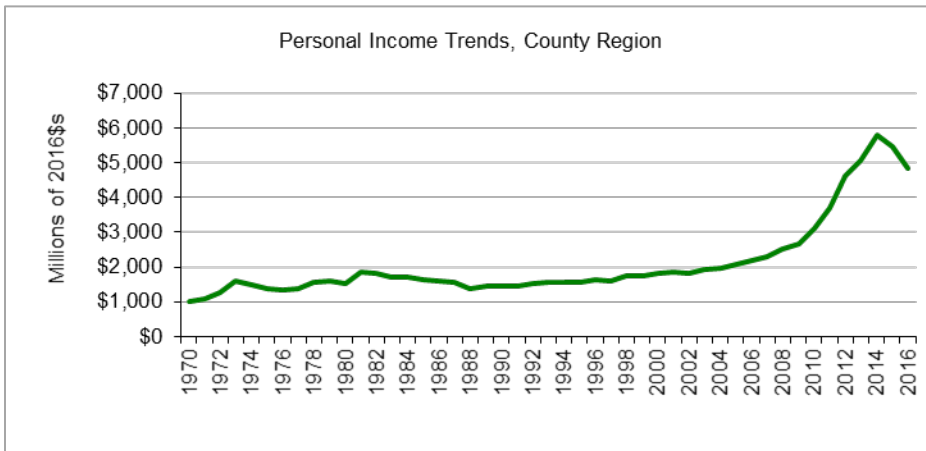


Figure 15. Personal income trends in the analysis area (U.S. Dept. of Commerce, Bureau of Economic Analysis 2017)

Traffic and Human Health

Within the analysis area, 93.5 percent of current oil production and 96.1 percent of current gas production occurs in McKenzie County, which is located at the northern end of the Little Missouri National Grassland. This concentration of oil and gas development in McKenzie County is reflected in nearby traffic activity, which affects road wear, commute times, and traffic fatality rates. Traffic rates in this portion of the state are 3 to 22 times those of most highways within North Dakota. As a consequence, McKenzie County has experienced some of the highest traffic fatality rates in the state overall, both as a gross amount and as a proportion to county population. Williams County has also experienced a particularly high gross amount of traffic fatalities, but less than McKenzie County when considered as a proportion of county population. The rates of traffic fatalities are much higher than the U.S. median.

Changes in road wear and commute times in response to varying traffic levels remain more difficult to accurately quantify, but each can be reasonably expected to increase with similar increases in traffic activity. These increases in road wear can be offset to a degree by returning payments to the state, from rent and royalty payments made by oil and gas developers.

Air and water pollution associated with future oil and gas leasing is discussed in detail in other sections of this document. National and state regulations are in place to set limits on pollution levels, in response to existing estimates on the potential risks to human health.

Environmental Justice

Executive Order 12898 requires Federal agencies to “...identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations” (EPA 1994). According to the Council on Environmental Quality,

...minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis....a minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above stated thresholds (CEQ 1997).

Outside of McKenzie County, ND, each county within the analysis area has a lower proportion of minority populations and a lower poverty rate than the state average, as shown in table 16. These statistics suggest that McKenzie County is where minority and low-income populations are most susceptible to being adversely affected by the leasing alternatives.

Table 16. Demographic characteristics by county

Location	Population (2016)	Share of population identified as non-white (2016)	Poverty rate (2015 estimate)
Billings County, ND	934	6.5 percent	10.3 percent
Golden Valley County, ND	1,817	3.8 percent	10.0 percent
McKenzie County, ND	12,621	16.7 percent	13.7 percent
Morton County, ND	30,809	7.7 percent	8.0 percent
Slope County, ND	763	4.9 percent	10.1 percent
Stark County, ND	31,199	7.7 percent	6.7 percent
North Dakota	757,952	12.1 percent	11.5 percent

Source: Census 2015, 2016a, 2016b

Effects of Alternative 1 (continue current leasing and stipulations)

Employment

Based on the reasonably foreseeable development scenario, alternative 1 would result in the drilling of 62 new oil and gas wells on the Little Missouri National Grassland per year. Much of the expected development can be reasonably presumed to occur in McKenzie County as a result, though the leasing would be scattered throughout the Little Missouri National Grassland.

During the drilling phase, drilling of the 62 wells would directly result in 791 jobs and \$117.3 million in labor income, in 2016 dollars, within the oil and gas drilling industry in the analysis area over the duration of the drilling process. When considering indirect and induced effects, such as supplies and services from other sectors or increased household spending, a total of 1,443 jobs and \$157.9 million in labor income would be generated over the duration of the drilling process.

Over the lifetime of extraction from the 62 wells, the maximum projected increases in oil revenue and gas revenue is projected to be \$191,906,486 in oil revenue and \$9,885,602 in gas revenue. These revenues could be expected to directly support 163 jobs and \$25.7 million in labor income in the oil and gas extraction industry within the analysis area over the duration of the leases supporting the 62 wells. When considering indirect and induced effects, a total of 267 jobs and \$31.4 million in labor income could be expected over the duration of the leases.

The annual extraction of oil and gas by these 62 wells would generate \$25,224,011 in total royalties. In addition, \$248,550 would be paid annually for rental of the 165,700 acres of land, at a price of \$1.50 per acre for the first five years of leasing (Federal Register 2015). Twenty-five percent of these rent and royalty payments, totaling \$6,368,140, would be returned to the state of North Dakota for use towards public roads and schools (Hoover 2015).

Quality of Life

Higher commute times and increased road wear are expected to occur primarily within McKenzie County and Williams County primarily along Federal Highway 2 and Federal Highway 85. In addition, commute times and road wear can also be expected to increase along nearby travel hubs, including Minot, Dickinson, and Williston. These effects will be most prominent during the initial drilling period of each well, as indicated by the particularly high employment levels during that period.

Human Health

Increased risk for traffic fatalities are also expected to occur primarily within McKenzie County and Williams County, following the surge in traffic from new development. Again, these risks will be highest during the initial drilling phase of each well. Outside of compliance with associated national and state standards, data on particular human health risks remains indeterminate.

Environmental Justice

McKenzie County holds the highest poverty rate and the largest share of minority populations within the analysis area (table 16). Furthermore, both the short-term and long-term economic effects from further oil and gas development are expected to occur primarily in McKenzie County. As such, while these effects on McKenzie County alone cannot be accurately quantified with current data, qualitative predictions can be made.

Minority and low-income populations within McKenzie County can be expected to benefit from increases in employment and wages in the short and long term, following the drilling and extraction of the newly

leased land. Accordingly, this surge in local employment would come with the aforementioned risk for traffic fatality and, most particularly, an increase in rent prices for temporary housing during the drilling phase primarily. This increased rent would partially offset the wages gained by those newly employed, while potentially displacing individuals who were unable to secure sufficient employment to afford the increased rent.

Cumulative Effects

Cumulative effects include the projection of oil and gas development on other than federal minerals and Forest Service surface (private, state, and other federal ownerships for both mineral and surface ownership) for 105 wells per year total. This total is approximately 70 percent more than the prediction for Forest Service only wells. The primary effects will be direct and indirect increases to state and local revenues from oil royalties, income, and business taxes. Higher populations, robust employment, higher traffic, and increased development for housing, new businesses, and infrastructure would be expected. If housing development does not keep pace relative to the demand associated with this economic activity, housing could become increasingly expensive and displace those who are on the fringes of the economic boom.

These predictions are based on the assumption that the demand for oil and gas remains fairly constant or increases over the next 10 years. If demand were to substantially fall, local communities could find themselves with an excess of housing and local businesses and over-built infrastructure.

The Federal Highway Administration and the North Dakota Department of Transportation are planning to widen a segment of Federal Highway 85 between Interstate 94 and the Watford City Bypass to accommodate four travel lanes (NDDOT 2016). The introduction of these extra lanes would mitigate the risk of traffic fatalities that result from the increased oil and gas extraction.

Effects of Alternative 2 (no new oil and gas leasing)

Alternative 2 would limit oil and gas leasing to currently existing permits. As such, the current development trends explained in the affected environment section would persist, with further development occurring on existing leases to maintain current production levels. However, as current leases are developed and spent, or relinquished without development, oil and gas development and production on National Forest System lands would decline over time.

Effects of Alternatives 3 and 3B (continue leasing with revised stipulations)

Employment

Alternatives 3 and 3B would stipulate no surface occupancy for over 43 and 58 percent more lands, respectively, compared to alternative 1. These additional acreage limitations are spread across the Little Missouri National Grassland, but are most notably concentrated within McKenzie and Slope counties. See figure 5 and figure 7. Due to the high proportion of oil and gas production in McKenzie County, relative to the rest of the analysis area, with the no surface occupancy limits on oil and gas development, the associated short-term and long-term employment and labor income may potentially be less than that of alternative 1. However, the degree cannot be accurately quantified, given current data and the potential for oil and gas developers to instead adapt the reasonably foreseeable production to the remaining acreage or if economic return compensates for potentially higher development costs. If the imposition of restrictive stipulations on more acres reduces the interest of oil companies in leasing and developing these acres, total rent payments could decline.

Quality of Life

Similar to alternative 1, alternatives 3 and 3B would result in higher commute times and increased road wear primarily within McKenzie County and Williams County along Federal Highway 2 and Federal Highway 85. Commute times and road wear could also be expected to increase along nearby travel hubs, including Minot, Dickinson, and Williston. As well, the effects would be most prominent during the initial drilling period of each well. However, the degree of each effect could be less than that in alternative 1, due to a higher proportion of no surface occupancy, which may concentrate well pads in some areas within McKenzie County. Just as well though, the overall change in traffic, as compared to alternative 1, remains indeterminate.

Human Health

Similar to alternative 1, alternatives 3 and 3B would result in increased risk for traffic fatalities primarily within McKenzie County and Williams County, and especially during the initial drilling phase of each well. The degree to which this risk would differ from that in alternative 1 remains indeterminate, however. Outside of compliance with associated national and state standards, data on particular human health risks remains indeterminate.

Environmental Justice

In McKenzie County, limits on surface occupancy, and thus economical access, relative to alternative 1, could result in less of both the short-term and long-term economic impacts to the area. Similar to the employment and traffic however, this effect remains indeterminate. Furthermore, as in alternative 1, the effects on McKenzie County alone cannot be accurately quantified, but qualitative predictions can be made. That is, minority and low-income populations within McKenzie County could be expected to benefit from increased employment and wages in both the short-term and long-term. However, these benefits would be offset by an increased risk for traffic fatality and an increase in rent prices for temporary housing, primarily during the drilling phase. Increases in rent would most negatively affect those who were unable to secure sufficient employment from the oil and gas development to afford the increased rent.

Cumulative Effects

Cumulative effects would be approximately the same as alternative 1, as the projected levels of development do not differ between the action alternatives.

Air Quality

Oil and gas development and production results in emissions of criteria air pollutants that are regulated under the Clean Air Act through implementation of the National Ambient Air Quality Standards. The National Ambient Air Quality Standards are designed to protect human and environmental health and are established and enforced by the Environmental Protection Agency and the North Dakota Department of Environmental Quality⁷. The agencies work together to monitor State air quality conditions, and to develop and enforce air pollution control regulations as needed, in order to assure that human and environmental exposure to the criteria pollutants remains below unhealthy levels. Criteria pollutants are six common air pollutants: sulfur dioxide (SO₂), particulate matter (PM₁₀ and PM_{2.5}), carbon monoxide (CO), ozone (O₃), nitrogen dioxide (NO₂) and lead (Pb). Additionally, North Dakota Department of

⁷ Formerly the Environmental Health Division of the North Dakota Department of Health (NDDH). The North Dakota Department of Environmental Quality (NDDEQ) was established as a separate agency in May 2019. References pre-dating the reorganization retain the Department of Health name.

Environmental Quality has established North Dakota Ambient Air Quality Standards for sulfur dioxide (SO₂) criteria pollutant as well as a non-criteria pollutant, hydrogen sulfide (H₂S).

In addition to criteria air pollutant emissions, oil and gas development and production releases hazardous air pollutants and greenhouse gases. Hazardous air pollutants, also known as toxic air pollutants or air toxics, are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. The Environmental Protection Agency has identified and sets emission standards regulating 187 hazardous air pollutants. Typically, emissions from various processes and operations at oil and natural gas facilities and natural gas transmission and storage facilities contain 5 different HAPs: benzene, toluene, ethyl benzene, and mixed xylenes, and n-hexane.

Criteria air pollutants, hazardous air pollutants and greenhouse gases are produced from vehicle exhaust, diesel-powered engine and compressor exhausts, post-burn pollutants from flaring, hydrocarbons emitted from vents or leaks, and emergency diesel-powered electricity generators. Particulate emissions are also regulated. These can result in increased particulate matter in the air from sources that include fugitive road and well pad dust caused by mechanical disturbances, wind erosion of exposed soils, industrial processes, and products of combustion.

In addition to the protection of human and environmental health, the Clean Air Act mandates the protection of Class I airsheds from the adverse effects of anthropogenic air pollution sources to water, fauna, flora, and visibility. Visibility is measured in deciviews, with one deciview defined as the change in visibility that is just perceptible to an average person, or by the standard visual range, which is the furthest distance one can still see the outline of an object. Interagency Monitoring of Protected Visual Environments measures aerosol species that affect visual range, including ammonium sulfate, ammonium nitrate, organic mass, elemental carbon, soil elements, and coarse mass.

Affected Environment

The North Dakota Ambient Air Quality Monitoring Network is designed to monitor those air pollutants that demonstrate the greatest potential for deteriorating the air quality of North Dakota. Due to a greater number of pollution-producing sources in the western part of the state (primarily associated with the energy producing industries), the greatest percentage of the network is located there. Overall air quality conditions are considered good by the North Dakota Department of Environmental Quality (NDDEQ 2019).

Emissions and National Ambient Air Quality Standards

Emissions generated by oil and gas development on Federal minerals on the Little Missouri National Grassland are only a portion of the oil and gas emissions in the four counties in which the Little Missouri National Grassland is located and an even smaller portion of the air emissions from all sector operations.

An emission inventory of oil and gas development on the Little Missouri National Grassland and in the four counties in which the grassland is located is summarized from the Final Report Development of 2015 Oil and Gas Emissions Projections for the Williston Basin. Source categories covered by a four-county study (McKenzie, Billings, Golden Valley, and Slope Counties) are similar, but not identical, to sources used to calculate emissions in the Little Missouri National Grassland analysis with one major difference. The Little Missouri National Grassland emissions inventory for producing wells in 2015 includes emissions due to on-road mobile sources, such as the truck traffic associated with the various facets of oil and gas development. The Environmental Protection Agency collects or estimates information for the National Emission Inventory (NEI), the most recent year's data being from 2017 (table 17). The 2016 Oil

and Gas Air Resource Impact Assessment used 2011 NEI data and other data sources in its Base Case Emissions Modeling Methodology. The 2011 National Emissions Inventory estimated emissions for on-road sources in the four county area are shown for comparison to the Forest Service generated emission inventory. The table was updated in 2020 to show 2017 NEI data. The emissions inventory showing emissions from all source categories is shown for comparison to oil and gas emissions (EPA NEI 2011 and 2017 All Emissions - 4 Counties). In addition, North Dakota state-wide emissions from all source categories are shown for comparison (EPA NEI 2011 North Dakota State Total Emissions from All Sources, DSEIS 2015; EPA NEI 2017).

Air quality is determined primarily by measuring the concentration of pollutants in the atmosphere. In North Dakota, there are a variety of different monitoring networks for measuring air quality, including: state and local monitoring stations, Clean Air Status and Trends Network monitoring stations, and National Atmospheric Deposition Network monitoring stations, and Interagency Monitoring of Protected Visual Environments monitors. In the project area, there are three locations that contain monitoring stations: Dunn Center, Theodore Roosevelt National Park (Painted Canyon), and Lostwood National Wildlife Refuge.

Table 17. Comparison of Little Missouri National Grassland oil and gas emissions to four county area emissions and statewide emissions from all source categories (McKenzie, Billings, Golden Valley, and Slope Counties)

Emission Sources (data source)	Nitrogen oxide (tons/yr)	Volatile Organic Compounds (tons/yr)	Carbon Monoxide (tons/yr)	Sulfur Oxides (tons/yr)	Particulate matter (tons/yr)
Little Missouri National Grassland Producing Wells and mobile sources, 2015 (Ramboll Environ 2016)	1,093	2,395	3,042	546	608
Four County Oil and Gas Emissions Inventory, 2015 (does not include mobile emissions sources) (Ramboll Environ 2016)	7,950	73,402	12,883	2,768	339
EPA National Emissions Inventory Mobile Emissions Estimate - Four Counties, 2011	1,369	356	4,237	5	2,914
EPA National Emissions Inventory All Emissions - Four Counties, 2011	8,125	52,598	39,833	667	11,812
EPA National Emissions Inventory North Dakota State Total Emissions from All Sources, 2011	178,839	437,053	541,562	106,843	365,003
EPA National Emissions Inventory 2017 On Road Mobile Emissions Estimate - Four Counties	893	252	3,206	3	50
EPA National Emissions Inventory 2017 On and Non Road Mobile Emissions Estimate - Four Counties	1,822	770	5,772	4	130
EPA National Emissions Inventory 2017 Paved, Unpaved and Construction Dust Emissions Estimate - Four Counties	N/A	N/A	N/A	N/A	11,192
EPA National Emissions Inventory 2017 All Emissions - 4 Counties	13,228	155,321	21,024	3,495	21,300

Each year, the North Dakota Department of Environmental Quality compiles a report summarizing the ambient air quality data obtained from the network of air quality monitoring sites in the state during the previous year. The reports include carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, ammonia, hydrogen sulfide, and particulate matter ambient air quality data. The North Dakota Department of Health released a report in 2017 that summarized air quality monitoring data from 2016 (NDDH 2017). The following is a brief summary from the report, a more detailed discussion is available in appendix B of the Air Quality and Climate Change Report. None of the pollutants monitored exceeded state or Federal standards during the 2016 reporting year.

- Carbon Monoxide - Neither the state nor Federal carbon monoxide standards of 35,000 parts per billion (1-hour) or 9,000 parts per billion (8-hour) were exceeded at the monitoring site. The maximum concentrations are as follows: 1-hour – 754 parts per billion; 8-hour – 672 parts per billion.
- Lead - No lead monitoring was conducted.
- Nitrogen Dioxide - Neither the state nor Federal nitrogen dioxide standards of 100 parts per billion (1-hour) or 53 per billion (annual) were exceeded at any of the monitoring sites. The maximum concentrations were as follows: Three-year average of the 98th percentile 1-hour average concentrations – 33 parts per billion; annual – 4.91 parts per billion.
- Ozone - Neither the state nor Federal ozone standard of 70 parts per billion was exceeded during the year. The maximum fourth-highest 8-hour concentration was 59 parts per billion.
- Particulate Matter (PM₁₀, PM_{2.5}) - The Federal PM₁₀ 24-hour standard states that the concentration of PM₁₀ in the ambient air should not go over 150 micrograms per cubic meter of air (µg/m³) more than once per year on average over a three-year period. Neither the state nor Federal PM₁₀ standard was exceeded during the year. The 4th highest value over three years was 107 µg/m³. Neither the state nor Federal PM_{2.5} standards of 35 µg/m³ (24-hour) and 12 µg/m³ (annual) were exceeded during the year. The maximum concentrations are as follows: 24-hour – 22 µg/m³; annual – 6.6 µg/m³.
- Sulfur Dioxide - Neither the state nor Federal sulfur dioxide standard of 75 parts per billion (1-hour) was exceeded at any state operated monitoring site. The maximum concentration measured was: 3-year average 1-hour 99th percentile – 25 parts per billion.
- Hydrogen Sulfide – No hydrogen sulfide monitoring was conducted.
- Ammonia - There is no ambient air quality standard for ammonia. The maximum 1-hour concentration measured was 123 parts per billion with a maximum yearly average (arithmetic mean) of 2.9 parts per billion.
- Air Toxics (Hazardous Air Pollutants) - No air toxics monitoring was conducted.

Visibility-reducing Emissions, Regional Haze, and Class I Airsheds

The Clean Air Act protects Class I areas. The Class I areas in North Dakota include the Theodore Roosevelt National Park which consists of three separate, distinct units and the Lostwood National Wildlife Refuge Wilderness Area (figure 16). Monitoring site THRO1 is within the project area and LOST1 is approximately 50 air miles from the northern boundary of the project area. The North Dakota Department of Environmental Quality studied the sources of pollution affecting visibility during the worst visibility days for Theodore Roosevelt National Park and Lostwood National Wildlife Refuge Wilderness Area. The Department reported that sulfate and nitrate emissions occurring within the state account for

between 13 and 21 percent of pollutants affecting visibility and far greater amounts of pollution are transported into the state from upwind areas.

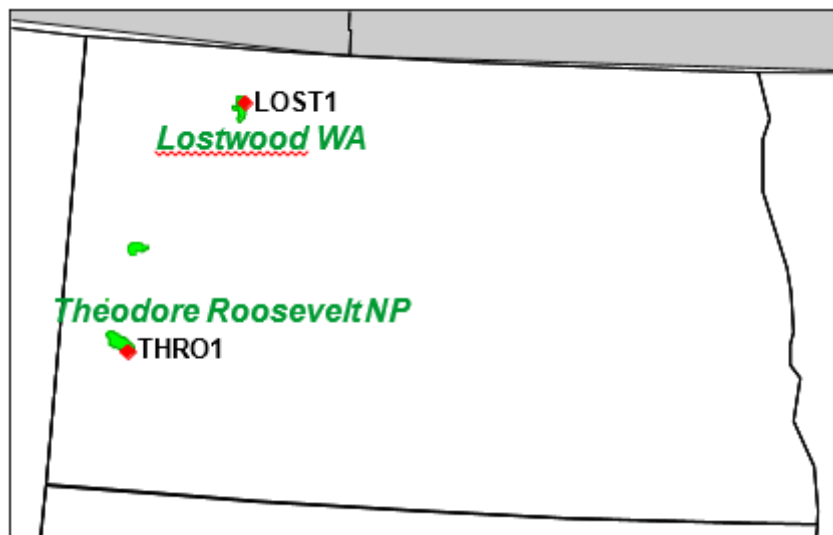


Figure 16. Map depicting Federal Class I areas and Interagency Monitoring of Protected Visual Environments monitors in North Dakota

In accordance with the 1999 Regional Haze Rule, Class I areas such as Theodore Roosevelt National Park are to show, over time, visibility improvement on the 20 percent worst days each year, and no degradation in visibility on the 20 percent best days each year. The mean visibility for all days can also be measured. For Theodore Roosevelt National Park, in 2012 the average visual range was 91 miles (147 kilometers). The visual range on average was 146 miles (235 kilometers) on the best 20 percent days, and 50 miles (80 kilometers) on the worst 20 percent days.

For the Theodore Roosevelt National Park, the total maximum nitrogen deposition due to all emissions in the 2013 base case used by modelers does not exceed the 5.0 kilograms per hectare per year (kg/ha-yr.) critical load value at Class I areas. The maximum annual sulfur deposition due to all emissions in the 2013 base case are all below the 5.0 kg/ha-yr. critical load value (Ramboll Environ 2016). See appendix A of the Air Quality and Climate Change Report for a detailed explanation of nitrogen and sulfur deposition critical loads and deposition analysis thresholds.

Effects of Alternative 1 (continue current leasing and stipulations)

Leasing of oil and gas mineral rights has no immediate effects on the environment, but commits resources as a transfer of property rights for development. Effects from the decision to lease oil and gas parcels come later, when the lessee decides to develop the parcel and applies for a permit to drill. The exact timing of such development is a function of market conditions and other factors that vary by lessee. The assumption for these indirect effects (i.e., those that come later in time) is based on the updated Reasonably Foreseeable Development Scenario (Hanna 2017) for the Little Missouri National Grassland, which predicts an average development of 62 oil wells per year. To model projected air quality impacts of the reasonably foreseeable development scenario, two approaches were used – near field and far field.

Near-field dispersion modeling was used to assess potential air quality impacts within 50 km of the project area. The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) Gaussian Plume dispersion model is EPA's preferred guideline model and was used for the

assessment developed by Anderson and Dzomba (2014). Plume visual impact modeling was performed to assess visibility impacts to Theodore Roosevelt National Park. The model used for this assessment is VISCREEN, which is the preferred model in accordance with the Federal Land Managers Air Quality Related Values Workgroup Phase I Report, as revised in 2010. VISCREEN Level 1 screening assumes worst case meteorological conditions and provides a conservative estimate of plume visual impacts.

Far field air quality impacts are best determined using photochemical grid modeling. Summaries of baseline and future air quality affects from oil and gas development and production are incorporated from Little Missouri National Grassland, Oil and Gas Air Resource Impact Assessment, 2016 – referred to as the Oil and Gas Air Resource Impact Assessment. The assessment covers the Little Missouri National Grassland portion of the Bureau of Land Management Montana and Dakotas Oil and Gas Air Resource Impact Assessment. The Air Quality and Air Quality Related Values impacts due to new oil and gas emissions within the Little Missouri National Grassland, as well as within each of the BLM Field Office planning areas in the Montana/Dakotas region, are presented in the assessment. The Air Quality and Air Quality Related Values impacts associated with new oil and gas emissions on Tribal and private/state lands within BLM Montana and Dakotas planning area are also presented, along with the cumulative impact associated with emissions from all oil and gas emissions. Emissions from non-oil and gas sources, such as major point sources, mobile emissions, wildfire, biogenic sources, and area sources within the planning area, are included in the analysis, as well (Ramboll Environ 2016).

Emissions and National Ambient Air Quality Standards

Overall, near field modeling found no estimated exceedances of the National Ambient Air Quality Standards. However, for nitrogen dioxide and PM_{2.5}, additional analyses and discussions were required.

The highest modeled nitrogen dioxide emissions occurred during the fracking/completion phase. While the overall 1-hour model result for nitrogen dioxide was below the National Ambient Air Quality Standards, individual fracking results were near or slightly exceeding the 1-hour standards for four of the five years modeled. An additional analysis determined the maximum distance from the well pad where modeled values for fracking/completion operations fell below the 1-hour standards for a given year. The analysis determined that at distances ranging from 470 to 532 meters, modeled concentrations were below the 1-hour standards. Though these distances could be used to inform a buffer to reduce potential public exposure to nitrogen dioxide, based on discussions with the North Dakota Department of Health and refinements in modeling methods since 2014, practical risks to the public seem low (NDDH personal communication 2018).

Modeled PM_{2.5} concentrations did not exceed the National Ambient Air Quality Standards, but modeled 1-hour concentrations for fracking/completion, when combined with background concentrations, were on average approximately 85 percent of the 1-hour standards. The main driver of PM_{2.5} concentrations are fugitive emissions and the modeling was performed without consideration for any emission controls. Control measures, such as use of gravel on roads or periodic watering of roads to reduce dust, will potentially lower actual PM_{2.5} concentrations. Similarly, far field modeling found no estimated exceedances of the National Ambient Air Quality Standards or any state standards in the region in the future (2032) year modeling.

Table 18. Summary of future (2032) emissions for the 16 oil and gas source categories (tons per year)

Source Group Description	Carbon Monoxide	Nitrogen Oxides	PM _{2.5}	PM ₁₀	Sulfur Dioxide	Volatile Organic Compounds
Existing oil and gas across Montana/Dakotas	11,096	7,853	268	268	1,800	52,218
LMNG – Low development scenario	1,217	698	146	999	174	3,808
LMNG – High ¹ development scenario	918	524	19	31	131	2,824
Total High Development Scenario on the LMNG	2,135	1,222	1,387	1,030	305	6,937

1. Note that high development scenario emissions are the incremental emissions that are added to the low growth emissions. LMNG = Little Missouri National Grassland

As newer Tier 4 equipment replaces older Tier 1-3 equipment, overall individual oil production emissions would decrease over time. More stringent air pollution controls are also being implemented by the state; North Dakota issued new regulations for ambient air quality standards, effective January 2019 ([NDAC 33.1-15-02](#)). More intensive development of the Bakken has also resulted in reduced emissions because, as more areas get electrical lines, the use of gas-powered electrical generators has declined (NDDH personal communication 2018). However, this decrease in emissions may be offset by increasing numbers of new wells with continued leasing. It should be noted that air quality modeling was based on an assumption of the use of Tier 4 equipment. Insofar as less than Tier 4 off-road diesel equipment is used in drilling and completion, actual emissions could be higher than those modeled.

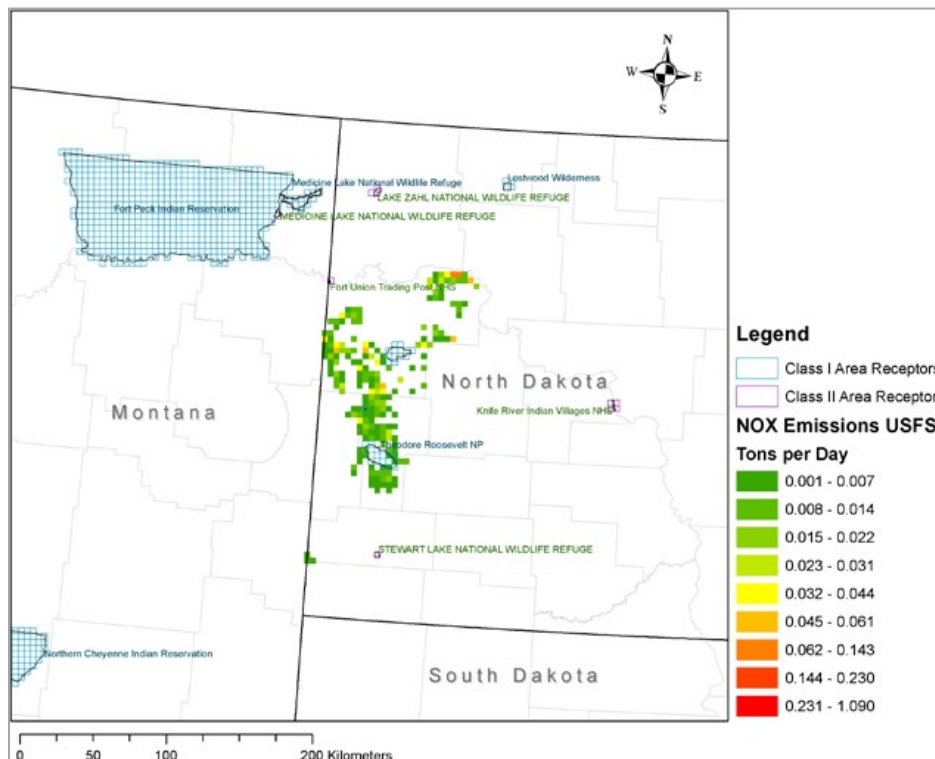


Figure 17. Nitrogen oxide emissions in the vicinity of Class I and Class II areas in alternative 1

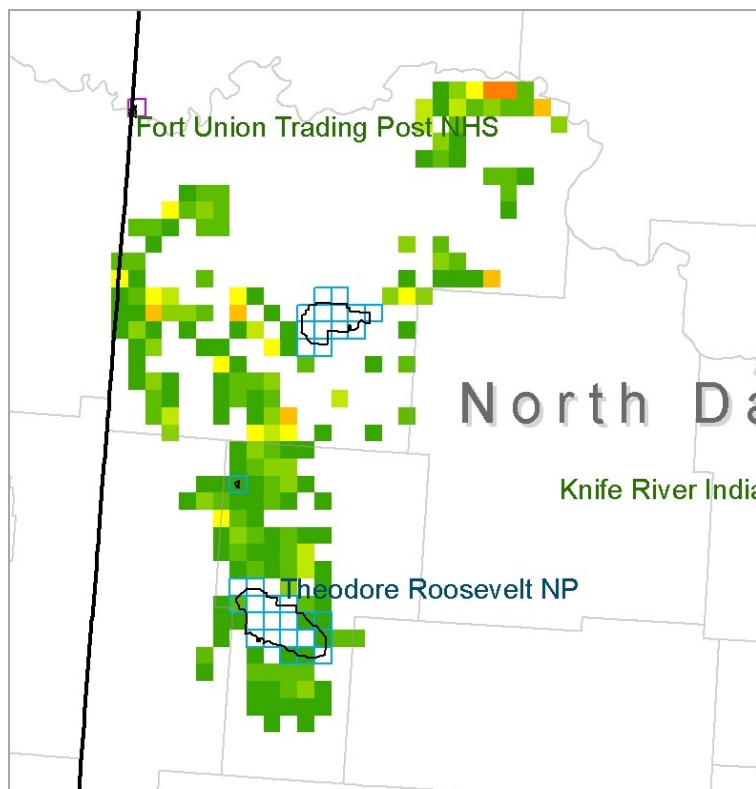


Figure 18. Locations of potential Little Missouri National Grassland oil and gas nitrogen oxide emissions and Class I area (blue) and sensitive Class II area (purple) 4-kilometer grid cell receptors

The air quality modeling results showed minor individual exceedances for 1-hour nitrogen dioxide standards within approximately 500 meters of fracking operations, but the overall 1-hour model result for nitrogen dioxide was below the National Ambient Air Quality Standards. Timing limitations and no surface occupancy, intended to limit noise and industrial disturbance in developed recreation sites, mean that chances for extended exposure to the public are low, as exceedance of the 1-hour standard depends on exposure for a full hour. Concerns of exposure of emissions to population transiting through the area of fracking were assessed as minimal, given normal traffic speeds and the sparse amount of traffic routinely traveling through the area, even if within 500 meters (NDDH personal communication 2018).

Visibility-reducing Emissions, Regional Haze, and Class I Airsheds

Under alternative 1 Little Missouri National Grassland oil and gas development and production emissions would reduce visibility and exceed nitrogen and sulfur deposition analysis thresholds at several Class I and Class II areas.

Nearfield visibility analysis stayed below default screening thresholds and showed no significant reduction in visibility at Theodore Roosevelt National Park due to Little Missouri National Grassland oil and gas development and production. Far field analysis showed emissions from oil and gas activity due to Forest Service actions in the Little Missouri National Grassland were estimated to cause exceedances of the 0.5 and 1.0 change in deciview visibility thresholds at the Fort Peck, Medicine Lake, and Theodore Roosevelt Class I areas. When examining the visibility impacts of the cumulative oil and gas emission scenarios, there were also exceedances of the 0.5 and 1.0 deciview thresholds at the Lostwood Class I area, in addition to Fort Peck, Medicine Lake and Theodore Roosevelt.

Nitrogen deposition due to new oil and gas from oil and gas leasing on the Little Missouri National Grassland were below critical load levels but above the deposition analysis threshold at Fort Peck and Theodore Roosevelt Class I areas. Cumulative nitrogen deposition levels due to oil and gas activity were also below Critical Load levels but above the deposition analysis threshold at Fort Peck, Medicine Lake, Lostwood, and Theodore Roosevelt Class I areas.

Sulfur deposition due to Little Missouri National Grassland oil and gas activity was below critical loads but above the deposition analysis threshold at the Theodore Roosevelt Class I area with cumulative oil and gas sulfur deposition impacts also below critical loads but above the deposition analysis threshold at the Lostwood and Theodore Roosevelt Class I areas.

Forest Service oil and gas actions in the Little Missouri National Grassland are not estimated to cause any exceedances of prevention of significant deterioration increments. The cumulative oil and gas scenarios are not estimated to cause any exceedances of prevention of significant deterioration increments except for 24-hour PM_{2.5} at the Fort Peck, Medicine Lake, and Lostwood Class I areas (Ramboll Environ 2016).

Effects of Alternative 2 (no new oil and gas leasing)

Alternative 2 would produce no new sources of criteria and hazardous air pollutants and greenhouse gases. Current undeveloped leases would produce new air pollution and greenhouse gases as they go online. However, any current undeveloped leases that expire before being developed would not be leased again under this alternative, creating less impact than under current management. As newer Tier 4 equipment replaces older Tier 1-3 equipment, and more stringent air pollution controls are implemented by the state, overall individual well emissions would decrease over time, with a lesser number of new wells under alternative 2.

Under alternative 2, Little Missouri National Grassland oil and gas development and production emissions would be less likely to reduce visibility and exceed nitrogen and sulfur deposition analysis thresholds at several Class I and Class II areas.

Effects of Alternative 3 (continue leasing with revised stipulations)

Alternative 3 would potentially allow the same level of increase in new oil and gas well development as alternative 1. However, because more acres are subject to no surface occupancy stipulations, some of these areas may be less desirable for lease and subsequent development, depending on economic considerations. Nonetheless, we assume the increase in new wells would lean towards the high oil and gas development scenario, resulting in overall increases to criteria and hazardous air pollution and greenhouse gases and the effects described in this report.

This alternative revises the stipulation which prohibits surface use (including fracking) from occurring during the May 1 – December 1 timeframe and prohibits surface occupancy within developed recreation sites. Instead of specifying named sites, it specifies sites with a development scale of 3 through 5, thus allowing sites to drop off or new sites to be added, as recreation changes. The expected effect of this change is no different from alternative 1, as developed recreation sites are not expected to change.

These timing limitations and no surface occupancy, intended to limit noise and industrial disturbance in developed recreation sites, mean that chances for extended exposure to the public are low, as exceedance of the 1-hour standard depends on exposure for a full hour. Concerns of exposure of emissions to population transiting through the area of fracking were assessed as minimal, given normal traffic speeds and the sparse amount of traffic routinely traveling through the area, even if within 500 meters (NDDH personal communication 2018).

As newer Tier 4 equipment replaces older Tier 1-3 equipment, overall individual oil production emissions would decrease over time. More stringent air pollution controls are also being implemented by the state; North Dakota issued new regulations for ambient air quality standards, effective January 2019 ([NDAC 33.1-15-02](#)). More intensive development of the Bakken has also resulted in reduced emissions because, as more areas get electrical lines, the use of gas-powered electrical generators has declined (NDDH personal communication 2018). However, this decrease in emissions may be offset by increasing numbers of new wells with continued leasing. It should be noted that air quality modeling was based on an assumption of the use of Tier 4 equipment. Insofar as less than Tier 4 off-road diesel equipment is used in drilling and completion, actual emissions could be higher than those modeled.

Under alternative 3 Little Missouri National Grassland oil and gas development and production emissions would reduce visibility and exceed nitrogen and sulfur deposition analysis thresholds at several Class I and Class II areas, as described in the effects of alternative 1. Currently leased parcels that are not held by production, should they become unleased in the future, would be offered again for lease, with effects also as described in alternative 1. The number and location of such re-offered leases cannot be predicted.

Effects of Alternative 3B (continued oil and gas leasing with revised stipulations and lease notices)

For air quality this alternative is similar to alternative 3 with the addition of a lease notice requiring operators using less than Tier 4 equipment to complete air quality analysis and monitoring to show compliance with Clean Air Act. As the air quality modeling was based on the assumption that Tier 4 engines are used, this lease notice would ensure that National Ambient Air Quality Standards are not exceeded, as per the modeling results described in the effects of alternative 1. All other effects are the same as alternative 3.

Similar to alternatives 1 and 3, under alternative 3B, Little Missouri National Grassland oil and gas development and production emissions would reduce visibility and exceed nitrogen and sulfur deposition analysis thresholds at several Class I and Class II areas, as described in the effects of alternative 1.

Cumulative Effects for All Alternatives

Cumulative effects analysis is incorporated as part of the modeling and effects analysis above. Baseline data plus the reasonably foreseeable development scenario for future development of oil and gas wells (average of 62 wells per year) form the basis for estimating the amount of air pollution and greenhouse gas emissions that will be produced in the future to 2032.

New wells may also occur on existing leases that have yet to be developed, or under alternatives 1, 3 and 3B, on new leases for National Forest System lands. The same can be said for leases on Federal minerals with non-National Forest System surface and for private or state mineral estate leases. The reasonably foreseeable development scenario projects a total of 105 new wells per year for all mineral ownerships (Hanna 2017), which is approximately 70 percent more than for Forest Service surface over Federal minerals. Cumulative emissions are thus assumed to be 70 percent greater than modeled emissions.

For alternative 2, no new oil and gas development would occur on currently unleased National Forest System surface with Federal mineral ownership, but additional wells could be developed on areas already under lease. Any current leases that were not developed prior to the 10-year lease expiration would not be leased again.

Summary of Effects

Under all action alternatives 1, 3, and 3B no exceedance of National Ambient Air Quality Standards was predicted by far-field modeling from oil and gas leases on Forest Service minerals. For near-field modeling, overall results showed no exceedances, though some individual results showed minor exceedances for the 1-hour standard for nitrogen dioxide.

Nearfield visibility analysis showed no significant reduction in visibility at Theodore Roosevelt National Park due to Little Missouri National Grassland oil and gas development and production. Far field analysis showed emissions from oil and gas activity due to Forest Service actions in the Little Missouri National Grassland were estimated to cause exceedances of the 0.5 and 1.0 change in deciview visibility thresholds at the Fort Peck, Medicine Lake, and Theodore Roosevelt Class I areas.

Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

Greenhouse Gas Emissions and Climate Change

Scientific publications and public awareness of global climate change has increased considerably in recent years. There is broad scientific consensus that increases in average global temperature are likely if atmospheric concentrations of greenhouse gases continue to accumulate at current rates. Increasing greenhouse gases are known to cause global warming and adverse climate effects, and the release of greenhouse gases is not regulated by law in the United States or by the state of North Dakota.

In 2019, the Council on Environmental Quality released draft National Environmental Policy Act guidance on consideration of greenhouse gas emissions (Kirkpatrick and Boling 2019). They determined that “a projection of a proposed action’s direct and reasonably foreseeable indirect GHG emissions may be used as a proxy for assessing potential climate effects.” To establish the scale of a proposed project’s potential emissions, they also directed that “where greenhouse gas inventory information is available, an agency may also reference local, regional, national, or sector-wide emission estimates to provide context for understanding the relative magnitude of a proposed action’s greenhouse gas emissions.” This report assesses the full life-cycle emissions of greenhouse gases, from exploration and production to end-use of oil and gas products, using the best available data.

Affected Environment

According to the North Dakota Department of Mineral Resources, the typical well drilled on the Bakken Shale produces 1,148,359 barrels of oil and 3,897,381 thousand cubic feet (mcf) of natural gas over the life of the well. For the Little Missouri National Grassland, drilling for federal oil and gas occurs in parts of McKenzie, Billings, Slope, and Golden Valley counties.

The relevant life cycle phases of crude oil and natural gas greenhouse gas emissions include:

- Exploration and production
- Raw material transport
- Refining and processing
- Product transport
- End-use

The phases trace the initial drilling and production of crude oil and natural gas through the supply chain as they are refined into consumable products, which are ultimately combusted.

Exploration and Production

The reasonably foreseeable development scenario states that an average of 66 wells per year⁸ are expected to be drilled on FS-managed lands over a 10-year time span (Hanna 2017), occurring in parts of McKenzie, Billings, Slope, and Golden Valley counties. The 66 wells per year are allocated based on the expected development to occur in each county (table 19). Expected development is projected from the average number of wells completed in each county from 2010 through 2016, based on data provided by the North Dakota Department of Mineral Resources. We assume that the lands managed by the Forest Service in these counties are representative of the counties as a whole in terms of development potential.

Wells are classified as oil or gas wells, depending on the ratio of gas to oil. The Energy Information Administration specifies a threshold of less than six thousand standard cubic feet of gas per barrel of oil are classified as oil wells (EIA 2018d). The Environmental Protection Agency threshold is less than 100 thousand standard cubic feet of gas per barrel of oil are classified as oil wells (EPA 2019). Using historical production data on the Little Missouri National Grasslands from wells located within the counties of interest, all the projected wells are classified as oil wells for both threshold values. Any gas produced is assumed to be associated gas (dissolved in crude oil).

Table 19. Projected wells by county based on historical well completions in Billings, Golden Valley, McKenzie, and Slope counties

Year	Billings County	Golden Valley County	McKenzie County	Slope County
2010	7	2	145	1
2011	23	7	275	1
2012	56	14	507	1
2013	36	21	693	0
2014	32	2	825	6
2015	6	2	573	0
2016	1	0	351	0
Average wells/year	23.0	6.86	481.29	1.29
Percent of total wells	4.5	1.3	93.9	.03
Projected wells*	30	9	620	2

*Total wells projected may not sum to 660 due to rounding.

Raw Material Transport

According to the Energy Information Administration, North Dakota has two crude oil refineries (EIA 2019a). Both refineries are owned by Marathon Petroleum Corporation, with one located in Mandan, ND and the other in Dickinson, ND. The Mandan facility, the larger of the two, is capable of processing 74,000 barrels of oil per day (Marathon Petroleum 2020), and the Dickinson facility is being converted to renewable diesel. Consequently, as validated by the North Dakota Department of Commerce, the Mandan facility is assumed to be the destination for all oil produced in this project. To reduce complexity, the starting point for all crude oil production is McKenzie County where the vast majority of development is expected to occur. This produces a transport distance of approximately 185 miles. Due to the extensive pipeline network in western North Dakota, all crude oil is assumed to be transported via pipeline.

⁸ The Reasonably Foreseeable Development Scenario actually predicts 62 wells per year for 10 years. Because of the numerous complex calculations, the results have not been adjusted. Expected effects are less and within the analysis displayed in this section.

There are over 20 natural gas processing facilities in North Dakota with all of them located in western North Dakota. The plants are spread relatively even throughout McKenzie County, with sparse facilities in Divide County to the north and Bowman County to the south. Due to numerous processing facilities, parameters for natural gas transport are modeled using national averages.

Refining and Processing

Data are unavailable regarding the exact outputs from the Mandan refinery; however, various sources indicate the facility follows typical national trends. Therefore, national averages for both crude oil refinery and natural gas processing parameters are used to estimate emissions from expected products (Skone and Gerdes 2009, EIA 2019b).

Product transport

According to Mandan Refinery, products are shipped using truck and rail. Most of the products produced at the Mandan refinery are transported to eastern North Dakota and Minnesota; however, their final destination is not known. Therefore, national average emission factors for crude product transport and processed natural gas are used (Skone and Gerdes 2009, Merrill et al. 2018, EPA 2019).

End-use

All products produced are assumed to undergo complete combustion.

Effects of All Action Alternatives

The acres available for oil and gas leasing and the number of wells predicted is consistent across all action alternatives (1, 3, and 3B). Only the manner of development, based on differing stipulations, differs by alternative. Therefore, total oil and gas production and the life-cycle greenhouse gas emissions are not expected to differ between action alternatives. In practice, full life-cycle emissions may vary, based on development patterns and economic considerations, but these variations cannot be meaningfully assessed at the scale of full life-cycle emissions. The following analysis applies to alternatives 1, 3, and 3B.

Alternative 2 would entail no new leasing, and therefore, no greenhouse gas emissions would be associated with the decision, if that were the chosen alternative. Emissions from current leases would occur, and some of those could be from new development on leases currently held, but not yet developed.

The emissions from each respective life cycle phase are presented in this section. Emissions are presented in several different units. Due to the differing heat trapping abilities of molecules (global warming potential), units of million metric tons (MMT) of carbon dioxide equivalent (CO₂e) are given. This conversion is useful for placing all emissions on the same scale for evaluating their potential climate change impact (Pachuri and Meyer 2014). Further, as there is a temporal component involved in the conversion, both 20-year and 100-year time horizon factors are included from the latest Intergovernmental Panel on Climate Change Assessment Report (AR5) (Pachuri and Meyer 2014).

Table 20. Exploration and production related emissions for counties of interest

Phase	Methane CH ₄ (tons)	Carbon Dioxide CO ₂ (tons)	Nitrous Oxide N ₂ O (tons)	20-year Carbon Dioxide Equivalent CO ₂ e (MMT)	100-year Carbon Dioxide Equivalent CO ₂ e (MMT)
Exploration	4,160.4	798,208.5	1.4	1.0	60.8
Production	111,662.4	6,242,470.1	126.2	14.2	8.5
Total	115,822.8	7,040,678.6	127.6	15.2	69.3

Table 21. Emissions from the transport of crude oil and natural gas

Material	Methane CH ₄ (tons)	Carbon Dioxide CO ₂ (tons)	Nitrous Oxide N ₂ O (tons)	20-year Carbon Dioxide Equivalent CO ₂ e (MMT)	100-year Carbon Dioxide Equivalent CO ₂ e (MMT)
Crude oil	2,860.266	1882,466.491	33.838	1.93	1.79
Natural gas	141,676.01	10,439,284.95	0.01	20.27	13.07
Total	144,536.28	12,321,751.44	33.85	22.20	14.86

Table 22. Crude oil refinery and natural gas processing facility emissions

Product	Methane CH ₄ (tons)	Carbon Dioxide CO ₂ (tons)	Nitrous Oxide N ₂ O (tons)	20-year Carbon Dioxide Equivalent CO ₂ e (MMT)	100-year Carbon Dioxide Equivalent CO ₂ e (MMT)
Gasoline	21,537.00	17,628,148.95	285.50	17.70	16.61
Diesel	15,371.58	12,454,168.42	192.45	12.52	11.73
Kerosene (jet fuel)	3,334.86	2,705,136.01	41.86	2.72	2.55
Petroleum Coke	1,795.78	1,463,685.26	23.12	1.47	1.38
Residual fuel oil	981.48	815,975.45	14.01	0.82	0.77
Natural Gas	42,955.51	4,134,942.05	14.68	7.03	4.85
Total	85,976.21	39,202,056.14	571.63	42.25	37.88

Table 23. Emissions related to the transport of processed oil and natural gas products (gasoline, diesel, kerosene, processed gas)

Crude oil products	Methane CH ₄ (tons)	Carbon Dioxide CO ₂ (tons)	Nitrous Oxide N ₂ O (tons)	20-year Carbon Dioxide Equivalent CO ₂ e (MMT)	100-year Carbon Dioxide Equivalent CO ₂ e (MMT)
Pipeline	1,231.82	1,064,475.77	13.81	1.0629	1.0003
Water carrier	13.65	132,482.38	7.33	0.1230	0.1223
Railroad	0.33	4,042.06	0.11	0.0037	0.0037
Truck	1.41	24,975.25	0.74	0.0229	0.0229
Processed natural gas					
Transmission	138,198.24	14,336,486.30	375.80	23.63	16.61
Distribution	88,422.44	31,775.69	-	6.77	2.27
Total	227,867.89	15,594,237.45	397.79	31.61	20.03

Table 24. Emissions from the combustion of crude oil and natural gas products

Product	Methane CH ₄ (tons)	Carbon Dioxide CO ₂ (tons)	Nitrous Oxide N ₂ O (tons)	20-year Carbon Dioxide Equivalent CO ₂ e (MMT)	100-year Carbon Dioxide Equivalent CO ₂ e (MMT)
Gasoline	6,116.20	141,316,439.26	1,287.62	128.98	128.67
Diesel	4,358.96	107,601,073.19	858.06	98.15	97.93
Kerosene	1,527.29	37,809,819.11	298.01	34.49	34.41

Product	Methane CH ₄ (tons)	Carbon Dioxide CO ₂ (tons)	Nitrous Oxide N ₂ O (tons)	20-year Carbon Dioxide Equivalent CO ₂ e (MMT)	100-year Carbon Dioxide Equivalent CO ₂ e (MMT)
Petroleum Coke	740.45	25,209,826.04	154.98	22.96	22.93
Residual fuel oil	351.60	8,680,901.12	68.70	7.92	7.90
Processed natural gas	2,924.93	154,595,448.45	283.97	140.54	140.39
Total	16,019.44	475,213,507.16	2,951.35	433.04	432.22

Utilizing information available in the reasonably foreseeable development scenario, 660 wells are projected to be drilled on the Little Missouri National Grasslands over a period of 10 years. It is important to note that the wells each have an expected life of 41 years, which is the timeframe used for this analysis. Over this 41-year life span per well, over 759 million barrels of oil and 2.58 trillion cubic feet of gas are projected to be produced. Table 25 summarizes the total emissions from each life cycle phase as well as their contribution to the total over a 41-year span.

Table 25. Summary of estimated life-cycle emissions resulting from oil and gas development

Phase	CH ₄ (1000 tons)	CO ₂ (1000 tons)	N ₂ O (1000 tons)	20-year CO ₂ e (MMT)	20-year Contribution (%)	100-year CO ₂ e (MMT)	100-year Contribution (%)
Exploration & production	115.82	7,040.68	0.13	15.2	2.80	9.4	1.82
Raw material transport	144.54	12,321.75	0.03	22.2	4.08	14.9	2.89
Refining and processing	85.98	39,202.06	0.57	42.3	7.76	37.9	7.37
Product transport	227.87	15,594.24	0.40	31.6	5.81	20.0	3.89
End-Use	16.02	475,213.51	2.95	433.0	79.55	432.2	84.03
Total	590.22	549,372.23	4.08	544.3	100.0	514.4	100.00

*MMT = million metric tons

The expected potential greenhouse gas emissions from this project over a 41-year span are 544.3 million metric tons of carbon dioxide equivalent, using 20-year AR5 GWP factors. Using 100-year AR5 GWP factors, the total estimate is 514.4 MMT CO₂e. Emissions from combustion of the final fuel products comprise approximately 80 to 84 percent of the overall total, depending on the GWP factors.

Production Uncertainty

Comparing life cycle assessment studies is notoriously difficult, due to differing system boundaries, assumptions, information sources, and the numerous operating parameters for all life cycle phases. The Environmental Protection Agency 2020 Greenhouse Gas Inventory estimates the uncertainty for emissions from petroleum systems to possess a lower bound of 31 percent and an upper bound of 34 percent for both methane and carbon dioxide emissions. Natural gas systems are estimated to have a lower bound of 14 percent with an upper bound of 17 percent for both methane and carbon dioxide. For combustion of fuels, petroleum related emissions possess a lower bound of six percent with an upper bound of six percent. Natural gas combustion has a lower bound of one percent with an upper bound of five percent. Manipulating the production volumes of crude oil and natural gas are the most important parameters in capturing uncertainty across the life cycle. Table 26 presents low, expected, and high

emission scenarios based on a 10 percent upper/lower uncertainty in production volumes of crude oil and natural gas.

Table 26. Potential emissions in million metric tons (MMT) of carbon dioxide equivalent for low, expected, and high production scenarios (10 percent increase/decrease in volume) using AR5 100-year GWPs

Scenario	Exploration & production	Raw material transport	Refining & processing	Product transport	End-use	Total
Expected	9.36	14.86	37.88	20.03	432.22	514.36
Low	9.27	13.37	34.22	18.03	389.00	463.89
High	9.45	16.34	41.82	22.03	475.45	565.10

Variation in production volumes produces the largest change in overall emissions, with a difference of approximately 50 million metric tons between scenarios. Figure 19 presents the potential emissions from expected, low, and high production scenarios and highlights the dominance of end-use life cycle emissions relative to other stages.

Oil and gas emissions in the Williston Basin should be declining on a per well basis due to new regulations and requirements by the Environmental Protection Agency and the State of North Dakota. One example of improving efficiency over time and that reduces emissions is the oil and gas industry is transitioning from older Tier 1 - 3 motor vehicle and generator engines to more efficient Tier 4 engines. Flaring is the largest producer of criteria air pollutants and greenhouse gases for the production life-cycle stage in North Dakota (NDDMR 2017b).

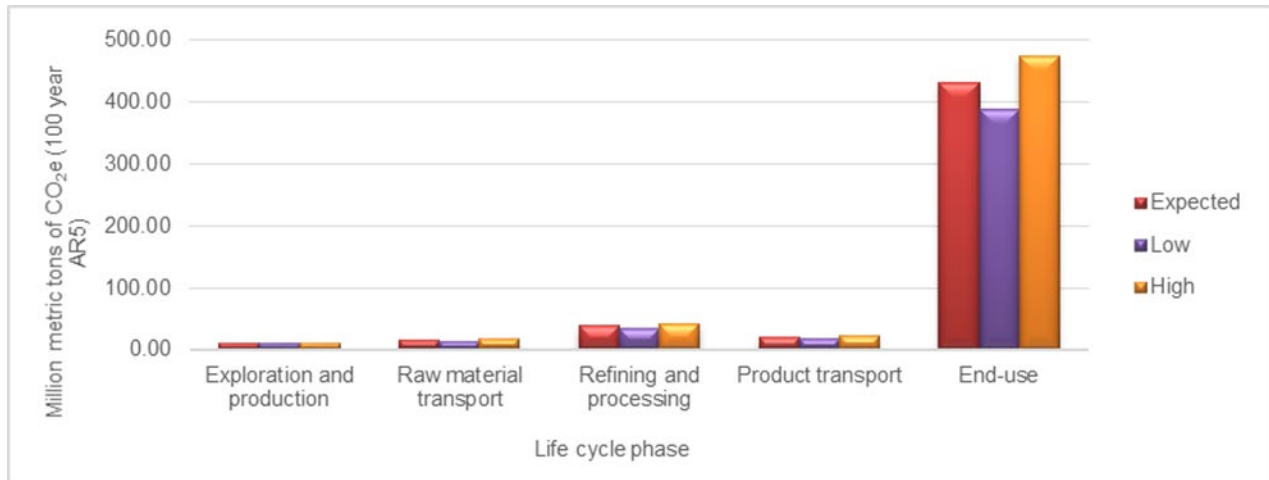


Figure 19. Potential emissions of carbon dioxide equivalent from low, expected, and high production volumes of crude oil and natural gas

Oil production flares release carbon dioxide and raw methane, both of which contribute to global climate change. Methane from flares is the largest source of greenhouse gas emissions from North Dakota's oil and gas sector. Gas flaring in North Dakota's Bakken Shale oil field increased from about 40 million cubic feet per day (MCFD) in 2007 to about 374 MCFD during 2014. Flaring decreased to about 145 MCFD in 2016 and increased again to about 222 MCFD in June 2017, the last month for which data were available (NDDMR 2017c). See figure 20.

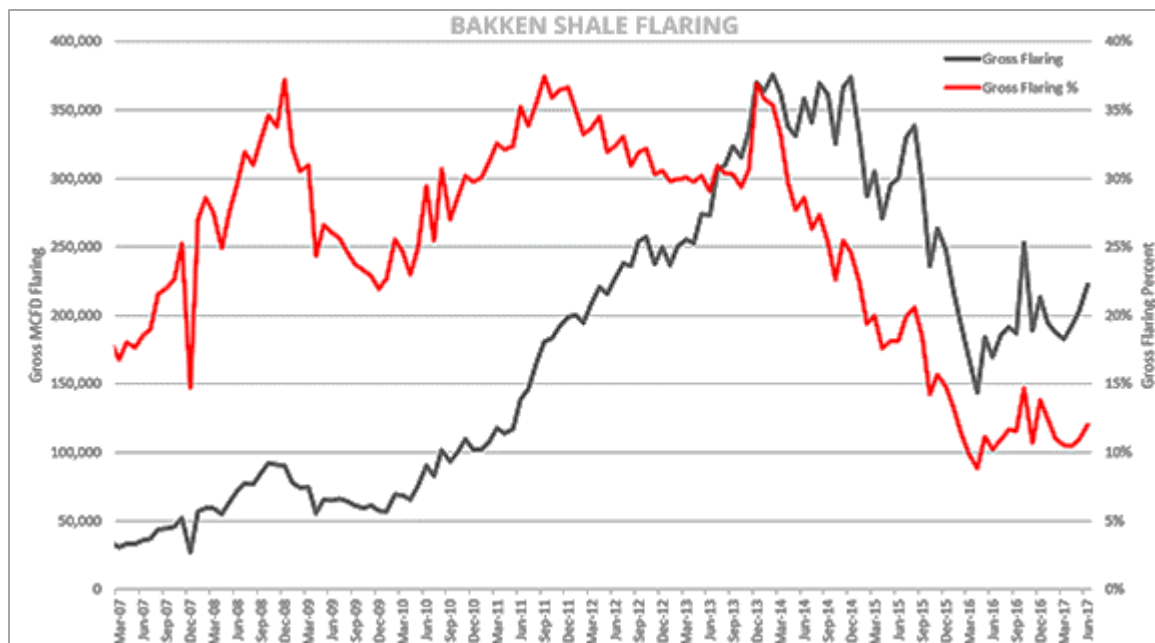


Figure 20. Bakken Shale gross flaring (black) and gross flaring percent of production (red) from 2007-2017 (North Dakota Industrial Commission, Department of Mineral Resources/North Dakota Pipeline Authority)

Like other oil fields, the Bakken Shale produces large amounts of gas along with its crude. Unlike other fields, though, it has historically lacked the pipelines and processing plants needed to move gas to market. Most other oil-producing states do not allow long-term flaring. In 2014, the State of North Dakota passed regulations aimed at limiting flaring by 2020. The State Industrial Commission set a goal of reducing flaring to 10 percent of total gas production and later reduced the final level to 9 percent. The State also required companies to submit plans for how they will capture gas when they apply for an oil well permit.

At the peak of the oil expansion in December 2014, producers in North Dakota were flaring 374 million cubic feet a day, or 25 percent of production. By April 2016, the volume was down to 144 million cubic feet a day, or 8.8 percent of production. In May of 2017, oil production grew to 1.85 billion cubic feet a day and flaring reached 203 million cubic feet per day, or about 10.9 percent of production. In June of 2017, the volume and percentage of flaring increased to 12 percent and 222 million cubic feet per day (Lee 2017). However, in June 2019, several gas processing facilities were off-line, gas capture rates dropped to 76 percent, and flaring reached a record of over 686 million cubic feet per day (NDDMR 2019).

Life cycle impact assessment

As stated previously, the total estimated emissions from this project, utilizing AR5 100-year GWPs, are estimated at 514.4 million metric tons carbon dioxide equivalent over the course of the project’s life. On an annual basis, this breaks down to 12.55 million metric tons carbon dioxide equivalent per year.

To better ascertain the scale of the project, comparisons with global, national, state, and Forest Service fossil lease emissions are helpful. According to World Research Institute (2020), in 2016, global anthropogenic carbon dioxide equivalent emissions from all sources were 49,358 million metric tons (IPCC 2014). Global anthropogenic emissions from all sources for 2020 are currently unavailable; however, the International Energy Agency states that 33,300 million metric tons of carbon dioxide equivalent were released in 2019 from fossil combustion (IEA 2020). In 2018, the United States was responsible for 6,677 million metric tons carbon dioxide equivalent in gross emissions from all sectors,

with 5,032 million metric tons carbon dioxide equivalent occurring from fossil fuel combustion (EPA 2020).

In 2017, according to the Energy Information Administration, energy-related emissions (combustion) for North Dakota were 56.17 million metric tons carbon dioxide equivalent (EIA 2019c). In 2018, petroleum and natural gas systems were estimated to emit 248.1 million metric tons carbon dioxide equivalent, which includes fugitive emissions and emissions from flaring (EPA 2020). A report published by the United States Geological Survey estimates greenhouse gas emissions from fossil fuel development (crude oil, natural gas, coal) on federal lands (Merrill et al. 2018). Taking this report in combination with fossil fuel development data on Forest Service managed lands, emissions in 2018 from Forest Service-leased fossil fuel development were approximately 75.7 million metric tons carbon dioxide equivalent. Table 27 presents the estimated contribution of the project on a per year (41-year life) basis to each of these categories.

Table 27. Relative yearly contributions of the project to global, national, state, and Forest Service emissions

Scale	Emissions* (MMT CO ₂ e)	Yearly addition (percentage)
Global anthropogenic, 2016 (all sources)	49,000	0.026
Global anthropogenic, 2019(fossil combustion)	33,300	0.032
United States anthropogenic, 2018 (all sources)	6,677	0.188
United States anthropogenic, 2018 (energy)	5,032	0.209
North Dakota anthropogenic, 2017 (fossil combustion)	56.17	18.768
United States petroleum and natural gas systems, 2018	248.10	0.807
Forest Service fossil fuel leases, 2018	75.70	16.572

*Million metric tons of carbon dioxide equivalent using AR5 100-year global warming potentials

Potential climate effects

Climate change refers to any major and sustained change in factors affecting the global climate system, such as surface and ocean temperatures, precipitation patterns, and atmospheric conditions. Evidence has shown that rising levels of greenhouse gases in the atmosphere have contributed to climate change. Excess greenhouse gases trap more heat, leading to a rise in Earth’s average surface temperature. The U.S. Global Change Research Program (<https://www.globalchange.gov/climate-change>) provides broader and more detailed information about climate change in the Fourth National Climate Assessment, which provide essential tools for linking science and decision-making (Wuebbles 2017).

General effects on changes in temperature and precipitation from increasing concentrations of greenhouse gases are documented in the latest assessments and are acknowledged (Pachauri and Meyer 2014). The Fourth National Climate Assessment reports scientific evidence of the effects of climate change on forests (Wuebbles 2017). The effects include but are not limited to:

- More frequent wildfires that burn larger areas
- More severe problems with insects, pests, and diseases threatening trees and crops
- Snowpack decline in mountainous regions due to decreased snowfall and shorter winters
- Plant and animal ranges shifting northward to accommodate warmer temperatures
- Threatened watersheds due to more frequent water shortages, increased pest and fire severity, and shifts in ecosystem health.

The climate impact for this project will be related to the additional greenhouse gas emissions it is predicted to emit into the atmosphere. Because local greenhouse gas emissions mix readily into the global pool of greenhouse gases, it is difficult and highly uncertain to assess the indirect effects of emissions from single or multiple projects of this size on global climate (EPA 2018). North Dakota emitted 56.17 million metric tons of carbon dioxide equivalent in 2017 from fossil fuel combustion, while Forest Service fossil leases emitted 75.7 million metric tons carbon dioxide equivalent in 2018. Referring to Table 27, the project will add approximately 19 percent and 17 percent, respectively, on an annual basis, to these categories. Climate trends for the Northern Plains reported in the National Climate Assessment include increasing temperature and more frequent droughts.

Cumulative Effects

The reasonably foreseeable development scenario projects up to 105 wells per year for all ownerships within the Little Missouri National over a 10-year time span (Hanna 2017), a figure that is almost 60 percent higher than for wells on Forest Service surface over federal minerals. Table 25 displays the full life-cycle emissions expected from oil and gas development on all ownerships within the project area, keeping well-life, production, transport, and other assumptions constant. These emissions would be expected to add approximately 28 percent to the North Dakota 2017 emissions from fossil fuel combustion.

In addition to oil and gas development on non-federal ownerships, the economic boom is resulting in many new housing and infrastructure developments. The entire Bakken region, especially McKenzie County, has seen large increases in population, business, and traffic beyond that directly connected to oil and gas production. Population in the region has increased approximately 33 percent the current boom started in 2008. (See Socioeconomic Considerations above.) All of this activity adds to the cumulative greenhouse gas emissions in the vicinity of the Little Missouri National Grassland. Exact measures are beyond the scope of this analysis.

Soils

Affected Environment

There are 303 individual soil map units within the project area. Silt loam, loam, and fine sandy loam textured soils make up over 90 percent of the surface textures in the project area. Alluvium and residuum compose the dominant parent materials across the landscape. The terrain encompassed by the analysis area is quite varied in respect to slope, aspect, and elevation; the landscape is distinctly hilly. The elevation in the project area ranges from 1,800 to 3,500 feet. The project area slopes range from 0 to greater than 40 degrees.

In 2011, the Dakota Prairie Grasslands used the watershed classification and assessment tracking tool (WCATT) protocol (USDA Forest Service 2011a) to assess the overall health of the 6th HUC watersheds on the Grasslands. One of the parameters assessed was the overall condition of the soils by watershed. This indicator addresses alteration to natural soil condition, including productivity, erosion, and chemical contamination. Soils, by watershed, were given an overall score of “poor”, “fair”, or “good”. These ratings were then used to give an overall rating to the functionality of each of the watersheds. Overall watershed functionality is discussed in the Watershed Report found in the planning record.

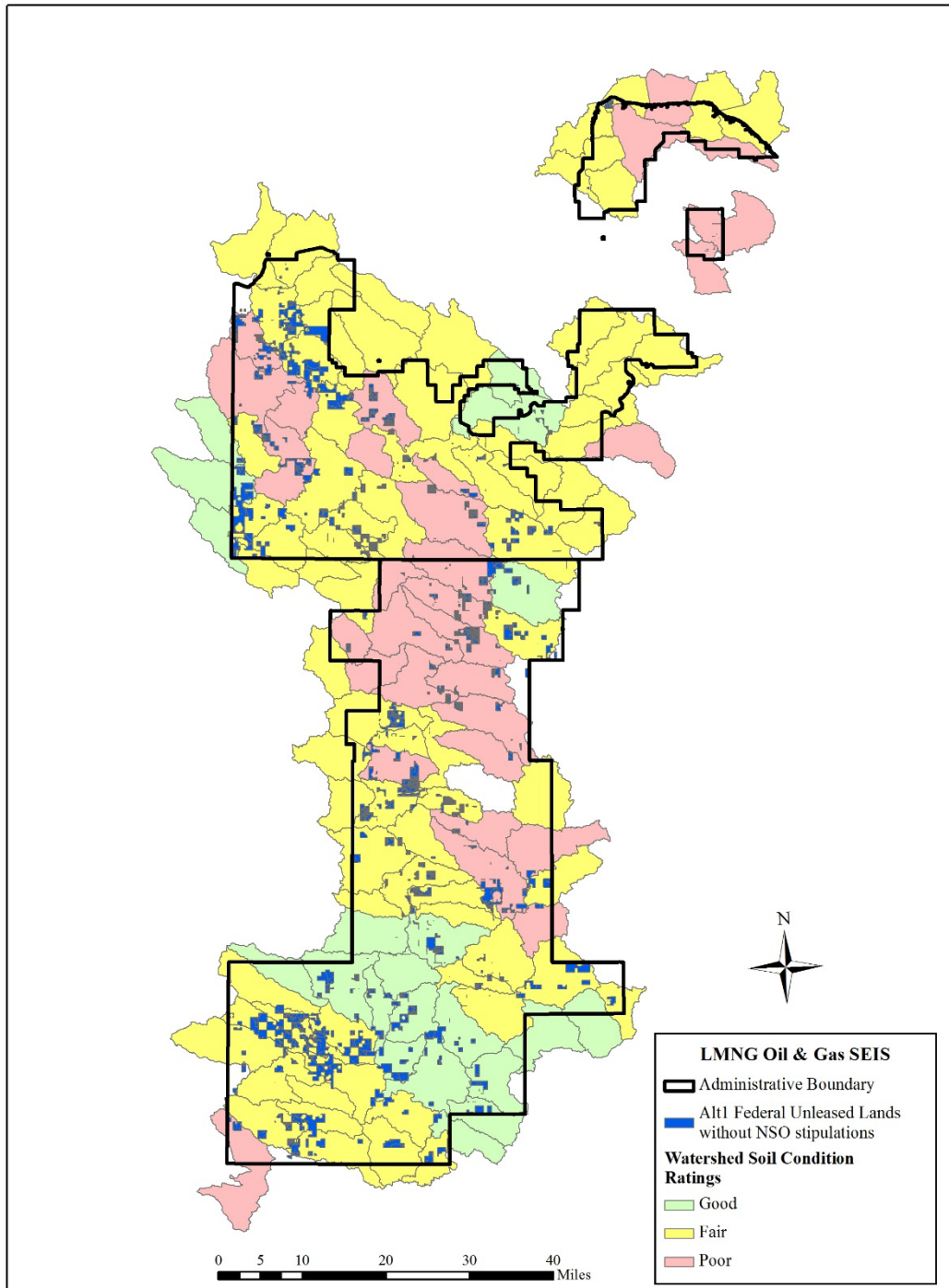


Figure 21. Soil condition ratings for sixth HUC watersheds involved with the Little Missouri National Grassland Oil and Gas SEIS

We assessed 128 watersheds across the Dakota Prairie Grasslands for soil condition. The majority of project area watersheds (76 watersheds or 59.4 percent of watersheds) have a fair rating for soil condition, while 31 watersheds, or 24.2 percent, have a poor rating, and 21 watersheds, or 16.4 percent have a good rating. For site-specific watershed scores related to soil condition, please see the soils planning record.

Effects of Alternative 1 (continue current leasing and stipulations)

General disturbance that supports construction of well pads and associated infrastructure (roads, pipelines, transmission lines, etc.) would be the primary impacts to soils. Under alternative 1, no surface occupancy stipulations would allow leasing but prevent surface disturbance on 75,100 acres and 141,200 acres could see disturbance.

The area of soil disturbance is estimated to be 5 acres per well site. The reasonably foreseeable development scenario for the grassland predicts that approximately 62 wells annually could be developed from leases made available. Therefore, a reasonably foreseeable disturbance scenario for each action alternative is 3,100 acres over 10 years. This disturbance could happen at roughly the same time or be spread out over a decade or more. A total disturbance estimate of 3,100 acres would equate to approximately 2.2 percent of the lands available for surface disturbance from leasing in alternative 1. This percentage represents a small disturbance footprint that would be spread among the 141,200 acres that are not subject to no surface occupancy stipulations.

Three soil properties are important indicators to determine the relative risk to soils from future oil and gas leasing activities. These include off road/off trail erosion hazard ratings, road/trail erosion hazard ratings, and land suitability for road placement.

Table 28. Soil resource indicators and measures for alternative 1

Soil hazards where surface disturbance may occur	Unleased Available Acres	Percent of acres subject to disturbance
Acres where disturbance is allowed on soils with severe and very severe off road/off trail erosion hazard ratings	16,190	11 percent
Acres where disturbance is allowed on soils with severe road/trail erosion hazard ratings	84,112	60 percent
Acres of lands poorly suited for road placement	80,261	57 percent

Alternative 1 had the most acres of potential disturbance on soils with severe off road/off trail erosion hazard ratings at 16,190, which constitutes approximately 11 percent of the 141,200 acres where disturbance is allowed during development. Site-specific mineral planning analysis would be completed for each of the proposed drilling permit applications, which would determine appropriate well pad, pipeline, and other infrastructure locations. We would use the appropriate soils information to avoid highly erosive soils during construction as much as possible for slopes under 40 percent. No surface occupancy applies to slopes over 40 percent. Grassland plan standards and guidelines and best management practices would be planned and implemented at the site-specific scale to limit erosion and reclaim the lands after use to ensure soil productivity in the future. Therefore, the potential effects to soils would be within acceptable levels.

Alternative 1 had the most acres of potential disturbance on soils with severe road/trail erosion hazard ratings at 84,112, which constitutes approximately 60 percent of the 141,200 acres where disturbance is allowed during development. Alternative 1 had the most acres of lands poorly suited for road placement at 80,261, which constitutes approximately 57 percent of the acres that could see surface disturbance following leasing. These numbers mimic those for potential disturbance on soils with severe road/trail erosion hazard rating, as they both deal with the placement of roads. Results indicate that soils in the planning area are generally unstable and erosive (over 50 percent of alternative 1 and alternative 3 have lands poorly suited for road placement) and road building provides a challenge. We do not know the site-specific nature of where roads would be placed at this stage of the planning process. Road location

determination would be made at the site-specific scale at a later date. Grassland Standards and Guidelines, National best management practices Road-2, Road-3, Road 4, and Road-6 would be implemented for all road construction and chapter 6 of the Gold Book would be used to close and reclaim lands where mining roads were present and not needed after mining activities are complete. Therefore, the potential effects to soils would be within acceptable levels.

Cumulative Effects

Activities include oil and gas mining, cattle grazing, road construction and maintenance, and recreation of various forms. Future approved oil and gas leasing is difficult to predict on the landscape due to the many variables that drive oil and gas development. The exact location and timing of development activities resulting from leasing cannot be precisely known until proposed in an application for permit to drill and surface use plan of operations.

The reasonably foreseeable development scenario for the action alternatives estimates that approximately 105 wells per year will be developed on all land and mineral ownerships over the next 10 years. This figure is approximately 70 percent greater than for Forest Service minerals alone. For Federal minerals with non-Federal surface, Bureau of Land Management stipulations apply, which are currently essentially equivalent to alternative 1 stipulations. However, for non-Federal mineral estate, soil protections are presumed to be less stringent, and impacts could be greater than the increased proportion of wells.

Cumulative effects for soils are generally analyzed at the sixth HUC scale and cannot be meaningfully analyzed at the scale of the entire project, especially given that precise locations of future wells are unknown and the unknown soils protection for private minerals. However, for wells developed on federal mineral estate, site-specific environmental analysis would occur, and a cumulative effects analysis would be completed at the project level when site-specific locations and a surface use plan of operations is known. The appropriate grasslands standards and guidelines and best management practices would be incorporated into the planning and implementation of each proposed oil and gas well on federal minerals. Such projects would be planned to meet grasslands standards and guidelines and avoid cumulative effects to the soils resource, taking into account existing and expected development on non-federal minerals at the time.

From a soils perspective, one positive aspect about the pattern of development, since horizontal drilling is the practice of putting multiple wells on a single pad. This practice reduces the disturbance footprint relative to oil produced, because one pad with six wells has a smaller footprint than six single well pads. The miles of new roads, transmission lines, and pipelines to service multi-well pads is also much lower than would be needed for single well pads, thus preserving more of the soil surface intact.

Effects of Alternative 2 (no new oil and gas leasing)

Under the no new oil and gas leasing alternative, there is no potential for future oil and gas development to currently unleased parcels on the grassland. Therefore, there is no potential for surface disturbance to soils from mining activities including road, pipelines, well construction, and any other mining infrastructure construction or mining activity. Implementation of grasslands plan standards and guidelines or best management practices would not be necessary.

There would be zero acres of new potential disturbance on soils with severe and very severe off road/off trail erosion hazard ratings, on soils with severe road/trail erosion hazard ratings, and on lands poorly suited for road placement from new leasing. New disturbance from currently leased but undeveloped parcels could occur. If current leases expire without being developed, they would not be leased again.

Cumulative Effects

Under this alternative, there would be no potential for surface disturbance to soils from mining activities including road, pipelines, well construction, and any other mining infrastructure construction or mining activity. Therefore, there would be no direct and indirect effects to the soils resource. Therefore, there can be no cumulative effects from new leasing.

Effects of Alternative 3 (continue leasing with revised stipulations)

Alternative 1 and 3 would have similar effects to the soil resource. The only difference between these alternatives is the amount of currently unleased land that could be disturbed by oil and gas development following leasing. Alternative 1 has an area of 141,200 acres available for surface disturbance from leasing while alternative 3 has an area of 108,500 acres available for surface disturbance from leasing. Alternative 1 and alternative 3 would produce the same disturbance. However, alternative 1 would have more land where that disturbance could occur.

As described for alternative 1, general soil disturbance for well sites would be approximately 3,100 acres; this represents 2.8 percent of the lands available for surface disturbance from leasing in alternative 3. This percentage represents a small disturbance footprint that would be spread among the 108,500 acres that are not subject to no surface occupancy stipulations.

As indicated in table 28 and table 29, from an erosion potential standpoint, we believe the measures indicate that alternative 1 and alternative 3 are essentially identical in terms of off road/off trail erosion hazards. Alternative 3 has a slightly lower risk of erosion from roads than alternative 1. Alternative 1 also has a slightly higher risk of erosion from roads than alternative 3. However, we believe these erosion risks from roads should not limit either alternative from being considered for future oil and gas leasing.

Grassland plan standards and guidelines and best management practices would be planned and implemented at the site-specific scale making impacts to the soils resource similar under both action alternatives. Therefore, the potential effects to soils would be within acceptable levels.

Table 29. Soil resource indicators and measures for alternative 3

Soil hazards where surface disturbance may occur	Unleased Available Acres	Percent of acres subject to disturbance
Acres where disturbance is allowed on soils with severe and very severe off road/off trail erosion hazard ratings	14,046	13 percent
Acres where disturbance is allowed on soils with severe road/trail erosion hazard ratings	60,844	56 percent
Acres of lands poorly suited for road placement	59,235	55 percent

Cumulative Effects

Cumulative effects for alternative 3 are the same as described for alternative 1.

Effects of Alternative 3B (continue oil and gas leasing with revised stipulations and lease notices)

Alternative 3B would modify the stipulations and lease notices for new leases. This alternative is being considered due to comments received during public scoping of the Draft Supplemental Environmental

Impact Statement. Alternative 3B includes all of the stipulations for alternatives 1 as amended with alternative 3 and the stipulations for alternative 3, except for changes indicated below. See figure 7 for alternative 3B map.

- Sage-grouse priority habitat areas – No surface occupancy
- Bighorn sheep lambing areas – Timing limitation; surface use is prohibited from April 1 through July 15 within 1 mile (line-of-sight).
- Inventoried roadless areas – Controlled surface use; well pads are allowed within a 0.25-mile buffer on either side of existing maintenance level 3-5 roads.
- Inventoried roadless areas – No surface occupancy outside the 0.25-mile buffer.

For this alternative, 118,500 acres of the Little Missouri National Grassland that are currently available and unleased would have no surface occupancy stipulations. Of the remaining acres where surface development could occur, 60,900 would have stipulations for timing limitations and/or controlled surface use, and 36,900 acres would have no stipulations beyond the standard lease terms.

Alternative 3B would have similar effects to soil resources as alternatives 1 and 3. The only difference between the alternatives is the amount of currently unleased land that could be disturbed by oil and gas development following leasing. Alternative 3B has an area of 97,800 acres available for surface disturbance from leasing. Alternatives 1, 3, and 3B would produce the same disturbance, however, alternatives 1 and 3 would have more land where that disturbance could occur.

Alternative 3B had approximately 60,600 acres of potential disturbance on soils with severe road/trail erosion hazard ratings, approximately 62 percent of the overall land that could be disturbed under leasing and has a slightly higher risk for erosion from roads, along with alternative 1, than alternative 3. Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

Cumulative Effects

Cumulative effects for alternative 3B are the same as those described for alternative 1.

Surface Water

Affected Environment

The major drainage through the Little Missouri National Grassland is the Little Missouri River which enters North Dakota in the extreme southwestern corner of the state and flows northward through the heart of the grasslands (figure 22). About 244 miles of the Little Missouri River flow through the designated administrative boundary, with about 100 miles where at least one, and sometimes both, shorelines are National Forest System lands.

There is an estimated 1,231 miles of smaller perennial and intermittent streams within the administrative boundary of the Little Missouri National Grassland, and 840 miles of those occur on National Forest System Lands. A majority of these streams are tributaries of the Little Missouri River, except for a few streams on the eastern edge of the grasslands that flow northwest to the Yellowstone or northeast into Lake Sakakawea.

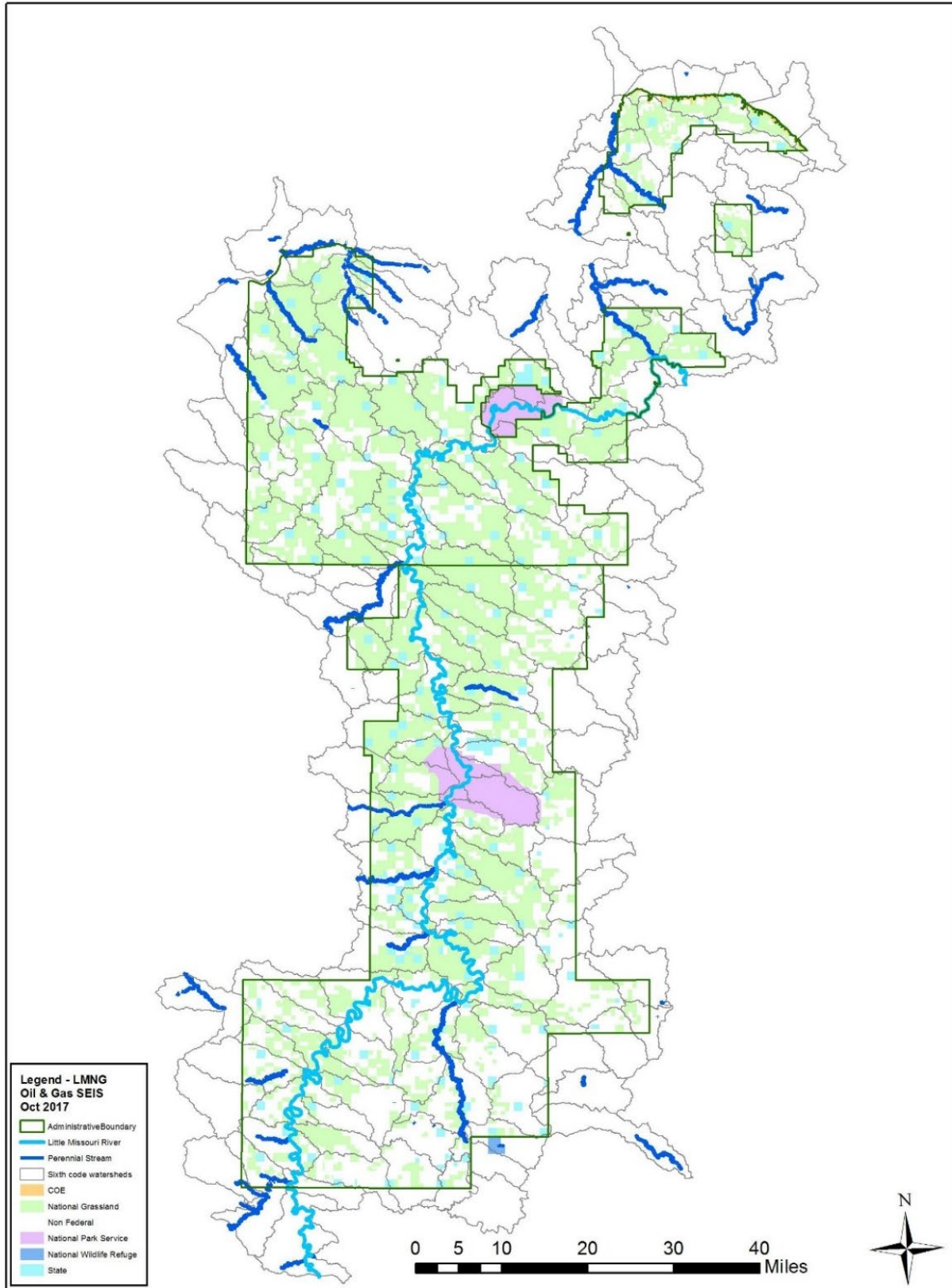


Figure 22. Little Missouri River and other perennial streams in project area

There are approximately 278 acres of wetlands within the project area. Ninety acres are located in the McKenzie District, and 188 acres are located in the Medora District. Wetlands consist of areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. In North Dakota, wetlands are typically one of three types.

- Palustrine: marshes, wet meadows, potholes, small shallow ponds, etc.
- Lacustrine: lakes, reservoirs, and large ponds
- Riverine: rivers and streams

Most of the naturally occurring wetlands in North Dakota are found in the Prairie Pothole region in the north, central and eastern part of the state. Wetlands in the unglaciated Southwestern Slope Region of the state are few and are present as riparian wetlands along watercourses and as artificially flooded wetlands around reservoirs, stock ponds and dugouts (Berkas 2013).

Water quality is affected by both point source and nonpoint source pollution that may be human-caused or natural in cause. Point sources are discrete conveyances such as pipes or man-made ditches and are regulated by the National Pollutant Discharge Elimination System permit program. This program is administered by the states, as authorized by the Clean Water Act, and controls water pollution by regulating point sources that discharge pollutants into waters of the United States. In contrast, nonpoint source pollution comes from many diffuse sources. Existing nonpoint source pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, depositing them into surface waterbodies.

Existing sources of pollution directly associated with oil and gas development are crude oil, fuels, lubricants, and those found in produced water and wastewater generated from oil and gas production. Sources of pollution incidentally related to oil and gas development include sewage, wastewater, and dust abatement chemicals. Pollution from sewage and wastewater is mainly caused by undersized wastewater treatment plants in small affected communities and development of new crew camps where sewage disposal is becoming an increasing problem. Nonpoint source pollution comes from the sediments generated by construction of well pads and roads associated with development and production, as well as general access roads to private land, which comprises the majority of the analysis area.

Existing streams and lakes that the State of North Dakota considers impaired, and thus not able to meet their designated beneficial uses, are reported on the State's 303(d) list, which is updated every other year. Listed water bodies are then scheduled for Total Maximum Daily Load development. Little Missouri National Grassland waterbodies listed on the State's currently approved 303(d) list are:

- Little Missouri River from its confluence with Deep Creek, downstream to its confluence with Andrews Creek in Billings and Slope Counties (48.8 miles, of which 14.1 miles flows through National Forest System lands),
- Little Missouri River from its confluence with Little Beaver Creek downstream to its confluence with Deep Creek in Slope County (77.5 miles, of which approximately 14 miles flows through National Forest System lands),
- Little Missouri River from its confluence with Beaver Creek downstream to Highway 85 in McKenzie County, (58.5 miles of which 9.3 miles flow through National Forest System Lands),
- Little Missouri River from Highway 85 downstream to its confluence with Cherry Creek, located in McKenzie and Dunn Counties, (21 miles of which only 1.0 mile flows through National Forest System lands), and

- Handy Water Creek and its tributaries, located in eastern McKenzie County (42.4 miles, of which 2.5 miles occur on National Forest System lands).

Streams that are on the 303(d) list are impaired by fecal coliform or *Escherichia coli*. The exception is Handy Water Creek, which has impairment to macroinvertebrates due to an unknown cause. No total maximum daily loads have been developed for these waterbodies.

Riparian ecosystems include floodplains, streambanks, lakeshores, and wetlands. Riparian areas may exist within any land use area, such as cropland, hayland, pastureland, rangeland, and forestland. All of the rivers, streams, wetlands, and reservoirs have adjacent riparian areas. Proper functioning condition assessments have been done on many riparian areas in the project area. The assessment monitors functionality of streams in terms of sediment transport and deposition, hydrologic processes and riparian vegetation in public rangelands. Results from these surveys show that 780 miles of streams are properly functioning, 742 miles of streams are properly functioning but are at risk from stream and watershed impacts, and 167 miles of stream are not properly functioning (figure 23).

In general, streams in proper functioning condition have stable stream channels with intact riparian areas that are effective at dispersing the energy of higher flows and protecting banks and other channel features. Streams that are functioning at risk generally have good conditions and are properly functioning, except that there is minor impairment of the channel, riparian, or upland features that are causing a risk to future health of the channel or riparian area. These systems may require a change in management for improvement to occur. Stream systems in the non-functional category are severely compromised in terms of channel, riparian, or upland conditions and would need a change in management to improve resource conditions.

Effects of Alternative 1 (continue current leasing and stipulations)

Under current leasing procedures, when well sites are located and an application for a permit to drill is filed, the site is inspected by a hydrologist and features are located that need to be protected and mitigated during operations and development. Potential problems with managing runoff, sediment, or contaminants are addressed, as well as determining extent and location of riparian areas. A wide variety of potential direct and indirect effects to water could occur from well development and production after the site is leased.

Water Quality, Sediment

The primary impacts to water resources from developing leased lands for oil and gas production would be the potential for direct disturbance of soils and subsequent changes in runoff amounts and timing. Indirect effects such as soil erosion and deposition could occur, as well as increases in sediment supply from transport and deposition and sedimentation from ground disturbing activities such as construction and grading of access roads, and drilling pad construction and maintenance. Pipeline construction and maintenance could also be a source of sediment. Any activity that disturbs, displaces, or compacts soil can lead to runoff and sedimentation.

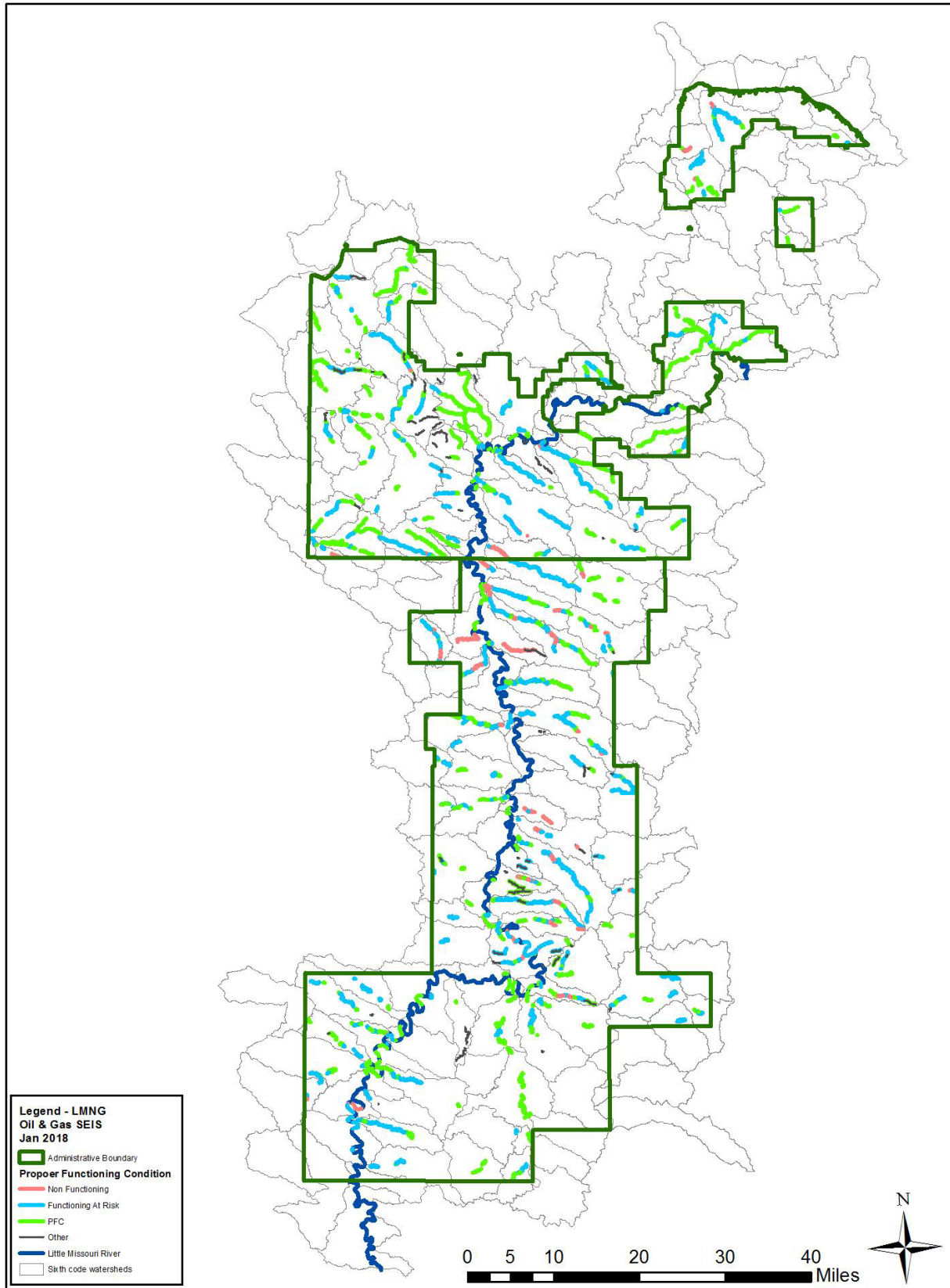


Figure 23. Streams monitored for proper functioning condition in the project area

Activities such as construction of pipelines and well pads have the potential for the indirect effect of increasing sediment runoff into nearby surface drainages. Roads to and from well sites coupled with the increased traffic may also contribute to increases in sediment yield locally. Culverts and ditches placed to facilitate storm water drainage alter natural drainage patterns, concentrate flow, and increase the potential for erosion, as well. Because well pads have stipulations about where they can be located in relation to a stream, but roads do not, it is likely that roads will provide the greater proportion of sediment runoff associated with the reasonably foreseeable development scenario. Depending on the density of roads constructed and their proximity to streams, effects to water quality from sediment runoff will likely range from negligible to major.

Other indirect effects potentially could be a result of surface flow transporting contaminants such as hydrocarbons and petroleum products, or other substances to nearby watercourses. Alternatively, substances could be directly absorbed into soils or enter shallow aquifers below drill sites. The substances could infiltrate underground and potentially contaminate wells or re-surface in surface water bodies.

To mitigate effects of runoff, best management practices and practices outlined in appendix F of the grasslands plan (2002) and no surface occupancy stipulations are incorporated at well pad designs and along roads in the Little Missouri National Grassland. Commonly applied best management practices used for oil and gas development and associated roads include (but are not limited to) perimeter berms on well pads, gradient terraces, check dams, geotextiles, silt fences, fiber rolls, slope diversions, water bars, and sediment traps. The purpose for using these measures are to control the indirect effects of erosion, runoff, and sediment, as well as to control the flow of, or contain any accidental release of chemical on or around the well pads. For these practices to be effective, proper installation, inspection, and repair occurs regularly.

Reclamation of sites would be required under lease agreements once the site is no longer needed. Post-well site development would lead to reduced erosion and improved site productivity for periods of a few years to a decade. In some cases, reclamation may be difficult to accomplish, and it may take many decades for hydrologic recovery at a site.

No surface occupancy stipulations applied during oil and gas leasing generally would help mitigate hydrologic effects, including sedimentation from site development, on those parcels covered by the stipulation. However, such effects may be displaced onto other parcels with Federal or non-Federal ownership.

Water Quality, 303(d) Listed Streams

No direct or indirect effects to 303(d) listed water quality impaired streams are expected from project activities. Most streams on the 303(d) list in the project area are listed for bacteria or impacts to benthic macroinvertebrates. Well development and oil and gas production do not generate bacterial contaminants. Indirectly, oil and gas development may increase the population in the development areas, increasing demand for water treatment facilities to handle additional sewage disposal. Wastewater treatment facilities will not occupy National Forest System lands and would not be expected to contribute to fecal coliform. Since the suspected source of fecal coliform in the impaired streams is likely to be related to livestock excrement, and since the increase in oil and gas leasing and development is not expected to affect livestock use on National Forest System lands, an increase in oil and gas leasing and development is expected to have no direct impacts on fecal coliform levels in the Little Missouri River.

Oil and gas production have the potential to impact runoff with hydrocarbons, sediments, dissolved metals, pesticides and herbicides, total dissolved solids, sodicity, and water quality effects from produced

water disposal and spills and other prohibited discharges. At well pads and tank batteries, secondary containment is in place to reduce the flow of spills off site, but this is not the case with spills from mobile equipment or pipelines. Routine handling of these types of pollutants would not affect water quality; however, any accidental releases from incidents such as tanker truck malfunctions, accidents, broken pipelines, or well blowouts could impact water quality depending upon the quantity released and its proximity to surface water. There have been cases where pollutants have intentionally been released. This type of illegal activity is investigated and prosecuted, if a responsible party can be found. These types of releases could cause a direct impact that could range from negligible to major, but would most often be temporary.

Water Supply

Water supply for drilling and hydraulic fracturing will be obtained off site. No new direct or indirect effects from surface water withdrawals on well sites at any point in the development process is expected, because the Forest Service has not allowed withdrawals of surface water to occur on its lands for industrial purposes. Such activity does not comply with Land and Resource Management Plan Standard D-1 (p. 1-11).

Riparian Function

Riparian areas are protected from direct impacts by stipulations (Water, Wetlands, Woody Draws, Riparian, and Floodplains) and best management practices as dictated by standards and guides in the grasslands plan (p. 1-9). Potential effects from oil and gas development following leasing include, damage to riparian vegetation or channels from heavy equipment or vehicles, or improper placement of ponds or other infrastructure; and erosion from well sites or roads leading to deposition within the stream or channel instability.

Riparian areas on the grasslands have a controlled surface use stipulation that generally does not allow well pads to be sited in riparian areas, though, roads accessing pads may need to cross them. Roads are not covered by the stipulation.

Riparian areas may also be disturbed by changes in drainage created when roads and well pads are constructed and the indirect effect of diverting water through culverts and concentrating flow into areas that have not naturally received them. This concentration of flow, coupled with increased runoff from construction areas, may result in the direct effect of increased upland and riparian zone erosion. Eroded material has the potential to enter streams, raising sediment concentrations and turbidity.

The grasslands plan stipulates that no surface occupancy or use be allowed within 0.25 miles each side of the Little Missouri River. The goal is to maintain the scenic integrity. This stipulation applies to well locations and production facilities. It does not apply to pipelines, power lines or roads that may be present but must be subordinate to the landscape. This stipulation applies to an estimated 21,850 acres of National Forest System land.

Cumulative Effects of Alternative 1

The 2017 reasonably foreseeable development scenario suggests that the pattern of development has shifted from one that was focused over structural plays to one that is a geographically widespread pattern based on changes in horizontal drilling technology. The expected development is 62 wells per year on Forest Service minerals and 105 wells per year for all ownerships. Alternative 1 stipulations and lease notices apply to all Federal minerals (Forest Service and private surface), but are not attached to private or state mineral leases.

The southern limit of the Bakken play does not extend south of Interstate 94, leaving approximately 33 out of 129 watersheds where Forest Service lands are not directly affected by oil and gas development in the Bakken play. These areas may be affected by population growth, traffic, and increasing demands for services. The Three Forks formation occurs in this area, however oil and gas potential is low to very low in most of the area (Hanna 2017). Drilling in the Three Forks formation may occur sporadically in a wildcat fashion, but is not expected to be as widespread or highly successful as for the Bakken formation.

Existing road density within watersheds ranges from less than 0.1 miles of road per square mile to 3.5 miles of road per square mile. The latter figure is considered high from a watershed management and potential sediment production perspective. There are risks of increased sediment delivery to channels from alternatives 1 and 3. Any ground disturbance or construction of new roads and pipelines can lead to increased sedimentation. The reasonably foreseeable development scenario will see an increase in roads associated with oil development, however, the trend seen to this point shows that most of the roads added are short road spurs linking well pads to already existing roads. Road density in any given watershed will likely increase only somewhat in comparison to what is already present. For highly disturbed areas, risks of sedimentation are higher.

For 303(d) stream watersheds, water quality is not expected to be cumulatively impacted by oil and gas leasing and development because leasing and development would not likely lead to increases in fecal coliform parameters for which the streams are listed. For water supply and stream flow impacts, because permits would not be available, leasing and development would not lead to increases in surface water withdrawals from Forest Service lands in the project area, though surface water withdrawals could be permitted by the State of North Dakota on other lands.

Cumulatively, surface flows could be withdrawn from adjacent private lands, and in turn cumulatively decrease stream flows on Forest Service lands. Decreased stream flows could cumulatively impact aquatic habitat for fish and other organisms by chronically degrading habitat and food supply, as well as, over time, change the shape and capacity of channels. According to the North Dakota State Water Commission (2019), the average fracking process in North Dakota requires about 25 acre-feet (8.13 million gallons) of water. In 2018, fracking accounted for 10.1 percent of consumptive water use in the state (North Dakota State Water Commission 2019).

Effects of Alternative 2 (no new oil and gas leasing)

This alternative would limit oil and gas leasing on the Little Missouri National Grassland to current valid permits. No currently unleased areas would be offered for lease, and current leases that expire would not be leased again. This alternative would add another 216,300 acres to Little Missouri National Grassland lands not currently leased for a total of 266,600 acres. Currently held leases would not be affected by this alternative, but would continue to operate under the stipulations and conditions in place when the lease was signed.

No additional direct, indirect, or cumulative effects to hydrology outside of those effects from current oil and gas leasing and development would occur under this alternative (see Affected Environment).

Past and present effects would be the same as under alternative 1, and future oil and gas leasing is foreseen to continue at the present pace, or higher, on non-Federal mineral estate and Federal split estate lands. However, under alternative 2, additional oil and gas development from new leases would not add to these impacts.

Effects of Alternative 3 and 3B (continue leasing with revised stipulations)

Direct, indirect, and cumulative effects of alternatives 3 and 3B are similar to alternative 1. All existing stipulations and lease notices would remain in effect, except where a revision is indicated. The major difference for surface water effects is an increase in no surface occupancy, as the projected number of wells remains the same.

The primary impacts to water resources from developing leased lands for oil and gas production for this alternative would be the potential for direct disturbance of soils and subsequent changes in runoff amounts and timing. Risks of sedimentation would be slightly lower than for alternative 1, since there would be a 32,700-acre reduction in the acres where surface development could occur for alternative 3 and 43,400 acres for 3B. Indirect effects such as soil erosion and deposition could occur, as well as increases in sediment supply from transport and deposition, and sedimentation from ground-disturbing activities such as construction and grading of access roads and drilling pad construction and maintenance. Pipeline construction and maintenance could also be a source of sediment. Other indirect effects potentially could be a result of spills with surface flow transporting contaminants such as hydrocarbons and petroleum products, or other substances to nearby watercourses. Alternatively, substances could be directly absorbed into soils or enter shallow aquifers below drill sites. The substances could infiltrate underground and potentially contaminate wells or re-surface in surface water bodies.

For alternatives 3 and 3B no direct or indirect effects to 303(d) listed water quality impaired streams would be expected from project activities. Because the same number of acres would be leased, the number of freshwater operational wells would be expected to be the same as under alternative 1. Riparian areas are protected from direct impacts by the same best management practices and stipulations used for alternative 1. There are relatively few perennial streams on the grassland, and the additional acres with no surface occupancy are not concentrated near these streams. Most of the benefit from lower levels of disturbance would occur in intermittent and ephemeral drainages and in more upland settings. Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

Cumulative effects would be similar to those under alternative 1.

Groundwater

Affected Environment

There are six surficial aquifers present, in part, under the Little Missouri National Grassland: Bennie Peer, Little Missouri River, Cherry Creek, Keene, Tobacco Garden, and Yellowstone Aquifers. These surficial aquifers are shallow deposits of sand and gravel, often associated with the stream channels. They are unconfined aquifers that gain recharge from precipitation and stream flow on the lands surface. These aquifers generally have low water quality and limited potential for development based on the small yield available from them (Shaver 2012).

Bedrock aquifers typically underlay very large areas and are at greater depth than surficial aquifers. The water from most beds above the Pierre Shale is suitable for industrial, livestock and domestic use (Croft 1985). These expansive bedrock formations can be found under a majority of the project area and beyond. This includes the Upper Cretaceous Fox Hills/Hell Creek Aquifer, which covers 60 percent of the State.

Within this project area, the aquifer ranges from 200 feet to 2000 feet deep—it is a major source for domestic stock use in rural areas, including the grasslands (Shaver 2012). This formation is the source for artesian wells that occur in topographically low areas. Because of declining water level trends in this aquifer and low recharge rates, it is the policy of the State Engineer to direct larger-scale water users, including water depots for oil field industrial supply, to water sources other than the Fox Hills/Hell Creek aquifer (Shaver 2012). In addition, the Fort Union Aquifer serves as a potential source of water for oil field industrial use.

Underground injection of oil well-produced waste fluids is the practice of placing fluids underground, in porous formations of rocks through wells. The Safe Drinking Water Act established the Underground Injection Control Program to provide safeguards so that injection wells do not endanger current and future underground sources of drinking water. The Environmental Protection Agency has five classes of underground injection for regulatory purposes. Injection of brines and other fluids associated with oil and gas production is Class II for regulatory purposes, and would be the technique used for the oil and gas leases. Class II injection is regulated by the North Dakota Oil and Gas Division.⁹ Within these rules, underground injection that causes or allows movement of fluid into an underground source of drinking water is prohibited, unless the underground source of drinking water is an exempt aquifer. Exempt aquifers are those that do not currently serve as a source of drinking water, nor cannot now and will not in the future serve as a source of drinking water, due to presence of hydrocarbons, contaminants, high concentration of dissolved minerals, or those that are difficult to access due to depth or location making it technologically impractical.

There are 25 disposal wells on the Little Missouri National Grassland, (NDDMR 2018). Twenty of the wells dispose of fluids into the Dakota Group aquifer, and five inject into the Minnelusa Formation, which is not considered an aquifer (unpublished data from Stephen Fried, UIC Supervisor – North Dakota Industrial Commission 2-25-2018). The Dakota Group aquifer is the only fully exempt aquifer used for Class II disposal (Stephen Fried, UIC Supervisor – North Dakota Industrial Commission, personal comm. 2-22-18). The Dakota Group aquifer is an expansive formation of Cretaceous age that extends well beyond the entire project area into neighboring states, sub-cropping in eastern North Dakota. Its geologic position in the project area is directly below the Pierre Shale and averages approximately 2,500 feet below the Fox Hill/Hell Creek aquifer. The Pierre Shale is a highly restrictive layer that prohibits movement of water between the two water-bearing formations.

Effects of Alternative 1 (continue current leasing and stipulations)

Groundwater Withdrawals

In North Dakota, permits are required to pump water from surface and groundwater sources and these permits are granted by the North Dakota State Water Commission. A permit is required for any surface or groundwater withdrawal, except those for which the amount used is less than 12.5 acre-feet per year and the use is for domestic, livestock, fish, wildlife, or recreation. It is the current policy of the North Dakota State Water Commission to direct large-scale water users, including water depots for oil field water supply, to water sources other than the Fox Hill/Hell Creek aquifer (Shaver 2012). Other bedrock aquifers tend to have water quality that is problematic for industrial uses because they are brackish, saline, hypersaline, or have high sodium, iron, and/or alkalinity (Schuh 2010).

The State Water Commission does not permit water withdrawals on lands that the permit applicant does not have permission to access for such purposes (Dan Farrell, North Dakota State Water Commission, personal communication 1-5-2018). The Forest Service has not allowed any withdrawals of groundwater

⁹ The rules and regulations can be found in North Dakota Administrative Code Chapter 43-02-05

to occur on National Forest System lands within the Little Missouri National Grassland for drilling or fracking; freshwater wells for operation and maintenance of completed wells is occasionally allowed. It is not reasonably foreseeable that the Forest Service would allow industrial groundwater withdrawals to occur on National Forest System Lands, as this is in violation of Land and Resource Management Plan Standard D-1 (p. 1-11). Withdrawals of groundwater from these same aquifers may be permitted to occur on adjacent private lands and would be analyzed and permitted by the North Dakota State Water Commission using their appropriation process. Because of water quality and quantity constraints of the aquifers in the project area and the presence of large quantities of higher quality surface water in the nearby Missouri River system reservoir, Lake Sakakawea, appropriation of groundwater for industrial use is unlikely (Schuh 2010).

Production Water Disposal

Disposal of waste fluids used for hydraulic fracturing and production wastewater from oil wells are handled by underground injection. All water used in the fracturing process, as well as production wastewater, is currently injected into Class II underground injection wells that are regulated by the North Dakota Industrial Commission and the North Dakota Department of Environmental Quality.

Requirements for design and monitoring of disposal wells include how the well is cased, holding tank designs and requirements of any other ancillary facilities related to disposal. On the Dakota Prairie Grasslands, water produced from a Federal lease is permitted to be disposed of in a disposal well on that lease, with no charge for disposal. Disposal of water produced off-lease is not permitted on the Dakota Prairie Grasslands. The lowest potable bedrock aquifer (Fox Hills/Hell Creek aquifer) is separated from the Dakota Group formation by about 2,500 feet. All of the separation between the two formations is due to the presence of the Pierre Shale, a formation that is highly restrictive regarding movement of fluids through the formation, creating a highly effective natural barrier between potable water aquifers and disposal formations.

The Dakota Prairie Grasslands also has guidelines regarding salt-water disposal wells and the circumstances under which their use and development on the grasslands may be approved, although commercial use is discouraged (Hays 2018).

Hydraulic Fracturing

There is a concern about the potential for the fracturing process to contaminate groundwater, either from leaking well casings or the fractures themselves creating a connection from the target formation into an aquifer. While cross-contamination between the target formations and usable drinking water aquifers in North Dakota may be a concern, there are several natural and regulatory safeguards in place that substantially reduce the risk of cross-contamination from this activity.

There is a substantial natural geologic barrier of at least 7,000-8,000 feet between the Bakken/Three Forks formations and the nearest usable drinking water in the Hell Creek/Fox Hills aquifers (see figure 22 and figure 23). Found in the 7,000-8,000 feet of separation are numerous restrictive, non-permeable, and low porosity geologic layers such as shale, evaporites, and mudstones. Because more than a mile of rock separates the target formation from potable water sources, there is no risk of fractures cross-connecting the Bakken/Three Forks formation with the Fox Hills/Hell Creek aquifer and causing upward leakage of hydrocarbons into potable water supplies.

In addition to the natural barriers, there are regulatory safeguards that are in place. North Dakota regulations require surface well casing and cement to extend past the drinking water formations to prevent drilling fluid, oil, gas, hydraulic fracturing fluid or saltwater from accidentally entering those formations

during drilling, hydraulic fracturing, and production operations. An intermediate 7-inch casing is also set and cemented inside the surface casing that extends to the well curve in the Bakken/Three Forks. Both casing operations are followed by a cement bond log to check the integrity of the bond between the casing and formation. (North Dakota Administrative Code 43-02-03-21). The combination of natural barriers and additional regulatory safeguards greatly lowers the risk of cross contamination into groundwater aquifers used as drinking water supplies and ensures no direct or indirect effects to groundwater in the project area.

Cumulative Effects

In the reasonably foreseeable development scenario, cumulative effects to groundwater may best be related to an increasing potential for spills to occur in groundwater recharge areas. Failures in safeguards designed to protect groundwater at individual wells are also a possibility, but because spills and failures in safeguards are unpredictable events, effects to groundwater as a result of these types of events are not able to be assessed. Best management practices and conditions of approval on federal minerals reduce the likelihood of spills and the chance that they will be contained on site. However, for all mineral estate, a total of 105 wells per year is expected to be developed. These additional wells may or may not have the same safeguards.

Other cumulative effects to groundwater are related to appropriations of groundwater occurring from aquifers that underlie National Forest System land that are also under adjacent private lands. The North Dakota State Water Commission manages appropriations so that permitted withdrawals do not exceed recharge capacity in aquifers, making withdrawals sustainable for groundwater users.

Effects of Alternative 2 (no new oil and gas leasing)

Alternative 2 would result in no new groundwater effects because there would be no new oil and gas leasing of Federal minerals on National Forest System lands.

Effects of Alternative 3 and 3B (continue leasing with revised stipulations)

Effects of alternative 3 and 3B would be similar to alternative 1 because these alternatives only differ in where surface activity is allowed, not in amount of potential leasing and the number of wells developed. Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

Wildlife

This evaluation presents existing information on threatened, endangered, proposed, or sensitive species and their habitat in the project area, and describes the anticipated direct, indirect, and cumulative effects resulting from the proposed project. The review is conducted to ensure that Forest Service actions do not contribute to the loss of species viability or cause a Forest Service sensitive species to move toward Federal listing. Management indicator species and migratory birds are also included in this analysis.

Affected Environment

Summaries of species information that is pertinent to oil and gas leasing on the Little Missouri National Grassland is included here. For additional detail regarding natural history and other threats to these species, please see the Wildlife Report.

Federally Listed Threatened and Endangered Wildlife Species

Eight threatened and endangered species occur within the Little Missouri National Grassland (USFWS 2018). Whooping crane, gray wolf, and red knot were dropped from the analysis because they were either not associated with habitats being analyzed in this project or management actions in the project area will not affect these species. Five species were carried forward in the analysis below, including: least tern, pallid sturgeon, piping plover, northern long-eared bat, and Dakota skipper.

No specific stipulations for Federally listed wildlife species currently exist on the grassland. (Stipulations exist to protect prairie dog colonies and other habitat where black-footed ferrets are known or thought to exist; however, none of these areas is thought to be currently occupied.) A lease notice, applied to all leases, ensures that consultation under the Endangered Species Act will occur and specific mitigations will be imposed for oil and gas development. Stipulations for other resources may directly or indirectly benefit listed species.

Least Tern (Endangered)

This species prefers large river systems or lakes, such as the Yellowstone River, Missouri River, Lake Sakakawea, and Lake Oahe. These are also the only areas in North Dakota where the least tern is found (USFWS 2013a). No known records for this species exist on Little Missouri National Grassland lands. No critical habitat has been designated for this species.

Current Status of Habitat or Threats to the Species: Sandbar and shoreline habitat has been heavily altered as a result of channelization, irrigation, and dam construction along the Missouri River. Key ecological features, such as cold, deep water, have also been altered and has changed fish species composition available to this species for forage. The encroachment of woody vegetation has reduced nesting habitat availability and recreational activity has further degraded or destroyed habitat. In addition, dam activities that release waters during summer months may have also destroyed nests (Dyke et al. 2015). Increased oil and gas development in North Dakota, which directly overlaps with much of the known breeding range of this species, also poses a major threat, especially with the potential risk of oilfield contamination to the preferred shoreline habitat of the Missouri River system.

However, the U.S. Fish and Wildlife Service, through the 5-year review process, evaluated the best available scientific information, and demonstrated an increase in abundance, number of breeding sites, and range of the least tern. These results led the U.S. Fish and Wildlife Service to conclude that the interior least tern is biologically recovered. However, a delisting proposal will not be initiated until a range wide population model and monitoring strategy are completed, and commitments to maintain management through conservation agreements are in place.

Pallid Sturgeon (Endangered)

This species is only found in the Missouri River, including its reservoirs, and parts of the Yellowstone River, in fast current areas with a firm sand or gravel bottom. It is well adapted for life on the bottom of a fast flowing, turbid river and can be found in stretches of river with 40 to 90 cubic feet per second velocity. Sandbars and tail-ends of chutes are used for feeding and resting. Water depths where this species is found vary by season, with shallow waters used more in the spring and deeper waters used in

the fall (Dyke et al. 2015). Suitable habitat exists along the Missouri River system, and fish have been found in the upper and middle sections of Lake Sakakawea (Kinzler 2018) which is adjacent to the Little Missouri National Grassland administrative boundary. No critical habitat has been designated for this species.

Current Status of Habitat or Threats to the Species: Loss of river habitat due to channelization and impoundment has caused declines in pallid sturgeon populations within the state and range wide. Much of this species' habitat was destroyed when a number of large dams were constructed on the Missouri River, which in turn, produced a number of large reservoirs. As a result, velocity, volume, and timing of flows in river systems were altered by channelization and river widths were reduced, preventing backwater areas to form (Dyke et al. 2015). Reservoirs also limit the amount of riverine habitat needed for drift distance for pallid sturgeon to complete the transition from free-floating embryos to exogenously feeding larvae, limiting recruitment in the upper Missouri River (USFWS 2014b).

Exploration of natural gas and oil deposits occurs in portions of this species' range. Studies have shown that the impacts of seismic air guns, when used in or near the water for mapping of oil deposits, can kill pallid sturgeon larvae (USFWS 2014b). Pipeline ruptures near large rivers systems also pose a threat to habitat if accidental hazardous materials are released into waterways (USFWS 2014b). The Silvertip Pipeline is an example of a pipeline rupture that threatened the Yellowstone River in 2011 with an accidental release of hazardous materials into a major river (USFWS 2014b). Thus, any pipeline spill or rupture that resulted in hazardous substances reaching Lake Sakakawea could potentially harm pallid sturgeon.

Piping Plover (Threatened) and Designated Critical Habitat

The interior populations of this species are found from central Canada, south to Nebraska. It is considered a migratory species in North Dakota and is present from mid-April to August, with peak breeding season occurring in the northern Great Plains from late May to mid-July (USFWS 2016). It nests on the shores of alkaline lakes and on sand and gravel bars in the Missouri River channel. Similar habitat in the Little Missouri River may also be suitable for nesting. No known records for this species exist on Little Missouri National Grassland lands. Critical habitat for this species occurs along the Missouri River where it meets the grassland boundary (Unit 11). Primary constituent elements associated with this critical habitat include sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river.

Current Status of Habitat or Threats to the Species: Sandbar habitat for nesting has been drastically altered "as a result of channelization, irrigation, and dam construction along the Missouri River. Current river flows do not mimic the natural river flows instrumental in forming sandbar habitat. High water releases during peak breeding season may flood nests. Encroachment of woody vegetation onto sandbars reduces nesting habitat availability. A wet cycle in North Dakota, beginning in 1993, has resulted in high water levels on alkali lakes inundating breeding habitat" (Dyke et al. 2015).

In addition, avian and mammalian predation, along with direct mortality from collisions with power lines and wind turbines, continue to be issues of concern. Increased oil and gas development in North Dakota overlaps with much of the known breeding range of this species and poses a major threat, especially with the potential risk of oilfield contamination to the preferred habitat of alkali lakes and shoreline habitat of the Missouri River system.

Northern Long-eared Bat (Threatened)

In North Dakota, the species is considered to be seasonal because no hibernacula have been identified, and it has only been identified in a few locations. Survey efforts in North Dakota have been limited. Prior to Barnhart and Gillam (2017), no previous study efforts existed that attempted to determine if bats utilize hibernacula during the winter months in North Dakota (Barnhart and Gillam 2017). It has been documented in forested habitat in riparian corridors of the Little Missouri and Missouri Rivers, the Missouri River Valley, Badlands, Little Missouri National Grassland, and Theodore Roosevelt National Park, and Little Missouri State Park (Tigner 2006; Dyke et al. 2015; Nelson et al. 2015). No critical habitat has been designated for this species.

Current Status of Habitat or Threats to the Species: Threats to the species include pesticide use, wind turbines, loss of habitat, and white-nose syndrome. Pesticides used in the vicinity of feeding grounds can affect bats by limiting their prey source. In addition, bats are known to store pesticides within fat reserves. Loss of natural water sources can also impact bats. Stock tanks and wells used for grazing can trap bats. Wind turbines have also been identified as a source of mortality to bats (Dyke et al. 2015).

Oil and gas exploration throughout the range of this species poses additional threats. Water withdrawal from habitat near shale gas development could affect the potential for roost-site selection, along with affecting the availability of prey. Compounding the potential loss of water resources is the possibility of existing water sources becoming contaminated from operations. Some contaminants reported in high volume hydraulic fracturing processes include three heavy metals, cadmium, mercury, and lead. Contaminants can not only be ingested directly from drinking water, but also ingested through prey items, resulting in dietary accumulation (Butler et al. 2018).

In addition, negative impacts from compressor stations associated with natural gas extraction produce disruptive noise year-round. With over half a million producing gas wells in the U.S., this infrastructure is a major source of noise pollution across the landscape (Bunkley et al. 2015).

Dakota Skipper (Threatened) and Designated Critical Habitat

The Dakota skipper historically ranged from southern Manitoba through North Dakota, Minnesota, South Dakota, Iowa, and Illinois. The species is now largely restricted to northeastern South Dakota, western Minnesota, and the drift prairie area of North Dakota (Butler et al. 2018, Royer and Marrone 1992).

Known locations for this species exist on Little Missouri National Grassland lands. Potential suitable habitat exists throughout the grassland and has been preliminarily mapped through modeling efforts, which still need ground validation in many areas. Critical habitat for this species occurs in the Northeastern portion of the grassland, near the Missouri River.

Current Status of Habitat or Threats to the Species: Many prairie-specialist butterflies such as the Dakota skipper have declined dramatically due to loss of habitat from conversion to agriculture. The remaining native prairies are highly fragmented and restrict prairie butterflies, such as the Dakota Skipper, to specific, isolated locations. Consequently, such species are sensitive to disturbances needed to maintain the high-quality prairie habitat, such as fire on the landscape (Butler et al. 2018).

Oil exploration that includes seismic surveys, drilling, and infrastructure establishment, including road and pipeline construction also impacts Dakota skippers and other butterfly species. Soil compaction, loss of native vegetation, fugitive dust degradation along roadside habitat, functional habitat loss and fragmentation, along with shifts in species composition further impact this species and other pollinator species in the Little Missouri National Grassland where activities occur (Butler et al. 2018).

Forest Service Sensitive Wildlife Species

Seventeen Region 1 Forest Service sensitive species are present within the Dakota Prairie Grasslands (USDA Forest Service 2011b). Four of these were dropped from the analysis because they are not associated with habitats being analyzed in this project or management actions in the project will not affect these species. Thirteen species were carried forward in the analysis and are described below. See table 4 in the Wildlife Report.

Four of the Forest Service sensitive species have stipulations in place to help manage the species habitat from oil and gas development activities. These are the bald eagle, bighorn sheep, burrowing owl, and greater sage-grouse. The remaining sensitive species may be managed using proposed mitigation measures if and where appropriate.

Baird's Sparrow

The conversion of native prairie to agricultural cropland has resulted in the loss and fragmentation of habitat for Baird's sparrow, which is one of the greatest conservation concerns for the species. Wiggins (2006) summarizes the primary threats to this species as heavy livestock grazing, the conversion of native prairie habitats to agricultural croplands, and the establishment of non-native and invasive grass species. Ludlow et al. (2015) specifically identified the increase of access trails and the growth of crested wheatgrass following the disturbance from oil and gas development to have negative consequences on Baird's sparrow reproductive success. However, a mix of native grass and forbs seeds is required for rehabilitation after oil and gas development on the Little Missouri National Grassland, and so, is not contributing to an increase in crested wheatgrass.

Bald Eagle

Though historical nesting has been recorded on (or near) the Little Missouri National Grassland, currently there are no known bald eagles nesting or roosting sites on the grassland. The species is occasionally observed during fall and spring migration periods. There is no preferred nesting habitat along the Little Missouri River.

Burrowing Owl

The species has declined overall in the Great Plains, where it is closely associated with prairie dog colonies. In North Dakota, the owl is nearly extirpated east of the Missouri River; west of the Missouri, occupancy dropped from 45 percent on 33 prairie dog towns on the grassland in 1991 to 27 percent on the same 33 prairie dog towns in 1996 (10 towns no longer existed, Murphy et al. 2001). The Breeding Bird Survey indicates the species has undergone declines of 6 percent per year from 1966 to 2015 in North Dakota (Sauer et al. 2017).

In addition to the reduction of prairie dogs (see analysis below), other threats to burrowing owl include habitat loss and fragmentation due to intensive agricultural and urban land conversion (Murphy et al. 2001).

Greater Sage-grouse

Greater sage-grouse were never widespread in North Dakota (Smith et al. 2004) and are presently confined to the southwestern portion of the state in Bowman, Slope, and Golden Valley Counties (Robinson 2014). The North Dakota population is considered contiguous with sage-grouse populations in Montana and South Dakota (Robinson 2014). Recent genetic analysis has shown a sub-population common to southeastern Montana, southwestern North Dakota, and northwestern South Dakota (Cross et al. 2016). In addition, North Dakota Game and Fish Department translocated 60 birds to Bowman county

in April of 2017 (Wilson 2017). In mid-June 2017, Department biologists reported that two hens had successfully hatched young and were brooding chicks.

Of the 52 historic leks in North Dakota, 21 are within the administrative boundary of Little Missouri National Grassland. Long-term data from North Dakota Game and Fish, collected from 1964 to 2019, show that 7 of these leks have had activity within the last 10 years. The most recent activity for three leks was in 2013, 2012 for one lek, 2011 for two leks, and 2010 for one. One more lek had two birds in 2014, but none for the 10 years prior to that and none since. Leks are defined by North Dakota Game and Fish as unoccupied when there has been no activity for 10 years. Although sage-grouse are not using historic lek sites on the Grassland, they may be using other national forest lands in the project area. Reintroduction efforts have been unsuccessful in establishing persistent populations.

Thirty additional leks occur in Bowman County and one in Slope County, outside the Grassland boundary. A few of these leks have had fairly consistent activity over the last 10 years, but total counts for all leks have declined by approximately 85 percent from 1999 to 2019.

While efforts to improve sagebrush habitat are ongoing, the decline in sage-grouse numbers in the last decade or so in North Dakota is credited to: conversion of sagebrush communities to crops, long term over-stocking and degradation of sagebrush communities, West Nile virus outbreaks, and increasing presents of vertical structures (power poles, buildings, fence lines, and other structures) that provide perches for predators. The population was especially hard hit by the West Nile virus in 2007-08 (Wilson 2017).

Loggerhead Shrike

This species is found in mixed grass prairie and shrub-steppe habitats in North Dakota. Declines have been documented in most regions of the country, even those with open habitat. Reasons are poorly understood. Pesticides, loss of wintering habitat quality, direct loss, and degradation of native grassland and sagebrush habitats have been suggested as possible causes (Wiggins 2005).

Breeding Bird Survey data indicates that the species has undergone a decline of -2.17 percent per year from 1966-2013, in North Dakota. Areas with high road densities may pose a threat to shrikes, which may be prone to vehicle collisions (Wiggins 2005). Livestock grazing may also pose a threat in heavily grazed systems, though light to moderate grazing may be acceptable in thinning vegetation and allowing greater accessibility to prey.

Long-billed Curlew

In North Dakota, the species is associated with mixed-grass and sagebrush-steppe communities. They prefer short vegetation, generally less than 30 centimeters tall (often less than 10 centimeters), and generally avoid habitats with trees, a high density of shrubs, and tall, dense grass (Fellows and Jones 2009, Sedgwick 2006).

Breeding bird survey data for North Dakota suggests an increase; however, the species was encountered on only 5 routes, rendering the data inconclusive. Western breeding bird survey data indicate an increase of 1.26 percent per year from 1966-2013; and in the Badlands and Prairie Region data indicates an increase of 2.26 percent per year for the same time period.

Some of the key threats include: introduction of exotic species such as crested wheatgrass; conversion of native prairie to agricultural cropland; human disturbance associated particularly with recreation and energy development, including oil and gas, loss or fragmentation of habitat; and pesticide spraying (Fellows and Jones 2009, Sedgwick 2006).

Sprague's Pipit

Sprague's pipits require native grasslands of intermediate height and sparse to intermediate vegetation density, low forb density, and little bare ground but low litter depth (Dyke et al. 2015). Locally, the species is known to nest on three of the Dakota Prairie Grasslands units, including the Grand River, Cedar River, and Little Missouri National Grassland. It is also found on nearby national grasslands including the Thunder Basin and Buffalo Gap National Grasslands. It is one of the few endemic species of the Northern Plains.

Research has shown that Sprague's pipits are susceptible to edge effects and habitat fragmentation (Davis 2004, Koper et al. 2009, Sliwinski and Koper 2012). Oil and gas infrastructure can contribute to fragmentation and is shown to have negative impacts to Sprague's pipit (Hamilton et al. 2011). Thompson et al. (2015) found that Sprague's pipit avoided areas up to 350 meters from well pads, and suggested that pads be within corridors or grouped.

Black-tailed Prairie Dog

Prairie dog distribution in North Dakota remains clustered along the Little Missouri River and its tributary drainages, and the Standing Rock Reservation and adjacent areas (Knowles 2007). On the Little Missouri National Grassland, recent surveys documented 136 colonies totaling 5,505 acres (Carlson McCain Inc. 2015).

Black-tailed prairie dog habitat has been reduced to 1 percent of its historic amount. The combination of grassland conversion and concentrated poisoning are the main causes of their population decline (Dyke et al. 2015).

Black-tailed prairie dogs are an important component of grassland ecosystems and provide breeding and foraging habitat for a number of species. Dyke et al. (2015) identify a number of priority conservation species in North Dakota dependent on prairie dog communities, including burrowing owl, ferruginous hawk, golden eagle, long-billed curlew, plains spadefoot toad, black-footed ferret (historical), swift fox, and others.

Bighorn Sheep

Bighorn sheep inhabit rugged escape terrain characterized by a mix of steep or gentle slopes, broken cliffs, rock outcrops, and canyons and their adjacent river benches and mesa tops (Beecham et al. 2007). This terrain is distributed throughout much of the Little Missouri National Grassland (Wiedmann and Hosek 2008), however the area is limiting in lambing habitat, characterized by areas that are unlikely to experience disturbance.

Two meta-populations exist in the Little Missouri National Grassland, northern and southern, separated by Interstate 94. Bighorn sheep habitat has been mapped and consists of 176,000 acres within the Little Missouri National Grassland administrative boundary.

Research has shown that bighorn sheep are sensitive to disturbance (Joslin and Youmans 1999, Keller and Bender 2007). Management activities that displace or disturb sheep, especially during lambing season, can negatively affect reproduction. Sayre's (1996) study suggests that vehicle traffic and increased human activity appears to disturb sheep more than the roads and oil wells, once they are established. Additionally, Feist (1997) found that low disturbance areas had a higher lamb recruitment level than those areas with moderate to high disturbance levels.

Specific areas have been identified under the Dakota Prairie Grasslands plan as management areas that recognize specific requirements of bighorn sheep. The management area (MA) designations within the analysis area are 3.51, 3.51a, and 3.51b. There are stipulations tied to these management areas. Only MA 3.51 has no surface occupancy within bighorn sheep habitat; however, there is discrepancy between the grasslands plan 3.51 layer and the modeling done by North Dakota Game and Fish. There is direction in the grasslands plan that protects lambing areas outside of MA 3.51, using time limiting stipulations.

North Dakota Game and Fish biologist, B. Wiedmann, feels the existing time limiting stipulation (April 1 through June 15) is inadequate to deal with the biological realities given the variability of parturition dates in bighorn sheep lambing, as well as other social large ungulates (personal communication February 6, 2018). In addition, Whiting et al. (2011) observed mean parturition dates of groups of bighorn sheep females in Utah as late as mid-June and observed some lambs born as late as early-July. In North Dakota, parturition is typically during May, but lambs have been observed being born in June and there is one documented case of one born in September (North Dakota Game and Fish 2002). Given these data, the average lamb may only be 0-3 weeks old when the timing limitation expires for leases near lambing habitat. In Wiedmann's professional opinion (personal communication February 6, 2018; Sayre 1996, and Feist 1997) the younger the lamb the more vulnerable to the various stresses if intense activities from oil and gas activities were to commence in mid-June near an active lambing area.

Ottoa Skipper

The Ottoa skipper is known to occur on the Little Missouri National Grassland. Populations of this species are generally small and localized (Royer and Marrone 1992). The loss of prairie communities to agriculture and development are the largest contributors to habitat loss and fragmentation (<https://www.xerces.org/>).

Regal Fritillary

The regal fritillary has been documented on the Little Missouri National Grassland in close proximity to the analysis area (Royer 1995). The most significant threat to the regal fritillary is loss of its prairie habitat to development and agriculture (<https://www.xerces.org/>).

Tawny Crescent

The tawny crescent is known to occur on the Little Missouri National Grassland. Typical habitat in North Dakota is moist clearings in natural aspen stands or green ash woodlands. In western North Dakota, it is found on north-facing slopes and other mesic sites (Royer and Marrone 1992). There appears to be a strong association in North Dakota between tawny crescents and green ash forest margins that border bluestem prairie. Aster serves as larvae hosts, and dogbane and spurge are favored nectar sources for adults.

Declines from historic conditions are likely related to habitat loss and degradation. Projects that lower groundwater levels could negatively impact this species and its habitat.

Northern Redbelly Dace

Northern redbelly dace range across Canada from British Columbia through the Northwest Territories to Nova Scotia, and from Montana to Maine, primarily in the Atlantic, Great Lakes, Hudson Bay, upper Mississippi, Missouri, and Peace-Mackenzie river drainages, with populations in the West ranging south to northern Colorado.

Habitat includes clear, cool, slow-flowing creeks, ponds and lakes with aquatic vegetation, including filamentous algae, and sandy or gravelly bottoms interspersed with silt. According to North Dakota Game

and Fish data, northern redbelly dace have been detected in Cannonball River, Clear Creek, Little Missouri River, Sand Creek and Whitetail Creek. Surveys done by Williams et al. (2016) have not found northern redbelly dace consistently and he notes that, although anecdotal, it could be from dewatering activities upstream.

Effects Common to All Species under Alternatives 1, 3, and 3B

Below is a summary of the potential wildlife effects common to alternatives 1, 3, and 3B from oil and gas leasing and development. A more detailed assessment can be found in the report “Biological Assessment of Oil and Gas Development on the Little Missouri National Grassland” (Butler et al. 2018). Leasing of oil and gas mineral rights, by itself, has no immediate effects on the environment, as it involves only a transfer of property rights and does not authorize any development. The effects from the decision to lease oil and gas parcels come later, when the lessee decides to develop the parcel and applies for a permit to drill. During the application process, specific conditions of approval are included in the permit in the form of design criteria, which ensure compliance with standards and guidelines of the land management plan. Design criteria mitigate potential site-specific impacts that cannot be anticipated prior to submission of a lease development plan. Where there are no stipulations for specific species, design criteria identified in this analysis may be incorporated into the permit.

Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

Habitat Effects

Habitat effects include removal of vegetation and disturbance to soils or substrates in aquatic, riparian, and upland habitats habitat from the construction of well pads and associated infrastructure (roads, pipelines, transmission lines, and other structures). The reasonably foreseeable development scenario predicts 62 wells per year over 10 years with an estimate of five acres of disturbance per well, or 3100 acres total. Actual acreage may be less because of multi-well pads. Such disturbance can cause direct mortality to individuals and impacts to populations by affecting the breeding, feeding, and sheltering habitats for species. Habitat modification includes habitat loss, fragmentation, edge effects, and movement barriers.

Fragmentation

The definition for fragmentation and connectivity can be found in the Dakota Prairie Grasslands Plan. Fragmentation is the breakup of a large land area (such as a grassland) into smaller patches isolated by areas converted to a different land type. Connectivity is the arrangement of habitat that allows organisms and ecological processes to move across the landscape. Patches of similar habitats are close together or linked by corridors of appropriate vegetation. Loss of connectivity or fragmentation comes from the variety of infrastructure required to conduct project activities and roads. The use of multi-well pads and the placement of well pads and infrastructure along existing roads will reduce fragmentation.

Wildlife Corridor Impacts

All wildlife move across the landscape to varying extents. Maintaining connectivity is important for individual movement for needed resources (food, water, etc.), immigration, emigration, and re-colonization, gene flow, seasonal migration and the ability for population movement in response to environmental changes such as fire, drought, and severe winters. Wildlife corridors can be impacted by

roads, fences, and other infrastructure. The degree to which corridor disruption occurs will depend on site-specific placement of oil and gas infrastructure.

Roads

Roads create a hazard for collisions and may inhibit wildlife movements. Oxley et al. (1974) found that small mammals were not willing to cross forested gravel roads of 30m and greater, and Swihart and Slade (1984) found that prairie voles and cotton rats were strongly inhibited from crossing a route less than 3m wide with vehicle traffic of 10 to 20 vehicles per day. In addition, roads may increase access that may result in an increase in violation of game and fish laws and hunting regulations, vandalism and illegal off-road vehicle travel, and also increase the likelihood of the spread on non-native plants.

Fugitive Dust

Traffic dispersed road dust is the largest source of particulate matter and exceeds the transport of soil by wind erosion (Anderson and Gesford 2007). It is estimated that one ton of dust is created for every 350 miles of gravel road traveled by a passenger vehicle (Anderson and Gesford 2007). Unfortunately, abatement measures including those that contain chloride solutions, increases salt in the soil and has the potential to be toxic to vegetation and aquatic organisms (Goodrich and Jacobi 2012, Dudley et al. 2014). Lewis et al. (2012) found that dust may impact fruit set in plants by inhibiting physiological processes. More research is needed to determine the true effects of road dust on plant health, but any effect could indirectly affect wildlife, including pollinators.

Introduction of Nonnative Plants

The potential for nonnative plant introduction is common whenever a site is disturbed. Nonnative species can out compete native grasses and forbs and may be invasive. Preston (2015) found nonnative species cover and species richness to be greater at well sites then elsewhere. Nonnative species may replace significant proportions of native plant communities, they may modify vegetation structure, the fire regime, hydrology, soil erosion rates, and forage production. These changes in turn can affect wildlife populations.

Disturbance Effects

Disturbance effects include those activities that may impact species and individuals during critical times of their life cycles, including breeding seasons, typically during the spring and early summer. Activities conducted at these times can impact all species of concern. Activities that create elevated sound levels or result in close visual proximity of human activities at sensitive locations (e.g., nest areas) have the potential to disrupt normal behavior patterns. Studies of the effects of human disturbance upon wildlife have revealed that the immediate postnatal period in mammals and the breeding period in birds are periods when individuals are most vulnerable to disturbance (Lindstrom 1999; Steidl and Powell 2006; Gaynor et al. 2018).

Light Effects

Ecological light pollution includes chronic or periodically increased illumination, unexpected changes in illumination, and direct glare. Flaring of methane gas is pervasive in the Williston Basin, to the extent that the glare at night is prominent from space. Lights from drilling rigs, pump-jacks, and other infrastructure also produce artificial light that may affect wildlife.

Ecological light pollution has demonstrable effects on the behavioral and population ecology of wildlife in natural settings. As a whole, these effects derive from changes in orientation, disorientation or misorientation, and attraction or repulsion from the altered light environment, which in turn may affect

foraging, reproduction, migration, and communication (Longcore and Rich 2004). The state of North Dakota has developed a target of limiting flaring to 11 percent of production by 2020.

Noise Effects

Wildlife response to noise disturbance is complex, being neither uniform, nor consistent. Shannon et al. (2016) reviewed two decades of research of noise impacts to wildlife. The majority of studies documented effects from noise, including altered vocal behavior to mitigate masking, reduced species abundance in noisy habitats, changes in vigilance and foraging behavior, and impacts on individual fitness and the structure of ecological communities.

Effects of Alternative 1 (continue current leasing and stipulations)

Federally Threatened and Endangered Wildlife Species

The only existing stipulations specific to threatened or endangered species pertain to black-footed ferrets, which are not present on the grassland. No stipulations for other listed species or habitat exist, outside of the lease notice for threatened, endangered, and sensitive plant or animal species.

Although there are no specific stipulations identified for threatened and endangered species, stipulations for other resources and standards and guidelines from the Dakota Prairie Grasslands Plan (see appendix A in the Wildlife report) would be followed for site-specific leasing decisions and may reduce effects for threatened and endangered species. Standards and guidelines are implemented through conditions of approval. Conditions of approval are not part of the proposed action, but are applied after the completion of site-specific environmental analysis to mitigate effects and provide resource protection. They are included in the permit that authorizes oil and gas production for a specific well site.

Also, if necessary, standard lease terms are available to aid in managing these species. Based on local knowledge and information, a Forest Service biologist can make the determination for the need for mitigation measures and project design features at the project scale.

A lease notice for threatened, endangered, and sensitive species notifies the lessee that species of concern or their habitat may be present, and that a biological evaluation and required mitigation measures may be required. The lessee is prohibited from any ground disturbing activities prior to a determination of whether species of concern are present.

If listed species may be affected by the proposed oil development, a biological assessment and consultation with the U.S. Fish and Wildlife Service under the Endangered Species Act must occur prior to authorization of any permit to drill or other ground disturbing activity. The lease notice ensures that site-specific protective measures will be developed for all listed species prior to any ground disturbing activities, including those newly listed after a lease is granted.

In addition to protections and mitigations that may be developed during environmental analysis and through consultation with U.S. Fish and Wildlife Service when oil and gas development is proposed, such development must also comply with standards from the grasslands plan.

Other resource stipulations may directly or indirectly benefit some of these species. If necessary, standard lease terms and terms in the lease notice are available to aid in management of these species. Based on local knowledge and information, a wildlife biologist can determine the need for mitigation measures at the project scale and whether consultation may be warranted.

Least Tern (Endangered)

There are approximately 26 miles of shoreline habitat along Lake Sakakawea where it meets sections of the Little Missouri National Grassland administrative boundary. Of this shoreline habitat, approximately 328 feet (100 meters) of Forest Service-managed unleased available area exists which could be impacted by surface disturbance associated with this alternative.

Most of the 26 miles of shoreline habitat between the boundary and Lake Sakakawea is managed by the Army Corp of Engineers. In 2017, the Army Corps submitted a biological assessment for Implementation of the Missouri River Recovery Management Plan. The recovery plan includes actions for improving habitat conditions specifically for least tern, pallid sturgeon, and piping plover. Implementation of proposed actions could provide for future nesting areas for least terns close to the area available for leasing under this alternative.

Increased oil and gas development in North Dakota, which directly overlaps with much of the known breeding range of this species, and associated activities, pose a threat to this species. Construction development and associated noise related to staging for seismic surveys, new road construction, powerlines, oil wells, and other associated infrastructure have the potential to impact habitat directly and indirectly by fragmenting contiguous habitat, along with disturbing terns from nesting or foraging activities.

Effects Determination for Alternative 1 – Least Tern

Without additional protection measures or stipulations, this alternative may impact individuals or foraging habitat. However, there is direction in the Dakota Prairie Grasslands Plan that provides partial protection, along with the lease notice for threatened, endangered, and sensitive plant or animal species. In addition, if least terns were to be found nesting in the area, mitigation measures similar to those recommended by the Fish and Wildlife Service in Louisiana, that no activity (such as drilling or seismic survey activity) should be conducted within 650 feet of a nesting colony, could be required by the North Dakota office of the U.S. Fish and Wildlife Service. The U.S. Fish and Wildlife Service (2019) suggests a half mile buffer from known nests, this could be applied during the permit process. A controlled surface use stipulation for Water, Wetlands, Woody Draws, Riparian, and Floodplains (appendix A) would apply to the approximate 100 meters of shoreline habitat adjacent to Lake Sakakawea, keeping well pads away from the water's edge. Also, directional drilling should be utilized to the furthest extent in order to position drilling wells away from least tern nesting colonies (USFWS 2017). **This alternative may affect but would not likely adversely affect the least tern and its habitat.**

There is no critical habitat designated for this species, and therefore, no effects.

Pallid Sturgeon (Endangered)

The administrative boundary of the Little Missouri National Grassland is bordered by Lake Sakakawea in McKenzie County, which is occupied by pallid sturgeons, but only a very small amount of National Forest System land is reservoir shoreline. Most shoreline is managed by the U.S. Army Corps of Engineers. Of this shoreline habitat, approximately 328 feet (100 meters) of Forest Service-managed unleased available area exists which could be impacted by surface disturbance associated with this alternative, mitigated by a controlled surface use stipulation that requires well pads to be placed away from the water's edge. There is no critical habitat designated for this species.

No direct effects are likely from the proposed action. Indirect effects potentially could be a result of a spill with surface flow transporting contaminants such as hydrocarbons and petroleum products, or other substances to nearby watercourses. Alternatively, spilled substances could be directly absorbed into soils

or enter shallow aquifers below drill sites. The substances could infiltrate underground and potentially contaminate wells or re-surface in surface water bodies (McNamara 2018, see hydrology and groundwater reports) adjacent to the approximately 100 meters of shoreline lake habitat that is occupied by pallid sturgeon. Conditions of approval reduce the likelihood of uncontained spills.

Effects Determination for Alternative 1 – Pallid Sturgeon

No direct effects are likely to pallid sturgeon, and best management practices for water quality will reduce potential indirect effects. **The proposed action may affect but would not likely adversely affect the pallid sturgeon and its habitat.**

Piping Plover (Threatened)

There are approximately 26 miles of shoreline habitat along Lake Sakakawea where it meets sections of the Little Missouri National Grassland administrative boundary. Of this shoreline habitat, approximately 328 feet (100 meters) of Forest Service managed unleased available area exists, which could be impacted by surface disturbance associated with this alternative, mitigated by a controlled surface use stipulation that requires well pads to be placed away from the water's edge. The shoreline is also designated critical habitat for this species.

Piping plover use of Lake Sakakawea fluctuates depending on water levels (Anteau in progress). Similar to least tern, piping plover are also included in the U.S. Army Corps of Engineers biological assessment for Implementation of the Missouri River Recovery Management Plan, which has actions to improve piping plover habitat on the Missouri River, including the shoreline of Lake Sakakawea.

Under alternative 1, oil development resulting from leasing of unleased areas along the shoreline of the lake has the potential for oil spills, noise, and infrastructure construction, all of which could reduce nesting areas, fragment habitat, and reduce productivity.

Piping plover nests are susceptible to being accidentally stepped on or crushed by people and vehicles. The presence of people also may cause the birds to desert the nest, exposing eggs or chicks to the sun and predators. Interruption of feeding may stress juvenile birds during critical periods in their life cycle.

Effects Determination for Alternative 1 – Piping Plover

If present, direct impacts could occur from human disturbance and vehicle use. Implementing actions, such as caging or closing piping plover nest areas could help to avoid such impacts. The Fish and Wildlife Service (2019) suggests a half mile buffer from known nests, this could be applied during the permit process. Controlled Surface Use for Water, Wetlands, Woody Draws, Riparian, and Floodplains (appendix A) would apply to the approximate 100 meters of shoreline habitat adjacent to Lake Sakakawea. Indirect impacts could occur from accidental spill, however best management practices and other mitigation measures could reduce this possibility. **This alternative may affect but would not likely adversely affect the piping plover and its habitat.**

Critical Habitat:

In addition, **this alternative may affect but would not likely adversely affect piping plover critical habitat.** No impacts are expected to primary constituent elements, however since unleased land is located adjacent to designated critical habitat, this alternative may impact or alter critical habitat. A controlled surface use stipulation for Water, Wetlands, Woody Draws, Riparian, and Floodplains (appendix A) would apply to the approximate 100 meters of shoreline habitat adjacent to Lake Sakakawea, keeping well pads away from the water's edge. Dakota Prairie Grasslands Plan standards and guidelines that provide partial

protection, along with the lease notice for threatened, endangered, and sensitive plant or animal species may alleviate some of the potential impacts.

Northern Long-eared Bat (Threatened)

Habitat occurs in wooded areas, riparian corridors, caves and mine shafts, which could be impacted by surface disturbance from oil and gas development associated with this alternative where leasing may occur. There is no critical habitat designated for this species.

Direct effects could occur if roosting trees used by northern long-eared bats were directly impacted by construction activities during summer use. Bats can also be directly affected by the increase in artificial light. Artificial lighting can have an impact upon a range of bat behaviors including foraging and commuting, emergence, roosting, breeding and hibernation (Stone et al. 2015).

Indirect effects could occur from the possibility of existing water sources becoming contaminated from operations. Some contaminants reported in high volume hydraulic fracturing processes include three heavy metals, cadmium, mercury, and lead. Contaminants cannot only be ingested directly from drinking water, but also through prey items resulting in dietary accumulation (Butler et al. 2018).

Other indirect effects include construction related activities that displace foraging or roosting long-eared bats due to noise and human activity.

Effects Determination for Alternative 1 – Northern Long-eared Bat

Of the 216,300 acres of available land for leasing, 12,070 has been mapped as potentially suitable woodland bat habitat. Of these, 5,080 acres have no surface occupancy, and the remaining 6,990 of suitable bat woodlands could be impacted by this alternative. However only 1,730 acres have no stipulations, while 5,260 acres have timing limitations or controlled surface use stipulations that have been identified for other resources, which may reduce impact to bats at the roost site. In areas with no stipulations, common mitigation measures that have been implemented for northern long-eared bat during other Forest Service activities include timing limitations of April 1 to September 30, to protect females and non-volant pups. Stipulations and mitigation measures will reduce many of the direct effects to bats at the roosting site; however, indirect effects, specifically to prey species, could still occur and may not be immediately detectable. Therefore, **this alternative may affect but would not likely adversely affect the northern long-eared bat.**

Dakota Skipper (Threatened)

The Dakota skipper is considered an obligate resident of undisturbed tallgrass to mixed grass prairies. Suitable Dakota skipper habitat is based on butterfly potential habitat analysis using the following criteria: slope, aspect, grassland lifeform, and moderate to high production areas (Dinkins 2018). The criteria were developed to identify potential mixed grass prairie types on low to moderate slopes on northerly aspects. There are 102,400 acres of potentially suitable butterfly habitat on the Little Missouri National Grassland. There is critical habitat designated for this species in the northeastern portion of the grassland, approximately 1 mile from Lake Sakakawea. The critical habitat is not located on the unleased Federal minerals with Forest Service surface ownership considered in this analysis; therefore, no direct or indirect impacts to critical habitat from this alternative are anticipated.

Direct effects to butterflies could occur due to mortality from vehicles and other equipment. However, most effects are due to impact to butterfly habitat. Miller (2018) lists habitat fragmentation, weed establishment and fugitive dust as effects that could occur from implementing alternative 1. Shifts in

species composition, as a result of habitat loss, can indirectly impact this species and other pollinator species in the Little Missouri National Grassland where activities occur (Butler et al. 2018).

Effects Determination for Alternative 1 – Dakota Skipper

Of the 141,200 acres of lands available for leasing with surface disturbance allowed under this alternative, 13,160 acres (9 percent) are on suitable Dakota skipper habitat. For other projects on the Little Missouri National Grassland, ground disturbance activities are cleared by a Forest Service wildlife biologist and a 1-kilometer buffer is implemented when suitable habitat is present, reducing potential direct effects to skippers. **Alternative 1 may affect but would not likely adversely affect the Dakota skipper and would have no effect on Dakota Skipper critical habitat.**

Forest Service Sensitive Wildlife Species

Bald Eagle

Current stipulations are consistent with the National Bald Eagle Management Guidelines (USFWS 2007) and include:

- no surface occupancy within one mile (line of sight) of bald eagle nest site;
- no surface occupancy within one mile (line of sight) of bald eagle winter roost site.

Because there is currently no nesting or wintering bald eagles on the Little Missouri National Grassland with low potential for both, and the current stipulations are consistent with the Bald Eagle Management Guidelines, the stipulations for bald eagle is adequate and the determination is this alternative **may impact individuals or their habitat but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species.**

If bald eagle nesting were to occur on the grassland, implementing the timing limitation for noise or activities February 1 to July 31 would be necessary.

Bighorn Sheep

Specific areas of the Dakota Prairie Grasslands have been identified under the grasslands plan as management areas that recognize specific management requirements for bighorn sheep. The management area designations for bighorn sheep within the analysis area are 3.51, 3.51a, and 3.51b. There are stipulations tied to these management areas, plus, there is direction in the grasslands plan that protects lambing areas that may fall outside the management areas.

Stipulations include:

- no surface occupancy within bighorn sheep habitat (MA 3.51)
- timing limitation within 1 mile of bighorn sheep lambing areas April 1 to June 15 (outside of MA 3.51)
- controlled surface use within 1-mile sight distance of bighorn sheep lambing grounds (outside of MA 3.51)
- controlled surface use and timing limitation MA 3.51A – bighorn sheep with non-Federal mineral ownership, when leased.
- controlled surface use and timing limitation MA 3.51B – bighorn sheep with non-Federal mineral ownership.

North Dakota Game and Fish feels the existing time limiting stipulation (April 1 through June 15) is inadequate to deal with the biological realities, given the variability of parturition dates in bighorn sheep lambing as well as other social large ungulates (Wiedmann 2018). Some lambs may only be 0-3 weeks old when the timing limitation expires for leases near lambing habitat.

Although oil and gas extraction technology is improving through horizontal drilling, requiring fewer pads to access the oil resource, there is still a need for daily visits to the site by field workers, creating a chronic disturbance factor for sheep.

This issue primarily affects the northern meta-population in Management Areas 3.51a and 3.51b. MA 3.51, south of Interstate-94, offers more protection from most oil and gas activities with no surface occupancy stipulations. Of the 1,358 acres of bighorn sheep habitat, 1,213 of those acres are considered unoccupied, exist outside of Management Area 3.51 and would have timing limitation and controlled surface use stipulations.

Determination for bighorn sheep is **this alternative may impact individuals or their habitat but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species**. Some benefit is realized to some individuals and the population under the shorter timing limitation protecting lambing habitat. However, timing limitations should probably be extended or shifted to address impacts when conditions cause parturition to change.

Burrowing Owl

Numerous burrowing owls are known to be in the project area.

- no surface occupancy within 0.25 miles (line of sight) of active prairie falcon or burrowing owl nest

Although no surface occupancy will limit effects to burrowing owls at the nest, general disturbance activities beyond the nest may impact foraging and other behaviors. The determination for burrowing owl is **this alternative may impact individuals or their habitat but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species**.

Greater Sage-Grouse

The majority of the historic lek sites within the administrative boundary are in the southwest corner of the grassland, which is considered primary grouse habitat. There are 197,016 acres of primary grouse habitat within the administrative boundary, of which 35,052 acres under Forest Service ownership remain available for leasing.

- timing limitation within 2 miles of sage-grouse display grounds (March 1 – June 15)
- no surface occupancy within 0.25 miles of center of sage-grouse display grounds

The identified stipulations are inconsistent with stipulations that have been identified for nearby land under different agency management. Manier et al. (2014) completed a report on the compilation and summary of published scientific studies that evaluate the influence of human activities and infrastructure on greater sage-grouse. Those data suggest that a buffer around leks should be between 3.1 to 5 miles radius. In addition, the Sage-Grouse National Technical Team (2011) has developed best management practices for fluid mineral development that are not represented in these stipulations.

As discussed above, consistent activity for all leks within the grassland administrative boundary has not been seen since 2013. However, individuals may be present, even though there are no active leks. If sage-grouse were to occur on the Little Missouri National Grassland, there is discrepancy between the current no surface occupancy and that suggested in scientific literature. Conversely, the 35,052 acres of available

priority habitat have not been highly desirable for leasing, as they are outside of the Bakken Formation, and are rated as very low potential for oil and gas. The reasonably foreseeable development scenario predicts one well might be drilled in the next 20 years in the entire area of very low oil potential outside the Bakken. The determination for greater sage-grouse is **this alternative may impact individuals or their habitat but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species.**

Black-tailed Prairie Dog

Stipulations and plan standards and guidelines surrounding prairie dogs are designed primarily to manage for black-footed ferret colonies. There are no known or suspected black-footed ferrets within the Little Missouri National Grassland at this time, so stipulations are not implemented with just the presence of prairie dogs. If black-footed ferrets were to be present and stipulations were implemented, black-tailed prairie dogs would benefit. Black-tailed prairie dogs may benefit from the burrowing owl stipulation and other stipulations that overlap with short grass prairie habitat. The determination for black-tailed prairie dog is **this alternative may impact individuals or their habitat but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species.**

Other Forest Service Sensitive Wildlife Species

The remaining Forest Service Sensitive species include:

- Baird's sparrow
- Loggerhead shrike
- Long-billed curlew
- Sprague's pipit
- Ottoe Skipper
- Northern redbelly dace

All of these species are known to occur on the Little Missouri National Grassland and could be impacted as described in the section Effects Common to All Species under Alternatives 1, 3, and 3B above. There are no specific stipulations listed under the current grasslands plan to help manage any of the above species, but plan direction and other resource stipulations may indirectly benefit them. If necessary, standard lease terms and the lease notice for threatened, endangered, and sensitive plant or animal species are available to aid in management of these species. Based on local knowledge and information, the national grassland or district biologist can make the determination for the need for mitigation measures at the project scale. The determination for these species is **this alternative may impact individuals or their habitat but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species.**

Other Raptors

In addition to the Forest Sensitive Species identified above, the grasslands plan has stipulations for raptors.

- Peregrine falcon no surface occupancy within 1 mile (line of sight) of active nest
- Prairie falcon nest no surface occupancy within 0.25 mile (line of sight) of active nest
- Merlin, golden eagle, ferruginous hawk no surface occupancy within 0.5 mile (line of sight) of active nest

Spatial and temporal buffer stipulations in other oil and gas development activities have contributed to the conservation of raptors (Fuller 2010). In addition to the no surface occupancy above, the grasslands plan has timing limitations for active nests to further reduce impacts from noise and activities.

Peregrine falcon, prairie falcon, merlin, golden eagle, and ferruginous hawk may be impacted by noise or human presence from oil and gas activities resulting in the potential for nest abandonment, foraging behavior change or unnecessary flushing; however, stipulations, specifically buffers around active nests, will reduce those impacts.

Big Game Species

In addition to bighorn sheep identified above there is also a stipulation identified for antelope (pronghorn) (timing limitation within mapped antelope winter range January 1 to March 31). Autenrieth et al. (2006) found that the greatest potential impacts from oil and gas development to antelope are through loss of habitat and displacement. They suggested that winter rangelands, seasonal movement corridors, and fawning areas require special management attention to reduce stress on crucial areas. The stipulation for pronghorn antelope is based on modeled winter range habitat and is only for the south side of Interstate 94. The stipulation for antelope may be adequate for project activities in the winter but does not address times of fawning. Summer habitat is crucial for pronghorn populations because fawning and fawn rearing occur on summer ranges.

Christie et al. (2016) found that although wells are not actively avoided by pronghorn, their placement in high-value habitat for this species contributes to significant habitat fragmentation. They recommend measures to conserve pronghorn habitat, such as constructing wells away from sagebrush, using existing roads to service newly constructed wells, and revegetating well pads with sagebrush plantings once they are no longer in use. Other processes may need to be implemented to address impacts during fawning.

There are no stipulations identified for deer; however, other resource stipulations, especially those for no surface occupancy, may also benefit deer.

- Antelope timing limitation within mapped antelope winter range (Jan. 1 - March 31)

Species of Interest – Swift Fox

In 1995, the Fish and Wildlife Service determined that the swift fox was warranted for listing as threatened; due to the listing backlog, there was a lag. In the interim, a Swift Fox Conservation Team was developed. Because of the efforts undertaken in swift fox monitoring, management, and research, as well as reintroductions in Canada and parts of the United States, swift foxes began to increase.

By 1998, the swift fox was downgraded from endangered in Canada. In the United States, the swift fox returned to over 40 percent of its historic range, and continues to expand. In 2001, during the development and finalization of the grasslands plan, the Fish and Wildlife Service removed the species from consideration for protection under the Endangered Species Act. However, the grasslands plan maintained stipulations for swift fox.

- Swift Fox timing limitation within 0.25 miles of swift fox dens (March 1 - July 31)

Currently there are no known breeding populations in the project area. If swift fox were to breed in the project area, current stipulations are adequate and **would help to maintain the long-term viability of the species.**

Management Indicator Species

There are three management indicator species identified for the analysis area. These include sharp-tailed grouse, black-tailed prairie dog, and greater sage-grouse. Refer to the discussions for black-tailed prairie dog and the greater sage-grouse, above.

Sharp-tailed grouse are known to occur throughout the project area. Stipulations to manage the species and habitat include:

- Timing limitation: Surface use is prohibited from March 1 to June 15 within one mile (line of sight) of an active sharp-tailed grouse display ground (lek); and
- No surface occupancy use allowed within 0.25 miles (line of sight) of an active lek.

The objective of the stipulations is to prevent abandonment of leks and prevent reduced reproductive success. Williamson (2009) concluded that the level of development within the Charlson oil field did not appear to negatively impact grouse, however continued surface damage to suitable habitat could. Some cautions were put forward related to the proportion of grassland versus croplands, the level of fragmentation related to roads, and other concerns.

Baydack and Hein (1987) found that females were more likely to be displaced from disturbed leks than males. This may affect the lek success, depending on the magnitude of disturbance. Continued disturbance at leks could cause population declines over time. Williamson (2009) also concluded that the current protections afforded through stipulations appeared adequate, particularly if enforced during the critical breeding periods.

Stipulations for sharp-tailed grouse, black-tailed prairie dog, and greater sage-grouse are adequate and **this alternative may impact individuals or their habitat but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species.**

Migratory Birds

Executive Order 13186 (January 10, 2001) requires Federal agencies to consider management impacts to migratory birds to further the purposes of the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and other laws. Federal agencies need to identify whether unintentional take will occur, and if so, whether such take would have a measurable negative effect on migratory bird populations. Take is defined to mean "... to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 CFR 10.12). Removal or destruction of vegetation is not considered a taking.

The objectives of the executive order is to address migratory birds by analyzing potential effects to: (1) species of concern identified in the Partners in Flight Continental Priorities and Objectives Defined at the State and Bird Conservation Region Levels: North Dakota (Rosenberg 2004);(2) important bird areas identified through the Audubon Society Important Bird Area program; (3) known important or unique avian over-wintering areas; and (4) identify the unintentional take of the action alternatives.

Wildlife Species of Concern

Rosenberg (2004) lists priority species of concern by vegetation type. All species of concern were reviewed for vegetation types found in the project area (grasslands and shrub/early successional). Except for raptors and grouse, there are currently no stipulations strictly set aside for migratory birds or their habitat. Some migratory birds are classified as endangered, threatened, or sensitive, and are discussed

above. However, stipulations identified for other species, research natural areas, special interest areas, woody draws and others indirectly may act as stipulations that provide protection for migratory birds.

Important Bird Areas and Overwintering Areas

The project area falls within the Ponderosa Pine Important Bird Area. There are no noted important overwintering areas within the project area. **Implementation may result in some level of incidental mortality (unintentional take) of some migratory birds. The removal of any eggs or fledglings is unlikely and would not result in a measurable negative effect to the bird populations listed above.**

Effects of Alternative 2 (no new oil and gas leasing)

Alternative 2 involves no new leasing and no new ground disturbance, as a result, no direct or indirect effects would occur; no new effects would contribute to past and present oil and gas activities. This alternative would have **no effect** on listed threatened and endangered species or their critical habitat and **no impact** to Forest Service sensitive, management indicator or migratory bird species on the Little Missouri National Grassland.

Effects of Alternative 3 (continue leasing with revised stipulations)

Federally Threatened and Endangered Wildlife Species

Direct and indirect effects as described for alternative 1 would apply to alternative 3. However, overall effects would likely be less than alternative 1 for all species due to additional acres of no surface occupancy, timing limitations and controlled surface use stipulations. The additional acres with stipulations in alternative 3 leaves only 30,900 acres with no stipulations. Specifically, impacts to Dakota skipper habitat will be reduced from 13,160 (9 percent) to 10,200 (7 percent) acres of potential impact. Similarly, northern long-eared bat woodland habitat subject to surface disturbance would decrease from 1,730 acres (14 percent) that could be impacted by alternative 1, to 1,110 acres (7 percent) impacted by alternative 3. The expected total disturbance over 10 years is 3,100 acres across all areas that could have surface disturbance. The exact locations would not be known until development is proposed.

This alternative also incorporates specific stipulations to further protect sage-grouse leks. In addition to bringing forward the no surface occupancy stipulation on sage-grouse display grounds, new timing limitations and controlled surface use stipulations associated with active leks will provide additional protection measures. However, the proposed sage-grouse stipulations in alternative 3 are inconsistent with stipulations for nearby land under different agency management and do not reflect recommendations from the Sage-Grouse National Technical Team, Conservation Objectives Team, North Dakota Game and Fish, and other literature-supported recommendations.

Forest Service Sensitive Species

Additional stipulations proposed under alternative 3 reduce the effects to threatened, endangered and sensitive species, though they do not eliminate all the potential direct and indirect effects identified in the alternative 1 analysis above. Implementation of **alternative 3 may affect but would not likely to adversely affect federally listed species and may impact individuals or their habitat but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species of Forest Service sensitive species, management indicator species, or migratory birds.**

Effects of Alternative 3B – Continue Oil and Gas Leasing with Revised Stipulations

Federally Threatened and Endangered Wildlife Species

Direct and indirect effects as described for alternative 1 and 3 would apply to alternative 3B, however overall the effects are likely to be decreased for all species due to an addition of no surface occupancy (43,400 acres). Specifically, impacts to Dakota skipper habitat will be reduced from 13,160 (9 percent) to 9,800 (7 percent) acres of potential impact. Similarly, northern long-eared bat woodland habitat available for leasing would decrease from 1,730 (14 percent) acres that could be impacted by alternative 1, to 1,350 (9 percent) acres impacted by alternative 3B. The expected total disturbance over 10 years is 3,100 acres across all areas that could have surface disturbance. The exact locations would not be known until development is proposed.

Forest Service Sensitive Species

No surface occupancy in sage-grouse priority habitat is consistent with other agency management and recommendations of the Sage-Grouse Technical Team. This alternative also works closely with North Dakota Game and Fish to inform the implementation stipulations for sage-grouse and bighorn sheep.

Although additional stipulations proposed reduces the effects to threatened, endangered and sensitive species it does not alleviate all the potential direct and indirect effects identified in the alternative 2 and 3 analysis above. Implementation of **alternative 3B may affect but would not likely to adversely affect federally listed species and may impact individuals or their habitat but will not likely contribute to a trend toward Federal listing or a loss of viability to the population or species of Forest Service sensitive species, management indicator species, or migratory birds.**

Cumulative Effects for Alternative 1, 3, and 3B

Oil and Gas Leasing

Oil and gas leasing has occurred and will occur on the Little Missouri National Grassland and on the interspersed and adjacent non-Federal land and minerals. The reasonably foreseeable development scenario projects a total of 105 wells per year on all ownerships. This represents a 70 percent increase over Forest Service mineral estate alone. Stipulations from the 2003 ROD (corresponding to alternative 1 in this document) apply to federal split estate minerals; the environmental protections for non-federal vary and cannot be precisely known. The activities associated with oil and gas development may affect fish and wildlife, along with their habitats. Disturbance to vegetation and habitat fragmentation are the primary effects. Increased traffic would also be expected to result in direct mortality to wildlife.

Wildlife Management – Prairie Dog Management Plan

This plan is expected to manage prairie dogs along the grassland boundary to limit and minimize unwanted prairie dog encroachment on to private and state lands. Management may also occur if there are health and safety concerns to the public or damage to infrastructure.

Grazing

Grazing has occurred and is expected to continue in the future on the Little Missouri National Grassland. Standards and guidelines in the Dakota Prairie Grasslands plan are intended to manage for species habitat in the plan area and provide direction to ensure persistence. Grazing is also prevalent on adjacent private lands, with fewer environmental controls.

Botanical Resources

Affected Environment

Sensitive Plant Species

There are no federally listed threatened or endangered plant species on the Little Missouri National Grassland, but there are 14 sensitive species. None of the current species is known to be in a downward trend within the project area. Their population status and NatureServe conservation status ranking are listed below. NatureServe (www.natureserve.org) provides each species global and state rankings that indicate the level of threat for the species (table 30).

Table 30. NatureServe rankings for sensitive plant species

Rank	Definition
G3	Vulnerable – at moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4	Apparently secure – uncommon but not rare; some cause for long-term concern due to declines or other factors
G5	Secure – At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
S1	Critically imperiled – at very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors at the state level.
S2	Imperiled – at high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3	Vulnerable – At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4	Apparently Secure – At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5	Secure – At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.
SNR/	Unranked – National or subnational conservation status not yet assessed
SU	Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

Smooth Goosefoot (*Chenopodium subglabrum*) – There are 16 mapped locations on the Little Missouri National Grassland, occupying 9.89 acres. This species is found in sandy river terraces and exposed sandy substrates in uplands involving sandstone outcrops, colluvium, sand blowouts and sand dunes. Two moderate sized populations along the Little Missouri River in Slope County appear to be persistent. Several ephemeral small populations are found further north along the river, but are spatially and temporally variable. There have been no documented effects to known populations from oil and gas production, but potential impact to suitable habitat or unknown populations is possible within upland habitat. This species has a global ranking of G3/G4, S1 in North Dakota and S2 in Montana.

Blue-eyed Mary (*Collinsia parviflora*) – There are 11 mapped locations on the Little Missouri National Grassland, occupying 8.06 acres. This species is found in woody understories, including green ash/elm draws, Rocky Mountain juniper, mesic shrub, and occasional xeric shrub communities. There are four current populations extending from northern Billings County to Slope County within woodland sites. Oil and gas production in Billings County occurs in close proximity to two historic sites, and has required some mitigation to avoid impacts. This species is ranked G5 (secure) globally, S2 (imperiled) in North

Dakota, and S5 (secure) in Montana. The ratings indicate that this species is globally secure, but at high local risk for extirpation in North Dakota.

Torrey's Cryptantha (*Cryptantha torreyana*) – There are 9 mapped locations on the Little Missouri National Grassland, that occupy 0.98 acres. This species is found in dry plains, rock outcrops, escarpments, and pine slopes. Only one small population is known to occur on Bullion Butte in Slope County. Bullion Butte is Management Area (MA) 1.2 and an inventoried roadless area with Federal mineral ownership, so there is minimal potential for oil and gas impacts to this site. Inventoried roadless areas have been protected from surface disturbance through lease notices in the past. The threats to habitat or unknown population sites is relatively low due to the rugged habitat conditions for this species. This species is ranked G5 (secure) globally, S1 (critically imperiled) in North Dakota, and SNR/SU (not ranked/under review) in Montana. The ratings indicate that this species is globally secure, but at high local risk for extirpation in North Dakota.

Nodding Buckwheat (*Eriogonum cernuum*) – There are six mapped locations on the Little Missouri National Grassland, that occupy 45.20 acres. This species is found on exposed sand substrates with low plant cover: erosional breaks, steep hillsides, sandstone outcrops and colluvium. There are four known population sites from Slope to northern Billings/Golden Valley Counties. The northern site occurs in close proximity to oil and gas production, and moderate potential for adverse effects to suitable habitat or unknown populations. This species is ranked G5 (secure) globally, S1 (critically imperiled) in North Dakota, and SNR/SU (not ranked/ under review) in Montana. The ratings indicate that this species is globally secure, but at high local risk for extirpation in North Dakota.

Dakota Buckwheat (*Eriogonum visherii*) – There are 63 mapped locations on the Little Missouri National Grassland, that occupy 596.5 acres. This species is found on badlands with barren clays and outwash zones, eroding bedrock or erosional breaks on prairie slopes and occasionally in dense saltgrass communities. Numerous populations ranging from few to tens of thousands of individual plants occur on both the Medora and McKenzie Ranger Districts. Several populations occur in close proximity to oil and gas production, and mitigation has been implemented to decrease direct effects. There is a moderate/high potential for adverse effects to individual populations and habitat. This species is ranked G3 (vulnerable) globally, S2S3 (imperiled) in North Dakota, and S1 (critically imperiled) in Montana. The ratings indicate that this species is globally vulnerable, and at high local risk for extirpation in North Dakota and Montana.

Missouri Foxtail (*Escobaria missouriensis*) – There are 222 mapped locations on the Little Missouri National Grassland that occupy 136.51 acres. This species is found on prairie slopes and plains, stony to loamy to clayey short-grass to mixed-grass prairies. It can also be found on the periphery of clayslicks where topsoil has been lost. There are numerous populations, usually of few to less than 100 individuals on both the Medora and McKenzie Ranger Districts. Several populations occur in close proximity to oil and gas production, and mitigation has been implemented to decrease direct effects. There is a high potential for adverse effects to individual populations, but population numbers and species viability are robust on the planning unit. This species is ranked G5 (secure) globally, SNR/SU (not ranked/under review) in North Dakota, and S4 (apparently secure) in Montana. Rankings indicate that this species is fairly secure both globally and in North Dakota and Montana.

Missouri foxtail (*Escobaria missouriensis*) was a USDA Forest Service sensitive species at the time of the analysis, but was removed from the list on May 15, 2019 (Marten 2019). Since the species was designated as sensitive in 2011, botanists on the LMNG have documented numerous additional populations. As a result, the species no longer meets the criteria for designation as a Forest Service sensitive species. The species was removed from the list at this time in order to eliminate the need for further analysis and

surveys for it during the 2019 field season. There is no difference for Missouri foxtail between alternatives 1 and 3, but the number of locations and acres affected by possible ground disturbance are reduced in alternative 3B. The original analysis with Missouri foxtail will be retained in the current analysis for consistency.

Sand Lily (*Leucocrinum montanum*) – There are 3 mapped locations on the Little Missouri National Grassland that occupy 50.79 acres. This species is generally found in shortgrass communities with fine textured substrates, but also found in an intermingled crested wheatgrass – needlegrass community. It has been reported from open coniferous woodlands, sagebrush scrub, and sandy flats. One active population is known on the McKenzie Ranger District (crested wheatgrass – needlegrass community), and there are as many as three extirpated population sites on the Medora Ranger District. Potential habitat for the species is rather ubiquitous, and there is a moderate/high potential for adverse effects to suitable habitat and unknown population sites. This species is ranked G5 (secure) globally, S2 (imperiled) in North Dakota, and S4 (apparently secure) in Montana. The ratings indicate that this species is globally secure, but at high local risk for extirpation in North Dakota.

Dwarf Mentzelia (*Mentzelia pumila*) – There are 11 mapped locations on the Little Missouri National Grassland that occupy 3.06 acres. This species is found on scoria exposures and colluvium with low plant cover. It has also been reported on slopes and sandy plains, and occasionally on hard clays and rocky soils. Only one known metapopulation site is found on the planning unit, and it is protected by its occurrence in the Limber Pines Research Natural Area Management Area 2.2. Threats to other potential habitat or unknown populations are low, due to the rugged habitat and steep slopes that naturally divert construction activity and/or result in no surface occupancy stipulations. This species is ranked G4 (apparently secure) globally, S1 (critically imperiled) in North Dakota, and S2 (imperiled) in Montana. The ratings indicate that this species is globally secure, but at high local risk for extirpation in North Dakota and Montana.

Alyssum-leaved Phlox (*Phlox alyssifolia*) - There are 62 mapped locations on the Little Missouri National Grassland that occupy 17.12 acres. This species is found on sandy/gravelly soil of open prairies, buttes, and ridge shoulders with shallow soils and bedrock exposures. It is also reported from clay banks. Only one metapopulation site is known on the shoulder and slopes of Bullion Butte in Slope County. Bullion Butte is protected by MA 1.2, and is an inventoried roadless area with Federal mineral ownership. Threats to other habitat or unknown populations appear low due to rugged habitat that naturally diverts construction activity and/or result in no surface occupancy stipulations. This species is ranked G5 (secure) globally, S1 (critically imperiled) in North Dakota, and S5 (secure) in Montana. The ratings indicate that this species is globally secure, but at high local risk for extirpation in North Dakota.

Limber Pine (*Pinus flexilis*) – This species is found on semi-arid exposed rocky ridges and foothills in the Limber Pines RNA, likely of native-American origin. Only one known metapopulation site is mostly protected by its occurrence in the Limber Pines Research Natural Area and rugged topography. Threats to potential habitat or other populations on the Little Missouri National Grassland are low or non-existent. There are two mapped locations on the Little Missouri National Grassland. These mapped locations occupy 0.52 acre. This species is ranked G4 (apparently secure) globally, S1 (critically imperiled) in North Dakota, and S2 (imperiled) in Montana. The ratings indicate that this species is globally secure, but at high local risk for extirpation in North Dakota and Montana.

Lanceleaf Cottonwood (*Populus acuminata*) – There are 19 mapped locations on the Little Missouri National Grassland that occupy 4.90 acres. This species is found on floodplains and stream banks, mesic woody draws, often with springs/seeps and occasionally near springs on open hillsides. Six documented population sites occur on the Medora Ranger District and within the South Unit of Theodore Roosevelt

National Park. Some sites occur in proximity to oil and gas production, but the potential for direct impacts are low due to no surface occupancy stipulations in woodland drainage habitat. This species is ranked GNA (not applicable) globally, S2 (imperiled) in North Dakota, and S4 (apparently secure) in Montana. The ratings indicate that this species is at high local risk for extirpation in North Dakota. It is not ranked globally due to being a hybrid species.

Alkali Sacaton (*Sporobolus airoides*) – There are 14 mapped locations on the Little Missouri National Grassland that occupy 3.61 acres. This species is found in secondary succession on clay outwash with saline conditions. It is also found on dry to moist sandy or gravelly soil. Several populations are present on the Little Missouri National Grassland, but many occur on reclaimed sites where records indicate they were planted as part of the seed mixture. The seed origin of these sites is generally from distant geographic regions, and their desirability is questionable. Further investigation and review of all population sites is warranted with regards to their likely origin and desirability. Threats to potential habitat or naturally occurring populations are moderate, but adverse effects to populations suspected or documented to be derived from non-local introductions are generally not mitigated. This species is ranked G5 (secure) globally, S2 (imperiled) in North Dakota, and S3 (vulnerable) in Montana. The ratings indicate that this species is at high local risk for extirpation in North Dakota.

Easter Daisy (*Townsendia exscapa*) – There are 38 mapped locations on the Little Missouri National Grassland that occupy 8.88 acres. This species is found on dry plains and hillsides, often with loamy or increased soil development and increased plant cover relative to Hooker's *Townsendia*. Recent DNA analysis has shown that both Easter daisy and Hooker's *Townsendia* are present on the Little Missouri National Grassland (Lee 2012), but it remains difficult to visually distinguish between the two species. Further investigation and review is warranted to definitively identify the distribution and population numbers of each species. Threats to habitat and populations are moderately high, but population numbers and species viability are strong. This species is ranked G5 (secure) globally, SNR/SU (not ranked/under review) in North Dakota, and SNR/SU (not ranked/ under review) in Montana. The ratings indicate that this species is globally secure. A ranking of SNR/SU (not ranked/under review) is somewhat ambiguous. It could indicate that new information has resulted in a different evaluation of the species.

Hooker's Townsendia (*Townsendia hookeri*) – There are 308 mapped locations on the Little Missouri National Grassland that occupy 82.06 acres. This species is found on low to moderate plant cover on dry plains, hillsides, gravelly benches and weathered scoria, often on clayey matrix or subsoil. There are numerous population sites on the Medora and McKenzie Ranger Districts, and mitigation is routinely implemented to avoid or decrease adverse effects to existing or newly discovered populations. Threats to habitat and populations are moderately high, but population numbers and species viability are strong. This species is ranked G5 (secure) globally, S1 (critically imperiled) in North Dakota, and S4 (apparently secure) in Montana. The ratings indicate that this species is at high local risk for extirpation in North Dakota.

Townsendia Species – There are 50 mapped locations on the Little Missouri National Grassland that occupy 13.95 acres. Many sensitive plant records document a *Townsendia* site without confirming the precise species present. This is due to taxonomical issues with determining the exact species of *Townsendia*. Two different species were not differentiated prior to 2011, and they remain difficult to visually distinguish when not in flower. All of the sites are considered to contain a sensitive species. These sites are analyzed separately within this report in order to capture potential impacts.

Table 31. Number of mapped populations of sensitive species, existing acres, ranking, and current condition within the Little Missouri National Grassland

Species name (scientific name)	Populations	Acres	Rank	Current condition
Smooth Goosefoot (<i>Chenopodium subglabrum</i>)	14	9.89	G3/G4, S1 (North Dakota), S2 (Montana)	There have been no documented effects to known populations from oil and gas production, but potential impact to suitable habitat or unknown populations is possible within upland habitat.
Blue-eyed Mary (<i>Collinsia parviflora</i>)	11	8.06	G5, S2 (North Dakota), S5 (Montana)	There are four current populations extending from northern Billings County to Slope County within woodland sites. Oil and gas production in Billings County occurs in close proximity to two historic sites, and has required some mitigation to avoid impacts.
Torrey's Cryptantha (<i>Cryptantha torreyana</i>)	9	0.98	G5, S1 (North Dakota), and not ranked in Montana	The threats to habitat or unknown population sites is relatively low due to the rugged habitat conditions for this species.
Nodding Buckwheat (<i>Eriogonum cernuum</i>)	6	45.20	G5, S1 (North Dakota), and not ranked in Montana	The northern site occurs in close proximity to oil and gas production, and moderate potential for adverse effects to suitable habitat or unknown populations.
Dakota Buckwheat (<i>Eriogonum visherii</i>)	53	596.5	G3, S1/S2 (North Dakota), S1 (Montana)	Several populations occur in close proximity to oil and gas production and mitigation has been implemented to decrease direct effects. There is a moderate/high potential for adverse effects to individual populations and habitat.
Missouri Foxtail (<i>Escobaria missouriensis</i>)	222	136.51	G5, not ranked (North Dakota), S4 (Montana)	Several populations occur in close proximity to oil and gas production, and mitigation has been implemented to decrease direct effects. There is a high potential for adverse effects to individual populations, but population numbers and species viability are robust on the planning unit. As of May 15, 2019 this species is no longer considered sensitive.
Sand Lily (<i>Leucocrinum montanum</i>)	3	50.79	G5, S2 (North Dakota), S4 (Montana)	Potential habitat for the species is rather ubiquitous, and there is a moderate/high potential for adverse effects to suitable habitat and unknown population sites.
Dwarf Mentzelia (<i>Mentzelia pumila</i>)	11	3.06	G4, S1 (North Dakota), S2 (Montana)	One known site is protected by its occurrence in the Limber Pines Research Natural Area MA 2.2. Threats to other potential habitat or unknown populations are low, due to the rugged habitat and steep slopes that naturally divert construction activity and/or result in no surface occupancy stipulations.

Species name (scientific name)	Populations	Acres	Rank	Current condition
Alyssum-leaved Phlox (<i>Phlox alyssifolia</i>)	62	17.12	G5, S1 (North Dakota), S5 (Montana)	One population is within an inventoried roadless area with Federal mineral ownership. Threats to other habitat or unknown populations appear low due to rugged habitat that naturally diverts construction activity and/or result in no surface occupancy stipulations.
Lanceleaf Cottonwood (<i>Populus acuminata</i>)	19	4.90	GNA, S2 (North Dakota), S4 (Montana)	Some sites occur in proximity to oil and gas production, but the potential for direct impacts are low due to no surface occupancy stipulations in woodland drainage habitat.
alkali sacaton (<i>Sporobolus airoides</i>)	14	3.61	G5, S2 (North Dakota), S3 (Montana)	Threats to potential habitat or naturally occurring populations are moderate, but adverse effects to populations suspected or documented to be derived from non-local introductions are generally not mitigated.
Easter daisy (<i>Townsendia exscapa</i>)	38	8.88	G5, not ranked (North Dakota and Montana)	Threats to habitat and populations are moderately high, but population numbers and species viability are strong.
Hooker's townsendia (<i>Townsendia hookeri</i>)	308	82.06	G5, S1 (North Dakota), S4 (Montana)	Threats to habitat and populations are moderately high, but population numbers and species viability are strong.
Undetermined Townsendia locations (<i>Townsendia</i> sp.)	50	13.95	Not available	No data

There have been 24 documented occurrences of adverse effects to existing sensitive plant populations on the Little Missouri National Grassland since 2003 (2016 Botany files). The vast majority of these occurrences involved oil and gas developments, with direct disturbances to Missouri pincushion cactus, two *Townsendia* species, and Dakota buckwheat, the four most abundant of the Forest Service-designated sensitive species. In a large majority of cases, the degree of adverse effect was decreased through avoidance or slight relocation of proposed developments and resulted in adverse effects to only a portion rather than the entire sensitive plant population. The combined effects have not contributed to a loss of viability for any of the four species.

Invasive Plant Species

The Great Plains have undergone continual transformations due to the influences of nature and human actions. There are considerable concerns with the establishment of invasive perennial grasses and noxious weed species into native prairie communities (Henderson and Koper 2014). Anthropogenic alteration of native vegetation and restoration efforts associated with abandoned farms resulted in plantings of introduced species that became widely naturalized, such as crested wheatgrass (Christian and Wilson 1999, Lesica and Allendorf 1999). Other invasive species and noxious weeds include sweet clover, Kentucky bluegrass, smooth brome, annual bromes, and leafy spurge have altered native communities and are problematic at local scales. Kentucky bluegrass and smooth brome have had recent rapid expansions into native grassland communities. DeKeyser et al. (2013), DeKeyser et al. (2015), Hendrickson and Lund (2010), Jordon et al. 2008, and others document the extensive invasions of these two species into native prairie communities, which have also resulted in substantial effects on the composition, structure and function of native prairie communities. The expansion of invasive species can also be linked back to

other past and present disturbances such as oil and gas, utility, road construction, livestock grazing, and recreation.

The disruption of native prairie communities potentially has substantial implications for livestock grazing and prairie plant and animal communities dependent on these systems. The restoration of these states requires a substantial commitment of funds and resources. There are no data for the amount and distribution of invaded grass sites in the analysis area, but it is thought to be extensive.

Oil and gas development sites are vulnerable to noxious weed and invasive species invasion. The total number of wells drilled to date on Forest Service surface is approximately 1,518. An average of 5 acres of disturbance per well pad would equal 7,590 acres of vegetation disturbed. However, prior to the Bakken boom and horizontal drilling, there were not multi-well pads. Additionally, the acreage does not take into account disturbance as a result of associated oil and gas disturbance such as access roads and pipelines. The current estimate of disturbance from oil and gas pad development (7,590 acres) is approximately 5 percent of the 141,200 acres available for oil and gas development with surface disturbance. While this overall percentage is relatively small, oil and gas sites are highly vulnerable to noxious weed and invasive species invasion. Sites have stipulations for vegetation control, but long-term control and/or eradication of undesirable species in open sites will require concerted effort. Another 620 wells are projected over the next 10 years.

Recent monitoring of oil and gas sites on the Little Missouri National Grassland found that a large percentage of the sites were infested with noxious weeds and/or invasive species (Botany Files 2018). There were 516 sites monitored at various stages of development. Sixty-nine (13 percent) of the sites had no infestations. The results of detection within monitoring sites by most common to least common include Canada thistle (383 sites, 74 percent), leafy spurge (121 sites, 23 percent), henbane (97 sites, 19 percent), bull thistle (69 sites, 13 percent), bindweed (53 sites, 10 percent), burdock (44 sites, 9 percent), wormwood (34 sites, 7 percent), halogeton (13 sites, 3 percent), houndstongue (3 sites, 1 percent), salt cedar (2 sites, less than 1 percent). Hoary cress was not detected in any plots during monitoring.

Effects of Alternative 1 (continue current leasing and stipulations)

Sensitive Plant Species

Exact locations of exploratory or development pads and wells and associated roads cannot be predicted at this stage in the planning process. Given these limitations, potential impacts are considered where mapped locations of sensitive plants overlap areas available for lease that do not have a no surface occupancy stipulation. There are approximately 141,200 acres that could be impacted by surface disturbance associated with this alternative.

Table 32 describes the number and acreage of mapped locations for each sensitive plant species in areas of potential disturbance in alternative 1. Table 32 presents the total number of acres of the mapped locations of rare plants, and the number of acres that have the potential to be directly impacted by oil and gas development. The purpose for showing these data is to illustrate the percentage of the plant acres that could be directly impacted. The acres of mapped locations that are not completely overlapped by potential disturbance can still be susceptible to indirect impacts such as noxious weed invasion.

Though there is potential for disturbance, none of the current species is known to be in a downward trend within the project area. For alternative 1, the determination for all sensitive plant species is **this alternative may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend to Federal listing or a loss of species viability rangewide** (see table 33).

Direct Impacts to Sensitive Plants

Direct impacts to sensitive plant species could include the loss or alteration of sensitive plant locations or their habitat from exploratory and developmental well pads, construction, and to a lesser extent, reconstruction of roads and maintenance of pipelines, facilities, and well pads. For a productive well, the loss of habitat would be long term, for the life of the well (10 to 40 years or more) and beyond, as reclamation also takes years. The area of direct development in the case of a production well is no longer functional in any capacity for plant species, and there is no potential for it to become so for the life of the well. Unproductive wells and associated access roads would be reclaimed, and vegetation would begin to reestablish within a few years. When reclaimed with appropriate native plant species, disturbance would be short term.

Table 32. Sensitive species resource indicators and measures for alternative 1

Common Name (Scientific Name)	Number of plant locations potentially disturbed	Acres of rare plants potentially disturbed (entire occurrence)	Acres of rare plants potentially disturbed (only areas overlapped by potential disturbance)	Percentage of rare plant acres that could potentially be impacted
smooth goosefoot (<i>Chenopodium subglabrum</i>)	0	0	0	0
blue-eyed Mary (<i>Collinsia parviflora</i>)	1	0.26	0.22	85
Torrey's Cryptantha (<i>Cryptantha torreyana</i>)	0	0	0	0
nodding buckwheat (<i>Eriogonum cernuum</i>)	0	0	0	0
Dakota buckwheat (<i>Eriogonum visleri</i>)	13	166.33	80.06	48
Missouri foxtail (<i>Escobaria missouriensis</i>)	25	7.35	7.32	99
sand lily (<i>Leucocrinum montanum</i>)	0	0	0	0
dwarf mentzelia (<i>Mentzelia pumila</i>)	0	0	0	0
alyssum-leaved phlox (<i>Phlox alyssifolia</i>)	0	0	0	0
limber pine (<i>Pinus flexilis</i>)	1	0.26	0.06	23
lanceleaf cottonwood (<i>Populus acuminata</i>)	1	0.26	0.01	4
alkali sacaton (<i>Sporobolus airoides</i>)	2	0.52	0.52	100
Easter daisy (<i>Townsendia exscapa</i>)	2	0.47	0.47	48
Hooker's townsendia (<i>Townsendia hookeri</i>)	16	14.32	8.71	61
<i>Townsendia</i> sp.	7	1.81	1.32	76

Species such as Missouri foxtail, Hooker's townsendia, and Easter daisy are the most likely to be adversely affected by direct adverse effects. This is because these species have relatively high population numbers and a wide geographic range across the Little Missouri National Grassland. Portions of Hooker's townsendia and the undetermined Townsendia would be protected by current development restraints, but nearly all of the Missouri foxtail and Easter daisy sites could potentially be impacted. Mitigation identified during site-specific botanical surveys prior to construction disturbances, which involve site relocations when sensitive plant occurrences are encountered, would continue to decrease the degree of adverse effect to all sensitive species. The lease notice for threatened, endangered, and sensitive species ensures that appropriate surveys will occur.

In general, there is a low potential for direct adverse effects from oil and gas production to five of the sensitive species, because habitat conditions or locations of currently documented population sites involve steep slopes, narrow ridgelines, woodland drainages, Research Natural Areas, or Wilderness Management Areas. Steep rugged topography or stipulations for no surface occupancy impede or prohibit the location of a well pad or access road in these locations. This group of species includes Torrey's cryptantha, dwarf mentzelia, alyssum-leaved phlox, limber pine, and lanceleaf cottonwood.

Smooth goosefoot and nodding buckwheat have a moderate potential for impacts from oil and gas development in combination with low numbers of occurrences on the Little Missouri National Grassland. These species are not recorded in the analysis area, and any potential impacts would be to the species' habitat. The remaining species with relatively low population numbers and at least a moderate potential to be affected by oil and gas development are alkali sacaton, and blue-eyed Mary.

Increased truck traffic and dust dispersal has the potential to create adverse effects to sensitive plant populations that are not directly disturbed by construction. The greatest severity of effect would likely occur to six of the sensitive species with annual growth forms that are dependent on maintaining a healthy seed bank for persistence of the population. Five of these six species are represented by low population numbers and/or a relatively low number of individuals within populations: blue-eyed Mary, nodding buckwheat, smooth goosefoot, dwarf mentzelia, and Torrey's cryptantha.

Indirect Effects to Sensitive Plant Habitat

One indirect effect of oil and gas development and road construction is habitat fragmentation. Habitat fragmentation may create islands of otherwise suitable habitat that are too small to allow for maintenance of populations of certain plants. Fragmentation also results in a greater amount of edge area relative to the amount of interior habitat area. Newly created edges experience changes in microclimate conditions, which may alter plant communities (Collinge 1996). No habitat fragmentation studies have been conducted with the sensitive plants analyzed in this report; their responses to habitat fragmentation are not known.

Another indirect effect is the establishment of invasive plants. Ground disturbance from natural or man-made causes provides openings for weed species to establish and spread. Effects associated with weed population expansion may include changes in plant community composition, structure, and function (Mack et al. 2000), which:

- may alter nutrient and fire cycles (Brooks 2008),
- result in declines in native plant diversity,
- degrade soil properties (Ehrenfeld 2003),
- decrease the quality and availability of forage for wildlife (Thompson 1996),

- reduce the aesthetic value of the landscape and scientific values of wilderness areas (Montana Department of Agriculture 2017),
- increase encroachment upon rare plant populations and their habitats, and
- produce an overall decline of ecosystem health (Vitousek et al. 1996).

Noxious weed introduction and establishment is likely to increase with ground disturbance and could result in habitat degradation or displacement of sensitive plant species. The sensitive species most threatened by invasive and noxious species due to overlapping habitat conditions are smooth goosefoot, blue-eyed Mary, nodding buckwheat, Missouri foxtail, sand lily, lanceleaf cottonwood, alkali sacaton and Easter daisy.

Indirect effects could occur from changes in soil or site characteristics, resulting in loss or change of the supporting substrate for plants, soil compaction, reduced plant vigor, or reduced seed or vegetative reproduction. Oil or other chemical spills could contaminate soils and render them temporarily unsuitable for plant growth until cleanup measures were fully implemented. If cleanup measures were less than successful, longer-term impacts could be expected.

Dispersal of road dust onto adjacent vegetation decreases plant growth and livestock forage value in heavily traveled areas, but is unlikely to have a long-term adverse effect on vegetation resources across the landscape. The degree of decreased plant growth that currently occurs adjacent to gravel roads will increase with increasing truck traffic associated with development of the Bakken Formation. However, these effects are not permanent and will gradually decrease in a particular area as well drilling shifts to new areas. Effects to vegetation along access roads leading to a single well site would be prominent over a period of weeks during well construction and water transport, while vegetation along primary roads accessing numerous sites within a region of the Little Missouri National Grassland could be affected during large portions of the growth season for several years. Maintenance related truck traffic would continue to each well site while it is productive, but result in lower levels of dust dispersal.

Invasive Plants

Project-related activities could contribute to an increase in invasive plants in three major ways (1) the creation of conditions that favor establishment of noxious weed species, such as soil disturbance and removal of native vegetation; (2) the spread of new and pre-existing weed infestations into newly disturbed areas via project tools, equipment, and personnel; and (3) the subsequent release of pre-existing weed seedbanks from dormancy or the quick build-up of new weed seedbanks on disturbed soils.

Soils disturbed by project activities can provide ideal habitat for weeds. Many weeds take advantage of disturbance to invade native plant communities, and the risk of weed spread increases as the extent of disturbance increases. Weed seeds and plant parts can be carried in soil clinging to machinery, vehicles, and clothing, to be deposited in weed-free areas. Roads can also facilitate invasion and spread by altering habitat conditions, stressing or removing native species, and allowing easier movement of wild or human vectors.

For this analysis, potential soil disturbance was determined by identifying available unleased land that was not under a no surface occupancy stipulation. This included areas of no stipulation, along with those areas that fell under timing limitations (seasonal restriction) or controlled surface use stipulations. The species with the highest amounts of existing infested acres in areas of potential direct disturbance are, in order, leafy spurge (860 acres, 14 percent of total acres), Canada thistle (317 acres, 19 percent of total acres), houndstongue (127 acres, 29 percent of total acres), common burdock (86 acres, 26 percent of total acres).

acres) and hoary cress (26 acres, 55 percent of total acres). The remaining noxious weed species have less than 10 acres in areas of potential direct disturbance. None of the species had more than two infestations.

Following establishment, new populations of weeds are often extremely difficult to eliminate, and even if controlled or eradicated, it may take several years or decades to re-establish native soil structure and biota. Reclamation monitoring conducted in 2011 and 2012 on 18 well sites that were primarily surrounded by high condition native species detected noxious weeds at many of the sites (Botany files). Noxious weeds were present on 14 (78 percent) of the 18 sites, despite increased or more consistent direction for their control. Canada thistle (*Cirsium arvense*) and leafy spurge (*Euphorbia esula*) were present on eight and nine of the sites respectively, with one or both of the species present on 11 of the 18 sites. Black henbane (*Hyoscyamus niger*) was present on five sites with evidence of recent control on some of the sites.

Design features for reducing the spread of weeds include preventive measures, such as cleaning equipment and monitoring for new weed infestations, and control measures to be implemented and monitored for effectiveness. Full implementation and prioritization of these measures would substantially reduce the risk of increasing weeds, as a result of the proposed activities, from moderate to low. If prevention and control measures do not receive a high priority and result in less than full implementation, the risk of increasing weeds due to proposed activities would remain moderate.

Effects to other resources associated with weed population expansion may include declines in the palatability or abundance of wildlife and livestock forage, declines in native plant diversity, reductions in the aesthetic value of the landscape, encroachment upon rare plant populations and their habitats, potential reductions in soil stability and subsequent increases in erosion, and an overall decline of ecosystem health.

Cumulative Effects

Past, present, and reasonably foreseeable actions affecting sensitive plants and noxious weeds include oil and gas, cattle grazing, road construction and maintenance, and recreation of various forms. All of the impacts discussed are imputed, because leasing alone entails no ground disturbance. When a proposal to develop a leased parcel is submitted, appropriate Grassland standards, guidelines, and best management practices would be incorporated into the planning and implementation of each proposed oil and gas development. Projects would be planned to meet Grassland standards and guidelines and avoid cumulative effects to the sensitive plant species and other resources. Measures would also be taken to reduce the risk of spreading noxious weeds.

The reasonably foreseeable development scenario projects a total of 105 wells per year on all ownerships. This represents a 70 percent increase over Forest Service mineral estate alone, with an expected increase in surface disturbance. Stipulations from alternative 1 apply to federal split estate minerals; the environmental protections for non-Federal vary and cannot be precisely known.

Cumulative Effects to Sensitive Plants

Oil and gas development is being implemented through the environmental analysis process. Approximately 1,518 active or reclaimed well sites and numerous miles of access road and utility corridors occur across the Little Missouri National Grassland. Impacts would be similar to those discussed for the current project. Effects in all but rare cases would be minimized by avoidance of sensitive plant species. In situations where impacts to sensitive plant species cannot be avoided, as described in the direct and indirect effects discussion for alternative 1, impacts will be analyzed at the site-specific level to ensure impacts do not lead to a trend towards listing. Impacts to sensitive plant

species with few occurrences on the grassland would be more detrimental than those that are widespread and numerous.

Recreation of various forms can result in direct impacts to sensitive plant species where individual plants are trampled by foot or crushed by tires of off-road vehicles. Indirectly, these activities can result in an increased risk of introducing noxious weeds and invasive species into suitable habitat for sensitive plant species.

Cumulative Effects to Invasive Plants

Monitoring indicates that many of the existing active or reclaimed wells, roads, and utility corridors across the Little Missouri National Grassland are infested with noxious weeds and invasive species. Under the 2007 Dakota Prairie Grasslands Noxious Weeds record of decision, herbicide treatment of noxious weeds continues to occur, but some invasive plants remain untreated.

In addition, livestock grazing impacts invasive plants. Moderate to heavy seasonal or season-long livestock grazing repeated on an annual basis can facilitate the spread of invasive plants when they are present in the system (USDA NRCS 2012, 2009) due to livestock selection of native plants. In addition, feeding of hay on private lands may contribute to invasive grasses or sweet clover. Weeds may also be carried on hides or hooves of livestock or on the vehicles of permittees and Forest Service personnel.

Road construction and maintenance projects can increase the risk of noxious weed spread. Roads provide vectors for the movement of noxious weeds and invasive plant species. Similarly, recreation can result in invasive species introduction either via vehicles or on clothing and shoes of hikers.

Effects of Alternative 2 (no new oil and gas leasing)

No ground disturbance would take place associated with oil and gas activities. There would be no change in effects to sensitive species or noxious weeds associated with oil and gas activities with this alternative. There would be no direct or indirect effects on habitat associated with oil and gas activities because the activities would not occur. Minor indirect effects would occur when undeveloped leases were surrendered and not re-offered, resulting in additional lands that would remain undisturbed, though the amount is unpredictable.

Effects of Alternatives 3 and 3B (continue leasing with revised stipulations)

Effects of alternatives 3 and 3B would be similar to those of alternative 1. Alternative 3 provides for an additional no surface occupancy stipulation for rare plants and roadless areas. The new stipulation under alternative 3 would prohibit surface occupancy and disturbance for three sensitive plant species: Dakota buckwheat, nodding buckwheat, and sand lily. Under alternative 3B blue-eyed Mary would also no longer be potentially impacted due to no surface occupancy for sage-grouse priority habitat. These four species have very few populations on the Little Missouri National Grassland, so impacts from oil and gas surface activities could reduce the capacity to maintain the species within the planning area. The new and revised stipulations would ensure that these species do not become locally extirpated and to prevent a trend toward Federal listing under the Endangered Species Act.

Alternative 3 has slightly less potential disturbance to known sensitive species and noxious weed species than alternative 1. Effects from potential ground disturbance were reduced in alternative 3 for known populations of Dakota buckwheat (*Eriogonum visherii*). Thirteen known locations and 80.6 acres of Dakota buckwheat would not be affected under alternative 3 compared to alternative 1. Potential impacts

were reduced for Hooker's townsendia (*Townsendia hookeri*) and *Townsendia* sp. Four fewer locations and 7.21 less acres of Hooker's townsendia would be potentially affected under alternative 3 compared to alternative 1. Three fewer locations and 0.54 less acres of *Townsendia* sp. would be potentially affected under alternative 3 compared to alternative 1. Indirect effects to these species and effects to their habitat, as described for alternative 1, could still occur. However, the new stipulation reduces the risk of impacting a large proportion of known occurrences on the planning unit (e.g., impacting one of three known sand lily occurrences on the grassland), which could lead to viability issues for the species due to the small population size.

Alternative 3B has slightly less potential than alternative 3 to disturb known sensitive species. There would be no effect from potential ground disturbance in alternative 3B for blue-eyed Mary (*Collinsia parviflora*) due to no surface occupancy stipulations. There would be 42 fewer sensitive plant locations that could be impacted by ground disturbance compared to alternative 1, and 22 fewer locations compared to alternative 3. There would be 94.08 fewer potentially impacted occupied acres compared to alternative 1 and 6.27 fewer acres compared to alternative 3. The species with reduced impacts are Dakota buckwheat, blue-eyed Mary, Missouri foxtail, Hooker's townsendia and *Townsendia* sp.

Alternative 3 has slightly less potential disturbance to known noxious weed species. The total number of locations that could be impacted by ground disturbance did not change, but five species had a total reduction of 127.68 acres of known infestations that could be impacted by ground disturbance. Thus, approximately nine percent less acreage would potentially be disturbed in alternative 3 compared to alternative 1. These species were Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), black henbane (*Hyoscyamus niger*), hoary cress (*Cardaria draba*) and common burdock (*Arctium minus*).

Alternative 3B has slightly less potential disturbance to known noxious weed species. The total number of locations that could be impacted by ground disturbance did not change. There would be 170.97 fewer acres of known infestations that could be impacted by ground disturbance compared to alternative 1, and 43.28 fewer acres of known infestations compared to alternative 3.

Lands that are currently leased but not held by production may eventually become available for re-leasing in the future with the stipulations from this decision. While these lands cannot be specifically identified and quantitatively analyzed, effects to resources would be equal to or less than the effects of current lease stipulations, described in alternative 1.

Cumulative Effects

Cumulative impacts are expected to be similar to those described in alternative 1. The acres of potential disturbance would be less than alternative 1, but the number of new wells would be the same. Dakota buckwheat, Hooker's townsendia and *Townsendia* sp. would have a slight reduction in potential cumulative impacts because there is a reduction in the number of mapped locations that are within the footprint of potential disturbance. Canada thistle, leafy spurge, black henbane, hoary cress, and common burdock would have a slight reduction in potential cumulative impacts because there is a reduction in the acreage of infestations that are within the footprint of potential disturbance.

Determination of Effects to Sensitive Plants for All Alternatives

The acronyms in the following table represent effects determination statements as defined below.

NI = No impact

BI = Beneficial impact

MAII = May adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend to Federal listing or a loss of species viability rangewide.

Table 33. Determination of effects to sensitive plants for all alternatives

Common Name (Scientific Name)	Alternatives 1, 3 and 3B	Alternative 2	Rationale for Alternatives 1, 3 and 3B
smooth goosefoot (<i>Chenopodium subglabrum</i>)	MAII	NI	Suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
blue-eyed Mary (<i>Collinsia parviflora</i>)	MAII	NI	Known mapped location and suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
Torrey's Cryptantha (<i>Cryptantha torreyana</i>)	MAII	NI	Suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
nodding buckwheat (<i>Eriogonum cernuum</i>)	MAII	NI	Suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
Dakota buckwheat (<i>Eriogonum visherii</i>)	MAII	NI	Known mapped locations and suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
Missouri foxtail (<i>Escobaria missouriensis</i>)	MAII	NI	Known mapped locations and suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated. As of May 15, 2019 this species is no longer considered sensitive.
sand lily (<i>Leucocrinum montanum</i>)	MAII	NI	Suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
dwarf mentzelia (<i>Mentzelia pumila</i>)	MAII	NI	Suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
alyssum-leaved phlox (<i>Phlox alyssifolia</i>)	MAII	NI	Suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
limber pine (<i>Pinus flexilis</i>)	MAII	NI	Known mapped location and suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
lanceleaf cottonwood (<i>Populus acuminata</i>)	MAII	NI	Known mapped location and suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.

Common Name (Scientific Name)	Alternatives 1, 3 and 3B	Alternative 2	Rationale for Alternatives 1, 3 and 3B
alkali sacaton (<i>Sporobolus airoides</i>)	MAII	NI	Known mapped locations and suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
Easter daisy (<i>Townsendia exscapa</i>)	MAII	NI	Known mapped locations and suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.
Hooker's townsendia (<i>Townsendia hookeri</i>)	MAII	NI	Known mapped locations and suitable habitat is present. Unknown populations and habitat could be affected, but not to the extent that populations are likely to be extirpated.

Rangeland Resources

Affected Environment

The Little Missouri National Grassland was formed primarily from lands acquired under the Bankhead-Jones Farm Tenant Act and has been grazed since the Soil Conservation Service began administering the land in 1938. Range was initially grazed by cattle, sheep, swine, and goats. Today, it is grazed by bulls, cows, calves, and yearlings, with incidental use by permittees' working horses. Term permits authorize grazing occupancy and use.

The number of grazing permits, grazing allotments, and maximum permitted forage consumption (animal unit months) have remained relatively stable over time, however, annual authorized livestock numbers for grazing on the district's allotments can vary substantially due to precipitation patterns and yearly forage production. In total there are four livestock term permits authorizing livestock grazing in this planning area. Since 2012, the number of authorized livestock has averaged about 91 percent of the number permitted due to drought-related issues such as reduced forage production or lack of livestock water.

Table 34. Allotment acres within the Little Missouri National Grassland

Resource Element	McKenzie District	Medora District	Total
Little Missouri National Grassland Acres	498,231	522,467	1,020,698
Waived Acres*	179,663	218,936	398,599
Other Acres**	44,839	41,035	85,873
Total Acres	722,733	82,438	1,505,171
Allotments	186	236	422
Permittees	1	3	4
Permitted AUMs	186,356	188,428	374,784
Authorized AUMs	173,792	171,562	345,354

* Waived Acres = private lands

** Other acres = State/Army Corps of Engineers

AUMs = animal unit months

Effects of Alternative 1 (continue current leasing and stipulations)

Under the current lease stipulations for range there are no specific best management practices identified, due to the minimal impacts that these leases affect range management. In certain areas, oil, gas and minerals management could affect the amount of estimated forage available for livestock.

Construction of roads and pads for oil and gas development would reduce estimated forage availability. Roads and oil pads generally occupy a small percentage of the landscape in areas where oil and gas development occur. It is estimated that the potential surface disturbance under alternative 1 would result in less than 0.5 percent animal unit months that would temporarily be lost from existing grazing allotments. Although this is a small percentage, it does reduce the estimated available forage over the life of the development. Reclamation is required by Forest Plan direction. After rehabilitation of roads and pads has been completed, estimated forage availability would be restored. Rehabilitation of these areas would be done with native vegetation species.

In addition to the loss of animal unit months (AUMs), construction, maintenance, and decommissioning activities also could:

- Generate fugitive dust emissions, which could result in a type of pneumonia in livestock known as bovine respiratory disease and may require livestock managers to alter their rotation pastures to avoid prolonged exposure or could negatively impact forage by covering vegetation;
- Damage rangeland improvements (fences, gates, cattle guards, buildings, and water supplies) or preclusion of use;
- Increase the potential for livestock/vehicle collisions;
- Increase the potential for trespass (accidental or intentional);
- Cause stress to livestock (calves and lambs) due to increased human presence; and
- Cause invasion and spread of noxious weeds and invasive plant species.
- Convert secondary rangelands (areas that are currently not available to livestock due to lack of water) into primary rangelands with the creation of new roads.

Cumulative Effects

On Forest Service lands, several management activities and allocations change the amount of estimated forage available for livestock, including desired vegetative conditions; rest; threatened, endangered, and sensitive species habitat requirements; other wildlife habitat needs; oil and gas development; riparian and wetland management; and special use designations. Oil and gas development, conversion of grasslands to crops, and housing or commercial development are activities that are prevalent on private lands within the project area. More than half of the area within the Little Missouri National Grassland administrative boundary is private or state owned, and has seen much higher levels of oil development during the recent boom than on Federal lands (table 7).

Cumulatively, these changes have been considered in the calculations of available forage for livestock, with the exception of impacts due to oil and gas road and pad development; prairie dog colony expansion; some threatened, endangered, and sensitive species habitat requirements; and standards for meeting proper functioning conditions in riparian areas and wetlands. Estimating forage changes for these activities is highly variable, with the extent of some of the impacts unknown. All of these impacts will be considered on a site-specific basis during development of allotment specific management plans and projects. Undoubtedly, available grazing land has been reduced by the high degree of oil and gas leasing

and development that has taken place, especially since 2006, on non-Federal and split estate Federal mineral estate within the Little Missouri National Grassland. The exact amount of these losses is unknown at this time.

Effects of Alternative 2 (no new oil and gas leasing)

This alternative would limit oil and gas leasing on the Little Missouri National Grassland and Federal minerals to current valid leases. No animal unit months would be lost, and new road and pipeline construction would be limited to that associated with leases on split-estate Federal minerals and non-Federal minerals. Road, pipeline, and transmission line construction would be limited to leases associated with lands, with lesser negative impacts from fugitive dust emissions, the potential for livestock stress and dust related illness, trespass, and the spread of noxious weeds and invasive plant species, and also less improvement in accessibility.

Currently held leases would not be affected by this alternative, but would continue to operate under the stipulations and conditions in place when the lease was signed. Current leases that expire before being developed would not be leased again. The past and present effects of oil and gas leasing would be the same as alternative 1, but no new areas within the Little Missouri National Grassland would be affected. Leases are often held by production for many decades, so this anticipated effect entails much uncertainty. There would be no cumulative effects in the near term and minor beneficial effects to rangeland resources in the long term.

Effects of Alternative 3 and 3B (continue leasing with revised stipulations)

The effects of alternative 3 and 3B would be the same as alternative 1, except that the potential loss of permitted animal unit months due to ground disturbance would occur on approximately 32,700 fewer acres for alternative 3 and 43,400 fewer acres for 3B, due to reduced surface occupancy allowed. Due to the revised stipulations in alternative 3 and 3B, there would likely be somewhat fewer miles of roads, pipelines, and transmission lines that would also incrementally reduce fugitive dust emissions, the potential for livestock stress and dust related illness, trespass, and the spread of noxious weeds and invasive plant species, relative to alternative 1. Fewer acres would become accessible to permittees thus reducing the number of acres that would be converted from secondary rangelands to primary rangelands.

Under alternative 3B the primary difference affecting the range resource is that well pads would be allowed within one-quarter mile of existing major roads within roadless areas and no surface occupancy would be allowed in sage-grouse priority habitat. The same amount of acreage would be available for lease and the same number of wells is expected, but a total of 118,500 acres could be no surface occupancy with 97,800 acres with potential for disturbance. This change primarily affects the Medora Ranger District south of Interstate 94 where priority sage-grouse habitat occurs.

The estimated surface disturbance and associated loss of animal unit months does not differ under alternatives 3 and 3B from alternative 1 because the acres available for leasing and the expected number of wells do not change. The primary change between alternative 1 and alternatives 3 and 3B would be the potential location of well pads.

As with alternative 1, alternatives 3 and 3B would also incur the loss of animal unit months; construction, maintenance, and decommissioning activities also could impact livestock grazing operations. Under these alternatives, more acres would have no surface occupancy, thus concentrating development in other areas. However, with one-third of one percent of both allotment acres and animal unit months affected, overall impacts to the range resource from oil and gas leasing and expected development are small.

Cumulative Effects for Alternative 3 and 3B

Similar to alternative 1, several management activities and allocations on Forest Service lands change the amount of estimated forage available for livestock, including desired vegetative conditions; rest; threatened, endangered, and sensitive species habitat requirements; other wildlife habitat needs; oil and gas development; riparian and wetland management; and special use designations. Oil and gas development, conversion of grasslands to crops, and housing or commercial development are activities that are prevalent on private lands within the project area and have presumably resulted in more land being taken out of range production, due to the higher levels of development on non-Federal mineral estate.

Cumulatively, these changes have been considered in the calculations of available forage for livestock, with the exception of impacts due to oil and gas road development; prairie dog colony expansion; some threatened, endangered, and sensitive species habitat requirements; and standards for meeting proper functioning conditions in riparian areas and wetlands. Estimating forage changes for these activities is highly variable, with the extent of some of the impacts unknown. All of these impacts will be considered on a site-specific basis during development of allotment specific management plans and projects. Other management practices in alternatives 3 and 3B may cumulatively impact livestock operations. Some of these practices may include requiring amendments to grazing agreements to allow for livestock re-distribution or a change in livestock rotation due to new oil and gas pad and associated effects (roads, pipelines, water developments).

Recreation

Affected Environment

The Little Missouri National Grassland is the largest national grassland in the country. It contains rugged badlands topography, which attracts tourists from all around. Within its boundaries are the three units of Theodore Roosevelt National Park, which is a popular attraction managed by the National Park Service. The Grassland has a variety of outstanding recreation settings and opportunities. The Dakota Prairie Grasslands, as a whole, receives between 70,000 and 100,000 visits per year. Visitation figures for the Little Missouri National Grassland alone, are not available.

The unit is named after the Little Missouri River, one of the longest undammed rivers in the United States. It provides scenic canoeing opportunities in the spring when water flows are sufficient. In the winter, snowmobiling is popular on and along the river. The Little Missouri River is a state designated scenic river. The Little Missouri National Grassland is a primary source for elk and bighorn sheep hunting on public lands in the state. Camping is spread throughout the unit with developed and dispersed use. Trail riding is another popular attraction in the area, with the Maah Daah Hey Trail stretching more than 144 miles and offering hiking, biking, and equestrian trail opportunities. Motorized travel and viewing scenery are the most popular recreation categories on the unit, including travel on Highway 85 through the grassland.

Recreation Settings, Opportunities and Experiences

The Forest Service uses the recreation opportunity spectrum to provide a variety of recreation opportunities that can be enjoyed in diverse settings. The recreation opportunity spectrum provides a framework for defining the types of outdoor recreation opportunities the public might desire, and identifies that portion of the spectrum a given national forest or grassland might be able to provide (USDA Forest Service 1982).

The existing acreages of recreation opportunity spectrum classes within the analysis area are listed in the figures and tables below.

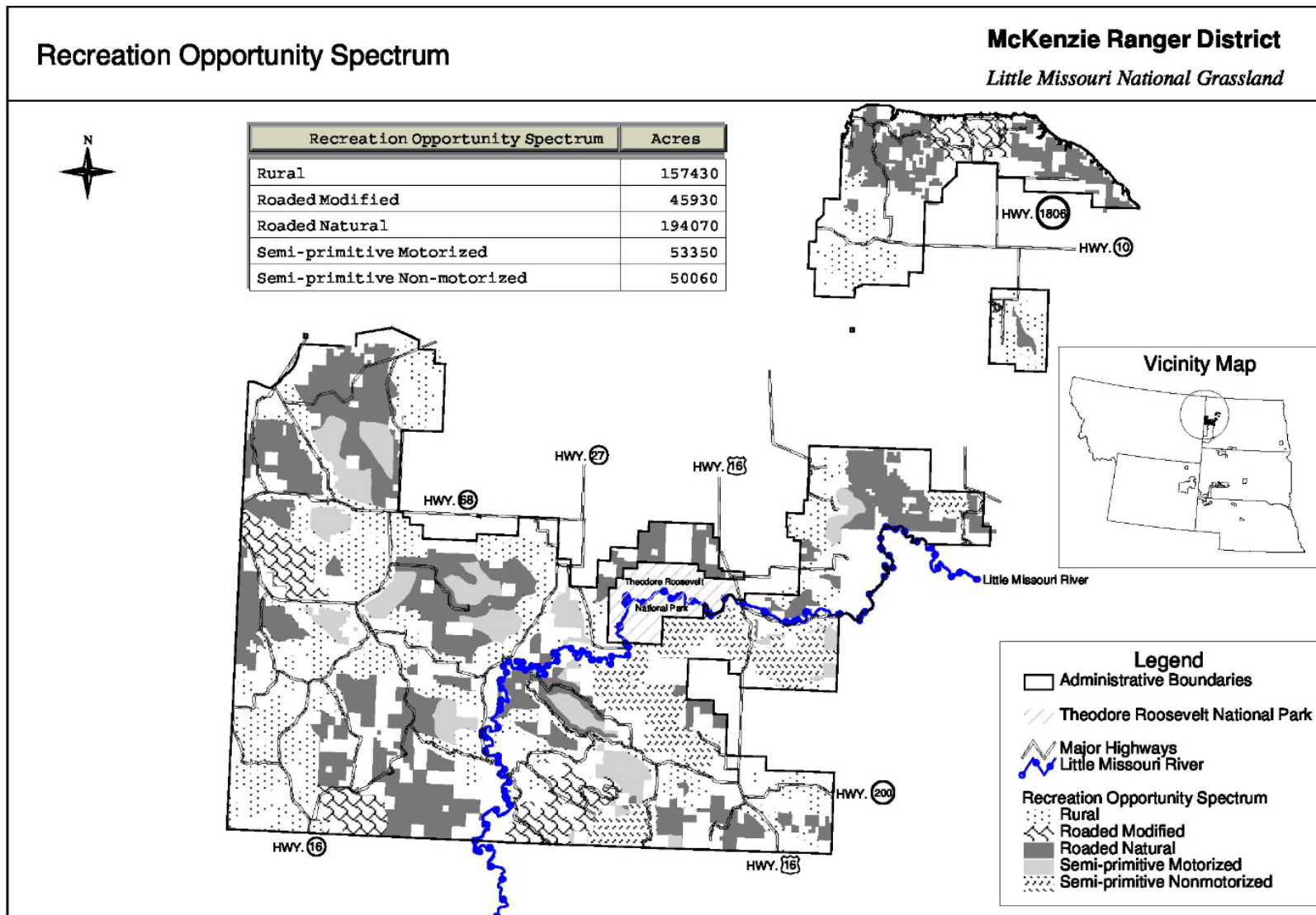


Figure 24. Recreation opportunity spectrum – McKenzie Ranger District

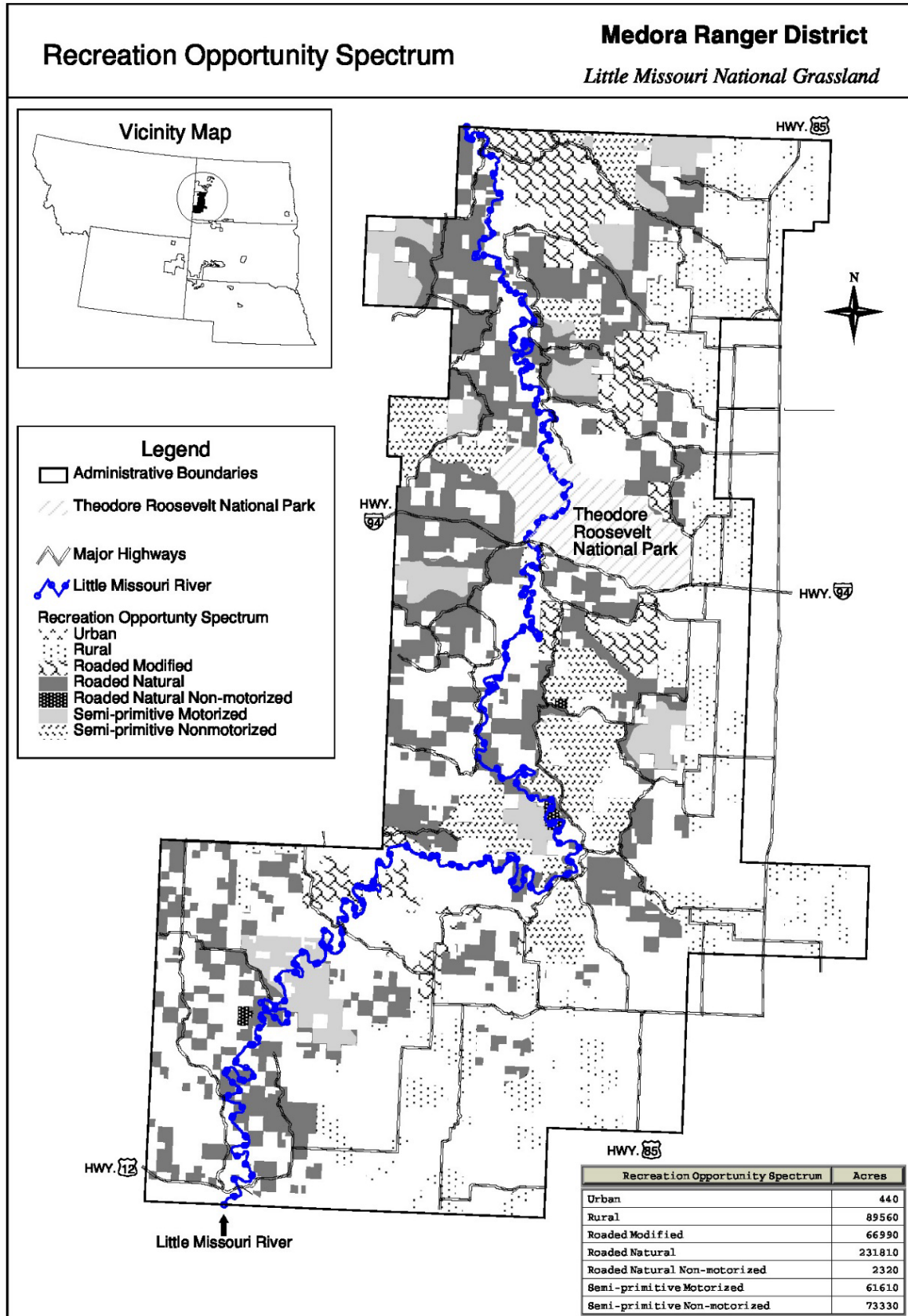


Figure 25. Recreation opportunity spectrum – Medora Ranger District

Table 35. Recreation opportunity spectrum acreage by ranger district

Recreation Opportunity Spectrum Classification	Description	McKenzie Ranger District Acres	Medora Ranger District Acres
Urban	Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans on-site are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.	0	440
Rural	Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.	157,430	89,560
Roaded Natural	Predominantly natural-appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interactions between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.	194,070	231,810
Roaded Modified	A subclass of roaded natural. Consists of areas exhibiting evidence of management activities (timber harvest, oil and gas development) that are dominant on the landscape.	45,930	66,990
Roaded Natural Non-motorized	A subclass of roaded natural with less evidence of human disturbance and activities.	0	2,320
Semi-Primitive Motorized	Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size (2,500 acres). Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on site controls and restrictions may be present, but are subtle. Motorized use is permitted.	53,350	61,610
Semi-Primitive Non-motorized	Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size (2,500 acres). Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on site controls and restrictions may be present, but are subtle. Motorized use is not permitted.	50,060	73,330

Visitors may encounter evidence of existing oil and gas development (well pads, fenced areas, heavy vehicle traffic) while travelling to and from their recreation destination or along main access routes within the Little Missouri National Grassland. Having areas free of infrastructure and commercial use can allow for remoteness and little to no sights or sounds of human presence.

Dispersed and Developed Recreation

Dispersed recreation activities on the Little Missouri National Grassland ranges from driving for pleasure to big game hunting to snowmobiling in winter. The Missouri River dam creates Lake Sakakawea, a major recreational resource for the area. There has also been a recent increase in fat-tire bike riding along the Maah Daah Hey National Recreation Trail during winter. Non-contiguous lands represent challenges for both managers and recreational users. Developed use across the grassland consists of several campgrounds, interpretive sites, and trailheads.

The Little Missouri National Grassland contains two such trails, the Lewis and Clark National Historic Trail and the Maah Daah Hey National Recreation Trail. The Lewis and Clark National Historic trail was established in 1978 and retraces the steps of the Corps of Discovery from 1804 to 1806 in their search for a route to the Pacific Ocean. The Lewis and Clark trail encompasses over 4,600 miles, crosses over many states and includes different variations of trail type and interpretive adventures. The Maah Daah Hey Trail exists throughout the entire grassland and spans 144 miles. It is a non-motorized trail that is nationally recognized as a premier backpacking, mountain biking, and horseback riding trail and is the backbone of the recreation program on the Dakota Prairie Grasslands. This trail is called a “crown jewel” by many recreationists within the Great Plains and surrounding states. The trail was designated in 2016.

Visitor Use

Forest Service visitor use data is tracked through the National Visitor Use Monitoring Program, conducted through on-site surveys and various other data collection methods. This largescale data collection is done for the entire Dakota Prairie Grasslands.

The most common activities listed in the visit use survey were viewing natural features, hiking/walking, bicycling, and hunting. Together, these four activities accounted for over 75 percent of the visits. Driving for pleasure was also important to some visitors. The average visit lasts a little more than 12 hours, but about half of the visits are less than 3 hours long. Most people visiting the Dakota Prairie Grasslands do so infrequently. Over three quarters of visits are from people who report visiting at most five times per year. The main visitation occurring on the Little Missouri National Grassland occurs along main travel corridors. Interstate 94 crosses the unit near Medora and Highway 85 bisects the grassland from the north to the south. The three units of the Theodore Roosevelt National Park lie just inside the boundaries and along the major roadways mentioned above. The National Park has seen a steady increase in visitation in the last decade, nearly doubling in recreation visits. Along with that, there has been an upward trend in recreation use and expectation on the grassland.

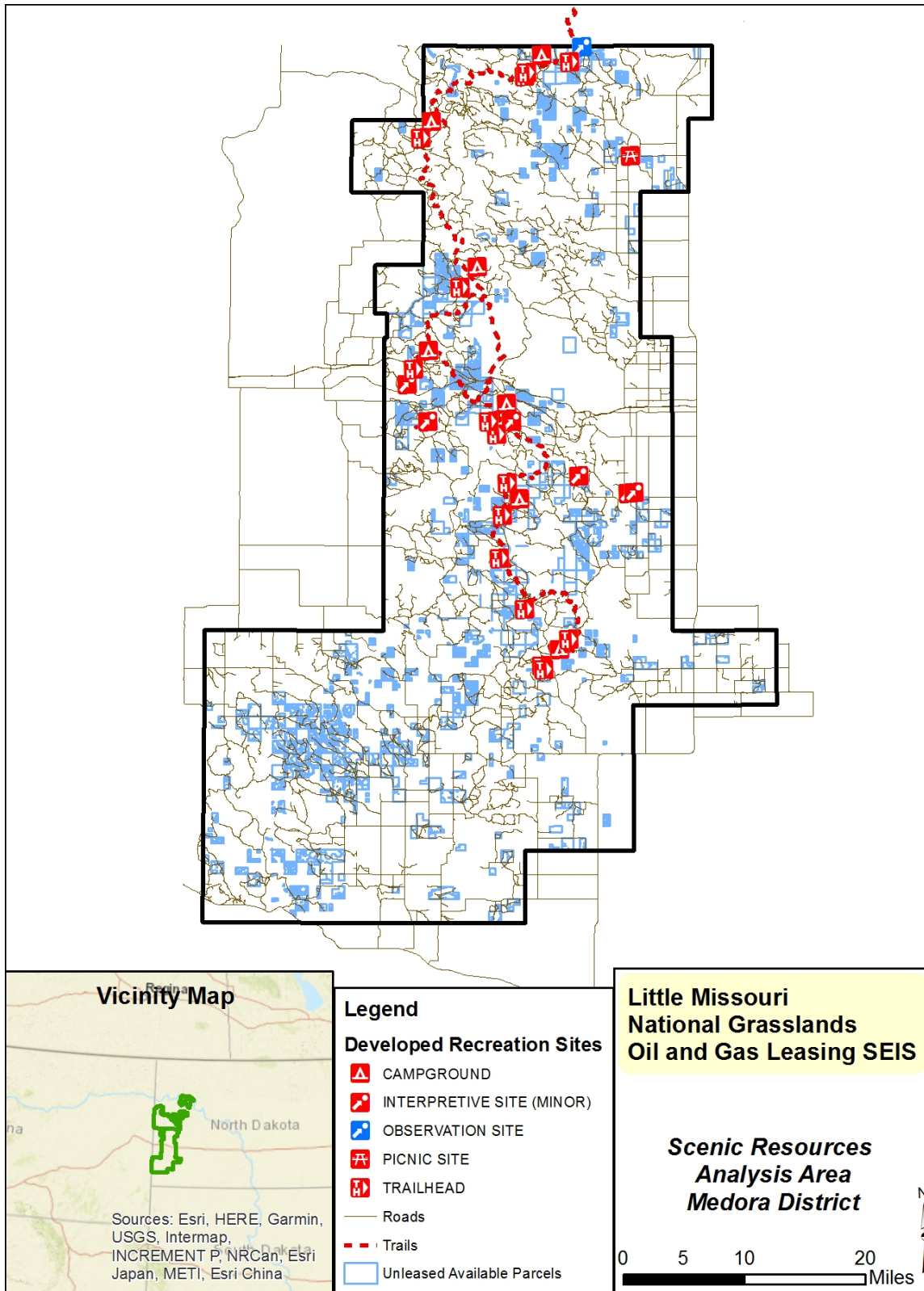


Figure 26. Little Missouri National Grassland recreation resources – Medora District

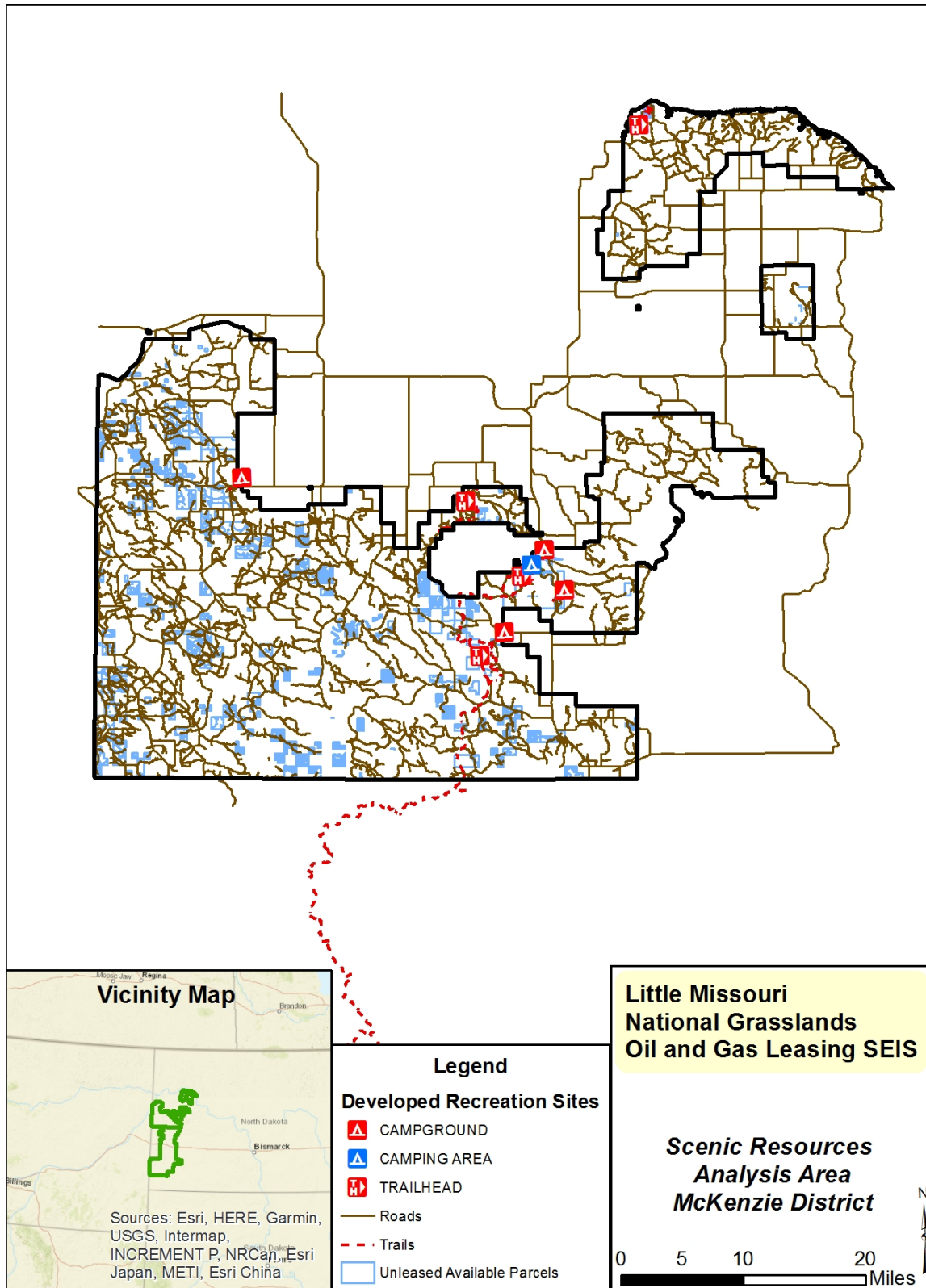


Figure 27. Little Missouri National Grassland recreation resources – McKenzie District

Inventoried Roadless Areas

There are several inventoried roadless areas across the Dakota Prairie Grasslands. The 2002 Land and Resource Management Plan provides direction for 115,000 acres of Little Missouri National Grassland inventoried roadless lands. The direction is to retain current roadless character prohibiting future road construction (with exceptions for existing rights) and allow selected management of about 104,000 more acres of inventoried roadless lands such that they would be available for potential road construction, subject to the stipulations contained in the lease on the Little Missouri National Grassland.

Table 36. Category 1C Inventoried roadless areas on the Dakota Prairie Grasslands

Name	Acres
John Town / Horse Creek	25,125
Long X Divide	10,099
Lone Butte	11,465
Collar / Bennett - Cottonwood	19,697
Magpie	21,281
Scairt Woman	6,100
Blacktail	8,620
Bell Lake	11,265
Dawsons Waterhole	6,087
Twin Buttes	13,492
Wannagan	6,025
Tracy Mountain	9,756
Easy Hill	7,344
Kinley Plateau	12,770
Bullion Butte	19,876
Kinley Plateau	4,130
Ponderosa Pine	7,471
Strom - Hanson	18,957

Effects of Alternative 1 (continue current leasing and stipulations)

If not properly mitigated, oil and gas activity could alter the sights and sounds of the Little Missouri National Grassland, which could affect the recreational experience for visitors to the Grassland.

There would be no immediate effects to recreation from authorizing leasing, as it involves a transfer of property rights and does not authorize any development. Nonetheless, leasing represents a commitment of resources and an expectation of future development, generally within 10 years. Future effects on the recreation setting from roads, pipelines, well pads, and support facilities such as gravel pits, staging areas and collection facilities, sights and sounds of oil and gas activities, and hazards from leaks, could all occur under alternative 1. To protect these resources, the Land and Resource Management Plan requires no surface occupancy for all developed campgrounds and a timing limitation within 0.25 miles of all campgrounds and developed sites from May 1 to December 1. Also, five areas are not available for leasing (MA 1.2A and MA 2.4) and other areas (e.g. MA 1.31, MA 2.2, and MA 4.22) are available with no surface use stipulations to protect recreation resources. In all of these areas, the undeveloped character

of the land would be largely protected. The level of protection depends on the level of development of existing and future leases.

Recreation Settings

Effects to the recreation settings, opportunities, and experiences from the development of future lease agreements would be minor, due to the current stipulations, lease notices, and the conditions of approval that would be applied at the time a plan of operations was submitted. Continued operations would still be present and have minor effects to current and future recreation visitors. Adding more wells or oil and gas operations and production facilities in the future would also cause effects to these settings, adding more sights and sounds of human activity.

The roads associated with existing or future wells could change the recreation setting in some areas. Whether this change is permanent or temporary depends on whether exploratory wells become producing wells and if the mitigation measures employed for effectively closing roads are no longer needed. It is possible that new and reconstructed roads that are currently closed could be left open for public use (if determined consistent with the travel planning process, and with grasslands plan guidance), thus changing the recreation setting in those areas.

Increased development may also increase the potential for illegal motorized use that impacts the recreation setting. Exploration could include considerable heavy industrial traffic, noise from the drilling operation, dust, and temporary air pollution. Dust and drilling noise would probably be most significant during the exploration and development phase, and greatly reduced during the production phase. This effect would probably not last longer than a few weeks per well, and with timing limitations for recreation sites this would only potentially affect areas not covered by a timing limitation stipulation. Field production could include lighter traffic than the site construction and drilling phases, but industrial and truck traffic could still be considerable.

In addition to the effects of traffic, grassland visitors would be aware of the presence of oil and gas wells by the sight of pumps, condensate tanks and other support facilities involving bright lights and noise and flaring that is pervasive on the Little Missouri Grassland. Also, based on reports from the grassland, minor spills and leaks of gas are a common occurrence, but are usually contained immediately (Medora District Spills Database 2018).

There are current stipulations and laws in place to protect areas recommended for wilderness, as well as other special places that can provide experiences in a natural setting away from sights, noise, and sounds.

Dispersed and Developed Recreation

There would be no immediate effects to the developed and dispersed recreation use areas from issuing lease agreements in the future. Effects from developing these leases would be the same as those stated above in the Recreation Settings section. There are current timing limitations (May 1 to December 1) and no surface occupancy stipulations in place to protect developed recreation areas. Future recreation site protection may be indirectly affected because the stipulations for recreation sites only apply to a select few named locations. If future development were to occur, this stipulation would not apply to the new facility or development. Some existing recreation use may be impacted or displaced. Recreation visitor safety would also be a concern but could be mitigated with signage and education.

There would be no immediate effects to the unique recreation areas and trails from issuing lease agreements. When the leases were developed, effects to these areas would be the same as those stated in the Recreation Settings section. Several of these sites are protected under current stipulations. Exploration

and development adjacent to trails could indirectly impact the quality of the recreation experience and the natural and historic setting along the trails if they overlap lease parcels. Whether locating wells away from the trail would be adequate for protecting the trail setting is dependent on site-specific terrain and vegetation. For sites that are not covered under a stipulation, at the time a proposal to drill is submitted, site-specific environmental analysis would be completed; therefore, protection measures for these sites would be implemented or negotiated under the conditions of approval.

National Trails

With two national recreation trails in the boundary of the Little Missouri National Grassland, future oil and gas exploration and development is not likely to “substantially interfere with the nature and purposes of the trail” (per requirements in the National Trails System Act, section 7 [16 U.S.C. 1246]) because site-specific analysis will determine all effects and take into account all the laws, regulations, and policies associated with a drilling proposal and the recreation sites and trails in the area. Additional mitigation measures related to access and visual resources would further protect trail resources. If an oil well were developed, the noise and the sight of its lights may be noticeable from parts of the trails. Exploration and development adjacent to the trails could indirectly impact the quality of the recreation experience and the natural and historic setting along the trails if they occur within the leased or unleased parcels. Whether locating wells away from the trail would be adequate for protecting the trail setting is dependent on site-specific terrain and vegetation.

All proposals to drill must go through site-specific analysis of the effects to the resources near the leased parcel. These areas would be protected by several layers of law and best management practices.

For all roadless areas in the Little Missouri National Grassland, a lease notice applies (see chapter 2).

Lands contained in this lease are located in an inventoried roadless area subject to the rule entitled “Special Areas; Roadless Area Conservation Rule; Final Rule” published in the Federal Register on January 12, 2001. The Roadless Area Conservation Rule or subsequent modifications thereof may prohibit operations such as road construction or reconstruction.

Cumulative Effects

The unleased parcels being considered in this document are part of a larger context in terms of energy development in the area, existing leases in the grassland, and continuing demand for both energy resources and grassland recreation experiences. Changes in population, the modes and level of recreation use, increased energy exploration and development, and residential development of private land near the national grassland have had an effect on the analysis area and will continue to do so into the future.

Effects of Alternative 2 (no new oil and gas leasing)

There would be no direct, or cumulative effects on recreation settings and opportunities, special areas, recreation developed and dispersed uses or facilities and no introduction of noise or unnatural lighting as a result of the no-action/no new leasing alternative. Currently held leases would continue to operate under the stipulations that were signed in that agreement at the time that specific lease was signed. If current leases expire without being developed, they would not be leased again.

Effects of Alternative 3 (continue leasing with revised stipulations)

Similar to alternative 1, there would be no immediate effects to recreation from authorizing leasing. Future effects from development on the recreation setting from roads, pipelines, well pads, and support facilities such as gravel pits, staging areas and collection facilities, sights and sounds of oil and gas activities, and hazards from leaks, would be expected to occur under alternative 3.

In addition to the stipulation protections outlined in alternative 1, alternative 3 proposes more protection for roadless areas and recreation facilities on a developmental scale. Adding no surface occupancy stipulations to roadless areas would ensure that their character and opportunities for solitude will remain intact therefore lessening the potential for effects. The modified recreation no surface occupancy stipulation would enhance visitor experiences in the future by protecting these resources, as well as ones that may be built at a later date. The effects to the recreation settings, opportunities and experiences would be minor as a result of alternative 3.

The effects to developed recreation areas would be less with this alternative because there would be added protection for all recreation sites meeting the development scale of 3 to 5 (roaded natural to urban). As development changes over time, the list of sites covered by this stipulation may change, but will always be based on the development scales.

Similar to alternative 1, there would be no immediate effects to the unique recreation areas and trails from issuing lease agreements. Future effects from development would be similar to those listed in alternative 1.

Alternative 3 would add no surface occupancy protection measures to all roadless areas across the grassland. Alternative 1 contains a lease notice for roadless areas, but not an official no surface occupancy stipulation. This alternative would ensure no ground disturbance in roadless areas for all future oil and gas operations conducted through lease agreements on the grassland. Any current leases in roadless areas, should they expire before they are developed, would be leased again with this stipulation applied.

Cumulative effects of alternative 3 would be the same as those described for alternative 1.

Effects of Alternatives 3B (continue leasing with revised stipulations)

All existing stipulations and lease notices from alternative 3 would remain in effect, except where a revision is indicated below.

For this alternative, of the 216,300 acres of the Little Missouri National Grassland that are currently available and unleased, 118,500 acres would have no surface occupancy stipulations. Of the remaining 97,800 acres where surface development could occur, 60,900 would have stipulations for timing limitations and/or controlled surface use, and 36,900 acres would have no stipulations beyond the standard lease terms.

The proposed stipulations for alternative 3B would add to or modify the current stipulations listed in alternative 3.

The two changes that would primarily affect recreation resources include:

1. New controlled surface use for inventoried roadless areas: Controlled surface use is allowed for constructing a well pad within 0.25 miles from the centerline of all existing maintenance level three, four and five roads at the time of the proposal. The near edge of the pad must be directly adjacent to the existing road right-of-way.
2. Revised no surface occupancy for inventoried roadless areas: No surface occupancy or use is allowed within inventoried roadless areas outside of 0.25 miles from existing maintenance level three, four, and five roads. This applies to well pads and roads, but not to pipelines, transmission lines, and other linear construction features

The first change results in additional acreage available for controlled surface use in areas 0.25 miles on each side of a maintenance level 3-5 road located in the inventoried roadless areas. The second change revises the no surface occupancy stipulation from alternative 3 for all other acreages outside the new controlled surface use buffer.

Special Areas

The 2001 Roadless Rule allows well pads and other oil and gas infrastructure (transmission lines and pipelines) to be built adjacent to existing roads. No new roads may be built. Under this stipulation the well pad in roadless areas must be constructed directly adjacent to the road right-of-way, and if rectangular, the long edge must be parallel to the road. Inventoried roadless areas with currently existing roads are shown in figure 28 and figure 29.

For alternative 3B there are 6,800 acres of National Forest surface owned unleased parcels in roadless that would fall under the controlled use stipulation. These areas are shown in red in figure 28 and figure 29. However, no surface occupancy stipulations for other resources affect 4,300 of the 6,900 acres within the buffer for a net of 2,600 acres of currently unleased available parcels that could be affected. For alternative 3B, the remaining 64,500 acres of unleased parcels outside of the 0.25-mile buffer in inventoried roadless areas would remain as no surface occupancy.

Authorizing development in an inventoried roadless area may have direct effects on the roadless characteristics and wilderness attributes of the potentially impacted inventoried roadless areas. Below is a summary of effects based on the roadless characteristics and wilderness attributes.

Natural Character of the Area:

In areas where the controlled surface use applies (0.25 miles on either side of a maintenance level 3-5 road), the natural character of these roadless areas will have potential direct effects. These effects would be long-term due to the duration of the well pads or other development such as transmission lines and pipelines in the roadless area. This may impact the natural character of these areas and the potential for future wilderness designation. Habitat and other changes to the ecological function may also be impacted due to new construction and noise. Rehabilitation after production may help to restore the natural character of the area. The remainder of the roadless area that is outside of this controlled surface use buffer would retain its natural character and may only receive indirect effects due to the proximity of the operations and the ability to see and hear the noise from certain spots inside the roadless area until wells are removed from production and reclamation is complete.

Area Lacking Permanent Improvements:

Similar to the effect listed above in item 1, the degree to which the area is without permanent improvements or human habitation would be impacted by adding well pads, transmission lines or pipelines, adding to already existing roads within or adjacent to the roadless area. This would be a long-term effect, as long as the improvements exist in the roadless area. Rehabilitation after production would lessen this effect over time.

Solitude and Primitive Recreation:

Solitude and primitive recreation would be negatively impacted if oil and gas developments were to occur in roadless areas. Isolation from the sights, sounds, and presence of others and the developments of humans would be less pronounced if leases were in production and well pads, transmission lines or pipelines were added to these areas. These impacts would be long-term when and if development were to occur in these areas until the infrastructure was removed and the area rehabilitated.

Unique Natural Features:

Special features or unique characteristics would not be impacted because several other stipulations exist to protect such areas. With all new lease developments, this would be considered before construction would begin.

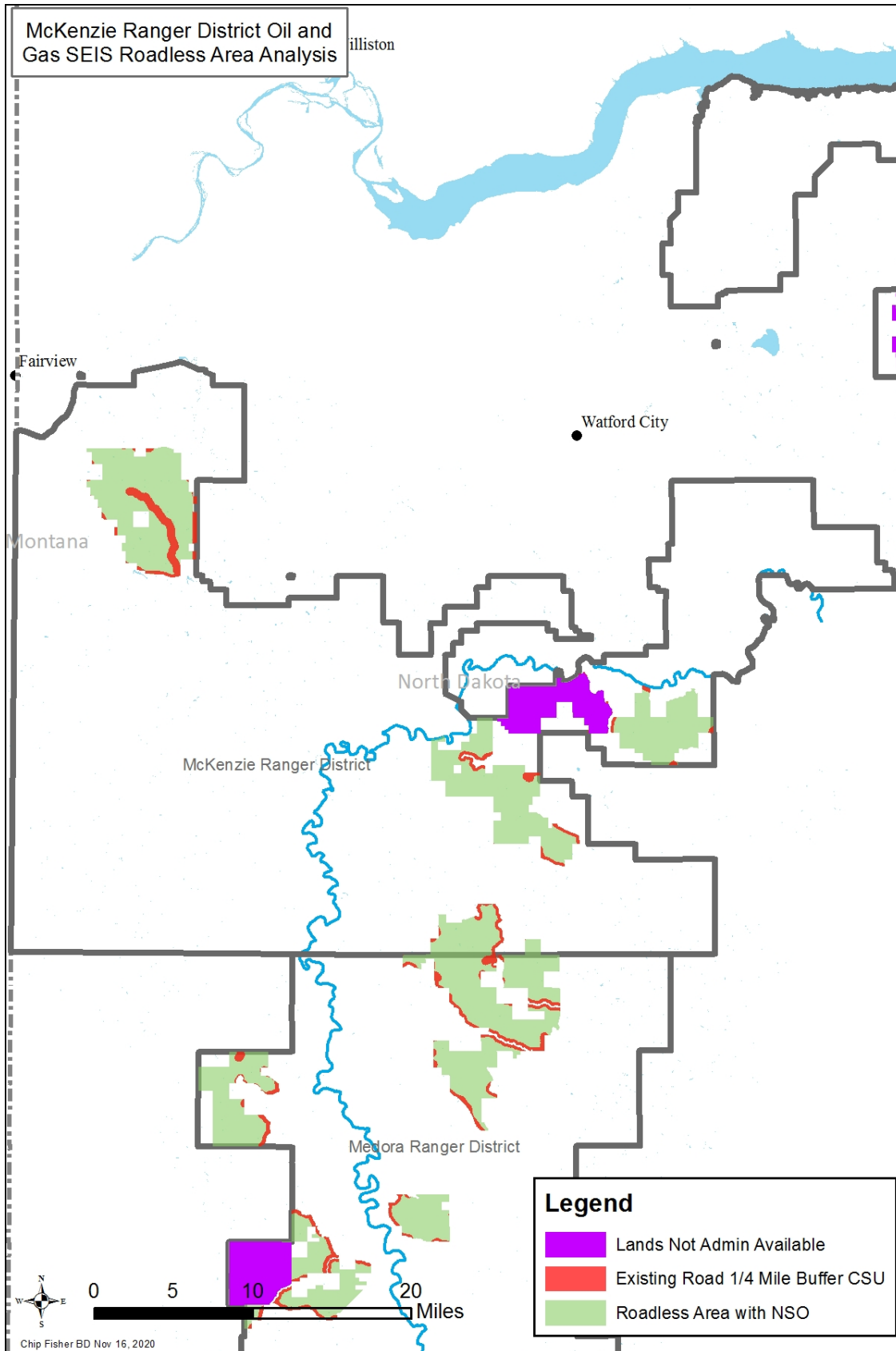


Figure 28. Controlled surface use buffers for existing roads in inventoried roadless areas on McKenzie RD

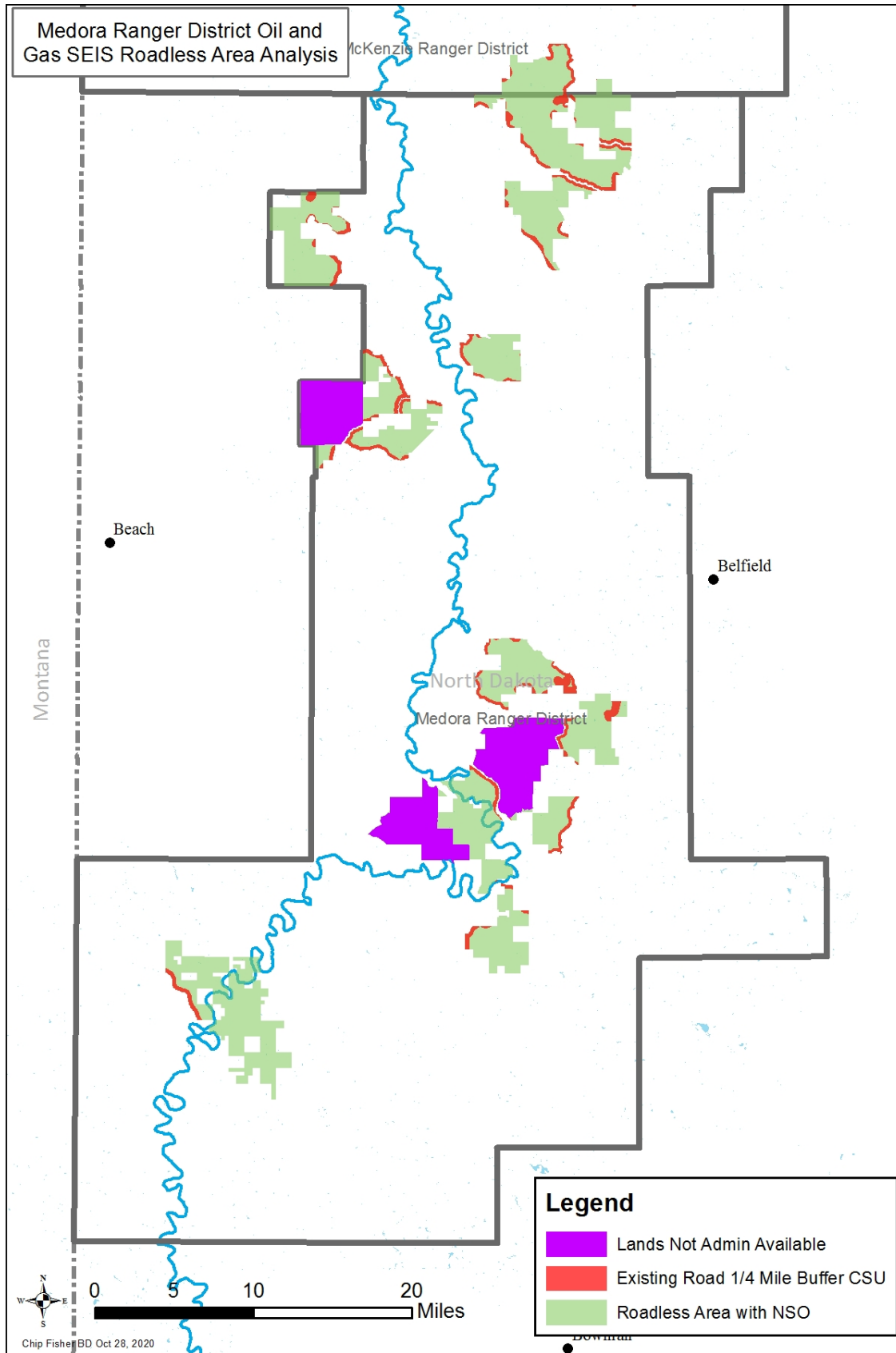


Figure 29. Controlled surface use buffers for existing roads in inventoried roadless areas on Medora RD

Suitable for Wilderness Designation:

The ability to manage and to maintain roadless and or wilderness designation would be impacted by this alternative. If developments were to occur, the buffer area would not be suitable for wilderness designation until production ceases and reclamation is complete. However, even after removal of the well pad, existing roads may persist, as many are county roads. This would be a long-term effect to this resource.

Cumulative Effects

The unleased parcels being considered in this document are part of a larger context in terms of energy development in the area, existing leases in the grassland, and continuing demand for both energy resources and grassland recreation experiences. Changes in population, the modes and level of recreation use, increased energy exploration and development, and residential development of private land near the national grassland have had an effect on the analysis area and will continue to do so into the future.

Because the expected total number of wells does not differ between the action alternatives, cumulative effects of alternative 3 and 3B would be the same as those described for alternative 1.

Summary of Effects

Table 37. Summary comparison of environmental effects to recreation resources

Resource Element	Indicator/Measure	Effects of Development Alternative 1	Alternative 2	Effects of Development Alternative 3	Effects of Development Alternative 3B
1. Recreation Settings and Opportunities	Effects on recreation opportunity spectrum classes	Site specific NEPA would be done to ensure ROS classes would be protected. Stipulations to protect areas exist. Minor Indirect effects may occur due to future leasing.	No effects	Site specific NEPA would be done to ensure ROS classes would be protected. <i>Stipulations to protect areas.</i>	Same as Alternative 3
2. Recreation Experiences	Sights and sounds – indirect effects	Minor Indirect effects may occur due to future leasing.	No effects	Minor Indirect effects may occur due to future leasing.	Same as Alternative 3
3. Developed & Dispersed Recreation Use	Effects to Recreation facilities	Minor Indirect effects may occur due to future leasing. <i>Stipulations to protect areas.</i> TL and NSO for Recreation sites (see list)	No effects	Minor Indirect effects may occur due to future leasing. <i>Modified Stipulations to protect areas.</i> TL and NSO for Recreation sites with a development scale of 3-5.	Same as Alternative 3

Resource Element	Indicator/Measure	Effects of Development Alternative 1	Alternative 2	Effects of Development Alternative 3	Effects of Development Alternative 3B
4. Unique Recreation areas and Trails	Changes to key recreation areas or trails	<p><i>Stipulations to protect areas.</i> TL and NSO for Recreation sites (see list) also, <i>See Special Area and Designation description below.</i></p>	No effects	<p><i>Stipulations to protect areas.</i> TL and NSO for Recreation sites with a development scale of 3-5. LRMP to protect recreation features (Goal 2a) <i>See Special Area and Designation description below.</i></p>	Same as Alternative 3
5. Special Areas and Designations	Changes to Special Areas including Congressionally designated areas, inventoried roadless areas, and National Trails	<p><i>Stipulations to protect areas.</i> NSO and CSU for; RNAs (19,080), SIAs (6,160), Backcountry Nonmotorized (64,820). NAA for Suitable for Wilderness (41,520). LN for Roadless. (71,300 acres of unleased parcels)</p>	No effects	<p><i>Stipulations to protect areas.</i> NSO and CSU for; RNAs (19,080), SIAs (6,160), Backcountry Nonmotorized (64,820). NAA for Suitable for Wilderness (41,520). NSO for Roadless Areas. (71,300 acres of unleased parcels)</p>	Same as Alternative 3, except: Revised NSO for Roadless Areas. (64,500 acres of unleased parcels) CSU for Roadless Areas (2,600 net acres unleased parcels)
6. Off-forest Recreation Settings and Opportunities	Off-forest effects on recreation settings	<p>Minor Indirect effects may occur due to future leasing. Site-specific NEPA would be done to ensure adjacent landowners were part of decision.</p>	No effects	<p>Minor Indirect effects may occur due to future leasing. Site-specific NEPA would be done to ensure adjacent landowners were part of decision.</p>	Same as Alternative 3

Scenic Resources

Affected Environment

The scenic quality of the Little Missouri National Grassland has long been valued by local residents and visitors for the open and scenic nature of the rolling plains and the rugged beauty of the badlands. Two geographic areas are located on the Little Missouri National Grassland. They are the Badlands Geographic Area and the Rolling Prairie Geographic Area. The landscape character of each is described

below. Landscape character is defined as “an overall visual and cultural impression of landscape attributes – the physical appearance and cultural context of a landscape that gives it an identity and ‘sense of place’” (USDA Forest Service 1995).

The topography of the Badlands Geographic Area includes intricately dissected drainages and draws dropping from grassy ridgelines or butte-like hills and color-banded mounds typical of a badlands landscape. Large slumps and earth flows typical of a highly erodible landscape can also be identified (figure 30). Small inclusions of rolling prairie are also typical of this geographic area. “True” badlands, characterized by largely unvegetated slopes greater than 40 percent are found within this geographic area. Elevations range from about 1,800 feet above sea level near Lake Sakakawea to about 3,500 feet above sea level atop some of the more prominent buttes. The desired landscape condition is to maintain the undeveloped character and scenic integrity.



Figure 30. View from Forest Service road into a badlands landscape type



Figure 31. View from Maah Daah Hey Trail into a rolling prairie landscape type

The topography of the Rolling Prairie Geographic Area is characterized as nearly level to rolling hills with some inclusions of scattered buttes and badlands landscapes (figure 31). The soils are quite well developed and stable, and occur beneath a fairly consistent mosaic of grass cover. Butte escarpments provide unique locations of biologic, geologic, cultural, and archaeological resources. Elevations range from about 1,800 feet above sea level near Lake Sakakawea to about 3,500 feet above sea level atop some of the more prominent buttes. On the northern portion of this geographic area, National Forest System lands lie adjacent to and drain directly into the Missouri River. The desired landscape condition is to maintain the Rolling Prairie's scenic nature.

Scenic attractiveness is the "primary indicator of the intrinsic scenic beauty of a landscape and of the positive responses it evokes in people. It helps determine landscapes that are important for scenic beauty, based on commonly held perceptions of the beauty of landform, vegetation pattern, composition, surface water characteristics, and land use patterns and cultural features" (USDA Forest Service 1995). Scenic attractiveness is measured as Class A (distinctive), B (typical), or C (indistinctive). Class A includes areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide unusual, unique, or outstanding scenic quality within the landscape character. Class B (typical) contains areas in which the natural and cultural features combine to create ordinary or common scenic quality, and Class C (indistinctive) contains those areas where natural and cultural features (or the lack thereof) combine to provide low scenic quality. From a site visit, aerial photography and other photographs, and descriptions contained in planning documents, it is evident that the scenic attractiveness of the project area includes areas of Class A (distinctive), Class B (typical), and Class C (indistinctive).

The project area is visible from a variety of locations both within and outside of National Forest System lands from a variety of distances. Viewing distances are typically described as foreground (within 0.5 miles), middleground (0.5 miles to 3 to 5 miles), and background (3 to 5 miles and beyond).

Existing Scenic Integrity

Scenic integrity is the key descriptor for existing and desired conditions, defined as "a measure of the degree to which a landscape is visually perceived to be 'complete'." Scenic integrity levels describe the existing condition of the scenic resource. Scenic integrity can describe an historic state, an existing state, or a short- or long-term goal. Scenic integrity objectives describe the objectives for management, or the desired future conditions. These are identified in the Dakota Prairie Grasslands Land and Resources Management Plan. The highest scenic integrity ratings are given to those landscapes that have little or no deviation from the character valued by constituents for its aesthetic appeal (USDA Forest Service 1995). The following figures show the scenic integrity objective assignments in the Land and Resources Management Plan. For clarity and legibility, the maps are divided into Northern, North Central, South Central, and Southern lease blocks.

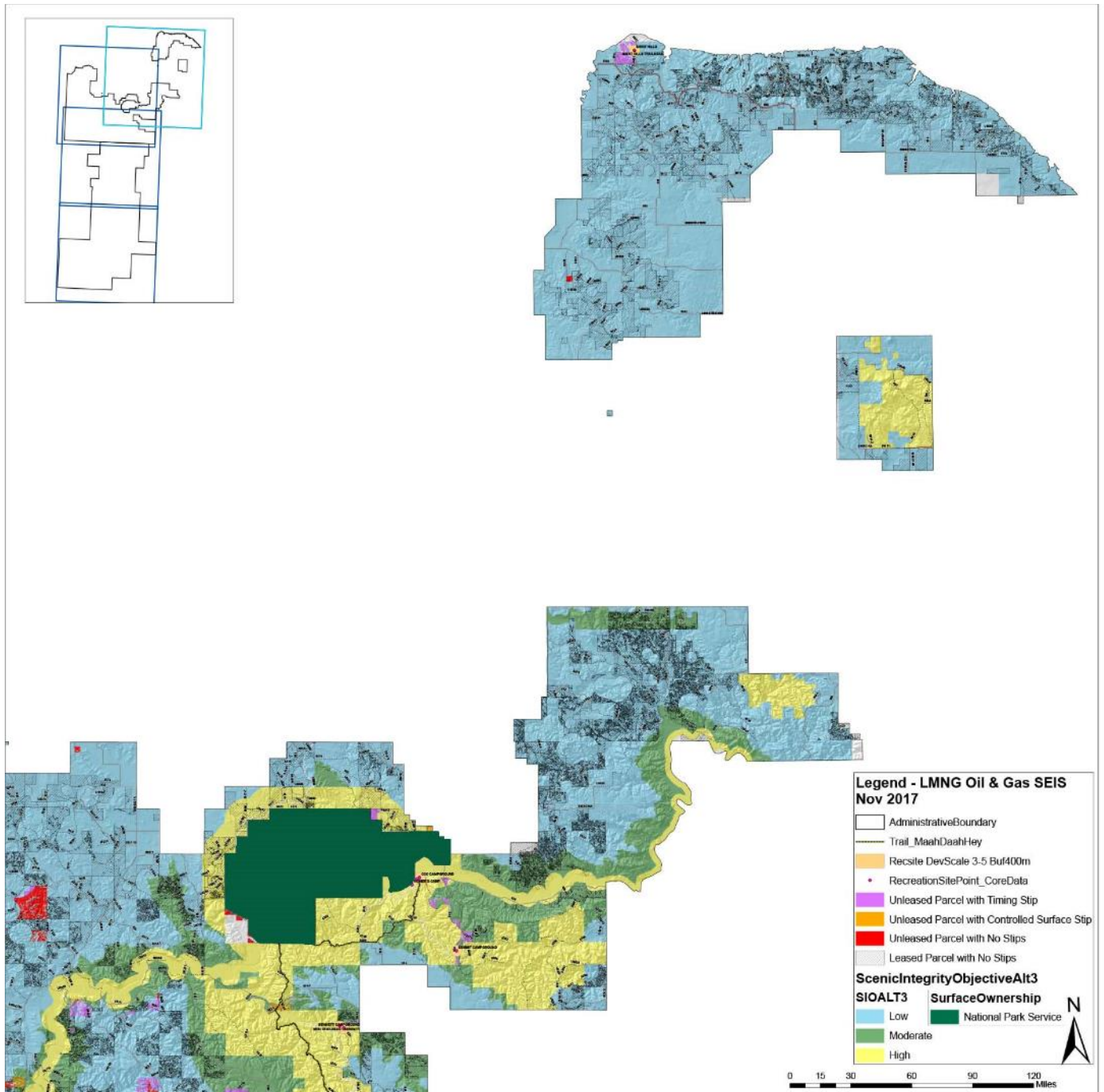


Figure 32. Scenic integrity objectives in the northern lease blocks

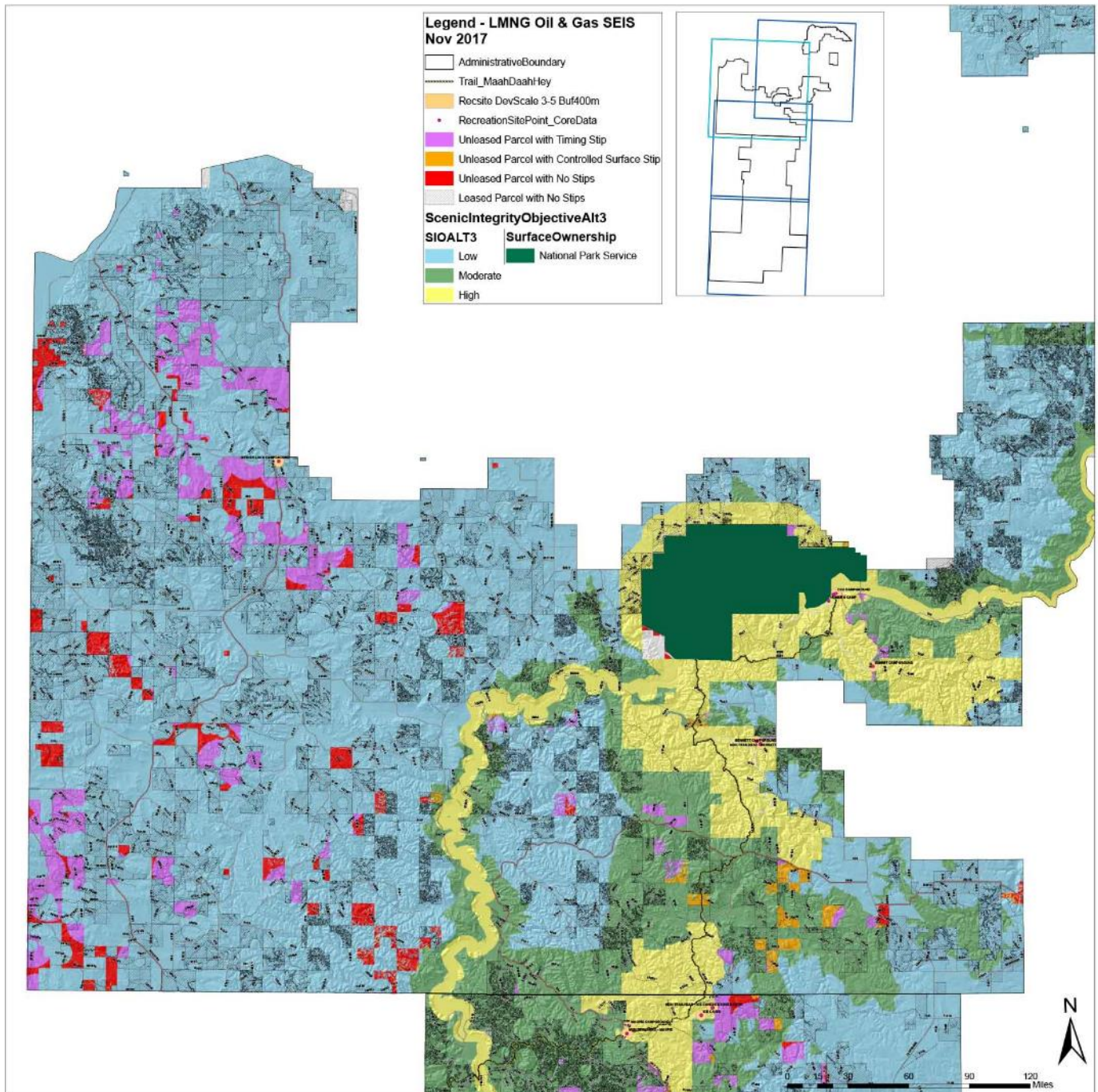


Figure 33. Scenic integrity objectives in the north central lease blocks

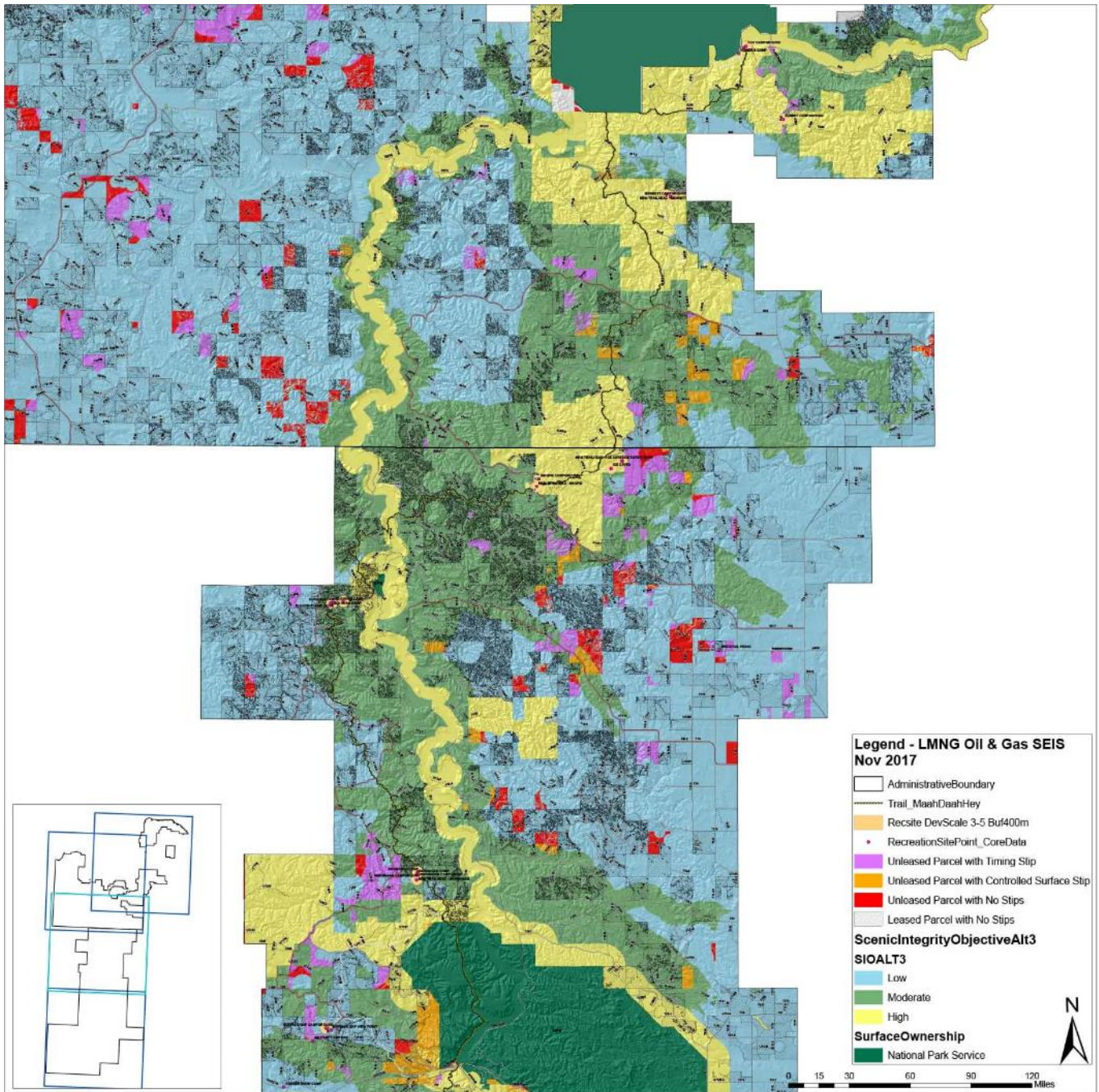


Figure 34. Scenic integrity objectives in the south-central lease blocks

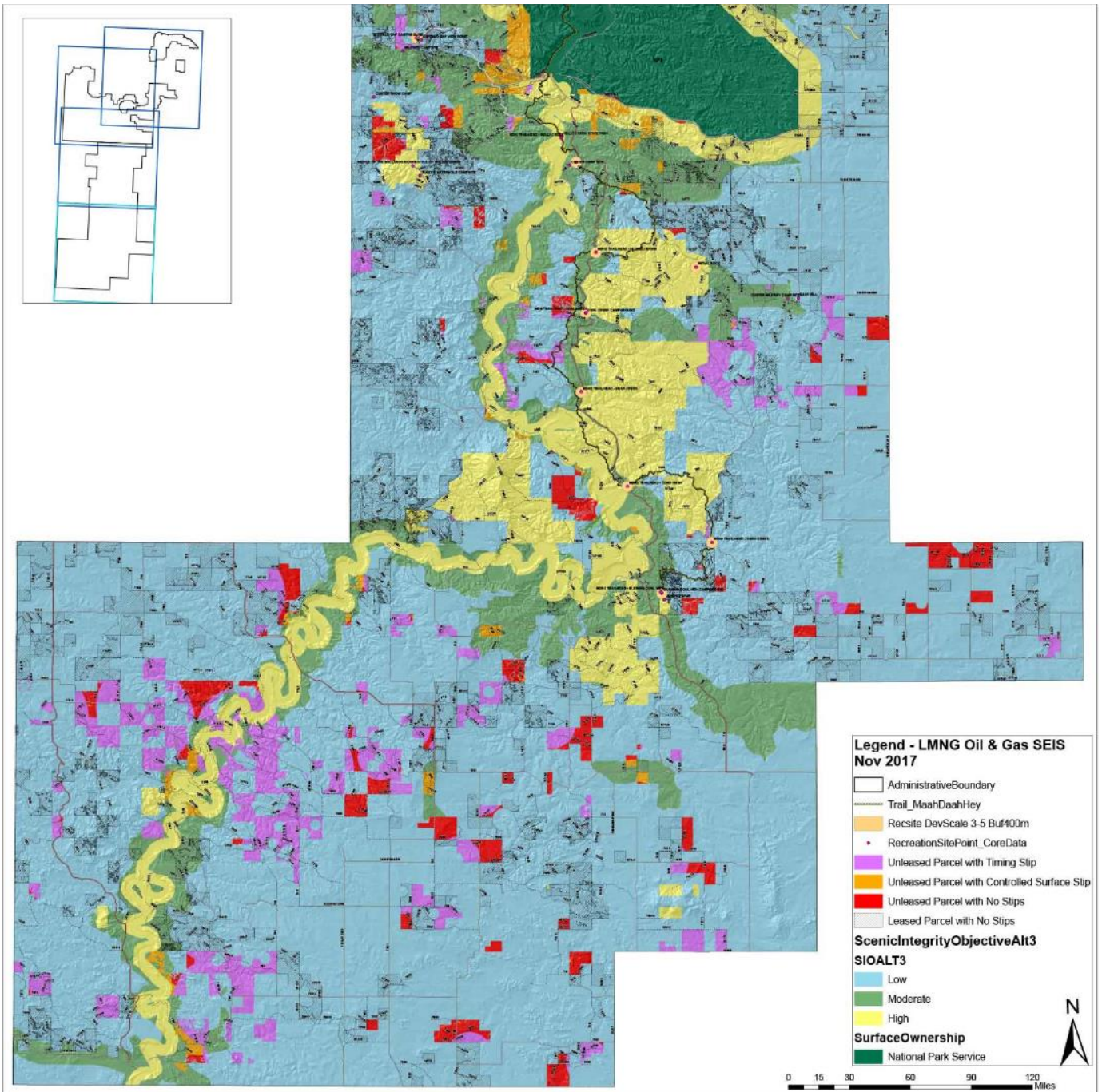


Figure 35. Scenic integrity objectives in the southern lease blocks

The analysis area, including State, Federal and private land, has been affected by human activities, and the impacts resulting from some of those activities are visible on the landscape from a variety of viewing platforms and locations. These activities include oil and gas development and production (including structures, buildings, pipelines, and transmission lines), road construction, mineral extraction, grazing, developed and dispersed recreation sites, trail construction, farming activities and patterns, and residential development. Of these, the existing oil and gas development and production (including associated facilities) and roads activities have the greatest impact on the scenic resources of the area.

The effects of oil and gas activities are visible in all viewing distances primarily throughout the Little Missouri National Grassland (on public and private lands). In foreground and near middleground viewing distances, these facilities can dominate the viewshed. Effects can be similar when multiple well pads are visible in the same viewshed, or when views from roads, are visible in short succession. In these instances, the scenic integrity objective would be considered low, where the activity “begin[s] to dominate” or “strongly dominate[s]” the valued landscape character. In more distant middleground and background views, visible effects of facilities are reduced by tying the facility into the backdrop through color and material selection or through orientation/arrangement of the facility components.

Many area roads in both geographic areas are valued for the scenic views, including travel on Interstate 94, Highway 85 and the Lewis and Clark roadway that run adjacent to and through the Little Missouri National Grassland. Along these roads, visitors may encounter evidence of existing oil and gas development (well pads, fenced areas, heavy vehicle traffic) while travelling to and from their recreation destination.

The scenic integrity objectives assigned high or moderate in the area of the proposed National Forest System lease parcels are less than 32 percent of the total area, indicating that scenic integrity is of moderate priority for resource management consideration in compared to other management needs.

Table 38. Scenic integrity objectives for project area unleased parcels

Scenic Integrity Objective	Project Area Acres	Unleased Acres	Percent of total
High ¹	178,900	39,500	18.3
Moderate ²	161,400	28,100	13.0
Low ³	685,600	148,400	68.7

1 - High - refers to landscapes where the valued landscape character appears intact. Deviations may be present but must repeat the form, line, color, texture and pattern common to the landscape character so completely and at such scale that they are not evident.

2 - Moderate - This level refers to landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.

3 - Low - This level refers to landscapes where the valued landscape character appears moderately altered. Deviations begin to dominate the valued landscape character being viewed, but they borrow valued attributes such as size, shape, vegetative type changes or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed but compatible or complimentary to the character within.

Dispersed and Developed Recreation

As described in the recreation section, the Little Missouri National Grassland is experiencing an increase in recreation and tourism activity while offering a range of recreation experiences from scenic driving to hunting, mountain biking, snowmobiling and travel along the Little Missouri River. Developed use across the grassland consists of several campgrounds, interpretive sites, and trailheads. Scenery impacts to these areas will be analyzed as a whole.

The primary visitation occurring on the Little Missouri National Grassland is due to main travel corridors that run adjacent to and through the grassland. Interstate 94 crosses the unit near Medora, and Highway 85 bisects the grassland to the north and south. The three units of the Theodore Roosevelt National Park lie just inside the boundaries and along the major roadways mentioned above. Views from these main travel corridors and Theodore Roosevelt National Park into the Little Missouri National Grassland are of concern with any future oil development that would follow leasing.

Special Areas and Designations

Little Missouri River

The Little Missouri River was inventoried in 1995 and found to be ineligible for inclusion into the Wild and Scenic Rivers Act designation (Jennings, J. 2018). It is, however, a state designated scenic river (Little Missouri State Scenic River Act). There is currently a 0.25-mile no surface occupancy stipulation that protects the foreground scenic resources on each side of the river.

National Trails

Two trails on the Little Missouri National Grassland are part of the National Trail System: the Lewis and Clark National Historic Trail and the Maah Daah Hey National Recreation Trail. The Maah Daah Hey Trail runs through both ranger districts and through the Badlands and Rolling Prairie geographic areas. It does not have specific stipulation protection; however, 58 miles of the trail pass through high scenic integrity objective areas and 63 miles through moderate scenic integrity objective areas. Stipulations for maintaining high and moderate scenic integrity objectives would apply to any future development activities.

Inventoried Roadless Areas

The Roadless Rule¹⁰ prohibits new road construction and timber harvest in inventoried roadless areas, subject to exceptions. Specific exemptions allow for roads in conjunction with the continuation, extension, or renewal of a mineral lease and for roads pursuant to reserved or outstanding rights.¹¹ Exceptions are also allowed for roads needed to protect public health and safety (law enforcement, fire suppression, etc.), and to conduct a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) action needed to prevent irreparable resource damage, for road safety, and determined to be in the public interest. In addition, the rule specifically does not affect a non-Federal landowner's right of access to their land.

Recreation Settings and Opportunities Outside the Grassland

The analysis area is a patchwork of land ownership types, as Bureau of Land Management (BLM), Forest Service and National Park Service are mixed with private, State and Tribal lands. Three individual units make up Theodore Roosevelt National Park (Northern, Southern, and the Elkhorn Ranch District) and all are directly adjacent to Little Missouri National Grassland lands. There is an existing 1-mile buffer of high scenic integrity objective around each of the units. Any current or future development activity would include site-specific environmental analysis including a scenic resource analysis and a viewshed analysis to ensure sensitive views are protected and the desired landscape character is achieved.

Oil and gas production on private land adjacent to Little Missouri National Grassland is increasing both in production and scale impacting the landscape character. Neither private nor State lands are required to

¹⁰ On January 12, 2001, the Special Areas, Roadless Area Conservation Final Rule, 66 FR 3244, (Roadless Rule) was signed by Secretary of the U. S. Department of Agriculture Dan Glickman. The Roadless Rule is codified at 36 CFR 294 Subpart B (2001).

¹¹ See Code of Federal Regulations at 36 CFR 294.12(b)(7) and 36 CFR 294.12(b)(3)

comply with Little Missouri National Grassland oil and gas stipulations. The BLM applies stipulations as directed by their North Dakota Resource Management Plan. Management of the lands and resources available to the public can be challenging with the different use types, stipulations, mediation techniques, or lack thereof. Adjacent land managers should share resources and the scenic resources as viewed by the public looking into or from the Little Missouri National Grassland should be analyzed during project-specific analysis prior to development.

Effects of Alternative 1 (continue current leasing and stipulations)

Without proper mitigation, oil and gas activity could alter the scenic integrity of the Little Missouri National Grassland. Under the reasonably foreseeable development scenario, adding approximately 62 wells per year would result in impacts to the scenic integrity. Approximately 216,300 acres would be available for lease under this alternative. There are also potential effects where these leased areas are viewed from outside the lease parcels, such as from ridgetops or from locations adjacent to the Little Missouri National Grassland.

In cases where transmission lines and pipelines are not placed underground or directly adjacent to a road, they are anticipated to be linear features crossing the landscape. In this case, the effect on scenic resources is potentially long term and such that the activities are more dominant in the foreground and middleground viewing distances, and potentially less obvious in the background viewing distance. Mitigating measures include moving transmission lines and pipelines to an area where it can be screened by topography or is less visible or by burying them, which has typically been done in this project area.

Most of these effects would be mitigated through the current stipulations, lease notices and the conditions of approval. To help ensure protection of scenic and recreation resources where visitors will most likely be viewing scenery, the grasslands plan includes a controlled surface use stipulation for high scenic integrity areas and moderate scenic integrity areas. By default, standard lease terms apply to areas of low scenic integrity objective. No surface occupancy, controlled surface use, and timing limitation stipulations intended to address concerns of resources other than scenery, can also affect scenery, usually in a beneficial manner. In addition, the plan states a stipulation for Management Area 4.22 with a 0.25-mile no surface occupancy buffer on each side of the Little Missouri River and for recreation resources, a no surface occupancy for all developed campgrounds, and a timing limitation within one-quarter of a mile of all campgrounds and developed sites from May 1 to December 1. Also, some areas are not available for leasing (MA 1.2A and MA 2.4) and other areas (e.g. MA 1.31, MA 2.2) are available with no surface occupancy stipulations. In these areas, the undeveloped landscape character would be largely protected. The level of protection depends on the level of development of existing and future leases.

Table 39 shows the possible mitigation measures relevant to scenic resources that may and should in most cases be applied at the application for permit to drill stage when surface disturbance is proposed.

Table 39. Potential mitigation measures for scenic resources

Resource	Mitigation Measure	Recreation/Roadless Resources
Access	Road locations and standards may be altered through realignment, relocation, screening, use of construction methods and materials having less impact, and reclamation, to meet the intent of adopted visual quality objectives, coordinate with recreation activities, and minimize impacts on other resources. Mitigating measures may include: fewer stream crossings; longer access roads which have less impact on other resources; insloped roads with drainage relief instead of outsloped roads, to lessen visual impact; construction techniques which lessen the amount of sidecast fill material; use of materials for bridges, traffic control devices, guard rails, retaining walls, and culverts which visually blend with surroundings; interim recontouring or revegetation to minimize the visual impact of ongoing operations; providing alternate recreation opportunities, such as a groomed snowmobile trail, when a road used by snowmobiles must be plowed; and, considering the use of a helicopter or other non-road access during wildcat exploration of a remote area.	Coordination with recreation activities would help to maintain access to important recreation activities and or enhance non-motorized recreation experience and associated settings. Within inventoried roadless areas, mitigation would help maintain the roadless area characteristics of primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation.
Visual Impacts	To maintain aesthetic values, surface disturbing activities may require special design, screening, or location to blend with the natural surroundings and meet the intent of adopted visual quality objectives. Mitigating measures may include moving facilities or disturbance to an area where it can be screened by vegetation or topography (or better reclaimed); constructing artificial hills or berms or planting vegetation to screen the disturbance; shaping and revegetating topsoil stockpiles and other temporary disturbance to blend with the natural surroundings; removing trees and other vegetation in a manner which creates a natural appearing opening; limiting the height of facilities; selecting construction materials which blend with the surrounding area; painting or staining facilities; treatment of disturbance to blend with the surrounding area; or moving or burying transmission lines, pipelines, or other facilities.	Maintaining aesthetic values, applying special design, screening, or locations to blend with the natural surroundings, and implementing reclamation to meet the intent of adopted scenic integrity objectives would minimize impacts to the recreation settings. Within inventoried roadless areas, mitigation would help maintain the roadless area characteristics of natural appearing landscapes with high scenic quality.
Activity Coordination	Operations will be coordinated with recreation and other activities. Operations other than drilling or production may be limited or halted on weekends, holidays, or during other periods of high use, such as hunting season, snowmobile season, or during livestock trailing.	Coordinating operations with recreation will reduce the potential impacts to visitors and commercial recreation operations in the vicinity of exploration and development activities and allow changes in operations to accommodate important, high use recreation timeframes.

Scenic Integrity

There would be no immediate effects to scenic values and scenic integrity objectives from a decision to authorize leasing. However, indirect effects are expected when future development occurs. The primary concerns associated with the impact of energy development on the visual quality of the Little Missouri National Grassland are the visibility of constructed features including roads, well pads, and pipelines; the presence of seismic or drilling equipment and transportation on roads surrounding mobilization to seismic testing or drill sites; and the potential for the long-term presence of a production facility.

Future effects from development activity are dependent on the amount and scale of the contrast between the natural landscape and constructed features, the distance that constructed roads and other features are

located relative to the location of the viewer, and the importance of scenic quality to experience of the viewer. Viewing distances, as mentioned earlier in the report are typically described as foreground (within 0.5 miles), middleground (0.5 miles to 3 to 5 miles), and background (3 to 5 miles and beyond). Facilities sited in a relatively open, flat prairie grassland in the foreground of a commonly used road would impact the landscape in a different way than facilities sited within a forested area, or distant from an actively used road.

Long-term effects to scenic resources result from ground disturbance and construction associated with roads and well pads for those that go into production. This is due to the removal of existing vegetation and manipulation and/or construction of landforms (elevated/cut and fill pads) that may contrast with the natural landforms in the surrounding area.

There are two types of road construction that occur related to well development. Access roads are constructed, and existing roads are improved to accommodate oil and gas equipment hauling. Road construction and improvement result in a variety of impacts to the scenic character of the landscape. Vegetation removal to build or widen a road creates some of the greatest impacts and reduces the sense of naturalness. The improvement of a road can reduce the sense of remoteness for people traveling a road. In addition, the traffic associated with equipment hauling or increased use because the road has been improved can lead to dust that can impact scenic quality.

The drill pads associated with the reasonably foreseeable development scenario are anticipated to be 4 to 7 acres of initial disturbance and reduced by 0.5 to 1 acre as the site is maintained. The visual impact of this difference in ground disturbance is minimal, in general. Vegetation removal and changing the contours of the terrain through earthwork are primary impacts to the scenic quality. Drilling rigs, storage facilities, and other temporary or permanent installations also change the scenic character of the views. If colors are selected for structure surfaces that harmonize with the landscape, visual impacts can be somewhat reduced, especially for middleground to background views.

Drill rigs vary in height from 100 feet (single) to 136 feet (triple). Depending on the height of the substructures, the mast of a drill rig may rise to 160 feet above ground surface, and is the most visible and noticeable part of a drill rig. Drilling operations typically continue 24 hours a day and 7 days a week. Nighttime lighting on the rigs can be controlled to reduce the nighttime visibility from a distance. This can be done by shielding light fixtures to eliminate direct up-light and being careful that they shine inward to the working area of the rig and not outward. Focus and illumination engineering can be used to make the rig less visible from outside of the drilling location at night. In addition, limits on the timing of operations, height of light poles, and wattage intensities can be used to limit light pollution. The potential for light pollution would be minor to moderate, depending upon the site. If oil or gas is discovered and developed, subsequent pumps and other built features are smaller scale and less visually evident than the exploratory drill rigs.

The utilization of horizontal drilling techniques has become more common over the last decade. This development has the potential to both positively and adversely impact scenic resources. The use of horizontal drilling can eliminate the need to drill as many wells, by grouping the drilling activity of several wells on the same well pad. According to the reasonably foreseeable development scenario, this reduces the overall number of well pads, roads, pipelines, and tank batteries needed with a one well per pad scenario. In addition, horizontal wells can reduce the amount of time that a well has to be produced; thereby reducing the amount of time the equipment and constructed features associated with the production facility are in place. This would likely result in reduced effects to scenery in the long term, at least those effects associated with the production facilities.

The reasonably foreseeable development scenario describes that in contrast to oil and gas development and production in the past, the use of multiple wells on a single pad is becoming more prevalent, and is expected to be part of the development of most wells for the period of the reasonably foreseeable development scenario. This type of well development and production is anticipated to result in fewer well pads in total, having the effect of concentrating the visual impact on well pads that are more distant from one another. The effect on scenic resources is long term and such that the activities are more dominant in the foreground and middleground viewing distances, and potentially more obvious in the background viewing distance, due to the scale of the operation and wide-open landscapes. In the foreground and middleground viewing distances, the impact is likely to be greater due to the increased level of development (larger pad, more equipment), but would likely reduce impacts in the background viewing distances as a result of greater dispersion.



Figure 36. Typical drilling operation and access road with well production operation in the background

Depending on drill pad locations, it could be difficult to meet high scenic integrity objectives and moderate scenic integrity objectives on the available lease parcels that are in the rolling prairie, wide-open landscapes, or those where viewers generally look down across the landscape. Drill pads placed in tree covered areas and areas with a less open landscape would provide opportunities for screening drilling structures and activities. In areas where there are large tracts of parcels available, the natural appearing character could be substantially changed if the area were fully developed for oil and gas exploration. To help protect scenic and recreation resources where visitors will most likely be viewing scenery, the grasslands plan states a controlled surface use occupancy for high scenic integrity areas and moderate scenic integrity areas. The controlled surface use stipulation allows use and occupancy on all or portions of the lease year-round, but lease activities are strictly controlled. In addition to the stipulations and conditions of approval, mitigation measures relevant to scenic resources should be applied at the application for permit to drill stage when surface disturbance is proposed. Also, a site-specific environmental analysis including scenic resource analysis and a viewshed analysis would be performed to ensure the designated scenic integrity objectives are maintained.

Dispersed and Developed Recreation

The Little Missouri National Grassland is experiencing an increase in developed and dispersed recreation use and opportunities. As a result, it is becoming increasingly important to protect the scenic resources to meet visitor expectations and maintain the landscape character in those recreation settings. There are current timing limitations, (May 1 to December 1) and no surface occupancy stipulations in place to protect developed recreation areas (see recreation site list above). Future recreation site protection may be

indirectly affected because the stipulations for recreation sites only apply to the sites specifically named in the grasslands plan.

The timing limit stipulation prohibits surface use during specific time periods to protect identified resource values. Since it does not apply to operation and maintenance of production facilities, this stipulation does not serve to reduce visual impacts, and general anticipated impacts to scenic quality and developed and dispersed recreation would apply. In addition to the stipulations and conditions of approval, mitigation measures relevant to scenic resources should be applied at the application for permit to drill stage when surface disturbance is proposed near developed and dispersed recreation. Furthermore, site-specific environmental analysis including scenic resource analysis and a viewshed analysis should be performed to ensure the desired scenic character is achieved.

Unique Recreation Areas and Trails

Protection of several of these sites are covered under existing stipulations. The Little Missouri River has a no surface occupancy stipulation of 0.25 mile on either side. All areas and resource indicators with a no surface occupancy stipulation may have some change to the scenic environment in a reasonably foreseeable development scenario. Roads could still be upgraded to accommodate equipment transport. If a pipeline or similar structure is installed, vegetation would be cleared and vegetation patterns in an area would change. Pipelines would generally be laid within a road prism, where they would have little effect on visual quality. Other pipelines would be laid alongside the road right-of-way for a shorter duration of time. These types of pipelines could have short-term visual impacts since they are very close to the road within the immediate foreground, and change the spatial character of the road corridor.

Special Areas and Designations

Under the reasonably foreseeable development scenario, oil and gas wells, pipelines and transmission lines and other activity would alter the undeveloped character of a portion of the roadless area for the time the surface is occupied as described earlier in this analysis. Views of oil and gas development if not properly mitigated would be visible in the foreground, middleground and background and would potentially reduce the quality of the experience for users, which may lead to the displacement of users in those areas. Oil and gas development could make some inventoried roadless areas ineligible or less likely to be considered by congress for wilderness designation in the future.

For the two designated national trails, the trailheads are protected with a no surface occupancy stipulation; however, the trails themselves do not have an existing stipulation for protection. Some stretches of the trails are in high and moderate scenic integrity objective areas and could be protected from the impacts of development under those stipulations. Under the reasonably foreseeable development scenario, exploratory drill rigs would likely be visible from the trails in foreground, middleground and background, which could reduce the quality of the scenic experience for individuals visiting the trails. Depending on the level of development, this could be considered incompatible with the purpose for which the trails were established. While views of oil and gas development might reduce the quality of the experience for some trail users, it would probably not displace users. In addition to the stipulations and conditions of approval, mitigation measures relevant to scenic resources should be applied at the application for permit to drill stage when surface disturbance is proposed near special areas and designations. Furthermore, site-specific environmental analysis including scenic resource analysis and a viewshed analysis would be performed to ensure the desired scenic character is achieved. This analysis would be essential to protect areas with high scenic quality, reference landscapes, traditional cultural areas and sacred sites and other identified unique characteristics by locating oil and gas development outside of these areas.

Settings Outside the National Grassland

The Little Missouri National Grassland analysis area is a patchwork of state, Federal, and private ownership. There would be no immediate effects to scenery viewed from settings outside the grassland from a decision to authorize leasing. However, future effects to adjacent landowners, State and Bureau of Land Management land as well as the three units of Theodore Roosevelt National Park that would be the same as what is stated above for Scenic Values and Scenic Integrity. There could also be potential indirect effects to scenic resources from an increase in development and development scale on private and state land adjacent to Federal land that are not required to follow Grassland stipulations or comply with scenic integrity objectives.

Consultation with adjacent landowners and agencies would be critical to determine sensitive areas and critical viewsheds in regard to settings outside the grassland. Specifically, the sensitivity mapping from Theodore Roosevelt National Park should be used to analyze views from the national park into the Little Missouri National Grasslands available lease parcels prior to development. The conditions of approval and mitigation measures relevant to scenic resources should be applied at the application for permit to drill stage when surface disturbance is proposed near settings outside the grassland. Furthermore, site-specific environmental analysis, including scenic resource analysis with a viewshed analysis would be conducted while including the public and other agencies in the decision-making process.

Cumulative Effects

Past, ongoing and reasonably foreseeable activities include oil and gas development, grazing, surface mineral development and operation, private land development, and road construction and maintenance. Continued oil and gas development has the greatest potential to affect scenery, and it is expected that future development will be comparable to or exceed current development rates. While some effects will be reduced due to technological developments, it is anticipated that the landscape character will become even more heavily modified in some viewsheds, and that other areas will begin to see the effects of this activity.

There are existing lease parcels within this analysis area and expectations would be that development continues. Any future exploration or development of oil and gas resources, if and when it does occur, would result in impacts. Depending on the level of future development, the visual quality would be reduced for individuals seeking a natural appearing landscape. These impacts would not occur until some point in the future and pursuant to additional environmental analysis and the Federal leasing and development process.

Effects of Alternative 2 (no new oil and gas leasing)

There would be no direct, indirect, or cumulative effects on scenic resources and no introduction of noise or unnatural lighting as a result of the no new leasing alternative. However, scenic resource impacts in the area could occur as existing leases are developed, and any of the effects described in this analysis could occur.

Effects of Alternative 3 (continue leasing with revised stipulations)

The proposed stipulations for alternative 3 would add to or modify the current stipulations listed in alternative 1.

Similar to alternative 1, there would be no immediate effects to scenery from authorizing leasing. However, leasing grants the right to develop the leased parcel for a period of 10 years. Future effects on the recreation setting from roads, pipelines, well pads, and support facilities such as gravel pits, staging

areas and collection facilities, sights and sounds of oil and gas activities, and hazards from leaks, are expected under alternative 3. The reasonably foreseeable development scenario, adding approximately 62 wells per year, would be the actions that would result in impacts to the scenic integrity. Leasing authorizes exploration for oil and gas, later developments would be subject to additional site-specific analysis; however, general potential effects are considered for this alternative.

To further protect resources, alternative 3 proposes to modify the current no surface occupancy stipulations for recreation and add a no surface occupancy stipulation for roadless areas. The no surface occupancy stipulation would help to ensure the protection of natural appearing landscapes with high scenic quality, reference landscapes, cultural landscapes, sacred sites, and other identified unique landscapes and scenic character within the inventoried roadless areas. This protection would also help keep some inventoried roadless areas eligible for wilderness designation in the future.

There would be no immediate effects to scenic values and scenic integrity objectives from a decision to authorize leasing. Indirect effects could occur if future development were approved and those effects are similar to alternative 1. In addition to the stipulation protections outlined in alternative 1, alternative 3 proposes more protection for roadless areas and recreation facilities on a developmental scale. Adding stipulations to roadless areas would ensure that their characteristics related to scenic resources remain intact therefore lessening the potential for indirect effects. The modified recreation stipulation would protect the scenic integrity and foreground views of all 3 to 5 development scale sites as well as those that may be developed in the future. Conversely, if a recreation area were downgraded in development scale, it would no longer be covered by the stipulation.

Effects to Alternative 3B (continued leasing with revised Alternative 3 stipulations)

Alternative 3B includes all existing stipulations and lease notices in alternative 1 and the stipulation revisions proposed in alternative 3. For alternative 3B, there are three proposed stipulations that have the potential to affect scenery: a no surface occupancy for sage-grouse priority habitat, an extension of the timing limitation for bighorn sheep, and a revision to the roadless stipulation from alternative 3.

Similar to alternatives 1 and 3, there would be no immediate effects to scenery from authorizing leasing. The action of leasing by itself does not have impacts to landscape character or scenic integrity. However, leasing conveys a 10-year legal right to develop a parcel, so indirect effects (those that occur later in time) are expected. Future effects on the recreation setting from roads, pipelines, transmission lines, well pads, and support facilities such as gravel pits, staging areas and collection facilities, sights and sounds of oil and gas activities, and hazards from leaks, could all occur in the project area, including roadless areas under alternative 3B. The reasonably foreseeable development scenario, adding approximately 62 wells per year, would be the actions that would result in impacts to the scenic integrity. Leasing authorizes exploration for oil and gas, later developments would be subject to additional site-specific scenery analysis, viewshed analysis and decisions; however, general potential indirect effects are considered for this alternative.

Alternative 3B modifies the proposed no surface occupancy stipulation for roadless areas in alternative 3 with an additional controlled surface use stipulation for roadless areas within 0.25 miles on each side of existing roads. The remaining acreage outside of the buffer in roadless areas would then fall under the no surface occupancy stipulation.

The no surface occupancy stipulation for sage-grouse habitat applies to approximately 35,000 acres in the southwest corner of the project area. Almost all of the acreage is in low scenic quality areas and no surface occupancy, therefore, will not be analyzed in detail in this section.

All other stipulations and indirect effects that would apply to alternative 3B, outside of inventoried roadless areas, will be the same as alternative 3.

Special Areas and Designations

For alternative 3B there are 6,800 acres of National Forest surface owned unleased parcels in roadless that would fall under the controlled use stipulation. These areas are shown in red in figure 28 and figure 29.

The stipulation applies to 0.25 miles (foreground) on both sides of existing ML 3-5 roads in roadless areas. Of the 6,800 acres, approximately 77 percent are located in low scenic integrity areas, 18 percent in moderate and the remaining 5 percent are in high scenic integrity areas. However, no surface occupancy stipulations for other resources affect 4,300 of the 6,900 acres within the buffer for a net of 2,600 acres of currently unleased available parcels that could be affected. For alternative 3B, the remaining 64,500 acres of unleased parcels outside of the 0.25-mile buffer in roadless would remain as no surface occupancy.

The 2001 Roadless rule allows well pads and other oil and gas infrastructure to be built adjacent to existing roads. No new roads may be built. Under this stipulation the well pad in roadless must be constructed directly adjacent to the road right-of-way, and if rectangular, the long edge must be parallel to the road. For further explanation of the roadless rule and how it applies to the controlled surface use stipulation and alternative 3B, refer to the “Recreation and Related Resources” report.

Under this alternative, there would be no immediate effects to special areas and designations from a decision to authorize leasing. Indirect effects would occur when leases are developed and would be the same as listed for alternative 3 for all no surface occupancy areas in roadless including the effects of transmission lines and pipelines creating a linear feature across the landscape as discussed under alternative 1.

For the 0.25 miles on either side of existing roads in roadless under the controlled surface occupancy stipulation, the indirect effects from the visual impact of well pads and associated oil and gas operations would be the same as outlined in alternative 1. To summarize, vegetation removal and changing the contours of the terrain through earthwork are primary impacts to the scenic quality. Drilling rigs, storage facilities, and other temporary or permanent installations also change the scenic character of the views. Depending on drill pad locations, it could be difficult to meet high scenic integrity objectives and moderate scenic integrity objectives on the available lease parcels that are in the rolling prairie, wide open landscapes, or those where viewers generally look down across the landscape. The indirect effects of well pads and oil and gas operations are described in more detail in alternative 1 and would be the same for alternative 3B in roadless areas.

In addition to the proposed stipulations and conditions of approval, mitigation measures relevant to scenic resources should be applied at the application for permit to drill stage when surface disturbance is proposed near special areas and designations. Furthermore, site specific environmental analysis, including scenic resource analysis and a viewshed analysis, would be performed to ensure the desired scenic character is achieved. This analysis would help to ensure the protection of natural appearing landscapes with high scenic quality, reference landscapes, cultural landscapes, sacred sites, and other identified unique landscapes and scenic character within the inventoried roadless areas.

Developed and Dispersed Recreation Use

There would be no immediate effects to developed and dispersed recreation use from a decision to authorize leasing. Future effects from development would be the same as alternative 3, assuming that the presence of well pads along existing roads within roadless areas would not effectively reduce the use of the area by recreationists. The quality of solitude could be somewhat reduced.

Unique Recreation Areas and Trails

There would be no immediate effects to unique recreation areas and trails from a decision to authorize leasing. The future effects, occurring with exploration and development, would be the same as alternative 3.

Off-Forest Settings

There would be no immediate effects to scenery viewed from off-forest settings from a decision to authorize leasing. There are potential indirect effects that would be the same as alternative 3, except there would be 6,800 fewer acres of no surface occupancy in the roadless areas that help protect and enhance views from private, state, and federal land into roadless areas.

As with alternative 3, the conditions of approval and mitigation measures relevant to scenic resources should be applied at the application for permit to drill stage, when surface disturbance is proposed near off-forest settings. Furthermore, site-specific environmental analysis including scenic resource analysis including a viewshed analysis would be conducted while including the public and other agencies in the decision-making process.

Cumulative Effects

Because the total number of wells does not differ between the action alternatives, the cumulative effects for alternatives 3 and 3B would be the roughly the same as those for alternative 1. The primary difference is that under alternative 3, no well pads would be built in inventoried roadless areas, because the no surface occupancy stipulation in alternative 3 allows for no exceptions, waivers, or modifications, pushing the placement of well pads outside the roadless areas. Thus, though the total number of well pads on the landscape would be the same, the placement and distribution would be different, and the inventoried roadless areas would remain more intact in the near and moderate future.

For alternatives 1 and 3B, leasing followed by development in roadless areas would reduce the scenic integrity until production had ceased and reclamation was complete.

Heritage Resources

Affected Environment

The Little Missouri National Grassland has a broad range of cultural sites, dating from Paleo-Indian times to the modern era. For a full discussion of the cultural resources on the Little Missouri National Grassland, see the discussion starting on page 3-442 in the Northern Great Plains Plans Revision Final Environmental Impact Statement.

Effects of Alternative 1 (continue current leasing and stipulations)

This alternative includes a total of 141,200 acres of national grassland that would become available for new oil and gas leasing. In total there are 243 known National Register of Historic Places eligible or unevaluated cultural sites within or directly adjacent to the proposed leasing area for this alternative (175

prehistoric, 65 historic, and three multicomponent sites that include both historic and prehistoric remnants).

Potential adverse impacts may occur to both previously recorded and currently unknown cultural sites from construction of oil wells, oil pads, oil pipelines, and access roads. However, this alternative includes a no surface occupancy stipulation to protect any at risk eligible or unevaluated sites, in compliance with Section 106 of the National Historic Preservation Act. As a result, there should not be any direct impacts to cultural sites. Indirectly, increased human traffic associated with oil production could result in increased looting activity at cultural sites within the vicinity of oil development.

Cultural resources are non-renewable resources. Current law, regulation and policy provide comprehensive protection for historic properties. Theoretically, there would be no anticipated cumulative effects to heritage resources. However, as a result of the potential for unanticipated emergency responses to events that pose a danger to public health and safety, such as hazardous waste spills or wildfires, alternatives that allow additional leasing of oil and gas on National Forest System lands may contribute to a cumulative impact on cultural resources. This potential cannot be quantified, and is described based on experience with previous oil and gas development. The large majority of historic properties have been successfully protected.

Effects of Alternative 2 (no new oil and gas leasing)

Under this alternative, no actions are proposed and any previously recorded or as yet undiscovered sites would remain undisturbed. Historic properties would be subject to natural deterioration and decay. However, under this alternative no surveys would be conducted to locate and identify any previously unrecorded sites, as would occur under alternative 1 and 3. No protective measures could be taken to protect currently unidentified cultural resources that may have otherwise been discovered as a result of surveys associated with one of the action alternatives. In the long-term, activity on National Forest System surface over Federal minerals should decline. However, leases are often held by production for many decades, so this anticipated effect entails much uncertainty.

Because no additional leasing would occur, there would be no cumulative effects to cultural resources with implementation of this alternative.

Effects of Alternative 3 and 3B (continue leasing with revised stipulations)

Alternative 3 includes a total of 108,500 acres of national grassland that would become available for new oil and gas leasing where surface development would be allowed. In total there are 223 known National Register of Historic Places eligible or unevaluated cultural sites within or directly adjacent to the unleased available acres where surface disturbance may occur under this alternative (156 prehistoric, 65 historic, and two multicomponent sites that include both historic and prehistoric remnants).

Though there are fewer sites when compared to alternative 1, because alternative 3 includes the same design features to protect at risk eligible or unevaluated sites, the effects would be the same as for alternative 1. There would not be any direct impacts to cultural sites. Indirectly, increased human traffic associated with oil production could result in increased looting activity at cultural sites within the vicinity of oil development. Cumulative effects would include the same indirect effect from increased development (oil and other) on adjacent private and state lands. Alternative 3B is the same as alternative 3, except that it has additional stipulations to protect sage-grouse habitat, bighorn sheep lambing areas, roadless areas, and air quality, resulting in only 97,800 acres with a potential for surface disturbance. The

potential effects to cultural sites are the same for each of these alternatives, which is why they are addressed together.

Cultural resources are non-renewable resources. Current law, regulation and policy provide comprehensive protection for historic properties. Theoretically, there would be no anticipated cumulative indirect effects to heritage resources. However, as a result of the potential for unanticipated emergency responses to events that pose a danger to public health and safety, such as hazardous waste spills or wildfires, alternatives that allow additional leasing of oil and gas on National Forest System lands may contribute to a cumulative impact on cultural resources. This potential cannot be quantified, and is described based on experience with previous oil and gas development. The large majority of historic properties have been successfully protected.

Paleontological Resources

Affected Environment

The planning area is rich with fossil resource and has fossil bearing formations on approximately 90 percent of the area (see figure 37). For an inventory of fossil bearing formations, please refer to table 3-217 on page 3-433 in the Northern Great Plains Plans Revision Final Environmental Impact Statement or to the Paleontological Report on the project website: <https://www.fs.usda.gov/project/?project=40652>.

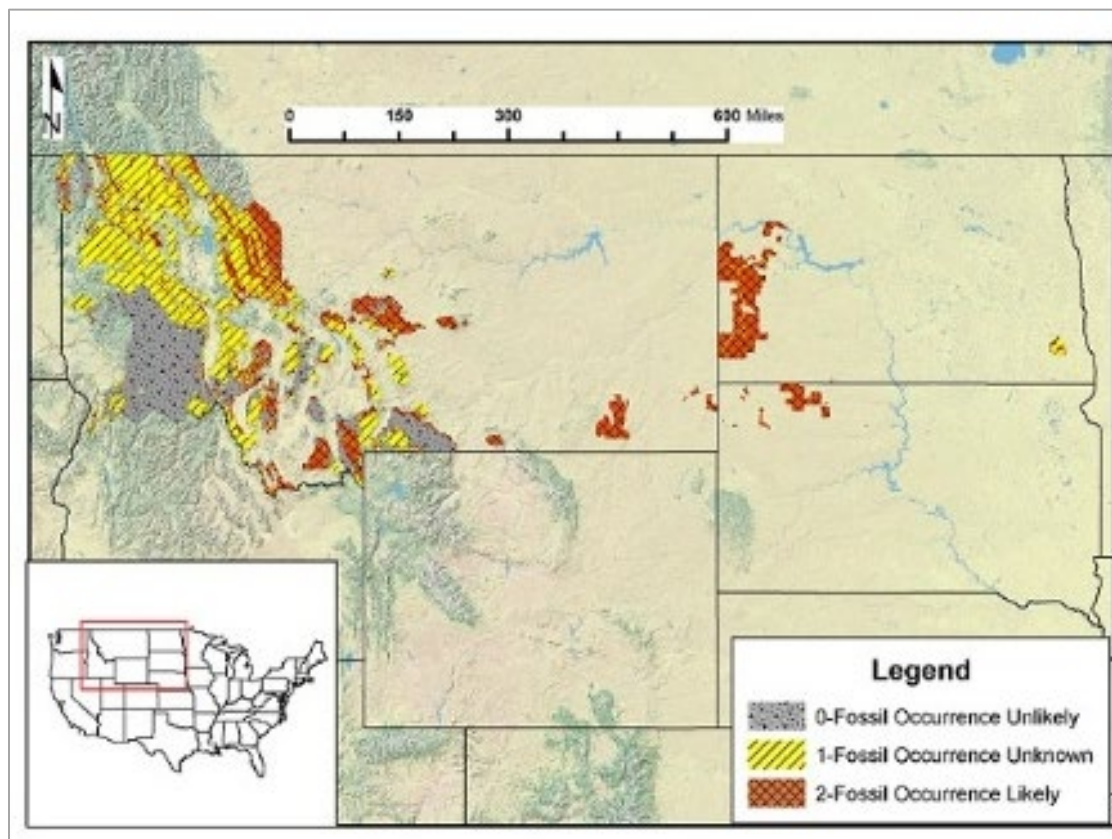


Figure 37. Likelihood of occurrence of paleontological resources in the Northern Region of the Forest Service

Numerous fossil-bearing formations within the planning area are found as outcrops at the surface or are directly contacted by subsurface activities. Existing management priorities include survey of high

potential fossil occurrence areas; fossil excavation in partnership with local universities; management and interpretation of special paleontological areas; presentation of educational programs regarding public land fossil management; and investigation of vandalized sites.

Effects of Alternative 1 (continue current leasing and stipulations)

Current stipulations and lease notices affecting paleontological resources include controlled surface use for special interest areas, including Slope Formation Type Section, Cannonball/Slope Formation Outcrop, and Bullion Creek Formation Type Section areas.

Alternative 1, continuing with current stipulations and lease notices, does not protect all paleontological resources, as defined by the Paleontological Resources Protection Act of 2008. The current lease notice focuses on vertebrate fossils and exclude scientifically important and management relevant invertebrate and plant fossils. Under these stipulations, invertebrates and plants would be excluded from paleontological resource inventories, and, therefore, the scientific information and specimens would be lost.

In addition, with new leases, more roads will be constructed, making paleontological resources more accessible for possible unauthorized activity. Heavy machinery involved in the construction of roads to access energy and mineral extraction areas, as well as the actual extractive activities themselves, are direct effects to which formations having only invertebrate and plant fossils would be subject. Construction activities for utility developments could directly and adversely affect fossil resources for the same reasons. Grouping of utilities within established corridors would reduce effects.

Alternative 1 may result in disturbance and unauthorized removal of invertebrate and plant fossils, and possibly leading to vertebrate fossils. Adjacent non-Federal landowners may allow collection of paleontological resources on their land, and regardless if the boundaries are staked and signed, collectors (research, hobby, commercial collectors etc.) may trespass onto National Forest System lands. Such activity would lead to increased law enforcement workload, increased ground disturbance, and resource, scientific, and public loss. Indirect effects include the exposure of paleontological resources and not being reported to the agency, which may increase the potential for vandalism of a site or theft of fossils during drilling and extraction activities.

Cumulative Effects

Cumulative effects over time can include loss of sites or parts of sites through natural erosional processes, not enough staff to discover, document, and monitor sites. Most impacts cited above could have long-term cumulative consequences. These consequences include land management projects that cause surface disturbance, increased public visitation, long-term consequences of non-sanctioned activities, such as vandalism, illegal excavation, and removal of paleontological resources, natural weathering and deterioration, erosion, landslide, fires and other physical processes. Enforcement of protective measures should result in a lower level of cumulative effects.

Other activities that may cumulatively affect paleontological resources on the Little Missouri National Grassland include recreational uses, hunting and fishing, and livestock grazing. The proximity and interspersed nature of private lands with National Forest System lands and the full suite of activities that create opportunities for access and discovery of paleontological resources on National Forest System lands, which may then be collected or damaged. Paleontological resources that occur on private lands are considered private property, and the collection or damage of those resources do not constitute cumulative effects on such Federal resources.

Effects of Alternative 2 (no new oil and gas leasing)

Under alternative 2, new leases will not be offered on the Little Missouri National Grassland, and there would be no chance for direct disturbance from the development of new oil and gas leases. Indirect effects of alternative 2 may be that areas without a lease or any agency activity may be more susceptible to unauthorized paleontological activity where these resources are accessible. However, the lower level of activity and access may also reduce such occurrences. Another indirect effect is that no new paleontological inventories would be conducted in connection with oil and gas leasing and development, and thus new discoveries may not occur. Loss of undiscovered sites through natural erosional processes may be more likely under alternative 2.

Cumulative Effects

Cumulative effects over time can include loss of sites or parts of sites through natural erosional processes, not enough staff to discover, document, and monitor sites. The lack of additional inventories that would result from oil and gas leasing may exacerbate this impact.

Effects of Alternative 3 and 3B (continue leasing with revised stipulations)

Alternative 3B is the same as alternative 3, except that it has additional stipulations to protect sage-grouse habitat, bighorn sheep lambing areas, roadless areas, and air quality. The potential effects to paleontological sites are the same for each of these alternatives, which is why they are addressed together in this analysis. With alternative 3, the lease notice for paleontological resources would be revised to comply with current law. Current controlled surface use stipulations for special interest areas would continue, including Slope Formation Type Section, Cannonball/Slope Formation Outcrop, Bullion Creek Formation Type Section areas. The revised lease notice for paleontological resources would define paleontological resource to broadly include any “remains, traces or imprints of organisms.”

The effects of alternative 3 and 3B are the same as for alternative 1, except that the lease notice will comply with current laws and regulations regarding all paleontological resources. Paleontological inventories that may be required under alternative 3 and 3B will include invertebrates and plants, including in situ fossilized trees, and vertebrates. Inclusion of all paleontological resources in inventories conducted under oil and gas development permits will provide more complete information for the Forest Service to manage the paleontological resources.

Cumulative Effects

Cumulative effects under alternative 3 and 3B would be the same as under alternative 1, except that more complete information about paleontological resources occurring within oil and gas lease parcels would be obtained from inventories required for all fossils, rather than just vertebrates.

Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and other organization and individuals during the development of this environmental impact statement:

Interdisciplinary Team Members

The core interdisciplinary team is responsible for developing the draft supplemental environmental impact statement. The Dakota Prairie Grasslands employees worked with Forest Service employees from the Forest Service Enterprise Program to draft this document.

Table 40. Preparers and contributors

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Joshua Meeks	Economist; Forest Service Enterprise Program	Socioeconomic Specialist Report
Scott Williams	Fire and air quality specialist; Forest Service Enterprise Program	Air Quality Report
Jacob Deal	Oak Ridge Institute Fellow	Greenhouse Gas Emissions Analysis
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Michael McNamara	Hydrologist; Forest Service Enterprise Program	Surface Water and Groundwater Reports
Angela Gatto	Wildlife biologist; Forest Service Enterprise Program	Biological evaluation and wildlife report
Terry Miller	Botanist; Forest Service Enterprise Program	Sensitive plants and Non-native Invasive Species Report
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Breton Friel	Archeologist; Forest Service Enterprise Program	Cultural Resources Report
Barbara Beasley	Paleontologist; Forest Service Washington Office	Paleontological Resource Report
Leslie Vaculick	Petroleum Engineer	Updated Reasonably Foreseeable Development Scenario
Sabry Hanna	Minerals Program Manager (past)	Updated Reasonably Foreseeable Development Scenario

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- Montana/Dakotas Bureau of Land Management
- National Park Service
- Billings County
- North Dakota Department of Environmental Quality, Air Quality Division
- North Dakota Game and Fish Department
- North Dakota Industrial Commission, Department of Mineral Resources

Distribution of the Supplemental Environmental Impact Statement

A notice of the availability of the final supplemental environmental impact statement was published in the Federal register. In addition, a legal notice of the objection period was published in the newspaper of record, The Bismarck Tribune. The final supplemental environmental impact statement and relevant announcements were posted to the Dakota Prairie Grasslands website.

A notice that this final supplemental environmental impact statement is available on the project website and in Forest Offices has been emailed or mailed to representatives of 64 organizations, representatives of 5 federally recognized Tribes, and 20 interested individuals, including those who commented during the 2015 scoping period and the 2019 comment period for the draft supplemental environmental impacts statement.

In addition, a copy of this document has been distributed to the following Federal agencies, as required by 40 CFR 1502.19:

- Advisory Council on Historic Preservation

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

- Animal and Plant Health Inspection Service (APHIS)
- Natural Resource Conservation Service
- USDA Office of Civil Rights
- National Agricultural Library
- National Oceans and Atmospheric Agency, Office of Policy and Strategic Planning
- Chief of Naval Operations, Energy and Environmental Readiness Division
- U.S. Coast Guard, Office of Environmental Management
- Army Corps of Engineers, Northwestern Division
- Environmental Protection Agency
- Department of Energy, Director of NEPA Policy and Compliance
- Federal Energy Regulatory Commission
- Federal Aviation Administration, Great Lakes Region
- Federal Highway Administration

References

- Anderson, S.B. and J.P. Bluemle. 1983. Oil Exploration and Development in the North Dakota Williston Basin: 1982-1983 Update. North Dakota Geological Survey.
- Anderson, B., and T. Dzomba. 2014. Near Field/Visibility Air Quality Impact Analyses for Oil and Gas Leasing and Development Activities on the Little Missouri National Grassland. USDA Forest Service.
- Anderson, J.A. and A.L. Gesford. 2007. Environmentally sensitive maintenance for dirt and gravel roads. A Manual to provide guidance using natural systems and innovative technologies to reduce erosion, sediment and dust pollution while more effectively and efficiently maintaining dirt and gravel roads. Pennsylvania Department of Transportation.
- Anteau, M.J. in progress. Habitat selection, productivity, and estimation of available nesting habitat for piping plovers on Lake Sakakawea. U. S. Geological Service. ScienceBase URL: <https://www.sciencebase.gov/catalog/item/54f9f18de4b02419550d9d67>
- Autenrieth, R.E., D.E. Brown, J. Cancino, R.M. Lee, R.A. Ockenfels, B.W. O’Gara, T.M. Pojar, and J.D. Yoakum. 2006. Pronghorn Management Guide. Biological and Management Principles and Practices designed to sustain pronghorn populations from Canada to Mexico. 21st Pronghorn Workshop and North Dakota Game and Fish Department. Bismark, North Dakota.
- Barnhart, P.R., and E.H. Gillam. 2017. Documentation of overwintering bat species presence and hibernacula use in the Badlands of North Dakota. *Northwestern Naturalist* 98:48–56.
- Baydack, R.K. and D. A. Hein. 1987. Tolerance of Sharp-Tailed Grouse to Lek Disturbance. *Wildlife Society Bulletin*, Vol. 15, No. 4 pp. 535-539
- Beecham, J.J. Jr., C.P. Collins, and T.D. Reynolds. 2007. Rocky Mountain Bighorn Sheep (*Ovis canadensis*): A technical conservation assessment. USDA Forest Service, Rocky Mountain Region.
- Berkas, W. 2013. North Dakota Wetland Resources. IN: National Water Summary – Wetland Resources. U.S. Geological Survey. p 303-307.
- Bohrer, M., S. Fried, L. Helms, B. Hicks, B. Juenker, D. McCuster, F. Anderson, J. LeFever, E. Murphy, S. Nordeng. 2008. State of North Dakota Bakken Formation Resources Study Project.
- Brooks, M.L. 2008. Chapter 3: Plant Invasions and Fire Regimes USDA Forest Service Gen. Tech. Rep. RMRS-GTR-42-vol. 6. 2008
- Bunkley, J.P., C. J.W. McClure, N.J. Kleist, C.D. Francis and J.R. Barber. 2015. Anthropogenic noise alters bat activity levels and echolocation calls. *Global Ecology and Conservation* 3 (2015) 62–71.
- Butler, W.H., A. Monroe, S. McCaffrey. 2015. Collaborative implementation for ecological restoration on US public lands: implications for legal context, accountability, and adaptive management. *Environmental Management* 55:564-577.
- Butler, Jack L.; Ott, Jacqueline P.; Hartway, Cynthia R.; Dickerson, Brian E. 2018. Biological assessment of oil and gas development on the Little Missouri National Grassland. Gen. Tech. Rep. RMRS-GTR-384. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 67 p.

- Carlson McCain Inc. 2015. Black-tailed prairie dog colony mapping Dakota Prairie Grasslands. Contract No. AG-87BJ-C-15-0008. Prairie Dog Mapping 2015. Medora, McKenzie and Grand River Ranger Districts Dakota Prairie Grasslands Project #5723.
- Christian J.M. and S.D. Wilson. 1999. Long-term ecosystem impacts of an introduced grass in Northern Great Plains. *Ecology* 80(7):2397-2407.
- Christie, K.S., W.F. Jensen, M.S. Boyce. 2016. Pronghorn resources selection and habitat fragmentation in North Dakota. *The Journal of Wildlife Management*
- Collinge, S.K. 1996. Ecological consequences of habitat fragmentation: implications for landscape architecture and planning. *Landscape and Urban Planning*. Volume 36, Issue 1, October 1996, pp. 59-77.
- Council on Environmental Quality (CEQ). 1997. Environmental Justice – Guidance Under the National Environmental Policy Act. Accessed Jan 30, 2018.
https://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf.
- Croft, M.G. 1985. Groundwater Resources of McKenzie County, North Dakota. County Groundwater Studies 37 - Part III, Bismarck: U.S. Geologic Survey in cooperation with the North Dakota State Water Commission, North Dakota Geological Survey, and McKenzie County Water Resources District.
- Cross, T.B., D.E. Naugle, J.C. Carlson, and M.K. Swartz. 2016. Hierarchical population structure in greater sage-grouse provides insight into management boundary delineation. *Conservation Genetics*, v 17, no. 6, p 1417-1433.
- Davis, S. 2004. Area Sensitivity in Grassland Passerines: Effects of Patch Size, Patch Shape, and Vegetation Structure on Bird Abundance and Occurrence in Southern Saskatchewan. *The Auk*, 121(4):1130-1145.
- DeKeyser E.S., M. Heehan, G. Clambey, and K. Krabbenhoft. 2013. Cool season invasive grasses in Northern Great Plains natural areas. *Natural Areas Journal* 33(1):81-90.
- DeKeyser E.S., L.A. Dennyhardt, and J. Hendrickson. 2015. Kentucky bluegrass (*Poa Pratensis*) invasion in the Northern Great Plains: a story of rapid dominance in an endangered ecosystem. *Invasive Plant Science and Management* 8(3):255-261.
- Dinkins, Meghan. 2018. Personal communication with Chip Fisher, GIS Analyst, U.S. Forest Service Northern Regional Office and Meghan Dinkins, Dakota Prairie Grasslands Wildlife Program Manager. September 12, 2018.
- Dudley, M.M. W.R. Jacobi, C.S. Brown. 2014. Roadway deicer effects on the germination of native grasses and forbs. *Water, Air, Soil Pollution*. 225:1984.
- Dyke, S.R., S.K. Johnson, and P.T. Isakson. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, ND.
- Ehrenfeld, J.G. 2003. Effects of Exotic Plant Invasions on Soil Nutrient Cycling Processes. *Ecosystems*, 6, 503-523. <http://dx.doi.org/10.1007/s10021-002-0151-3>

- Feist, J.J. 1997. Bighorn sheep (*Ovis Canadensis*) ecology and demography in the North Dakota Badland (Master of Science). University of North Dakota.
- Fellows, S.D. and S.L. Jones, 2009. Status Assessment and Conservation Action Plan for the Long-billed Curlew (*Numenius americanus*). U.S. Fish & Wildlife Publications. 476.
- Fetterman, L. 2018. Archaeologist, Dakota Prairie Grasslands. Personal communication with S. Downey, environmental coordinator, U.S. Forest Service Enterprise Program. August 15, 2018.
- Federal Register. 2015. Oil and Gas Leasing; Royalty on Production, Rental Payments, Minimum Acceptable Bids, Bonding Requirements, and Civil Penalty Assessments. Accessed Jan 9, 2018. <https://www.federalregister.gov/documents/2015/04/21/2015-09033/oil-and-gas-leasing-royalty-on-production-rental-payments-minimum-acceptable-bids-bonding>.
- Fuller, M.R. 2010. Raptor nesting near oil and gas development: An overview of key findings and implications for management based on four reports by Hawk Watch International. BLM Technical Note 432.
- Gautier, D.L., G.L. Dolton, K.I. Takahashi, and K.L. Varnes. 1996. 1995 National assessment of United States oil and gas resources; results methodology, and supporting data. No. 30. U.S. Geological Survey
- Gaynor, K.M., C.E. Hojnowski, N.H. Carter, and J.S. Brashares. 2018. The influence of human disturbance on wildlife nocturnality. *Science*. Vol. 360: 1232-1235.
- Goodrich, B.A. and W.R. Jacobi. 2012. Foliar damage, ion content, and mortality rate of five common roadside tree species treated with soil applications of magnesium chloride. *Water, Air, Soil Pollution* 223:847-862.
- Hamilton, L.E., B.C. Dale, and C.A. Paszkowski. 2011. Effects of disturbance associated with natural gas extraction on the occurrence of three grassland songbirds. *Avian Conservation and Ecology* 6(1):7.
- Hanna, Sabry. 2017. Dakota Prairie Grasslands: Little Missouri and Cedar River National Grasslands: Updates to the March 15, 2013 Reasonably Foreseeable Development Scenario for Oil and Gas. Unpublished Report. USDA Forest Service, Dakota Prairie Grasslands.
- Hays, Misty. 2018. Dakota Prairie Grasslands Minerals Program Manager. Comments on internal draft SEIS. August 15, 2018.
- Henderson, D.C. and N. Koper. 2014. Historic Distribution and Ecology of Tall-Grass Prairie in Western Canada. Pages 40-49 in Proceedings of the North American Prairie Conference. Prairie Naturalist, South Dakota State Univ., Pierre, South Dakota.
- Henderson, D.C. and N. Koper. 2014. Historic Distribution and Ecology of Tall-Grass Prairie in Western Canada. Pages 40-49 in Proceedings of the North American Prairie Conference. Prairie Naturalist, South Dakota State Univ., Pierre, South Dakota.
- Hendrickson, J. R. and C. Lund. 2010. Plant community and target species affect responses to restoration strategies. *Rangeland Ecology & Management* 63(4):435-442.

- Hoover, Katie. 2015. Reauthorizing the Secure Rural Schools and Community Self-Determination Act of 2000. Accessed December 11, 2017. <http://nationalaglawcenter.org/wp-content/uploads/assets/crs/R41303.pdf>.
- International Energy Agency (IEA). 2020. Global CO2 emissions in 2019. Available at: <https://www.iea.org/articles/global-co2-emissions-in-2019>. (Accessed: 3rd June 2020)
- Intergovernmental Panel on Climate Change (IPCC). 2014. Climate Change 2014 Synthesis Report Summary Chapter for Policymakers. Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Core Writing Team, R. K. P. and L. A. M. (eds.).
- Jabbari, H. 2013. Hydraulic Fracturing Design for Horizontal Wells in the Bakken Formation, Williston Basin. Dissertation submitted to the Graduate Faculty of the University of North Dakota. May.
- Jennings, Jennie. 2018. Dakota Prairie Grasslands Hydrologist. Email communication January 29, 2018.
- Jordan N.R., D.L. Larson, and S.C. Huerd. 2008. Soil modification by invasive plants: effects on native and invasive species of mixed-grass prairies. *Biological Invasions* 10(2):177-190.
- Joslin, G., and H. Youmans, coordinators. 1999. Effects of recreation on Rocky Mountain wildlife: A Review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society. 307pp.
- Keller, B. and L. Bender. 2007. Bighorn Sheep Response to Road-Related Disturbances in Rocky Mountain National Park, Colorado. *The Journal of Wildlife Management*, 71(7), 2329-2337.
- Kinzler, Russell. 2018. Email communication between Angela Gatto, Wildlife Biologist, Forest Service Enterprise Program and Russell Kinzler, North Dakota Game and Fish Department. September 20, 2018.
- Kirkpatrick, C. and Boling, E. A. 2019. Draft 2019 CEQ Guidance. 84 p.
- Knowles, C.J. 2007. Status of the black-tailed prairie dog in North Dakota. 14 pp.
- Koper, N., D.J. Walker and J. Champagne. 2009. Nonlinear effects to distance to habitat edge on Sprague's pipits in southern Alberta, Canada. *Landscape Ecology*, 24:1287-1297.
- Lee, C. 2012. Species identification of North Dakota *Townsendia* species using taxonomic and molecular DNA approaches. University of British Columbia, department of Botany. Vancouver, B.C . 9 pp.
- Lee, M. 2017. Bakken Shale Gas flaring rises despite N.D. regulations. E&E News: Energywire Tuesday, August 15, 2017. <https://www.eenews.net/stories/1060058765>
- Lesica, P. and F.W. Allendorf. 1999. Ecological genetics and the restoration of plant communities: mix or match? *Restoration ecology* 7(1):42-50.
- Lewis, M.B., E.W. Schupp, and T.A. Monaco. 2012. Dust deposition from unpaved roads is correlated with decreased reproduction of an endangered Utah endemic shrub. In Symposium proceedings: Restoring the West 2012 – Balancing energy development and biodiversity. October, 2012. Utah State University. <http://digitalcommons.usu.edu/rtw/2012/>

- Lindstrom, J. 1999. Early development and fitness in birds and mammals. *Trends in Ecology and Evolution*. Vol.14 (9):343-348.
- Longcore T. and C. Rich. 2004. Ecological Light Pollution. *Frontiers in Ecology and the Environment*, 2(4):191-198
- Ludlow, S.M., R.M. Brigham, and S.K. Davis. 2015. Oil and natural gas development has mixed effects on the density and reproductive success of grassland songbirds. *The Condor*, 117:64-75.
- Mack, R.N., Simberloff, D., Lonsdale, W.M., Evans, H, Clout, M., and F.A. Bazzaz. 2000. Biotic invasions: causes, epidemiology, global consequences, and control. *Ecological Applications*. 10:689–710.
- Manier, D.J., Bowen, Z.H., Brooks, M.L., Casazza, M.L., Coates, P.S., Deibert, P.A., Hanser, S.E., and Johnson, D.H., 2014, Conservation buffer distance estimates for Greater Sage-Grouse—A review: U.S. Geological Survey Open-File Report 2014–1239, 14 p., <http://dx.doi.org/10.3133/ofr20141239>.
- Marathon Petroleum Corporation. 2020. Mandan Refinery. Accessed June 3, 2020. <https://www.marathonpetroleum.com/Operations/Refining/Mandan-Refinery/>
- Maxwell, S.C. 2011. Hydraulic fracture height growth. *Canadian Society of Exploration Geophysicists (CSEG) Recorder*. November.
- Meridian Energy Group Inc. 2017. The Davis Refinery. Accessed Nov 27, 2017. <https://www.meridianenergygroupinc.com/the-davis-refinery/>.
- Merrill, M. D. et al. 2018. Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates for 2005-14.
- Montana Department of Agriculture. 2017 How about this one: Montana Department of Agriculture. 2017. Montana Noxious Weed Management Plan 2017 Update. Helena, Montana 48 p.
- Murphy, R.K., K.W. Hasselblad, C.D. Grondahl, J.G. Sidle, R.E. Martin, and D.W. Freed. 2001. Status of the burrowing owl in North Dakota. *Journal of Raptor Research*, 35(4):322-330.
- National Research Council. 2013. *Induced Seismicity Potential in Energy Technologies*. Washington, DC: The National Academies Press. Available online at: <https://doi.org/10.17226/13355>
- Nelson, J.J., P.R. Barnhart, E.H. Gillam. 2015. Distribution and Occurrence of Bat Species in North Dakota. *The Prairie Naturalist* 47:84–93; 2015. 10 pp.
- Nordeng, S.H. and L.D. Helms. 2010. Three Forks Formation Assessment. North Dakota Geological Survey and Department of Mineral Resources.
- North Dakota Department of Environmental Quality (NDDEQ). 2019. Annual Report, North Dakota Ambient Air Quality Monitoring Program Network Plan with Data Summary. North Dakota Department of Health, Division of Air Quality, 918 E Divide Avenue, 2nd Floor, Bismarck, ND 58501-1947.
- North Dakota Department of Health (NDDH). 2017. Annual Report, North Dakota Ambient Air Quality Monitoring Program Network Plan with Data Summary. North Dakota Department of Health, Division of Air Quality, 918 E Divide Avenue, 2nd Floor, Bismarck, ND 58501-1947.

- North Dakota Department of Health (NDDH). 2018. Meeting with Division of Air Quality staff. Personal communication.
- North Dakota Department of Health, Division of Water Quality. (2016). North Dakota 2016 Integrated Section 305(b) List of Waters Needing Total Maximum Daily Loads. Bismarck: North Dakota Department of Health.
- North Dakota Department of Transportation (NDDOT). 2016. 2016 Traffic Volume Map. Accessed Nov 17, 2017. https://www.dot.nd.gov/docs/maps/traffic/trafficstate_2016.pdf.
- North Dakota Game and Fish. 2002. Study No. C-III: Bighorn Sheep Population Studies. Submitted by Bret Wiedman. Project No. W-67-R-42. Report No. A-154.
- North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division (NDDMR). 2017a. North Dakota Daily Oil Produced and Price. Accessed Feb 6, 2018. <https://www.dmr.nd.gov/oilgas/stats/DailyProdPrice.pdf>.
- North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division (NDDMR). 2017b. North Dakota Monthly Gas Produced and Price. Accessed Feb 6, 2018. <https://www.dmr.nd.gov/oilgas/stats/gasprodsold.pdf>.
- North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division (NDDMR). 2017c. ND Monthly Bakken Oil Production Statistics. Accessed Feb 6, 2018. <https://www.dmr.nd.gov/oilgas/stats/historicalbakkenoilstats.pdf>.
- North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division (NDDMR). 2017d. Historical monthly gas production and sales statistics. Accessed Feb 6, 2018. <https://www.dmr.nd.gov/oilgas/stats/statisticsvw.asp>.
- North Dakota Industrial Commission Department of Mineral Resources, Oil and Gas Division (NDDMR). Oil and Gas: ArcIMS Viewer. 2018. <https://www.dmr.nd.gov/OaGIMS/viewer.htm> (accessed March 1, 2018).
- North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division (NDDMR). 2019. Director's Cut, June 2019 Production. Accessed Jan 29, 2020. <https://www.dmr.nd.gov/oilgas/directorscut/directorscut-2019-08-15.pdf>
- North Dakota State Government. 2017. North Dakota Transparency. Accessed Dec 19, 2017. <http://data.share.nd.gov/pr/Pages/budget-by-budget-unit.aspx>. (Link no longer active 03/04/2020)
- North Dakota State Water Commission. 2019. North Dakota Fracking and Water Use Facts. Available online at: http://www.swc.nd.gov/pdfs/fracking_water_use.pdf
- Oxley, D.J., M.B. Fenton, and G.R. Carmody. 1974. The Effects of Roads on Populations of Small Mammals. *Journal of Applied Ecology*, 11(1), 51-59.
- Palisch, T.T., M.A. Chapman, and J. Godwin. 2012. Hydraulic fracture design optimization in unconventional reservoirs: A case history. Paper SPE 160206 presented at the Annual Technical Conference and Exhibition, San Antonio, TX. October 8-10.

- Pachauri, R.K., Meyer, L. A. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC (2014). doi:10.1046/j.1365-2559.2002.1340a.x
- Preston, T.M. 2015. Presence and abundance of nonnative plant species associated with recent energy development in the Williston Basin. Environmental Monitoring Assessment. 187: 200-216.
- Ramboll Environ. 2016. United States Forest Service, Little Missouri National Grassland Oil and Gas Air Resource Impact Assessment, Final Report. Prepared for BLM Montana/Dakotas State Office, 5001 Southgate Drive, Billings, MT 59101. Prepared by Ramboll Environ U.S. Corporation, 773 San Marin Drive, Suite 2115, Novato, CA 94998. Kleinfelder, Inc., 1801 California Street, Suite 1100, Denver, CO 80202. July 2016. 06-632912.
- Robinson, A. C. 2014. Management plan and conservation strategies for greater sage-grouse in North Dakota. North Dakota Game and Fish Department. Bismarck, ND.
- Rosenberg, K.V. 2004. Partners in Flight Continental Priorities and Objectives Defined at the State and Bird Conservation Region Levels: North Dakota
- Royer, R. 1995. A comprehensive annotated list of the butterflies (Lepidoptera: Rhopalocera) occurring in Little Missouri National Grassland: Billings, Golden Valley, McKenzie and Slope Counties, North Dakota. USDI National Biological Service, Northern Prairie Wildlife Research Center, Jamestown, ND. 19pp.
- Royer, R. Marrone, G.M. 1992. Conservation Status of the Powesheik Skipper (*Oarisma Powesheik*) in North and South Dakota: A Report to the United States Department of the Interior Fish and Wildlife Service, Denver, Colorado. Minot State University.
- Rubenstein, J.L. and A.B. Mahani. 2015. Myths and facts on wastewater injection, hydraulic fracturing, enhanced oil recovery, and induced seismicity. Seismological Research Letters. 86 (4):1-8.
- Sage-Grouse National Technical Team. 2011. A Report on National Greater Sage-Grouse Conservation Measures. Available online at: https://eplanning.blm.gov/epl-front-office/projects/lup/9153/39961/41912/WySG_Tech-Team-Report-Conservation-Measure_2011.pdf.
- Sauer, J.R., D.K. Niven, J.E. Hines, D.J. Ziolkowski, Jr, K.L. Pardieck, J.E. Fallon, and W.A. Link. 2017. The North American Breeding Bird Survey, Results and Analysis 1966 - 2015. Version 2.07.2017 USGS Patuxent Wildlife Research Center, Laurel, MD
- Sayre, R. W. 1996. Ecology of bighorn sheep in relation to habitat and oil development in the Little Missouri Badlands (Doctor of Philosophy). University of North Dakota.
- Schuh, W. M. 2010. Water Appropriation Requirements, Current Water Use, and Water Availability for Energy Industries in North Dakota: A 2010 Summary. Water Resources Investigation No. 49, Bismarck: North Dakota State Water Commission.
- Sedgwick, J.A. 2006. Long-billed Curlew (*Numenius americanus*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region.

- Shannon, G., M.F. McKenna, L.M. Angeloni, K.R. Crooks, K.M. Fristrup, E. Brown, K.A. Warner, M.D. Nelson, C. White, J. Briggs, S. McFarland and G. Wittemyer. 2016. A synthesis of two decades of research documenting the effects of noise on wildlife. *Biological Review* 91:982-1005.
- Shaver, Robert. 2012. Availability and Quality of Surface and Groundwater Resources in West-Central and Southwest North Dakota. ND Water Resources Investigation No. 53, North Dakota State Water Commission.
- Skone, T. J. & Gerdes, K. 2009. Development of Baseline Data and Analysis of Life Cycle Greenhouse Gas Emissions of Petroleum-Based Fuels. *Netl.*
- Sliwinski, M.S., and N. Koper. 2012. Grassland bird responses to three edge types in a fragmented mixed-grass prairie. *Avian Conservation and Ecology* 7(2): 6.
- Smith, J.T., L.D. Flake, K F. Higgins, and G.D. Kobriger. 2004. History of greater sage-grouse in the Dakotas: distribution and population trends. *Prairie Naturalist* 36(4):213-230.
- Steidl, R.J., and B.F. Powell. 2006. Assessing the effects of human activities on wildlife. *The George Wright Forum* 23(2):50-58.
- Stiver, S.J., A.D. Apa, J.R. Bohne, S.D. Bunnell, P.A. Deibert, S.C. Gardner, M.A. Hilliard, C.W. McCarthy, and M.A. Schroeder. 2006. Greater Sage-grouse Comprehensive Conservation Strategy. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming
- Stone, E.L., S. Harris, G. Jones. 2015. Impacts of artificial lighting on bats: a review of challenges and solutions. *Mammalian Biology* 80:213-219.
- Swihart, R.K., and Slade, N.A., 1984. Road crossing in *Sigmodon hispidus* and *Microtus ochrogaster*. *Journal of Mammalogy*, Vol. 65, No. 2, pp. 357–360.
- Thompson, M.J. 1996. Winter foraging response of elk to spotted knapweed removal. *Northwest Sci.* 70(1):10-19.
- Thompson, S.J., D.H. Johnson, N.D. Niemuth, and C.A. Ribic. 2015. Avoidance of unconventional oil wells and roads exacerbates habitat loss for grassland birds in the North American Great Plains. *Biological Conservation* 192:82-90.
- Tigner, J. 2006. Bat Surveys for the Little Missouri Grassland, North Dakota 2006.
- U.S. Department of Agriculture (USDA), Forest Service. 1982. 1982 ROS Users Guide. Available Online: http://www.fs.fed.us/cdt/carrying_capacity/rosguide_1982.pdf Accessed Nov 8, 2017.
- U.S. Department of Agriculture (USDA), Forest Service. 1995. Landscape Aesthetics: A Handbook for Scenery Management. Agriculture Handbook No. 701. Washington DC.
- U.S. Department of Agriculture (USDA), Forest Service. 2002. Dakota Prairie Grasslands Land and Resource Management Plan. Bismarck, ND.
<http://www.fs.usda.gov/detailfull/dpg/landmanagement/?cid=stelprdb5340280&width=full>
- U.S. Department of Agriculture (USDA), Forest Service. 2003. Dakota Prairie Grasslands Oil and Gas Leasing Record of Decision. Available online at:
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3818893.pdf

- U.S. Department of Agriculture (USDA), Forest Service 2011a. Watershed Condition Classification Technical Guide.
- U.S. Department of Agriculture (USDA), Forest Service. 2011b. Sensitive Wildlife Species List for Forest Service, Region 1 (February 2011). USDA, Forest Service, Northern Region, Missoula, MT. 3 pp.
- U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (USDA NRCS). 2012, 2009. Ecological Site Description: Loamy.
- U.S. Department of Commerce, Bureau of Economic Analysis (BEA). 2017. Regional Economic Accounts, Washington, D.C. Table CA30. Accessed Dec 12, 2017.
<https://headwaterseconomics.org/tools/economic-profile-system/>.
- U.S. Department of Energy, Energy Information Administration (EIA). 2017a. Petroleum product prices. Accessed Jan 24, 2018. <https://www.eia.gov/analysis/projection-data.php#annualproj>. Website as of 03/03/2020 <https://www.eia.gov/petroleum/>
- U.S. Department of Energy, Energy Information Administration (EIA). 2017b. Natural gas supply, disposition, and prices. Accessed Jan 24, 2018. <https://www.eia.gov/analysis/projection-data.php#annualproj>. Website as of 03/04/2020 <https://www.eia.gov/naturalgas/>
- U.S. Department of Energy, Energy Information Administration (EIA). 2017c. Frequently Asked Questions. Accessed Jan 24, 2018. <https://www.eia.gov/tools/faqs/faq.php?id=45&t=8>. Website as of 03/04/2020 <https://www.eia.gov/tools/faqs/>
- U.S. Department of Energy, Energy Information Administration (EIA). 2018a. Energy-Related Carbon Dioxide Emissions by State, 2000–2015. U.S. Energy Information Administration, U.S. Department of Energy. Washington DC.
- U.S. Department of Energy, Energy Information Administration (EIA). 2018b. North Dakota Carbon Dioxide Emissions from Fossil Fuel Consumption (1980-2015). Microsoft EXCEL spreadsheet. U.S. Energy Information Administration, U.S. Department of Energy. Washington DC.
- U.S. Department of Energy, Energy Information Administration (EIA). 2018c. Henry Hub Natural Gas Spot Price. Accessed Jan 5, 2018. Available at: <https://www.eia.gov/dnav/ng/hist/rngwhhdM.htm>.
- U.S. Department of Energy, Energy Information Administration (EIA). 2018d. The Distribution of U.S. Oil and Natural Gas Wells by Production Rate.
- U.S. Department of Energy, Energy Information Administration (EIA). 2019a. Number and Capacity of Petroleum Refineries. Accessed Dec 3, 2019. Available at:
https://www.eia.gov/dnav/pet/PET_PNP_CAP1_DCU_SND_A.htm
- U.S. Department of Energy, Energy Information Administration (EIA). 2019b. U.S. natural gas processing plant capacity and throughput have increased in recent years. Available at:
<https://www.eia.gov/todayinenergy/detail.php?id=38592>.
- U.S. Department of Energy, Energy Information Administration (EIA). 2019c. State Carbon Dioxide Emissions Data. Available at: <https://www.eia.gov/environment/emissions/state/> Accessed Jan 29, 2020.

- U.S. Department of the Interior, Bureau of Land Management (USDI BLM). 2015. Record of Decision and Approved Resource Management Plan Amendments for the Rocky Mountain Region, Including the Greater Sage-Grouse Sub-Regions. Washington, DC. 148 p. Available at: https://eplanning.blm.gov/epl-front-office/projects/lup/36511/63222/68471/RM_ROD_9.21.15_508_lowres.pdf.
- U.S. Department of Interior, Office of Natural Resources Revenue (ONRR). 2016. FY16 Data from ONRR for Federal Leases on National Forest System lands.
- U.S. Environmental Protection Agency (EPA). 1994. Summary of Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Accessed Jan 30, 2018. <https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice>.
- U.S. Environmental Protection Agency (EPA). 2018. Report on the Environment. 1200 Pennsylvania Ave., N.W., Washington, DC 20460, U.S.A.
- U.S. Environmental Protection Agency (EPA). 2020. Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018. doi:10.1017/CBO9781107415324.004.
- U.S. Fish and Wildlife Service (USFWS). 2007. National bald eagle management guidelines. Available online at: <http://www.fws.gov/southdakotafieldoffice/NationalBaldEagleManagementGuidelines.pdf>
- U.S. Fish and Wildlife Service (USFWS). 2013a. Fact Sheet for Interior Least Tern (*Sternula antillarum*). Mountain-Prairie Region. North Dakota Field Office.
- U.S. Fish and Wildlife Service (USFWS). 2014b. Revised Recovery Plan for the Pallid Sturgeon (*Scaphirhynchus albus*). U.S. Fish and Wildlife Service, Denver, Colorado. 115 pp.
- U.S. Fish and Wildlife Service (USFWS). 2016. Recovery plan for the Northern Great Plains piping plover (*Charadrius melodus*) in two volumes. Volume I: Draft breeding recovery plan for the Northern Great Plains piping plover (*Charadrius melodus*) and Volume II: Draft revised recovery plan for the wintering range of the Northern Great Plains piping plover (*Charadrius melodus*) and comprehensive conservation strategy for the piping plover (*Charadrius melodus*) in its coastal migration and wintering range in the continental United States. Denver, Colorado. 166 pp.
- U.S. Fish and Wildlife Service (USFWS). 2017. Suggested streamlined coordination for oil and natural gas exploration, drilling and production in Louisiana shale plays. Louisiana Ecological Services Office developed in partnership with the Louisiana Department of Wildlife and Fisheries.
- U.S. Fish and Wildlife Service (USFWS). 2018.– Region 6 – Mountain Prairie Region Website [Last accessed February 2018]. <https://www.fws.gov/mountain-prairie/index.php>
- U.S. Fish and Wildlife Service (USFWS). 2019.– Region 6 – Mountain Prairie Region Website [Last accessed February 2019]. <https://www.fws.gov/mountain-prairie/index.php>
- Vitousek, P.M., C.M. D’Antonio, L.L. Loope, and R. Westbrooks. 1996. Biological invasions as global environmental change. *American Scientist* 84: 468–478.
- Warpinski, N.R. 2011. Fracture growth in layered and discontinuous media. Proceedings of the Technical Workshops for the Hydraulic Fracturing Study: Fate and Transport. U.S. Environmental Protection Agency, Washington DC. May.

- Warpinski, N.R., J. Du, and U. Zimmer. 2012. Measurements of hydraulic-fracture induced seismicity in gas shales. Paper SPE 151597 presented at the SPE Hydraulic Fracture Technology Conference, The Woodlands, TX. February 6-8.
- Whiting J.C., Bowyer, R.T., Flinders, J.T. and Eggett, D.L. 2011. Reintroduced bighorn sheep: fitness consequences of adjusting parturition to local environments. *Journal of Mammalogy*, 92(1):213-220.
- Wiedmann, B. 2018. Personal communication between Angela Gatto, Forest Service Enterprise Program Wildlife Biologist and B. Wiedmann, North Dakota Department of Game and Fish, Wildlife Biologist. February 6, 2018.
- Wiedmann, B. and B. Hosek. 2008. Status of Bighorn Sheep in North Dakota. Biennial Symposium of Northern Wild Sheep and Goat Council 16:19-27.
- Wiggins, D. 2005. Loggerhead Shrike (*Lanius ludovicianus*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region.
- Wiggins, D.A. 2006. Baird's Sparrow (*Ammodramus bairdii*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region.
- Williams, C.S., T. Coenen, C. Folmer, and C. Marvel. 2016. Fish survey of select tributaries of the Little Missouri National Grassland, McKenzie District, Dakota Prairie Grasslands, June 2016. Report submitted to U.S. Forest Service, Dakota Prairie Grasslands, Bismarck, North Dakota.
- Williamson, R. M. 2009. Impacts of oil and gas development of sharp-tailed grouse on the Little Missouri National Grassland, North Dakota. Thesis Master of Science, Wildlife and Fisheries Sciences Department, South Dakota State University.
- Wilson, R. 2017. Sage Grouse Recovery Effort Underway. *North Dakota Outdoors*. 79 (9).
- World Resource Institute. Climate Watch. Available at: <https://www.wri.org/our-work/project/climate-watch>. (Accessed: 3rd June 2020)
- Wuebbles, D. J. et al. 2017. Climate Science Special Report: Fourth National Climate Assessment. I.
- Zhai, Z. and M.M. Sharma. 2005. A new approach to modeling hydraulic fractures in unconsolidated sands. Paper SPE 96246 presented at the SPE Annual Technical Conference and Exhibition, Dallas, TX. October 9-12.

Appendix A – Stipulations and Lease Notices for Alternative 1, Alternative 3 and Alternative 3B

This appendix includes detailed descriptions of the standard lease terms and stipulations, including the rationale, objectives, methodology, waivers, exemptions, and modifications relevant to each.

Contents

Alternative 1 – Current Lease Stipulations from the 2003 Oil and Gas Record of Decision	183
Alternative 3 – New and Revised Stipulations	211
Alternative 3B – New Stipulations	216

The following terms are used relative to the lease stipulations:

- **Not Currently Authorized for Leasing (NCA):** Lands are determined to be administratively available for leasing, but the decision to lease is withheld until some future time.
- **Stipulation:** A provision that modifies standard lease rights and is attached to and made a part of the lease. Stipulations have been developed for the following categories: 1) no surface occupancy, 2) timing limitations or seasonal restrictions, and 3) controlled surface use.
- **No Surface Occupancy (NSO):** Use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values.
- **Timing Limitation (TL) (Seasonal Restriction):** Prohibits surface use during specified time periods to protect identified resource values. This stipulation primarily applies to drilling and well completion. It does not apply to the operation and maintenance of production facilities, unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient.
- **Controlled Surface Use (CSU):** Use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operational constraints that may modify the lease rights. Controlled surface use is used for operating guidance, not as a substitute for no surface occupancy or Timing stipulations.
- **Operation and Maintenance Activities:** Those actions needed to operate and maintain facilities to ensure they remain in a safe and functional order and to facilitate production of oil and gas resources at those facilities as designed. Examples of operations and maintenance activities include, but are not limited to, site inspections, monitoring, product removal, equipment maintenance and repair, etc.
- **Lease Notice (LN):** Provides more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders. A Lease Notice also addresses special items the lessee should consider when planning operations, but does not impose new or additional restrictions.
- **Standard Lease Terms (SLT):** The terms incorporated into every oil and gas lease. Standard lease terms require compliance with all laws and regulations to ensure protection of other energy, mineral, and surface resources. Under standard lease terms, the authorized officer has limited authority to modify the siting and design of facilities and to control the rate of development and

timing of activities as well as require other mitigation under standard lease terms (BLM Form 3100-11 and 43 CFR 3101.1-23).

- **Waiver (oil and gas leasing):** Permanent exemption from a lease stipulation. Waivers can be granted if the condition described in the stipulation no longer applies anywhere in the leasehold.
- **Exception (oil and gas leasing):** Case-by-case exemption from a lease stipulation. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criterion applies.
- **Modification (oil and gas leasing):** Modifications are similar to exceptions, but broader in scope, and involve a fundamental change to the provisions of the stipulation. They can be granted either temporarily or for the duration of the lease. A modification may include an exemption from or alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria applied.

Alternative 1 – Current Lease Stipulations from the 2003 Oil and Gas Record of Decision

The following lease terms, stipulations, and lease notices apply to alternative 1 and alternative 3, unless revised by alternative 3 as indicated in the next section.

Water, Wetlands, Woody Draws, Riparian, and Floodplains

Controlled Surface Use (CSU)

Resource: Water, Wetlands, Woody Draws, Riparian, and Floodplains (CSU)

Stipulation

Try to locate activities and facilities away from the water's edge and outside the riparian areas, woody draws, wetlands, and floodplains. If necessary, to locate facilities in these areas, then:

- Deposit no waste material (silt, sand, gravel, soil, slash, debris, chemical or other material) below high water lines, in riparian areas, in the areas immediately adjacent to riparian areas or in natural drainageways (draws, land surface depressions or other areas where overland flow concentrates and flows directly into streams or lakes).
- Deposit no soil material in natural drainageways.
- Locate the lower edge of disturbed or deposited soil banks outside the active floodplain.
- Stockpile no topsoil or any other disturbed soil in the active floodplain.
- Locate drilling mud pits outside riparian areas, wetlands and floodplains. If location is unavoidable in these areas, seal and dike all pits to prevent leakage or use containerized mud systems.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Water, number 6 (p. 1-10). This stipulation is to protect the biological and hydrologic features of riparian areas, woody draws, wetlands, and floodplains.

Application Methodology

Use this stipulation in riparian areas, woody draws, wetlands, and floodplains that are greater than 400 meters wide. Regulation 43 CFR 3101.1-2 includes measures to relocate operations up to 200 meters and to delay operations up to 60 days in any lease year. Therefore, use standard lease terms for areas less than 200 meters from edge.

Waivers

This stipulation may be waived if the authorized officer determines the entire leasehold no longer contains any riparian areas, woody draws, wetlands, or floodplains.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorized officer determines that portions of the area do not include riparian areas, woody draws, wetlands, and floodplains.

Soils

No Surface Occupancy (NSO)

Resource: Slopes Greater than 40 Percent (NSO)

Stipulation

Surface occupancy and use is prohibited on slopes greater than 40 percent.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Soils, number 4 (p. 1-11). The objective of this stipulation is to protect soil resources from loss of productivity, prevent erosion on steep slopes, soil mass movement, and resultant sedimentation.

Application Methodology

Use this stipulation on slopes greater than 40 percent.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and the entire leasehold no longer contains any slopes greater than 40 percent.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include slopes greater than 40 percent.

Recreation

Timing Limitation (TL)

Resource: Developed Recreation Sites (TL)

Stipulation

Surface use is prohibited within 0.25 miles of the established boundaries of Burning Coal Vein, Buffalo Gap, Sather Lake, CCC, and Summit Campgrounds, Whitetail Picnic Area, and the six Maah Daah Hey Trail overnight camps (Wannagan, Roosevelt, Elkhorn, Magpie, Beicegel, and Bennett) from May 1 through December 1.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Minerals and Energy Resources, number 13 (p. 1-12). To maintain the recreation opportunities and settings within the area surrounding campgrounds, picnic areas, and recreation trail overnights.

Application Methodology

The 0.25-mile distance will be from the established boundary. This stipulation does not apply to operation and maintenance of production facilities.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorized officer determines that portions of the area are not within 0.25 miles of the established recreational facility.

No Surface Occupancy (NSO)

Resource: Developed Recreation Sites (NSO)

Stipulation

No surface occupancy or use is allowed within developed recreation sites.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Recreation, Developed Recreation Sites, number 11 (p. 1-21). The objective is to maintain the recreation opportunities and settings within developed recreation sites

Application Methodology

Use this stipulation in developed recreation sites: Burning Coal Vein, Buffalo Gap, Sather Lake, CCC, and Summit Campgrounds, Whitetail Picnic Area, and the six Maah Daah Hey Trail overnight camps, Wannagan, Roosevelt, Elkhorn, Magpie, Beicegel, and Bennett.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and the entire leasehold no longer contains developed recreation sites.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include developed recreation sites.

Wildlife

Wildlife stipulations are listed in the order of timing limitations, controlled surface use, and no surface occupancy.

Wildlife - Timing Limitations (TL)

Resource: Sharp-tailed Grouse Display Grounds (TL)

Stipulation

Surface use is prohibited from March 1 through June 15 within 1 mile (line of sight) of a sharp-tailed grouse display ground.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 15 (p. 1-14). The objective is to prevent abandonment of display grounds and reduced reproductive success.

Application Methodology

This stipulation applies to active sharp-tailed grouse display grounds. The 1-mile radius extends outward from the center of a display ground. This stipulation applies to drilling, testing, new construction projects, and does not apply to operation and maintenance of production facilities.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and all display grounds within the leasehold or within the stipulated distance from the leasehold have not been used during the past 2 breeding seasons.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated. An exception may be granted if the display ground has not been used by May 1 of the current year.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include display grounds that have been used during the last 2 breeding seasons.

Resource: Sage Grouse Display Grounds (TL)

Stipulation

Surface use is prohibited from March 1 through June 15 within 2 miles (line of sight) of a sage-grouse display ground.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 15 (p. 1-14). The objective is to prevent abandonment of display grounds and reduced reproductive success.

Application Methodology

This stipulation applies to active sage-grouse display grounds. The 2-mile radius extends outward from the center of a display ground. This stipulation applies to drilling, testing, new construction projects, and does not apply to operation and maintenance of production facilities.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and all display grounds within the leasehold or within the stipulated distance from the leasehold have not been used during the past 5 breeding seasons.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated. An exception may be granted if the display ground has not been used by May 1 of the current year.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include any display grounds that have been used during the past five breeding seasons.

Resource: Bighorn Sheep Lambing Areas (TL)

Stipulation

Surface use is prohibited from April 1 through June 15 within 1 mile (line-of-sight) of bighorn sheep lambing areas.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 12 (p 1-14). The objective is to safeguard lamb survival and prevent bighorn sheep displacement from lambing areas.

Application Methodology

This stipulation applies to bighorn sheep lambing areas established outside of management area

3.51. This stipulation applies to drilling and testing and new construction projects, and does not apply to operation or maintenance of production facilities. Currently, there are no lambing areas or no areas within one mile of lambing areas that are outside MA 3.51 or 3.51A. This stipulation will be applied if bighorn sheep populations expand outside MA 3.51 or 3.51A.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and there are no lambing areas within the leasehold or within the stipulated distance from the leasehold.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include lambing areas.

Resource: Black-footed Ferret Habitat (TL)

Stipulation

Surface use is prohibited from March 1 through August 31 within 0.125 mile (line of sight) of prairie dog colonies occupied or thought to be occupied by black-footed ferrets.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 23 (p 1-15). The objective is to protect ferrets when breeding and rearing young.

Application Methodology

This stipulation applies to prairie dog colonies occupied, or thought to be occupied, by black-footed ferrets. The spatial buffer extends out from the outer boundary of a prairie dog colony occupied by black-footed ferrets. This stipulation applies to drilling and testing and new construction projects, and does not apply to operation or maintenance of production facilities.

Waivers

The authorized officer may grant a waiver if ferret surveys, following protocol approved by the U.S. Fish, Wildlife, and Rare Plants Service, indicate a low probability that ferrets occur in prairie dog colonies located in the leasehold, or if the U.S. Fish and Wildlife Service determines that black-footed ferrets do not occur in the area. Currently, there are no prairie dog colonies occupied by black-footed ferrets that are outside MA 3.63. This stipulation will be applied if black-footed ferret populations expand outside MA 3.63.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated. An exception may be granted if surveys indicate a low probability that ferrets occur in a prairie dog colony where drilling, testing, or new construction is proposed.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that black-footed ferrets do not occur in portions of the area.

Resource: Swift Fox Dens (TL)

Stipulation

Surface use is prohibited from March 1 through August 31 within 0.25 mile (line of sight) of swift fox dens.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 52 (p 1-17). The objective is to prevent den abandonment and reduced reproductive success of swift fox.

Application Methodology

This stipulation applies to swift fox den sites. This stipulation applies to drilling and testing and new construction projects, and does not apply to operation or maintenance of production facilities.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and there are no dens within the leasehold or within the stipulated distance from the leasehold.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include swift fox dens.

Resource: Pronghorn Antelope Winter Range (TL)

Stipulation

Surface use is prohibited January 1 through March 31 on identified pronghorn antelope winter range.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Direction Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 11 (p. 1-13). The objective is to maintain the health, vigor, and physical condition of wintering pronghorn by minimizing disturbance on winter range during the critical period.

Application Methodology

This stipulation applies to the mapped pronghorn winter range. This stipulation applies to drilling and testing and new construction projects, and does not apply to operation or maintenance of production facilities.

Waivers

The authorized officer may waive this stipulation if it is determined that the entire leasehold no longer contains critical winter range for pronghorn.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include pronghorn antelope wintering areas.

Wildlife - Controlled Surface Use (CSU)

Resource: Black-footed Ferret Habitat (CSU)

Stipulation

Operations in prairie dog colonies known or thought to be occupied by black-footed ferrets are subject to the following constraints:

- Limit oil and gas development to no more than one location per 160 acres aliquot parts of a section.
- Access for routine maintenance of oil and gas facilities in prairie dog colonies is limited to daylight hours. This does not apply to emergency repairs.
- If it's necessary to place a new road in a prairie dog colony, align the road to minimize habitat loss.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, numbers 25, 26 and 27 (p. 1-15), and Management Area Direction, MA 3.63, Black-footed Ferret Reintroduction Habitat, Standards and Guidelines, Minerals and Energy Resources, number 4 (p. 3-27). The objective is to protect against activities that could result in adverse impacts on black-footed ferrets or ferret recovery objectives.

Application Methodology

This stipulation applies to prairie dog colonies occupied by black-footed ferrets outside Management Area 3.63. Currently, there are no prairie dog colonies occupied by black-footed ferrets that are outside MA 3.63. This stipulation will be applied if black-footed ferret populations are found outside MA 3.63.

Waivers

The authorized officer may waive this stipulation if black-footed ferrets are released under an experimental non-essential population status; this stipulation may be waived for areas inside the experimental population area but outside Management Area 3.63.

Exceptions

No conditions for an exception are anticipated, and approval of an exception is unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification is unlikely.

Resource: Bighorn Sheep Habitat (CSU)

Stipulation

New developments, including new facilities, roads, and concentrations of humans, within one mile of bighorn sheep lambing areas may be moved or modified to be out of view of the lambing areas.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 12 (p. 1-14). The objective is to safeguard lamb survival and prevent displacement of bighorn sheep from lambing areas by moving facilities to avoid disturbance.

Application Methodology

This stipulation applies to areas outside Management Area 3.51 and 3.51A but within one mile of lambing areas located in Management Area 3.51 and 3.51A. This stipulation applies to drilling and testing and new construction projects, not to operation or maintenance of production facilities.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and there are no lambing areas in the leasehold or within the stipulated distance from the leasehold.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of this area may be modified if the authorizing officer determines that portions of the area do not include bighorn sheep lambing areas.

Wildlife - No Surface Occupancy (NSO)

Resource: Golden Eagle, Merlin, and Ferruginous Hawk Nests (NSO)

Stipulation

No surface occupancy or use is allowed within 0.5 miles (line of sight) of golden eagle, merlin, and ferruginous hawk nests.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 55, (p.1-17). The objective is to prevent reduced reproductive success and adverse habitat loss.

Application Methodology

This stipulation applies to active golden eagle, merlin, and ferruginous hawk nests.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and all nests within the leasehold or within the stipulated distance from the leasehold are known to have been unoccupied during each of the previous seven years.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area include nests or nest site(s) known to have been unoccupied during each of the previous seven years. The boundary of the stipulated area may also be modified if the authorized officer determines that portions of the area can be occupied without adversely affecting the eagles.

Resource: Bald Eagle and Peregrine Falcon Nests (NSO)

Stipulation

No surface occupancy or use is allowed within 1.0 mile (line of sight) of bald eagle and peregrine falcon nests.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 55 (p. 1-17). The objective is to prevent reduced reproductive success and adverse habitat loss.

Application Methodology

This stipulation applies to active bald eagle and peregrine falcon nests if nests are established on the Little Missouri National Grassland.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and all nests within the leasehold or within the stipulated distance from the leasehold are known to have been unoccupied during each of the previous seven years.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area include nests or nest site(s) known to have been unoccupied during each of the previous seven years. The boundary of the stipulated area may also be modified if the authorized officer determines that portions of the area can be occupied without adversely affecting the eagles.

Resource: Bald Eagle Winter Roosts (NSO)

Stipulation

No surface occupancy or use is allowed within 1.0 mile (line of sight) of bald eagle winter roosting areas.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 55 (p. 1-17). The objective is to prevent adverse impacts on wintering and migrating bald eagles.

Application Methodology

This stipulation applies to bald eagle winter roosting areas if winter roosts are established on the Little Missouri National Grassland.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and winter roosting areas are no longer used within the leasehold or within the stipulated distance from the leasehold.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include winter roosting areas. The boundary of the stipulated area may also be modified if the authorized officer determines that portions of the area can be occupied without adversely affecting the eagles.

Resource: Prairie Falcon, and Burrowing Owl Nests (NSO)

Stipulation

No surface occupancy or use is allowed within 0.25 miles (line of sight) of prairie falcon and burrowing owl nests.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 55 (p. 1-17). The objective is to prevent reduced reproductive success and adverse habitat loss.

Application Methodology

This stipulation applies to active prairie falcon and burrowing owl nests.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and all nests within the leasehold or within the stipulated distance from the leasehold are known to have been unoccupied during each of the previous 7 years.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area include nests or nest site(s) known to have been unoccupied during each of the previous 7 years. The boundary of the stipulated area may also be modified if the authorized officer determines that portions of the area can be occupied without adversely affecting these raptors.

Resource: Sharp-tailed Grouse and Sage Grouse Display Grounds (NSO)

Stipulation

No surface occupancy or use is allowed within 0.25 miles (line of sight) of a sharp-tailed grouse and sage-grouse display ground.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction Fish, Wildlife, and Rare Plants, number 13 (p. 1-14). The objective is to prevent abandonment of display grounds, reduced reproductive success, and adverse habitat loss.

Application Methodology

This stipulation applies to active sharp-tailed grouse and sage-grouse display grounds. The 0.25-mile radius extends outward from the center of a display ground.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and all display grounds within the leasehold or within the stipulated distance of the leasehold have not been used during the last 2 breeding seasons (sharp-tailed grouse) or 5 breeding seasons (sage-grouse).

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include any display grounds that have been used during the last 2 breeding seasons (sharp-tailed grouse) or 5 breeding seasons (sage-grouse). The boundary of the stipulated area may also be modified if the authorized officer determines that portions of the area can be occupied without adversely affecting sage-grouse or the display grounds.

Resource: Roadless Area Portion of Black-footed Ferret Reintroduction Habitat (NSO)

Stipulation

No surface occupancy or use is allowed within the roadless portion of MA 3.63 (the southwest corner of the management area).

Objective (Justification)

Refer to Land and Resource Management Plan, Management Area Direction MA 3.63, Black-footed Ferret Reintroduction Habitat, Standards and Guidelines, Minerals and Energy Resources, number 12. The objective is to maintain those characteristics, which retain eligibility for roadless consideration and maintain the undeveloped character of the land.

Application Methodology

Use this stipulation in the southwest portion of MA 3.63 for the area west of road 849, (see MA3.63 map, crosshatched area).

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

Scenery Management

High Scenic Integrity Objective (SIO) Areas Controlled Surface Use (CSU)

Resource: Scenery (CSU)

Stipulation

Surface occupancy and use is subject to operational constraints to maintain the landscape character intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and to such scale that they are not evident.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Scenery Management, number 1 (p. 1-22). The objective is to maintain the Scenic Integrity Objective (SIO) for areas identified as high.

Application Methodology

Use this stipulation on areas identified as high on the adopted SIO map. Operational constraints may include utilizing topographic/vegetative screening, matching color tones of facilities with surrounding topographic features, orienting the well pad/facilities, redesigning production facilities to such scale that they may not be evident, or placing facilities outside the high SIO area.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver is unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception is unlikely.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include high SIO areas.

Moderate Scenic Integrity Objective (SIO) Areas Controlled Surface Use (CSU)

Resource: Scenery (CSU)

Stipulation

Surface occupancy and use is subject to operational constraints to maintain a landscape character that is no more than slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Scenery Management, number 1 (p. 1-22). The objective is to maintain the scenic integrity objective (SIO) for areas identified as moderate.

Application Methodology

Use this stipulation on areas identified as moderate on the adopted SIO map. Operational constraints may include utilizing vegetative/vegetative screening, matching color tones of facilities with surrounding topographic features, orienting the well pad/facilities, redesigning production facilities to such scale that they are visually subordinate to the landscape, or placing facilities outside the moderate SIO area.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver is unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception is unlikely.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include moderate SIO areas.

Heritage

No Surface Occupancy (NSO)

Resource: National Register Eligible Heritage Sites (NSO)

Stipulation

No surface occupancy or use is allowed within National Register eligible heritage sites.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Heritage Resources, number 6 (p. 1-25). The objective is to protect National Register eligible heritage sites and immediate environment of the site.

Application Methodology

Use this stipulation for National Register eligible heritage sites greater than 200 meters in radius.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

Management Area Prescriptions

MA 1.2A Suitable for Wilderness

Not Available for Leasing

Resource: Suitable for Wilderness (Not Available)

Stipulation

Areas determined to be suitable for wilderness, Management Area 1.2A are not available for leasing.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management area direction for MA 1.2A Suitable for Wilderness, Standards and Guidelines, Minerals and Energy Resources, number 3 (p. 3-4). The objective is to maintain those characteristics, which retain eligibility for wilderness consideration.

Application Methodology

Management Area 1.2A is not available for leasing.

MA 1.31 Backcountry Recreation Non-motorized

No Surface Occupancy (NSO)

Resource: Backcountry Areas (NSO)

Stipulation

No surface occupancy or use is allowed within boundaries of backcountry non-motorized management areas.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management Area Direction, MA 1.31 Backcountry Recreation Non-motorized, Standards and Guidelines, Minerals and Energy Resources, number 2 (p. 3-6). The objective is to retain recreation opportunities in a natural- appearing landscape.

Application Methodology

Use this stipulation in MA 1.31

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

MA 2.1 Special Interest Areas – Botanical Resources

No Surface Occupancy (NSO)

Resource: Aspen Stand, The Bog, Grand River Sand Dunes, Black Butte, Black Cottonwood, Riparian Pools, and Roundtop Butte Special Interest Areas (NSO)

Stipulation

No surface occupancy or use is allowed within the boundaries of Aspen Stand, The Bog, Grand River Sand Dunes, Black Butte, Black Cottonwood, Riparian Pools, and Roundtop Butte Special Interest Areas.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management Area Direction, MA 2.1, Special Interest Areas, Standards and Guidelines, Minerals and Energy Resources, number 1. The objective is to protect the botanical resources.

Application Methodology

Use this stipulation in Management Area 2.1: Aspen Stand, The Bog, Grand River Sand Dunes, Black Butte, Black Cottonwood, Riparian Pools, and Roundtop Butte Special Interest Areas.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

MA 2.1 Special Interest Areas - Heritage Resources

No Surface Occupancy (NSO)

Resource: Battle of the Badlands, Custer Trail/Davis Creek, and Square Buttes Special Interest Areas (NSO)

Stipulation

No surface occupancy or use is allowed within the boundaries of Battle of the Badlands, Custer Trail/Davis Creek, and Square Buttes Special Interest Areas.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management Area Direction, MA 2.1, Special Interest Areas, Standards and Guidelines, Minerals and Energy Resources, number 1 (p. 3-8). The objective is to protect the heritage resources.

Application Methodology

Use this stipulation in Management Area 2.1 Special Interest Areas, Battle of the Badlands, Custer Trail/Davis Creek, and Square Buttes Special Interest Areas.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

MA 2.1 Special Interest Area – Paleontology and Geological Resources

Controlled Surface Use (CSU)

Resource: Bullion Creek Formation Type Section, Slope Formation Type Section, and the Cannonball/Slope Formation Outcrop (CSU)

Stipulation

Operations may be moved or modified to preserve certain geologic type sections for future scientific research, education, and interpretation.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management Area Direction, MA 2.1, Special Interest Areas, Standards and Guidelines, Minerals and Energy Resources, number 1 (p. 3-8). The objective is to protect against activities will directly or indirectly modify or destroy geologic outcrops, in order to maintain them in a condition to allow geologic scientific research, education, and interpretation.

Application Methodology

Use this stipulation in MA 2.1 Special Interest Areas, Bullion Creek Formation Type Section, Slope Formation Type Section, and the Cannonball/Slope Formation Outcrop. All access and other development and production-related facilities will be allowed under the conditions described in the justification.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

No Surface Occupancy (NSO)

Resource: White Buttes, Burning Coal Vein/Columnar Juniper, and Ice Caves Geologic Areas (NSO)

Stipulation

No surface occupancy or use is allowed within the boundaries of White Buttes, Burning Coal Vein/Columnar Juniper, and Ice Caves Special Interest Areas.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management Area Direction, MA 2.1, Special Interest Areas, Standards and Guidelines, Minerals and Energy Resources, number 1 (p. 3-8). The objective is to protect geologic and biostratigraphic type sections, and immediate environment of the site, including inherent scientific, natural historic, interpretive, educational, and recreational values for the area potentially impacted.

Application Methodology

Use this stipulation in Management Area 2.1 Special Interest Areas, White Buttes, Burning Coal Vein/Columnar Juniper, and Ice Caves.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

MA 2.2 Research Natural Areas

No Surface Occupancy (NSO)

Resource: Research Natural Areas (NSO)

Stipulation

No surface occupancy or use is allowed within the established boundaries of Bear Den-Bur Oak, Cottonwood Creek Badlands, Little Missouri River, Mike's Creek, Ponderosa Pines, Limber Pine, and Two Top/Big Top Research Natural Areas.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management Area Direction, MA 2.2, Research Natural Areas, Standards and Guidelines, Minerals and Energy Resources, number 2 (p. 3-14). The objective is to maintain natural conditions for research purposes and protect against activities, which directly or indirectly modify the natural occurring ecological processes within the RNA.

Application Methodology

Use this stipulation in Management Area 2.2 Research Natural Area in the following areas: Bear Den-Bur Oak, Cottonwood Creek Badlands, Little Missouri River, Mike's Creek, Ponderosa Pines, Limber Pine, and Two Top/Big Top. All access and other development and production-related facilities will be prohibited.

Waivers

The authorized officer may grant a waiver if an area is found unsuitable as research natural area.

Exceptions

The authorizing officer may grant an exception to this stipulation if conditions change and portions of an area are determined to be unsuitable for a research natural area.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area are unsuitable as a research natural area.

MA 2.4 Identified American Indian Traditional Use Areas

Not Available for Leasing

Resource: American Indian Traditional Use Areas (Not Available)

Stipulation

American Indian Traditional Use Areas, Management Area 2.4 are not available for leasing.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management Area Direction, MA 2.4 American Indian Traditional Use Areas, Standards and Guidelines, Minerals and Energy Resources, number 2 (p. 3-21). The objective is to maintain those characteristics, which retain the value of the area for traditional American Indian uses.

Application Methodology

Management Area 2.4 is not available for leasing.

MA 3.51 – Bighorn Sheep Habitat

No Surface Occupancy (NSO)

Resource: Bighorn Sheep Habitat (NSO)

Stipulation

No surface occupancy or use is allowed within MA 3.51

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management Area Direction, MA 3.51 Bighorn Sheep Habitat, Standards and Guidelines, Minerals and Energy Resources number 1 (p. 3-23). The objective is to achieve optimum habitat suitability for bighorn sheep.

Application Methodology

This stipulation applies to MA 3.51.

Waivers

No conditions for a waiver are anticipated, and approval of waiver is unlikely.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include bighorn sheep populations.

MA 3.51A – Bighorn Sheep Habitat with Nearby Non-Federal Mineral Ownership

Not Currently Authorized for Leasing (NCA)/Timing Limitations (TL)/Controlled Surface Use (CSU)

Leasing of the Federal mineral estate will not occur in MA 3.51A until after there is development of a well on an adjacent spacing unit or an access road built across the area to access non-Federal rights. Once

there is development on adjacent non-Federal minerals or an adjacent Federal spacing unit, leasing may be allowed using the following CSU and TL stipulations.

Resource: Bighorn Sheep Habitat (CSU)

Stipulation

Operations may be modified or moved to minimize additional impacts on bighorn sheep habitat.

Resource: Bighorn Sheep Habitat (TL)

Stipulations

- Drilling, testing, and new construction activity will be confined to June 15-October 15 to accommodate breeding, winter range, and lambing seasons for bighorn sheep.
- Limit on-lease activities (operation and maintenance of facilities) to the period from 10 a.m. to 4 p.m. except in emergency situations.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management, MA 3.51A, Bighorn Sheep Habitat with Non-Federal Ownership, Standards and Guidelines, Minerals and Energy Resources, number 1 (p. 3-25). The objectives are to provide quality forage, cover, escape terrain, and solitude for bighorn sheep.

Application Methodology

Use this stipulation in MA.3.51A, Bighorn Sheep habitat with interspersed non-Federal minerals. This stipulation applies to drilling and testing of wells and new construction projects, and does not apply to operation or maintenance of production facilities.

Waivers

No conditions for a waiver are anticipated, and approval of waiver is unlikely.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include bighorn sheep populations.

MA 3.51B – Bighorn Sheep Habitat with Non-Federal Mineral Ownership

Timing Limitations (TL)/Controlled Surface Use (CSU)

Leasing of the Federal mineral estate shall occur in MA 3.51B with surface occupancy using TL and CSU.

Resource: Bighorn Sheep Habitat (CSU)

Stipulations

- Operations may be modified or moved to minimize additional impacts on bighorn sheep habitat.

- Future roads to non-producing wells on private minerals under National Forest System lands would be obliterated and the disturbed areas reclaimed.
- Road construction and associated lease activities will be located to minimize loss of bighorn sheep habitat.
- Well locations will be located to avoid lambing areas, steep slopes (escape terrain) and known travel corridors.
- Whenever possible, access roads will be gated to prevent unnecessary human activity.

Resource: Bighorn Sheep Habitat (TL)

Stipulations

- Drilling, testing, and new construction activity will be confined to June 15-October 15 to accommodate breeding, winter range, and lambing seasons for bighorn sheep.
- Limit on-lease activities (operation and maintenance of facilities) to the period from 10 a.m. to 4 p.m. except in emergency situations.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management, MA 3.51A, Bighorn Sheep Habitat with Non-Federal Ownership, Standards and Guidelines, Minerals and Energy Resources, number 1 (p. 3-25). The objectives are to provide quality forage, cover, escape terrain, and solitude for bighorn sheep.

Application Methodology

Use this stipulation in MA.3.51B, Bighorn Sheep habitat with interspersed non-Federal minerals. This stipulation applies to drilling and testing of wells and new construction projects, and does not apply to operation or maintenance of production facilities.

Waivers

No conditions for a waiver are anticipated, and approval of waiver is unlikely.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action are acceptable or can be adequately mitigated.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include bighorn sheep populations.

MA 3.63 Black-footed Ferret Reintroduction Habitat

Controlled Surface Use (CSU)

Resource: Black-footed Ferret Reintroduction Habitat (CSU)

Stipulation

Operations in prairie dog colonies known or thought to be occupied by black-footed ferrets are subject to the following constraints:

- Limit oil and gas development to no more than one location per 160 acres aliquot parts of a section.

- Access for routine maintenance of oil and gas facilities in prairie dog colonies is limited to daylight hours. This does not apply to emergency repairs.
- If it is necessary to place a new road in a prairie dog colony, align the road to minimize habitat loss.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife and Rare Plants, numbers 25, 26 and 27 (p. 1-15), and Management Area Direction, MA 3.63, Black-footed Ferret Reintroduction Habitat, Standards and Guidelines, Minerals and Energy Resources, numbers 4 (p. 3-27). The objective is to protect against activities that will adversely impact black-footed ferret reintroduction objectives.

Application Methodology

Use this stipulation in MA 3.63, black-footed ferret reintroduction habitat.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver is unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception is unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification is unlikely.

MA 3.63 Black-footed Ferret Reintroduction Habitat

No Surface Occupancy (NSO)

Resource: Roadless Area Portion of Black-footed Ferret Reintroduction Habitat (NSO)

Stipulation

No surface occupancy or use is allowed within the roadless portion of MA 3.63 (the southwest corner of the management area).

Objective (Justification)

Refer to Land and Resource Management Plan, Management Area Direction MA 3.63, Black-footed Ferret Reintroduction Habitat, Standards and Guidelines, Minerals and Energy Resources, number 12 (p. 3-28). The objective is to maintain those characteristics, which retain eligibility for roadless consideration and maintain the undeveloped character of the land.

Application Methodology

Use this stipulation in the southwest portion of MA 3.63 for the area west of road 849, (see the management area map, crosshatched area).

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

MA 4.22 River and Travel Corridors

This area is managed to protect or preserve the scenic values and recreation uses of the Little Missouri River Corridor, defined as national grasslands contained within a 0.25-mile zone on each side of the river.

No Surface Occupancy (NSO)

Resource: Little Missouri River (NSO)

Stipulation

No surface occupancy or use is allowed within 0.25 miles each side of the Little Missouri River.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Management Area Direction, MA 4.22, River and Travel Corridors, Standards and Guidelines, Minerals and Energy Resources, number 2 (p. 3-36). The objective is to maintain the recreation opportunities and settings within the river corridor.

Application Methodology

Use this stipulation in the Little Missouri River Corridor, within 0.25 miles each side of the river. This stipulation applies to well locations and production facilities. It does not apply to pipelines, powerlines or roads that may be present but must be subordinate to the landscape.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and the entire leasehold no longer contains Little Missouri River corridor.

Exceptions

The authorizing officer may grant an exception to this stipulation if the operator submits a plan that demonstrates impacts from the proposed action can be adequately mitigated so that the natural appearance of the river corridor is maintained.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include Little Missouri River corridor.

Lease Notices from 2002 Dakota Prairie Grasslands Plan and 2003 Oil and Gas Record of Decision

Lease notices are attached to leases to transmit information at the time of lease issuance to assist the lessee in submitting acceptable plans of operation, or to assist in administration of leases.

Lease notices are attached to leases in the same manner as stipulations, however, there is an important distinction between lease notices and stipulations. Lease notices do not involve new restrictions or requirements. Any requirements contained in a lease notice must be fully supported in law, regulations, standard lease terms, or onshore oil and gas orders. The lessee does not sign a lease notice. Guidance in the use of lease notices is found in Bureau of Land Management Manual 3101 and 43 CFR 3101.1-3.

Lease notices may be revised from time to time to reflect updates in laws, regulation, or other policy. These changes do not require a grasslands plan amendment or a revision of the leasing decision.

FS Parcel No.

Serial No. _____

Notice for Lands of the National Forest System Under Jurisdiction of Department of Agriculture

The permittee/lessee must comply with all the rules and regulations of the Secretary of Agriculture set forth at Title 36, Chapter II, of the Code of Federal Regulations governing the use and management of the National Forest System when not inconsistent with the rights granted by the Secretary of Interior in the permit. The Secretary of Agriculture's rules and regulations must be complied with for (1) all use and occupancy of the National Forest System prior to approval of an exploration plan by the Secretary of the Interior, (2) uses of all existing improvements, such as forest development roads, within and outside the area permitted by the Secretary of the Interior, and (3) use and occupancy of the National Forest System not authorized by an exploration plan approved by the Secretary of the Interior.

All matters related to this stipulation are to be addressed to:

Insert Authorized Representative Name Here

Who is the authorized representative of the Secretary of Agriculture.

Roadless Area Conservation Rule

Lands contained in this lease are located in an inventoried roadless area subject to the rule entitled "Special Areas; Roadless Area Conservation Rule; Final Rule" published in the Federal Register on January 12, 2001. The Roadless Area Conservation Rule or subsequent modifications thereof may prohibit operations such as road construction or reconstruction.

Threatened, Endangered, and Sensitive Plant or Animal Species

The lease area may contain threatened and endangered species or habitat necessary for the continued existence of threatened, proposed, candidate or endangered species which are protected by the 1973 Endangered Species Act, as amended (16 USC 1531 et seq.) and implementing regulations (50 CFR 402 et seq.). The lease area may also contain habitat or species, which may require protective measures to prevent them from being listed as threatened or endangered; or result in a loss of viability or biological diversity

(36 CFR 219.19 or 219.26). A biological evaluation of the leased lands may be required prior to surface disturbance to determine if endangered, threatened, proposed, candidate or sensitive plant or animal species or their habitat are present and to identify needed mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator shall:

1. Contact the Forest Service to determine if a biological evaluation is required. The Forest Service is responsible for ensuring that the leased land is examined through a biological evaluation, prior to undertaking any surface-disturbing activities, to determine effects upon any plant or animal species listed or proposed for listing as threatened, endangered, or a sensitive species.
2. The lessee or operator may choose to conduct the evaluation on the leased lands at their discretion and cost. This biological evaluation must be done by or under the supervision of a qualified

biologist/botanist approved by the Forest Service. An acceptable report must be provided to the Forest Service identifying the anticipated effects of a proposed action on endangered, threatened, proposed, candidate or sensitive species. An acceptable biological evaluation is to be submitted to the Forest Service for review and approval no later than that time when an otherwise complete application for permit to drill or subsequent surface-disturbing operation is submitted.

3. Implement mitigation measures required by the Forest Service. Mitigation may include the relocation of proposed lease-related activities or other protective measures. The findings of the biological evaluation, analysis, and consultation may result in restrictions to the operator's plans or even disallow use and occupancy to comply with the 1973 Endangered Species Act (as amended), threatened and endangered species regulations, and Forest Service statutes and regulations.

If endangered, threatened, proposed, candidate or sensitive plant or animal species are discovered in the area after any required biological evaluation has concluded, an evaluation will be conducted to assess the effect of ongoing and proposed activities. Based on the conclusion drawn in the evaluation, additional restrictions or prohibitions may be imposed to protect the species or their habitats.

Cultural Resources

The Forest Service is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures, in accordance with the Archaeological Resources Protection Act of 1979, the National Historic Preservation Act of 1966 (as amended), and the American Indian Religious Freedom Act of 1996. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator, unless notified to the contrary by the Forest Service, shall:

1. Contact the Forest Service to determine if a site-specific cultural resource inventory is required. If a survey is required, then:
2. Engage the services of a cultural resource specialist acceptable to the Forest Service to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the area of proposed disturbance to cover possible site relocation, which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the Forest Service for review and approval at the time a surface-disturbing plan of operation is submitted.
3. Implement mitigation measures required by the Forest Service and BLM to preserve or avoid destruction of cultural resource values. Mitigation may include relocation of proposed facilities, testing, salvage, and recordation or other protective measures. All costs of the inventory and mitigation will be borne by the lessee or operator, and all data and materials salvaged will remain under the jurisdiction of the U.S. Government as appropriate.

The lessee or operator shall immediately bring to the attention of the Forest Service and BLM any cultural resources or any other objects of scientific interest discovered as a result of surface operations under this lease and shall leave such discoveries intact until directed to proceed by Forest Service and BLM.

Vertebrate Paleontology

The Forest Service is responsible for assuring that the leased lands are examined to determine if paleontological resources are present and to specify mitigation measures, in accordance with the Organic Act and the National Forest Management Act of 1976.

Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator, unless notified to the contrary by the Forest Service, shall:

4. Contact the Forest Service to determine if a site-specific vertebrate paleontologic inventory is required. The Forest Service will conduct inventories and surveys as part of the field review for the proposed activity on the lease. The operator may voluntarily engage the services of a qualified paleontologist to conduct the inventory.
5. Implement mitigation measures required by the Forest Service and Bureau of Land Management to preserve or avoid destruction of vertebrate paleontologic resources. Mitigation may include relocation of proposed facilities or other protective measures.
6. The lessee or operator shall immediately bring to the attention of the Forest Service any vertebrate paleontologic resources discovered as a result of surface operation under this lease, and shall leave such discoveries intact until directed to proceed by the Forest Service.

Floodplain and Wetlands

The lessee is hereby notified that this lease may contain land within a riparian ecosystem. All activities within this area may be highly restricted in order to comply with Executive Order 11988 - Floodplain Management and Executive Order 11990 - Protection of Wetlands, in order to preserve and restore or enhance the natural and beneficial values served by floodplains and wetlands.

Riparian ecosystems will be managed by the Forest Service to protect from conflicting uses in order to provide healthy, self-perpetuating plant and water communities that will have optimum diversity and density of understory and overstory vegetation. Occupancy and use of lands within riparian ecosystems proposed in a proposed Surface Use Plan of Operations will be considered in an environmental analysis done to identify the mitigation measures necessary to protect the riparian area. Special measures such as road design, well pad size and location or directional drilling, may be made part of the permit authorizing the activity.

Guidance for Meeting Scenic Integrity Objectives

The Forest Service has moved from the old visual management system (VMS) to the new scenic integrity system (SMS). To aid those familiar with the VMS to transition to the new SMS, the following table is provided. For example, the old retention visual quality objective (VQO) equals the new high scenic integrity objective (SIO). The table provides examples of the type of mitigation that may be required to meet some situations and may be altered to achieve the management objectives.

Examples for meeting scenic integrity objectives¹

Production Phase Elements	High SIO (VQO Retention)	Moderate SIO (VQO Partial Retention)	Low SIO (VQO Modification)
Drill Pad	May be moved or modified to utilize topographic or vegetative screening.	May be moved or modified to utilize topographic or vegetative screening.	Standard lease terms will be applied
Access Road	Low grade, traversing slope, subterrain base, surfacing material coordinated with surrounding ground color.	Low grade, traversing slope, subterrain base, surfacing material coordinated with surrounding ground color.	Standard lease terms will be applied

Production Phase Elements	High SIO (VQO Retention)	Moderate SIO (VQO Partial Retention)	Low SIO (VQO Modification)
Tanks	May be moved or modified to utilize topographic or vegetative screening or moved offsite. ²	May be moved or modified to utilize topographic or vegetative screening.	Standard lease terms will be applied
Heater/Treater Tank and Shed	Offsite, or installed horizontal, aligned for view. ²	Installed horizontal, aligned for view.	Standard lease terms will be applied
Pump	Low Visibility Production Method. ³	Low Visibility Production Method ³ or conventional method aligned for end view.	Standard lease terms will be applied
Electric Power	Buried in road corridor	Buried in road corridor	Standard lease terms will be applied

- 1) All categories include work such as matching paint color to surrounding landscape or vegetation planting.
 2) Movement of production facilities or tanks to an offsite location requires BLM approval.
 3) May require a submersible pump, "rotoflex," or special color.

Notice for Split Estate Lands under Jurisdiction of the Bureau of Land Management

Split Estate Lands:

The lands included in this lease are split estate. Title to the mineral estate is held by the United States and the surface is non-Federal ownership. Due to this status the mineral estate is administered by the BLM, even though these lands are within a U.S. Forest Service withdrawal.

For split estate lands, BLM places necessary lease stipulations and conditions of approval on permitted activities and works in cooperation with the surface owner.

Surface Management of Non-Federal Surface Lands:

The BLM has the statutory authority to require lease stipulations and conditions of approval for activities of its lessees to minimize adverse impacts that may result from federally authorized mineral lease activities. These stipulations and conditions of approval are intended to comply with the BLM's responsibilities under the Endangered Species Act, the National Historic Preservation Act, and the National Environmental Policy Act and to protect or preserve the privately-owned resources while preventing adverse impacts to adjoining lands, not to dictate management to the surface owner.

Applications for Permit to Drill (APD)

The following BLM office is responsible for the receipt, processing, and approval of applications for permit to drill. This office is located at:

North Dakota Field Office
 99 23rd Avenue West, Suite A
 Dickinson, North Dakota 58601

The applications are to be submitted by oil and gas operators pursuant to the requirements found in Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases (Circular No. 2538).

Additional requirements for the conduct of oil and gas operations of Federal oil and gas leases can be found in the Code of Federal Regulations Title 43, Part 3160. Copies of Onshore Oil and Gas Order No. 1, and pertinent regulations, can be obtained from the BLM office listed above. Early coordination with this office on proposals is encouraged.

Alternative 3 – New and Revised Stipulations

Alternative 3 would include all of the stipulations from alternative 1 with the following revisions and additions.

Roadless Areas

No Surface Occupancy (NSO)

Resource: Inventoried Roadless Areas (NSO) – new

Stipulation

No surface occupancy or use is allowed within inventoried roadless areas.

Objective (Justification)

For justification refer to the Forest Service Roadless Area Conservation Final Rule, published on January 12, 2001. The objective is to prevent landscape fragmentation and preserve roadless area values and characteristics.

Application Methodology

Use this stipulation for all inventoried roadless areas.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

Recreation

Timing Limitation (TL)

Resource: Developed Recreation Sites (TL) - revised

Stipulation

Surface use is prohibited from May 1 through December 1 within 0.25 miles of the established boundaries of sites classified as Recreation Site Development scale 3 through 5, based on information in the Dakota Prairie Grasslands INFRA database.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Minerals and Energy Resources, number 13 (p. 1-12). To maintain the recreation opportunities and settings within the area surrounding campgrounds, picnic areas, and recreation trail overnights.

Application Methodology

The 0.25-mile distance will be from the established boundary. This stipulation does not apply to operation and maintenance of production facilities.

As of 2018 these sites included: Birnt Hills Interpretive Site, Burning Coal Vein, Buffalo Gap, Sather Lake, CCC, and Summit Campgrounds, Whitetail Picnic Area, and the four Maah Daah Hey Trail overnight camps, Wannagan, Elkhorn, Magpie, and Bennett. This stipulation applies to all recreation sites whose development scale is classified as 3, 4, or 5 at the time of leasing.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

The authorized officer may grant an exception to this stipulation if an environmental analysis determines that the impacts of the plan submitted by the operator are acceptable or can be adequately mitigated so as not to disrupt recreational opportunities and settings.

Modifications

The boundaries of the stipulated area may be modified if the authorized officer determines that portions of the area are not within 0.25 miles of the established recreational facility.

No Surface Occupancy (NSO)

Resource: Developed Recreation Sites (NSO) – revised

Stipulation

No surface occupancy or use is allowed within sites classified as Recreation Site Development scale 3 through 5, based on information in the Dakota Prairie Grasslands INFRA database.

Objective (Justification)

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Recreation, Developed Recreation Sites, number 11 (p. 1-21). The objective is to maintain the recreation opportunities and settings within developed recreation sites

Application Methodology

As of 2018 these sites included: Birnt Hills Interpretive Site, Burning Coal Vein, Buffalo Gap, Sather Lake, CCC, and Summit Campgrounds, Whitetail Picnic Area, and the four Maah Daah Hey Trail overnight camps, Wannagan, Elkhorn, Magpie, and Bennett. This stipulation applies to all recreation sites whose development scale is classified as 3, 4, or 5 at the time of leasing.

Waivers

This stipulation may be waived if the authorized officer determines conditions have changed and the entire leasehold no longer contains developed recreation sites.

Exceptions

The authorized officer may grant an exception to this stipulation if an environmental analysis determines that the impacts of the plan submitted by the operator are acceptable or can be adequately mitigated so as not to disrupt recreational opportunities and settings.

Modifications

The boundaries of the stipulated area may be modified if the authorizing officer determines that portions of the area do not include developed recreation sites.

Wildlife

The following represent additions to current stipulations for greater sage-grouse. They are listed in the order of timing limitations and controlled surface use. The no surface occupancy stipulation for 0.25 miles around sage-grouse and sharp-tailed grouse display grounds is carried forward into this alternative, as well as the current timing limitation for sage-grouse. All other wildlife stipulations are carried forward in their current form.

Timing Limitation (TL)

Resource: Sage Grouse Display Grounds (TL) – new

Stipulation

Prohibit surface activities that create noise at 20 dBA above ambient measured at the perimeter of an active lek from March 1 through April 30 from 6 pm to 9 am.

Restrict road and trail maintenance within 2 miles from the perimeter of active leks from March 1 to April 30 from 6 pm to 9 am.

Objective (Justification)

The objective is to conserve, enhance, and/or restore sagebrush and associated habitats to contribute to the long-term viability of the greater sage-grouse.

Application Methodology

This stipulation limits operations between March 1 to June 15 in priority and general habitat management areas.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

Controlled Surface Use (CSU)

Resource: Sage-Grouse Priority and General Habitat Management Areas (CSU) – new

Stipulations

Proposed wells and associated disturbance may have to be moved more than 0.25 miles in order to provide topographic screening between the disturbance and active leks and reduce impacts to areas of high-density sage brush.

Objective (Justification)

To provide increased opportunities for energy development while ensuring the protection of sage-grouse habitat in consideration of mixed ownership patterns. The objective is to conserve, enhance, and/or restore sagebrush and associated habitats to contribute to the long-term viability of the greater sage-grouse.

Application Methodology

This stipulation applies to priority and general habitat management areas.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

The authorized officer may grant an exception to this stipulation if an environmental analysis determines that the impacts of the plan submitted by the operator are acceptable or can be adequately mitigated to minimize impacts to active leks and areas of high-density sage brush.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

Rare Plants

No Surface Occupancy (NSO)

Resource: Known Populations of Dakota buckwheat, nodding buckwheat, sand lily (NSO) – new

Stipulations

No surface occupancy allowed within 200 feet of mapped populations for Dakota buckwheat (*Eriogonum visheri*), nodding buckwheat (*E. cernuum*), and sand lily (*Leucocrinum montanum*).

Objective (Justification)

To provide protection for these very rare sensitive plant species with narrow ranges. These species have very few populations on the Little Missouri National Grassland, so impacts from oil and gas surface activities could reduce the capacity to maintain the species within the planning area. The objective is to ensure that the species do not become locally extirpated and to prevent a trend toward Federal listing under the Endangered Species Act.

Application Methodology

This stipulation applies to known, mapped populations of these species.

Waivers

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

Revised Lease Notice

Paleontological Resources

The Forest Service is responsible for assuring that the leased lands are examined to determine if paleontological resources are present and to specify mitigation measures, in accordance with the Organic Act, the National Forest Management Act of 1976, the Paleontological Resources Preservation Act, and regulations at 36 CFR 291.

The term ‘paleontological resource’ means any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth, with the exception of those defined as archeological resources under the Archaeological Resources Protection Act of 1979, or cultural items as defined in the Native American Graves Protection and Repatriation Act.

Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator, unless notified to the contrary by the Forest Service, shall:

1. Contact the Forest Service to determine if a site-specific paleontological inventory is required. The Forest Service is responsible for ensuring that the leased land is examined, prior to undertaking any surface-disturbing activities, to determine potential effects upon any paleontological resources.
2. The lessee or operator may, at their own discretion and cost, engage the services of a paleontological resource specialist acceptable to the Forest Service to conduct a paleontological resource inventory of the area of proposed surface disturbance. An acceptable inventory report is to be submitted to the Forest Service for review and approval at the time a surface-disturbing plan of operation is submitted.
3. Implement mitigation measures required by the Forest Service and Bureau of Land Management to preserve or avoid destruction of any paleontological resources. Mitigation may include relocation of proposed facilities, recovery (removal), and recordation, other protective measures, or a combination of mitigation procedures. All costs of the mitigation, preparation, and curation will be borne by the lessee or operator, and all data, reports, and specimens salvaged will remain under the jurisdiction of the U.S. Government as appropriate.
4. The lessee or operator shall immediately bring to the attention of the Forest Service any paleontologic resources discovered as a result of surface operation under this lease, and shall leave such discoveries intact until directed to proceed by the Forest Service.

Alternative 3B – New Stipulations

Roadless Areas

Controlled Surface Use (CSU)

Resource: Inventoried Roadless Areas (CSU) – new

Stipulation:

Controlled surface use is allowed by constructing a well pad within 0.25 miles from the centerline of all existing maintenance level 3, 4, and 5 roads at the time of the proposal. The near edge of the pad must be directly adjacent to the existing road right-of-way. Additionally, the long axis of the well pad must be situated parallel to the road.

Objective (Justification):

For justification refer to the Forest Service Roadless Area Conservation Final Rule, published on January 12, 2001. The objective is to prevent landscape fragmentation and preserve roadless area values and characteristics while providing for energy development needs. Existing maintenance level three, four and five roads available for use will be determined and defined at the time of the proposal.

Application Methodology:

Use this stipulation for all inventoried roadless areas. For the purposes of this stipulation the “time of the proposal” means at the time of lease issuance. As such, all maintenance level three, four and five roads will be identified at that time and shown on a map attached to the lease. The buffer represents the maximum extent of disturbance allowed. When feasible, disturbance should be less than the buffer width.

Waivers:

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions:

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications:

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

No Surface Occupancy (NSO)

Resource: Inventoried Roadless Areas (NSO) – new

Stipulation:

No surface occupancy or use is allowed within those portions of inventoried roadless areas outside of a corridor within 0.25 miles of existing maintenance level 3, 4, and 5 roads, as described in the roadless areas CSU stipulation.

Objective (Justification):

For justification refer to the Forest Service Roadless Area Conservation Final Rule, published on January 12, 2001. The objective is to prevent landscape fragmentation and preserve roadless area values and characteristics.

Application Methodology:

Use this stipulation for all inventoried roadless areas. As per case law and the 2001 Roadless Rule, this stipulation applies to well pads and roads, but does not apply to pipelines and transmission lines, deemed “linear construction features.”

Waivers:

No conditions for a waiver are anticipated, and approval of a waiver would be unlikely.

Exceptions:

No conditions for an exception are anticipated, and approval of an exception would be unlikely.

Modifications:

No conditions for a modification are anticipated, and approval of a modification would be unlikely.

Wildlife

No Surface Occupancy (NSO)

Resource: Sage-Grouse Priority Habitat (NSO) – new

Stipulation:

Surface occupancy and surface disturbing activities will be prohibited within Sage-Grouse Priority Habitat Management Areas.

Objective (Justification):

To protect sage grouse habitat in consideration of mixed ownership patterns from habitat fragmentation and loss and sage grouse populations from disturbance inside Priority Habitat Management Areas while providing for energy development needs.

Application Methodology:

This stipulation applies to 35,052 acres of National Forest System Lands where mineral rights are federally owned, and the surface acres are identified as Sage-Grouse Priority Habitat.

Waivers:

This stipulation may be waived over the entire lease if, in coordination with the North Dakota Game and Fish Department, it is determined that the area holds limited value for sage grouse life cycle needs compared to neighboring lands (e.g., state, private, etc.), as determined by the state wildlife agency, and doing so would lead to greater benefits to sage grouse on those lands. Any changes to the stipulation will be made in accordance with the land and resource management plan and/or the regulatory provisions for such changes.

Exceptions:

The authorized officer may grant an exception if an environmental review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of sage grouse and doing so would limit impacts to higher quality habitat or habitat connectivity on neighboring lands (e.g., state, private, etc.). The Forest Service can and does grant exceptions if the Forest Service, in coordination with the North Dakota Game and Fish Department, determines that granting an exception would not adversely impact the population being protected and would improve management opportunities in areas of higher habitat value on neighboring lands.

Modifications:

The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate (i.e., resulting in impacts to higher value habitat on other lands) or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the sage grouse (e.g., reproductive display, daytime loafing/staging activities, nesting, etc.) **or** doing so would provide for more effective sage grouse habitat management and conservation at the landscape scale.

Resource: Bighorn Sheep Lambing Areas (TL) – revised

Stipulation:

Surface use is prohibited from April 1 through July 15 within 1 mile (line-of-sight) of bighorn sheep lambing areas.

Objective (Justification):

For justification refer to the Land and Resource Management Plan Grassland-wide Direction, Fish, Wildlife, and Rare Plants, number 12. The objective is to safeguard lamb survival and prevent bighorn sheep displacement from lambing areas.

Application Methodology:

This stipulation applies to bighorn sheep lambing areas established outside of management area 3.51. This stipulation applies to any: construction, drilling, and completion operations over 24 hours, and does not apply to operation or maintenance of production facilities.

Waivers:

This stipulation may be waived if the authorized officer determines conditions have changed and there are no lambing areas within the leasehold or within the stipulated distance from the leasehold.

Exceptions:

The authorized officer may grant an exception to this stipulation if an environmental analysis determines that the impacts of the plan submitted by the operator are acceptable or can be adequately mitigated to safeguard lamb survival and prevent bighorn sheep displacement from lambing areas.

Modifications:

The boundaries of the stipulated area may be modified if the authorized officer determines that bighorn sheep lambing areas do not occur within one mile of the stipulated area.

New Lease Notice

Air Resources

The lessee/operator is given notice that prior to project-specific approval, additional reporting may be required to document that the diesel-fueled non-road engines to be used during drilling or completion activities (with greater than 200 horsepower design rating) meet the current emissions standards required by the EPA for non-road diesel engines (as verified and enforced by North Dakota DEQ and EPA). The documentation associated with that reporting must include information that confirms the following:

1. the engine(s) to be used were manufactured to meet current USEPA NO_x emission standards, or
2. the engine(s) emits NO_x at rates less than or equal to current USEPA emission standards for non-road diesel engines.

If not utilizing engines manufactured to meet current USEPA NO_x emission standards, the lessee/operator is given notice that additional air resource analyses and/or near-field monitoring may be required to demonstrate compliance with the National Ambient Air Quality Standards. The additional analyses and/or near-field monitoring information may result in the imposition of additional project-specific control measures to protect air resources.

For the purposes of this lease notice “current emissions standards required by the EPA” means those standards in place at the time of lease issuance.

Appendix B – Response to Comment

Introduction

The Forest Service released the draft supplemental environmental impact statement on November 2, 2018. The original 45-day comment period was extended an additional 30 days. During this extension, a five-week federal government-wide furlough ensued. The Grasslands supervisor therefore further extended the comment period to compensate for furlough period. We received a total of 34 comment letters between November 2, 2018 and February 21, 2019 when the comment period closed.

We assigned a number to each letter and comment within a letter, grouped and summarized similar comments, assigned each comment to categories and subcategories, and prepared responses. Summaries or example comments illustrate the issue, followed by the response. Comment letters and numbers covered are listed above the comment summaries.

The letter numbers, commenter name, and affiliation are listed below.

Letter #	Name	Organization
1	Glatt, L. David	North Dakota Dept of Health
2	Hoover, Courtney	US Department of the Interior, Office of Env. Policy and Compliance
3		Individual
4		Individual
5		Individual
6	Plummer, Kevin	Little Missouri Grazing Association
7	Arthaud, James	Billings County Commission
8	Link, Greg	North Dakota Game and Fish Department
9		Individual
10		Individual
11	Swenson, ED, Jan	Badlands Conservation Alliance
12	Arthaud, James	Billings County Commission
13		Individual
14		Individual
15	McEnroe, Michael	North Dakota Wildlife Federation
16	Enderud, Derek	Petro-Hunt, LLC
17		Individual
18	Anon	North Dakota Backcountry Hunters and Anglers
19	Skokos, Scott	Dakota Resource Council
20	Helm, Lynn	North Dakota Department of Mineral Resources
21	Sandbo, Holly	National Parks Conservation Association
22	Turner, Brian	National Trust For Historic Preservation
23	Hanson, Jesse	North Dakota Parks and Recreation
24		Individual
25	Miller, Clayton	NP Resources and NP Energy Services
26	Parks, Tripp	Western Energy Alliance

Letter #	Name	Organization
27		Individual
28	Strobel, Philip	US EPA
29	Smith, Jodi	North Dakota Department of Trust Lands
30	Cutting, Kari	North Dakota Petroleum Council
31		Individual
32	Parks, Tripp	Western Energy Alliance
33	Link, Greg	North Dakota Game and Fish Department
35		Individual

Cooperating Agencies

National Park Service

#2-2

Comment: The NPS will continue to work with the energy industry and other agencies to reduce impacts and improve recreation as stated in the DSEIS. Each project application in proximity to the park will require individual mitigation measures, company engagement, and agency involvement. The NPS can provide technical expertise and specialized knowledge in preserving park resources and providing an exceptional visitor experience. Communication and cooperation will be essential and should be formalized through an agreement. The NPS looks forward to collaborative ecosystem stewardship with the United States Forest Service and the Bureau of Land Management on this topic.

Response: The Dakota Prairie Grasslands acknowledges the critical role of park resources and the expertise provided by park staff for both recreation and mitigation to natural resources. We are eager to cooperate through both formal and informal procedures.

Billings County

#7-1, 7-2

Comment: Billings County formally requests cooperating agency status with respect to the draft Northern Great Plains Management Plans Revision Supplement Environmental Impact Statement ("SEIS") for Oil and Gas Leasing.

As noted, Billings County has authority by law to approve various aspects of oil and gas development that occur within the County, including authorizing rights-of-way for utility lines, pipelines, and roads and therefore qualifies for Cooperating Agency status. Billings County has special expertise as it relates to the environmental, social, and economic impacts associated with the proposed action to revise oil and gas leasing and stipulations, as well as how any approved decision will relate to local land use plans, policies, and controls.

Response: Since the release of the draft supplemental environmental impacts statement Billings, McKenzie, and Slope Counties have entered into formal agreements as cooperating agencies for the environmental analysis. The Grasslands welcomes the local expertise and perspective provided by these arrangements and the collaborative discussions that have occurred.

Purpose and Need

Connection among the reasonably foreseeable development scenario, changed conditions, and purpose and need

#30-7, 30-8, 30-9

The Forest Service should clearly articulate the connections among the reasonably foreseeable development scenario, changed conditions and the purpose and need for action. The record is devoid of meaningful discussion about how or why the purported change in "the pattern of development and type of operations" in the LMNG over the past decade has increased impacts or warrants further restrictions. In reality, these technological changes have decreased impacts.

Response: The purpose and need for the SEIS presumes neither increased nor decreased impacts from the current pattern of oil and gas drilling. The purpose and need is simply "to determine whether current oil and gas lease stipulations and lease notices (see chapter 2) are providing adequate protection to resources on the Little Missouri National Grassland on those lands previously determined to be administratively available for leasing." (DSEIS, p 5)

The Reasonably Foreseeable Development Scenario (RFDS) recognizes a change in the pattern of development. The purpose and need of the analysis is to assess the adequacy of environmental protections in light of such change, whether positive, negative or neutral. Other changed circumstances include changes in law, such as the Paleontological Resources Protection Act of 2008, or species newly listed under the Endangered Species Act. Section 390 of the Energy Policy Act of 2005 provides for expedited NEPA review of an application for a permit to drill only when such drilling has been analyzed as a reasonably foreseeable activity in a NEPA document within the last five years, encouraging the frequent assessment and updating of leasing terms. These factors form the essence of the purpose and need of the project, and our analysis acknowledges reduced surface impacts that accrue with multi-well pads. Even though the presence of multi-well pads reduces the overall footprint of disturbance for each well, the increased number of wells and associated flaring, water use, traffic, and other connected actions warrant a "hard look" analysis, as directed by the Energy Policy Act of 2005.

The Reasonably Foreseeable Development Scenario (RFDS) is intended to provide an up-to-date estimate of the character, pace, and scale of oil and gas development within the Little Missouri National Grassland; assessing the environmental impacts or benefits of such development is not the purpose of the RFDS, and it does not attempt to do so. Rather, it forms the basis for an interdisciplinary analysis, which is then documented in the supplemental EIS.

Process/Decision Making

Extend Comment Period

#4-1, 8-1, 15-1, 18-1, 19-1, 20-4, 21-1, 25-5, 33-1

Comment: Because of the complexity of this document and the important role it will play in guiding oil and gas development for the foreseeable future, the Department felt it necessary that more time be granted to allow for thorough review. Unfortunately, at that time, a longer extension was not granted. It wasn't until February 7th that the Department learned the comment period had been extended to February 20th. Though the extension is appreciated, the start and stop nature of providing an extension after the deadline

does not provide the same opportunity as a contiguous comment period. The Department believes that the extension was inadequate, as it was not granted earlier. We, therefore, respectfully ask that an additional 60 days be provided to thoroughly digest, analyze, and provide both comprehensive and creative feedback on this important document.

Response: The 45-day comment period started on November 3, 2018, the day following publication of the notice of availability in the Federal Register. It was originally scheduled to expire on December 17, 2018. Prior to that expiration, the Grasslands supervisor requested the Environmental Protection Agency to allow an extension of the comment period for an additional 30 days. The new expiration date was set to January 16, 2019. In the meantime, the federal government furlough occurred. When the furlough ended, the Grasslands supervisor again requested an extension of the comment period for a time period equal to the previous extension that overlapped the furlough. Both extensions of the comment period were formally noticed in the Federal Register. The second extension ended on February 21, 2019. Thus, the total period to examine the draft SEIS and submit comments was over three and a half months. We believe these extensions are reasonable, while still allowing the project to continue to reach a decision in a reasonable timeframe in accordance with EO 13783.

Lease availability

#11-6

We want to state in writing as confirmed by Forest Service personnel at the Dickinson open house that all leasing, including that of expiring, suspended or unleased minerals, will not be available during this planning process. Furthermore, we wish it clarified as to similar status of federally owned minerals under private surface. Without such confirmation, this entire process becomes a sales catalog for the oil and gas industry.

Response: New leases have been suspended since 2013, based on decisions by the district rangers for Medora and McKenzie ranger districts, in recognition of changed circumstances since 2008. This decision is administrative; nothing in regulation prohibits leasing during this period. The most recent revision of the Dakota Prairie Grasslands Land and Resource Management Plan (2002) identified the lands to be made available for leasing. See also 36 CFR 228.102(d). Federal minerals within the administrative boundary of the Little Missouri National Grassland, whether under National Forest surface or non-federal surface, are covered by these decisions as to whether to authorize the Bureau of Land Management to offer these minerals for lease. Please see the supporting document on the process for oil and gas leasing and production on National Forest System lands on the project website:

<https://www.fs.usda.gov/project/?project=40652>.

Reasonably Foreseeable Development Scenario (RFDS)

#15-13, 15-15, 24-2

Comment: A RFDS is a prediction and only as good as the information and premises on which it is based. BCA finds that the RFDS updates dated 8-28-2017 fail to consider important aspects of ongoing and future oil and gas development in the Little Missouri National Grassland and therein underestimate future activity. First, the difference in length of lease terms on federal vs. private and state minerals colors the information offered in Table 1 on page 2 of the updated RFDS. BCA holds that the August 2017 updates to the RFDS do not adequately reflect the practicable realities of future oil and gas development on the Little Missouri National Grassland.

The NDWF would suggest that this rate of ultimate well development is low based on the 10- year lease period to develop production which would then hold the lease for as long as production occurs. Ultimate development will involve many more wells than those drilled in the short-term 10-year "develop it or lose it period" to hold the lease by production.

Response: The RFDS is intended to cover a period of ten years on all ownerships within the LMNG boundary. Any leases sold during this timeframe will not expire before the RFDS is considered outdated, therefore, the impacts suggested by the commenter are unlikely to occur within that timeframe. The RFDS predicted a total of 62 wells per year would be developed on federal mineral estate and up to 105 wells per year on all ownerships. Table 1 shows data from the North Dakota Industrial Commission on the number of wells drilled per year for the last 10 years.

Though individual years may exceed the total expected on all ownerships, the ten-year average of 107.2 is very close to the RFDS prediction. The number of wells drilled on national forest mineral estate over the period ranges from 1 to 34, with an average of 20.1, which is well below the prediction of 62 wells per year.

Ten-year record of wells drilled per year within LMNG boundary

Ownership	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average
State	5	4	9	9	2	26	17	6	0	10	8.8
Private	24	49	54	65	83	107	96	71	106	122	77.7
Army Corps	1	2	0	0	3	0	0	0	0	0	0.6
National Forest	14	23	31	29	22	32	1	4	11	34	20.1
Total	44	78	94	103	110	165	114	81	117	166	107.2

The fact that industry will preferentially drill on non-federal surface, due to lower expense, quicker timeframes, and fewer regulations does not change the total number of wells that will be drilled. All ownerships are included in the RFDS estimates. The specific locations for leasing and development within the Little Missouri National Grassland will be dictated by market conditions at the time.

The analysis of impacts to air quality, water quality, and all other resources is based on the total projected number of new wells on all mineral ownerships over the next ten years. The anticipated total is 62 wells per year or 620 total, far short of the numbers suggested by the commenter. No projections by state or federal entities suggest such high numbers.

The US Forest Service does not suggest 1,240 new wells will be drilled on the remaining unleased available Federal mineral estate with federal surface; to clarify, the RFDS covers a period of 10 years, predicting 105 wells will be drilled per year on all ownerships within the administrative boundary of the Little Missouri National Grassland.

Analysis of changes in extractive technology

#15-2, 18-2, 32-5, 25-2, 25-3, 25-4, 25-7, 25-8, 25-9, 26-4, 30-12, 30-29

Comment: The Bakken and the current oil and gas technology were unknown in 2001 and 2003. The Bakken and Three Forks formations were not described, and horizontal drilling and hydraulic fracturing (fracking) were, if not unheard of, were at least not described or analyzed. Impacts due to water use and 2,000 semi-trucks trips per well were not described or evaluated. For these reasons, the DSEIS should go

back and analyze how oil and gas development actually occurred with the Bakken formation and fracking, because that is how the current and future oil and gas development described in this DSEIS will proceed.

Comment: The SEIS ignores the operational and technological drilling advancements that have dramatically reduced impacts. Since 2008, multi-well pad development has reduced impact per well to 1.0 - 1.25 acres from 5 acres; 5-year impact in the SEIS will be 310-390 acres not 1,550 acres. Existing pads can be utilized for on- and off-lease minerals; existing pads can also connect currently "stranded" wells to gathering thereby reducing flaring. New facility designs, regulations, and operating standards have substantially reduced fugitive and other emissions.

Response: Please see attachment A: Steps to Approving Oil and Gas Leasing on National Forest System Lands. It describes both the process and operations of current oil and gas technology, including a comparison of the number and average footprint of well pads and immediate roads pre and post horizontal drilling. The section "Overview of Operations" describes how leasing and oil and gas development has occurred over the past ten years within the Little Missouri National Grassland.

The RFDS, upon which the SEIS is based, acknowledges and describes the change in the methods of oil and gas extraction resulting from horizontal drilling. The practice of hydraulic fracturing dates to well before the recent increase in activity in the Bakken and Three Forks formations; the combination of horizontal drilling and fracking is new. Increasingly, water for fracking and completion is delivered via temporary piping. Increased traffic from all aspects of the increased oil and gas activity is analyzed in the socio-economic section of the DSEIS. Impacts from roads and traffic on unpaved roads is analyzed in the surface water section and also discussed under wildlife and botanical resources.

We agree industry efficiencies are increasing and that multi-well pads reduce some impacts. At the same time, the general level of activity (traffic, flaring, construction of pipelines and transmission lines, etc.) has increased greatly. Analyzing these positive and negative impacts is the purpose of the supplemental environmental impact statement.

Comprehensive and collaborative planning

#11-4, 19-4, 21-9

Comment: NPCA's preferred alternative would withdraw all unleased LMNG land from oil and gas development as a first step, then engage in a comprehensive inter-agency, multi-jurisdictional planning process that considers the overall impact on the environment of ongoing private and state oil and gas development. The USFS needs to engage with stakeholders on a plan that includes a robust assessment of the LMNG and identifies areas of high cultural, natural, and recreational value.

Comment: An approach with much more detailed language ensuring a comprehensive management rather than the piecemeal approach this method encourages is needed. Details regarding land that is already leased, new road placement, reclamation, and flaring to mention just a few items need to be better thought out to prevent the further damage of the surface of the LMNG and the increase of future emissions from oil and gas leasing of minerals under USFS land.

Response: Comprehensive planning generally occurs during revision of the land management plan, scheduled to begin in 2021. Management prescriptions and land allocation made with the planning process specify where values such as wildlife habitat or recreation take priority. Reclamation is already required for all disturbance from oil and gas leasing, including for pipelines, roads, and electrical transmission lines, and always requires the use of native species. Local emissions and flaring are regulated by the State of North Dakota. The majority of total emissions resulting from oil and gas

extraction occur during end use (see the section in the SEIS on Greenhouse gas Emissions and Climate Change). With continued oil and gas leasing, total emissions will necessarily increase.

Regulatory authorities

#32-2

Comment: We urge USFS to align the final SEIS with [Department of the Interior SO and IM] directives, which will ensure consistent implementation of federal permitting requirements between the Service and BLM. Consistency between the two agencies will reduce confusion for the federal partners and ensure operators are not tasked with differing compliance requirements across the landscape.

Response: The Bureau of Land Management has sole authority to lease federal minerals. This authority is carried out in cooperation with decisions made by the Forest Service to authorize the BLM to offer minerals for lease. The BLM is responsible for managing the underground oil and gas resources along with the administration and issuance of fluid mineral leases, holding both administrative and regulatory authority. Please see attachment A Steps to Approving Oil and Gas Leasing on National Forest System Lands. Because the BLM has jurisdiction by law, it is required by 40 CFR 1501.6 to be a cooperating agency in the preparation of this supplemental environmental impact statement and will sign a decision for the selected alternative.

#32-4

Comment: We note that the State of North Dakota and other federal agencies have primary authority to regulate numerous aspects of oil and natural gas development, including air quality and species protections. The final SEIS should only address issues over which USFS has jurisdiction.

Response: We are required to fully analyze the effects of oil and gas leasing, even as we acknowledge that the control of certain regulatory aspects is outside USFS authority. Regarding listed species, we are legally obligated to write and submit a biological assessment to US Fish & Wildlife Service, to which they will respond with concurrence or a biological opinion (National Environmental Policy Act section 102 C [42 USC § 4332, Forest Service Handbook 1909.15 chapter 20]).

Application of stipulations to infrastructure

#11-16

Comment: Because roads, pipelines and transmission lines do not have the stipulations that govern siting of well pads and related infrastructure, the disturbance created during both construction and use can serve as inroads for degradation, especially as impacts hydrology, soil and vegetation. Changes in drainage patterns, sediment loads and spills will all impact hydrology, soils and vegetation in a landscape where more than half of the streams are already properly functioning but at risk or assessed at not properly functioning.

Response: Lease stipulations and conditions of approval apply to lease parcels, and therefore to roads, pipelines, transmission lines, and other infrastructure, unless specifically excluded in the application methodology for the stipulation. Such infrastructure must be specified in the Surface Use Plan of Operation that accompanies the Application for a Permit to Drill. Both of these documents are subject to environmental analysis and decision-making under the National Environmental Policy Act and Forest Service regulations at CFR 218. The Surface Use Plan of Operations must comply with standards and guidelines specified in the Dakota Prairies Grasslands Land and Resource Management Plan. This

compliance is enforced by site-specific best management practices and conditions of approval at the permitting stage, when the locations are proposed. Please see attachment A Steps to Approving Oil and Gas Leasing on National Forest System Lands at the end of this document and Environmental Protections Incorporated into Drilling Permits and Plans of Operation on the project website:

<https://www.fs.usda.gov/project/?project=40652>.

Stipulations by individual lease

#21-4

Comment: NPCA opposes any BLM process that uses lease stipulations or notices as the primary mitigation solution for adverse environmental effects. The Application for Permit to Drill (APD) stage, where lease stipulations and notices are enforced, provides for little or no public input. Moreover, mitigation measures such as lease stipulations are insufficient to resolve potential adverse effects on the site for a number of reasons, including that they only apply within the four-corners of the leased parcels and therefore do nothing to address or mitigate other impacts. Critically, postponing decisions that could result in adverse environmental or public health impacts to the APD stage means that the scope of development will be shaped after the lease is held by an oil and gas operator, and after BLM has agreed to the development of resources. This in effect constitutes an "irretrievable commitment of resources" on the part of the BLM, when the agency issues a lease without reserving the right to later prohibit development. See *New Mexico ex rel. Richardson*, 565 F.3d at 718 (holding that BLM must evaluate the "reasonably foreseeable" site-specific impacts of oil and gas leasing prior to making an "irretrievable commitment of resources"); see also *Sierra Club v. Peterson*, 717 F.2d 1409, 1411 (D.C. Cir. 1983) ("[o]n land leased without a No Surface Occupancy Stipulation the Department cannot deny the permit to drill; it can only impose 'reasonable' conditions which are designed to mitigate the environmental impacts of the drilling operations").

Response: Commenter confuses the purpose of lease stipulations and the standard lease terms, as compare to conditions of approval, which are applied to the application for a permit to drill and surface use plan of operations. Leasing a federal estate for oil and gas, by definition, conveys a right to later develop the lease as a contractual obligation. The commenter is correct that leasing constitutes an "irretrievable commitment of resources," and thus requires a NEPA analysis and decision.

Stipulations are the only mechanism for limiting contractual rights when a lease is acquired. The exploration and development stage is subject to an additional NEPA analysis and decision, and includes the same public involvement as any other environmental assessment or categorical exclusion. This is the stage where conditions of approval are granted, and are designed to comply with management direction, standards and guidelines of the Dakota Prairie Grasslands Land and Resource Management Plan and with oil and gas regulations at 36 CFR 228.

Comprehensive management occurs with the land management plan. It applies to all National Forest System surface. A truly comprehensive approach for a landscape such as the Little Missouri National Grassland would require collaboration among all surface and mineral estate owners, due to the mixed and disjunct pattern of ownership. See also the response to #11-4.

#15-4

Comment: A better option, or alternative would be for the Dakota Prairie Grasslands, U.S. Forest Service, to analyze the 216,300 acres available for lease and develop new stipulations to protect and maintain all the environmental factors prior to leasing. In this way the oil and gas industry would know the stipulations and conditions of approval before bidding, and the Forest Service would not be limited in

developing stipulations and conditions of approval for Application for Permit to Drill (APD) permits. Currently stipulations developed before leasing do not provide the flexibility to incorporate site of spacing unit specific conditions on APDs.

Response: Stipulations must be developed prior to leasing, as they become part of the leasing contract. The leasing decision for specific lands (36 CFR 228.102(e)) is a mid-level decision that determines those stipulations. Conditions of approval are applied at the finer scale of the spacing unit and cannot be determined until the lessee proposes a Surface Use Plan of Operations. Please see attachment A: Steps to Approving Oil and Gas Production on National Forest System Lands.

#21-5

Comment: Alternative 3 continues to address oil and gas development in the LMNG at the individual lease level. Such an approach almost guarantees that the impacts of each individual lease will be reviewed piecemeal and the cumulative impact of all the development resulting from individual leases will be inadequately assessed, if it is considered at all.

Response: The specification of stipulations for leasing, as applied to distinct parcels, is the mechanism by which federal agencies determine how leasing will occur. Stipulations can only be applied to individual leases and are the only mechanism by which the federal government can limit (such as with no surface occupancy) or condition (such as with timing limitations or conditional surface use) the contract for access that is conveyed by leasing, beyond those aspects that can be applied as conditions of approval. We have included cumulative effects analysis for all resources, looking at the totality of parcels available for leasing within the administrative boundary of the grassland. Leasing and development decisions follow regulations at 36 CFR 228, with which we are complying.

Effect of federal stipulations on private and state minerals

#25-2, 25-3, 25-4, 25-7, 25-8, 25-9, 25-10, 25-29, 26-1, 26-8, 30-5, 30-6, 30-7, 30-8, 30-9, 30-11, 30-12, 30-27, 30-28, 32-18

Comment: In permitting development projects, drilling units commonly encompass multiple lease tracts that would be unfairly affected by the NSO and timing restrictions. These options are severely hindered by inflexible lease stipulations and administrative policies that seek to push development off existing well pads and onto adjacent landowners. Lease stipulations and administrative policies that discourage or eliminate the benefits of this new technology are contrary to the stated objectives of the USFS and many other stakeholders.

Comment: NSOs have the demonstrated effect of concentrating and pushing development onto adjacent landowners (private and state) that are not subject to the restrictions. This reality is not acknowledged nor accounted for in the Draft EIS and it is not fair for those landowners or optimal for the LMNG as a whole. The Draft EIS claims that existing federal leases will not be affected by the new stipulations of Alternative #3. This is misleading in that it does not acknowledge the mechanism by which multiple leases are pooled together for horizontal well development and it also ignores the deleterious effect of federal stipulations on private and state minerals. For example, when the surface location of the proposed development is on nonfederal lands but includes federal minerals (a split estate as described in the Draft EIS), the BLM may still apply all stipulations on the federal mineral lease to the Conditions of Approval for the permit, thereby impeding the reasonable development of private property. The following illustration of two drilling units shows how minority tracts of currently unleased federal minerals are: a) preventing the development of both leased federal and leased private minerals, as well as b) when leased, will impinge upon the currently leased mineral estate with conditions of approval that are based on

stipulations considered in the DEIS. Graphs in attachment. These examples demonstrate that the Draft EIS incorrectly concludes that the lease stipulations are limited only to administratively available leases with USFS surface. They also reinforce NDCP's position that lease stipulations should be used sparingly as they are rigid and often carry more unintended consequences.

Comment: It is not true that the new and revised NSO and timing lease stipulations will apply only to new leases - multiple leases are pooled together for horizontal well development and BLM will impose the most current least stipulations on existing leases. The new and revised NSO and timing stipulations will impede the reasonable development of private and state property where federal minerals are involved

Response: Lease stipulations in the action alternatives are not intended to reduce options that reuse or concentrate impacts in existing development, the use of multi-well pads, or any other of the practices described by the commenters. Chapter 2 of the SEIS clarifies that the intention for placement of infrastructure during drilling and production should endeavor to use existing disturbance and site facilities where most environmentally desirable, irrespective of ownership within a spacing unit. If Forest Service mineral estate with NSO stipulation is accessed only through horizontal drilling, thousands of feet below the surface, the NSO stipulation is satisfied and cannot arbitrarily be applied to the whole spacing unit.

We have updated the geodatabase to create separate layers for each stipulation, allowing them to be precisely located. Many of the stipulations allow waivers, exceptions, and modifications. In conjunction with precise locations and the intention to coordinate with state agencies for optimum siting of oil and gas infrastructure, such waivers, exceptions, and modifications provide flexibility, which will allow well pads and other infrastructure to be sited on federal land to minimize impacts on the spacing unit as a whole.

We acknowledge that additional no surface occupancy and timing restrictions in alternative 3 have the potential to affect more surface acreage by fragmenting industry's access and ability to use all extraction efficiencies.

Time periods for analysis of effects

#15-16

Comment: Alternative 2 is described as removing the 216,300 acres for only 5 years, while Alternatives 1 and 3 are analyzed over a 20-year period. Why is there a discrepancy in the time frames for the alternatives? If Alternative is only for a 5-year delay, this further supports the suggestion waiting for the 5 years, conducting a more complete analysis, and leasing some acres then with a more carefully defined set of stipulations and conditions.

Response: If either of the action alternatives 1 or 3 is implemented, the effects of leasing and subsequent development are expected to last at least 20 years, because leases are granted for a 10-year term and development may be delayed until close to the end of the term. Irrespective of the alternative chosen, the RFDS is expected to be updated after five years, at which time a new leasing decision may be made. Thus, leases granted within that 5-year timeframe could still be developed as late as year 15, with construction effects continuing later. A decision to discontinue leasing could change in as little as five years. Therefore, in being conservative, we conclude that a decision to not authorize the BLM to offer leases, would not extend more than five years.

Direct vs. indirect effects

#15-17, 15-24

Comment: In describing Alternatives 1 and 3, the DSEIS repeatedly says there are no direct impacts from leasing because the lease is just a paper transaction. The impacts from drilling and production are said to be indirect impacts. The attitude that the impacts are somehow lessened or not a result of the leasing seems to be a shirking of responsibility by the Forest Service. Ultimately, as a result of this and past leasing, there will be thousands of oil wells, roads, pipelines and other infrastructure constructed on the Little Missouri National Grasslands.

The DSEIS must evaluate and describe both the direct and indirect impacts of their leasing and permitting actions. And again, the Forest Service is making the claim that because leasing is a paper transaction, there are no direct impacts, only indirect impacts, which do not have to be accounted for or mitigated.

Response: The Council on Environmental Quality defines direct effects of a decision as those “which are caused by the action and occur at the same time and place.” Indirect effects are those that “are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.” See 40 CFR 1508.8. Leasing conveys a legal right to develop the minerals leased, so impacts from drilling and production, by definition, come later in time. In this analysis, we assume that all parcels leased will be developed within 10 years from the final decision, though in some cases, leases expire without being developed.

During this stage, a programmatic analysis was done, as this decision does not authorize any oil and gas drilling operations at any specific location. When the Application for Permit to Drill and Surface Use Plan of Operations are proposed, the site-specific analysis would occur, and effects to all resources would be analyzed for any site-specific activities or actions.

Classification of "direct" vs. "indirect" carries no assumption in the NEPA analysis about the degree of impact. By definition, such development is an indirect effect of the specific lands leasing decision, even though it has more impact on resources than leasing prior to any development.

Alternatives

Rationale for preferred alternative

#25-26, 30-3, 30-23, 32-21

Comment: NDPC cautions against adopting new or revised lease stipulations provided in Alternative #3 unless supported by substantial record evidence demonstrating a clear and unequivocal need, and that such measures will be effective in meeting the desired outcome.

Response: The need for many of the proposed stipulations is to comply with current law, including the 2001 Roadless Rule. Consistency with inter-agency standards for sage grouse management and protection of those sensitive plant species that, because of limited populations and range, are at risk for extirpation, are additional reasons for the proposed stipulations. The standard suggested by the commenter (demonstration of a clear and unequivocal need) is not required or even mentioned by CEQ or Forest Service regulations governing NEPA decisions. Refer to 40 CFR 1505 and 36 CFR 220, respectively.

#30-24

Comment: The Draft EIS draws the exact same conclusion under Alternative #3; yet fails to provide any reasonable explanation either in the body of the report or the supporting reports as to why Alternative #3 should still be preferred. See DEIS at 85. This is a violation of the applicable NEPA regulations, which require the agency to provide a "clear basis for choice among the options." 40 C.F.R. § 1502.14. The failure to provide a clear basis for preferred Alternative #3 on one hand, while consistently stating that Alternative #1 is effective as the other. This is also a problem in other areas of the Draft EIS as well.

Response: Commenter misreads the regulations at 40 CFR 1502.14, which state the environmental impact statement "should present the environmental impacts of the proposal and alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." Any alternative that is fully analyzed may be chosen at the sole discretion of the decisionmaker. Even though the total expected number of wells and acres available for leasing do not differ between alternatives 1 and 3/3B, these alternatives differ by the location and extent of the three broad types of stipulations (no surface occupancy, controlled surface use, and timing limitations), as well as by the content of stipulations and lease notices.

Analysis of alternative 1, the proposed action, seeks to identify issues and impacts of maintaining current operations set forth in the 2003 Record of Decision; specifically the relationship between such issues, impacts, and the body of stipulations within, including individual stipulations that are no longer compliant with current law. Many of the changes proposed in alternative 3 are necessary to comply with current law. When the 2003 Record of Decision (ROD) for Oil and Gas Leasing was completed, the Roadless Rule was under litigation; since 2012 it is settled law. Under alternative 3B, we have added a conditional surface use buffer of 0.25 miles on either side of existing major roads to the no surface occupancy stipulation for inventoried roadless areas. We have further clarified that surface occupancy is prohibited only for roads and well pads to better conform the Roadless Rule. Changes to greater sage-grouse stipulations under alternative 3B are designed to better conform to research and policy changes completed since the 2003 ROD was signed, and changes to bighorn sheep lambing timing limitations are in response to comments by North Dakota Game and Fish Department.

Least restrictive alternative

#25-1, 25-6, 25-30, 26-2, 30-2, 30-10, 30-12, 30-23, 30-30, 32-1, 32-3, 32-20

Comment: BLM's Manual on Land Use Planning specifically states that "[w]hen applying leasing restrictions, the least restrictive constraint to meet the resource protection objective should be used."¹(1 BLM Handbook H-1601-1, App. C. II. H. at 24.) While USFS is not bound by a BLM manual, we nevertheless urge the agency to observe this regulatory guidance as it considers any stipulations for oil and natural gas leases, especially with regard to timing limitations, no surface occupancy (NSO) stipulations, and controlled surface use (CSU) restrictions. We note that the draft SEIS states numerous times that the effects of Alternatives 1 and 3 would be the same or substantially similar, and when that is the case the "least-restrictive" standard should lead to Alternative 1 being selected.

Response: In accordance with the National Environmental Policy Act, and the implementing regulations of CEQ, the EIS includes analysis of alternatives 1, 2, and 3, plus modifications in 3B. Alternative 1 would be the continuation of leasing with current stipulations within the administrative boundary of the Little Missouri National Grassland; alternative 2, no leasing, and alternative 3, which is similar to alternative 1 with some revised stipulations to comply with current law, plus the substitution of a stipulation for the lease notice in alternative 1 to address inventoried roadless areas.

The largest effective increase in no surface occupancy comes from the substitution of a stipulation for the lease notice applicable to inventoried roadless areas. When the 2003 record of decision was signed, the Roadless Rule was still under litigation, so a stipulation was not appropriate at that time. Since that litigation has been resolved, all leasing activities must, by law, comply with the 2001 Roadless Rule, whether stipulations requiring such exist or not. Alternative 3B stipulations, combining a controlled surface use buffer around existing major roads with no surface occupancy outside of this buffer, were designed to best comply with the Roadless Rule. Other stipulations in alternatives 3 and 3B were designed to address new circumstances, new laws, or to add flexibility.

In accordance with FSH 1909.15, the responsible official will consider this analysis in making a reasonable decision to best meet the purpose and need based on the evidence presented in the final supplemental environmental impact statement and the public comments received. That decision may include a combination of stipulations from any of the alternatives that were analyzed fully.

Pros and cons of alternative 2

#3-2, 9-1

Comment: My comments are to restrict further leasing to allow new technology and developments to be brought on board. This will have a large influence in lessening the impact of oil and gas mining in a very pristine environment that is so important to many, especially future generations. Let's take care to do this carefully now. We cannot afford to get it wrong. Restrictions now is a worthwhile investment for the future.

#13-1, 15-3

Comment: Of these three alternatives, the NDWF believes that Alternative 2, the no action alternative should be the preferred alternative. Lease prices are generally low at current times. These acres could be withheld from lease until prices are better and there is not a glut of oil on the world market. If or when demand increases and current leases or US production decreases, these unleased acres could then be leased for higher rates and an improved return to the federal treasury. The roughly 699,000 currently leased federal lands have only been marginally developed, with one or only a few wells drilled per lease to hold production. Many more wells, perhaps 10 to 20 or more per 1,280-acre spacing unit could be developed for continued and increased oil and gas production without leasing any more Federal acres. So of the three offered alternatives; Alternative 2, the "no action" alternative makes the most economic sense.

Response: Drilling and well development is always dependent on current economics. Given that federal oil leases are for a 10-year term, it is difficult to predict whether oil prices and demand will increase or decrease during the term of the lease. Horizontal drilling and fracking is expensive, and revenue from one well may be necessary to develop additional wells. Leases may also expire without being developed. Counties generally benefit from a steady revenue from federal leases, rather than highs and lows. Please see the oil and gas and socio-economic sections in the SEIS for analysis of the production and economic effects of alternative 2.

#12-2, 16-1, 19-3

Comment: Petro-Hunt views Alternative 2 as unacceptable. If Alternative 2 is adopted it would lead to unorderly development, stranding of federal, state, and fee owned minerals and drilling and completion of unnecessary wells. USFS is a multi-use agency and this alternative would be significantly detrimental to efficient production of federal leases.

Response: In accordance with the National Environmental Policy Act, and the implementing regulations of CEQ, the SEIS includes analysis of alternative 2. This alternative was analyzed in response to public comments and concerns related to unleased areas of federally owned minerals with National Forest System surface ownership within the administrative boundary of the Little Missouri National Grassland (FEIS Chapter 3). According to FSH 1909.15, the responsible official will consider this analysis in making a reasonable decision to best meet the purpose and need and based on the evidence presented in the FEIS and the public comments received.

Unintended consequences of alternative 2

#11-5, 21-3, 22-2

Comment: There are also unintended consequences of the no leasing alternative that could prove detrimental: Industry's tendency to site development on private surface to avoid USFS regulation, regardless of private landowner preference and without consideration for the integrity of the larger landscape, would continue and perhaps be exacerbated. Development of areas on the edge of being economic could occur unnecessarily and for political reasons. The lifetime of poorly producing wells may be extended and the number of temporarily abandoned and plugged but not reclaimed sites could expand. Simply not leasing has the potential to push surface development onto sites that further impact special places. No leasing may limit the opportunity for mineral exchange now and into the future.

Comment: The DSEIS acknowledges that federal public lands are intermingled in the planning area with State of North Dakota school trust lands and private lands. However, it does not discuss the risk that, if Alternative 2 were adopted, these adjacent lands would be subject to more development pressure. Adoption of Alternative 2 may give the public the illusion that USFS has given the landscape greater protection while, in actuality, it could cause greater harm. USFS can play a leadership role in adopting best practices that direct development outside of sensitive areas. We urge USFS to make clear in its final planning document that enhanced collaboration with state and private partners is the most effective way to eliminate the risk of harm to the areas closest to the Park and Elkhorn Ranch.

Response: We agree with many of the commenters' points. Thoughtful leasing decisions combined with efforts to collaborate with all landowners to find the most environmentally benign siting for infrastructure may provide both environmental and economic advantages. Officials at Theodore Roosevelt National Park have engaged proactively with oil developers in the past to mitigate effects to the park and are committed to continuing to do so. The National Park Service is a cooperating agency for the SEIS.

Clarification of lease availability under alternative 2

#15-14

Comment: Page 26: DSEIS states that Alternative 2 would remove 216,300 acres from leasing. It would be more correct to say that Alternative 2 will not change anything from the current status; it will not remove acres from being leased; they are not leased now.

Response: Under the 2003 decision, currently unleased acres could be leased. A new decision to discontinue leasing would temporarily remove the 216,300 acres from the pool of available lease parcels.

Alternative 3 conflicts with EO 13783

#26-1, 30-1

Comment: The USFS's preferred Alternative #3 runs directly counter to this Administration's energy policy and Executive Order 13783. It imposes numerous regulatory burdens, including taking significant LMNG acreage out of production, encumbering energy production, constraining economic growth, and preventing much needed job creation in North Dakota. Alternative # 3 would create more impacts than Alternative #1. Adopting Alternative #3 would create conflicting precedent with other USFS/BLM regions. The rigid lease stipulations in Alternative #3 conflict with those EISs, particularly on air quality, and would create bad precedent.

Response: Many stipulations in all of the action alternatives include waivers, exceptions, and modifications that allow flexibility when either a) the conditions that the stipulation are intended to mitigate are not present on the lease parcel, or b) adjacent non-federal lands hold higher quality habitat and allowing surface occupancy on the federal surface would overall reduce environmental impacts. Such discussions and negotiations will be carried out in collaboration with non-federal landowners, North Dakota Game and Fish, North Dakota Department of Environmental Quality, and other stakeholders.

Stipulations in alternatives 3 and 3B were designed in consultation with BLM, with particular emphasis on consistency among the agencies, especially regarding greater sage grouse and air quality for alternative 3B.

None of the action alternatives includes any stipulations regarding air quality; alternative 3B includes a lease notice that additional modeling may be required to show that air quality standards for non-road diesel engines will be met, if those proposed are less than current standards, as specified by North Dakota Department of Environmental Quality.

Effects of expanded NSO

#29-1

Comment: NDDTL is concerned that increasing areas of proposed NSO, as proposed in Alternative 3, will impact current and future income generated from trust lands and surrounding lands, as well as overall land management. Currently in spacing units where a federal Application for Permit to Drill (APD) is required, the NDDTL has often experienced significant delays in production of its minerals and receipt of royalties... Expanded NSO impacts surrounding lands by not allowing needed infrastructure (pipelines, roads, electrical transmission, etc.) access through lands impacted by the expanded NSO. Further, expansion of NSO areas will also result in oil and gas operators seeking to place wells and associated infrastructure on trust lands or private surface, to allow drilling of federal minerals outside spacing units, which unnecessarily increases environmental damage to trust lands and private land... Delays in the federal APD process and the access issues created by NSO expansion will impact the NDDTL financially in a number of ways. The NDDTL manages a comprehensive investment management program of the trust financial assets and it can generate a consistent return on its investments, that in-turn is available to support educational beneficiaries. Royalty income delays of several years can cost millions of dollars when compounded over time. Delays can also harm the NDDTL through the price received for produced oil and gas. Oil and gas markets are volatile and multi-year delays can prevent an operator from drilling a well when commodity prices are favorable. In cases of sharp downturns in price, wells that might have been able to produce earlier at a higher price may be forced to produce at lower prices or be bypassed altogether.

Response: The expansion of no surface occupancy stems primarily from a change from lease notice to stipulation for inventoried roadless areas (IRAs) in alternatives 3 and 3B, which adds a net of 32,480 acres for alternative 3 or 17,886 acres for alternative 3B. However, surface occupancy was already precluded in the IRAs by lease notice citing the 2001 Roadless Rule. Road building is prohibited by the Roadless Rule, but not well pads and other infrastructure, per se. A buffer of 0.25 miles from the center line of existing roads within IRAs will allow for well pad construction in alternative 3B. Pipelines and other linear construction features are allowed by the Roadless Rule and the stipulations in alternative 3B.

The stipulation covering greater sage-grouse priority habitat in alternative 3B also results in additional acres of no surface occupancy. This habitat occurs only in the southwestern corner of the Little Missouri National Grasslands, outside of the Bakken Play where little exploration or development has occurred in the last decade. However, should this area become active in the future, the sage-grouse stipulations are written with waivers, exceptions, and modifications that encourage collaboration with North Dakota Game and Fish biologists and adjacent landowners to encourage a landscape approach that would allow infrastructure to be built on federal surface when doing so would result in the least impact to the best available sage-grouse habitat.

We acknowledge the financial impacts of delays in permitting. The Energy Policy Act of 2005 provides for streamlined analysis and permitting for an Application for Permit to Drill once the final SEIS and record of decision are completed.

Additional Alternative Recommendations

Selective mineral withdrawal alternative

#11-3, 11-18, 11-20

Comment: We hold that at least one further alternative available to the decision-making process is available and merits further study; that more in-depth consideration of the benefits and impacts of selective withdrawal of mineral availability for both unleased and expiring leases must be pursued. Regardless of the Forest Service focus only on federal minerals underlying federal surface, in the real and practicable world, we all know that the intermingled ownership prevalent in the Little Missouri National Grassland is interconnected, thus impacting multiple interests and users, including agriculture, wildlife, recreation, extractive industry, etc. This may be the last best time to make wise decisions if we want the future of the Grassland to have any chance of maintaining a glimpse of its substantial traditional past values while allowing for reclamation down the road when the oil and gas industry is either done with it or passes into obsolescence. BCA would recommend that the USFS start by referencing multiple areas, landmarks, and or landscapes including: Existing Suitable for Wilderness Existing Backcountry Recreational Non-Motorized Existing and nominated Special Interest Areas and Research Natural Areas Areas with High Scenic Integrity goals. Riparian areas Lakeshore Proximity to the three units of Theodore Roosevelt National Park (TRNP). ND Industrial Commission Areas of Interest lands, but including both public and associated private surface ownership. While this list may not be inclusive, it is representative and gives the Forest Service a place to start in analyzing potential for selective withdrawal of authorization to lease.

To further exemplify our intention, a look at the map on page 17 of the DSEIS (Figure 4. Alternative 3) readily identifies areas where potential for withdrawal would hold significant benefit: Johns Town/Horse Creek Acreage abutting the North Unit of Theodore Roosevelt National Park (TRNP) Wannagan and Twin Buttes Tracy Mountain Both sides of the Little Missouri River between Bullion Butte and Kendley

Plateau Strom Hanson Again, the lists above are in no way inclusive of all areas that should be considered in an alternative for selective lease authorization withdrawal as they do not represent those currently leased acreages that are likely to reach expiration. All non-producing, suspended, and potentially expired leases as identified on page 24 of the DSEIS (Figure 6) should be further defined by date and additionally considered for withdrawal, especially as associated with the areas outlined. Such information should be available to the interested public.

Targeted formations of non-producing leases and lease dates would be helpful in seeing the full potential for determination of lease and no-lease options in an Alternative 4.

Response: The most up-to-date status of current leases is publicly available through the BLM LR2000 reports, accessible at: <https://reports.blm.gov/reports.cfm?application=LR2000>

As specified in 36 CFR Subpart E Oil and gas leasing and production consists of three levels of analysis. The first level is the area or forest-wide decision for lands administratively available (36 CFR 228.102(d)). That decision was most recently made in the most recent revision of the grasslands plan, completed in 2002. The second level is the leasing decision for specific lands (36 CFR 228.102(e)), which specifies the stipulations that will be applied and authorizes the BLM to offer the specific lands for lease. That decision was made with the 2003 record of decision and reaffirmed with a 2008 supplemental information report. The third level is the review of the Application for Permit to Drill by the BLM and the Surface Use Plan of Operations by the Forest Service (36 CFR 228.107).

After 2008, the pace and scale of development in the Bakken changed with the start of horizontal drilling, necessitating this review of the specific lands leasing decision. The analysis for lands administratively available for leasing is outside the scope of this analysis. Any decision to change the lands available for leasing would require an amendment to the grasslands plan. Such an analysis is best addressed in the context of all land allocations. Revision of the grasslands plan is expected to begin in 2021 or 2022.

Covenant Consulting Group alternative

#18-4, 18-5, 18-6, 18-7, 19-5, 33-13, 33-14

Comment: The Forest Service failed to fully address key issues or include strategies identified in the assessment (Stakeholder Assessment of the North Dakota Badlands and the Little Missouri River Valley 2016) conducted by the Covenant Consulting Group (CCG), an assessment partially funded by the Forest Service. It is inconceivable that this body of work was not used to inform SEIS process... CCG focused on four key sectors to solicit ideas, namely ranching, oil industry, government agencies, and conservation and recreation groups. The report concludes with three recommended strategies to achieve the project's goal of developing mineral resources with responsible stewardship of the Badlands: 1. A collaborative process including all parties; 2. Regulatory and statutory changes; and 3. A landscape-level pilot project that includes all parties. BHA is concerned that the CCG assessment has played little or no part in the SEIS oil and gas process. BHA recommends that the Forest Service: 1) review the CCG assessment, 2) determine which issues should be addressed in a new alternative, and 3) act on the report's recommended strategies. If the Forest Service is committed to using best management practices and new technology, it is paramount the Service engage in a collaborative process to inform its decision. A collaborative process will benefit the Service, the public and stakeholders.

Comment: After CCG released the stakeholder assessment, the Badlands Advisory Group (BAG) was formed in August 2016. Recommendations from the assessment included the development of an advisory committee to identify and work out the practical details of the assessment's recommendations. The

original assessment found that many of those interviewed felt accessing data on oil development was difficult and communications between oil companies, government agencies, and landowners was sometimes lacking. BAG's objectives include: 1) think big picture at a landscape level, 2) prioritize the key issues that are most important and achievable, and 3) identify those practical, achievable action steps that would promote land stewardship. BHA believes these objectives should align well with Forest Service objectives and recommends the Service collaborate with the BAG to develop an alternative considered in detail that achieves mutual goals.

Response: The Forest Service encourages the formation of multi-stakeholder collaborative groups and is committed to working with any group that comes forward. Nothing prevents the Badlands Advisory Group from formulating and proposing its own alternative, however, the Forest Service cannot accept advice from any group that is not open to the public without violating the Federal Advisory Committee Act.

Inadequate Range of Alternatives

#11-1, 11-2, 15-46, 15-56, 18-3, 24-1

Comment: We are not satisfied with the range of alternatives offered. Considering the magnitude of potential development and the significance of this belated opportunity to address impacts, we find the alternatives as outlined in the Draft SEIS without adequate relief.

Comment: BHA does not believe the Forest Service has developed a reasonable range of alternatives to address changed conditions and new technology. Council on Environmental Quality regulations requires a reasonable range of alternatives.

Response: The agency is not required to consider "every conceivable alternative" (Kentucky ex rel. Beshear v. Alexander, 655 F.2d 714, 718 (60, Cir. 1981).) Issues identified during scoping and management concerns of the DPG interdisciplinary team were used to develop an alternative to the proposed action (alternative 1). Discussion of these issues resulted in alternative 3. Alternative stipulations proposed in public comments on the draft SEIS were fully considered by the interdisciplinary team. Some of these comments resulted in additional modification, specified as alternative 3B, with new or revised stipulations and lease notices. Others were considered, but not analyzed in detail. See chapter 2 in the FSEIS. The Grasslands supervisor requested complete analysis of all stipulations in alternative 3/3B, to provide full comparison and the maximum decision space.

#21-8

Comment: Alternative 3 does not go far enough to provide a comprehensive review of all remaining leasing. It continues to address oil and gas development in the badlands on a lease-by-lease basis, which does not satisfy NEPA's requirement to consider the direct, indirect, and cumulative impacts of a proposed action. For this reason and those discussed above, NPCA believes that the USFS's preferred alternative, Alternative 3, is unacceptable and requests a more robust preferred alternative that is fully compliant with the requirements of NEPA.

Response: While stipulations are applied on a lease-by-lease basis, the analysis in the SEIS addresses the overall pattern of the effects of stipulations on the landscape, and not by individual lease. The ground disturbance effects of oil development are considered as indirect effects (those that occur later in time) that are reasonably foreseeable, given the 10-year right to develop that is conferred by the lease contract. Cumulative effects, considering non-federal oil and gas leasing and associated other development, is addressed in each section of the SEIS. Site-specific NEPA analysis and decision occurs when the lessee

submits a Surface Use Plan of Operations that includes specific locations for well-pads, pipelines, and other infrastructure.

Stipulations and Lease Notices

Stipulation flexibility

#11-19

Comment: Flexibility must be built into stipulations and mitigation practices that allow for changes in species habits, habitat and patterns due to both oil and gas disturbance and climate change.

Response: Flexibility is built into stipulations through the application of waivers, exceptions, and modifications. Conditions of approval are designed to enforce the standards and guidelines of the grasslands plan and can change and evolve as conditions warrant.

Application of timing limitations

#15-54

Comment: Page 126: The DSEIS recognizes that the timing limitations or APD permit only apply during oil well development and not during production. Admittedly then this does not alleviate disturbance impacts to either wildlife or recreation except during drilling.

Response: The commenter is correct. Timing limitations do not apply to operations and maintenance. To not allow wells to operate and not allow maintenance after being drilled is both impractical and unsafe. The industrial disturbance during drilling and completion (noise, traffic, etc.) is substantially greater than during operation and maintenance. Site specific impacts are further analyzed in the exploration and production stage environmental analysis.

Clarify number and type of stipulations

#15-5

Comment: Page 11: The DSEIS refers to three types of stipulations, yet six stipulations are listed; NSO, controlled surface use, timing, timing only for construction and installation, stipulations based on resource concerns (i.e., 40% slope), and stipulations based on location in a Management Area.

Response: Within the three major types of stipulations (no surface occupancy, controlled surface use, and timing limitations) variations occur based on application methodology and the objective of the stipulation. No surface occupancy for slopes greater than 40 percent vs. for sage-grouse priority habitat represent different objectives, not different types of stipulations. Stipulations that are specific to a management area are based on allocations in the grasslands plan, but still fall within the three major types of stipulations. Timing limitations always apply only to construction, drilling, and completion and not to operations and maintenance. Once a well goes into production, the operation must generally continue until the well is depleted, and cessation of maintenance would pose a danger of property and environmental damage.

Timing of lease notice and APD

#15-7

Comment: T/E species, cultural and paleontological resources, and riparian areas are listed as lease notices, to be addressed if discovered. The NDWF suggests these should be lease stipulations listed prior to the APD process, when it becomes too late to address or avoid such impacts.

Response: As lease notices these are, in fact, listed prior to the APD process, and allow the Forest Service and BLM to require that the operator conduct current surveys in the process of obtaining a permit to drill. To change these requirements to stipulations, we would need to have complete survey data for all available parcels, so as to know whether or not cultural and paleontological resources are present. Such surveys are not feasible, given budget and personnel constraints. For threatened, endangered, and sensitive species, even if full surveys were completed, habitat occupancy could change and we may miss some parcels that should be covered by any such stipulation or include parcels where the species is no longer present. Current surveys just prior to planned development are by far the most effective approach to managing impacts to species of concern.

Design Features

Site-specific design features

#1-4, 1-5, 1-8, 4-2

Comment: Projects that involve construction, drilling, completion and/or production of crude oil or natural gas wells should select locations that minimize the potential for environmental damage during development of the well and in the event of a spill, restrict fluids from reaching surface waters. Well placement should avoid close proximity to drainage areas and steep slopes. Environmental damage can be reduced by developing a spill response plan that emphasizes rapid deployment of prepositioned assets necessary to contain spills and subsequent cleanup. Proper surveillance and monitoring of pipelines is necessary for the early detection of leaks.

Projects that involve construction of pipelines should select locations that minimize the potential for impacts to human health and the environment during and after construction by avoiding, when possible, source water protection areas and sensitive surface and groundwater environments. Additionally, when possible, pipeline routes should select areas with natural barriers to both surface and ground waters.

Any fill material placed below the high-water mark must be free of topsoils, decomposable materials, and persistent synthetic organic compounds (in toxic concentrations). This includes, but is not limited to, asphalt, tires, treated lumber, and construction debris. The Department may require testing of fill materials. All temporary fills must be removed. Debris and solid wastes will be removed from the site and the impacted areas restored as nearly as possible to the original condition.

#18-8

Comment: BHA understands that no new stipulations can be attached to a leased parcel. BHA believes, however, that a high priority should be placed on negotiations when a leaseholder wishes to develop a lease to ensure that surface impacts are minimized as much as possible. Surface impacts from oil and gas development, including pad size and access roads should be kept to an absolute minimum. Conditions of approval should be used to take advantage of technology and siting of well pads, roads and related facilities to reduce impacts to wildlife and scenic resources. Operators must comply with all conditions of

approval specified in a permit to drill. These conditions should be subject to public notice and comment and should include public input through on-the-ground reviews. With respect to roads, they should either be identified as open or closed for public use. Closed roads should be gated and signed as such. Easements through private property should be in the U.S. Government's name, providing both public and administrative access.

Response: These comments concern the site-specific application of stipulations, best management practices, and the standards and guidelines of the Dakota Prairie Grasslands Land Management Plan. Conditions of approval attached to the Application for Permit to Drill and the Surface use Plan of Operations are put in place during the site-specific analysis of the APD and SUPO. Please see attachment A Steps to Approving Oil and Gas Leasing on National Forest System Lands at the end of this document and Environmental Protections Incorporated into Drilling Permits and Plans of Operation on the project website. There are no community or non-community source water protection areas within the project area, as defined by the state of North Dakota.

Oil and Gas

Non-federal surface and/or mineral rights surrounded by No Surface Occupancy (NSO)

#20-1

Comment: Of primary concern are tracts with surface rights and/or mineral rights owned by the state of North Dakota or by private parties that will be completely surrounded by lands managed by DPGL as No Surface Occupancy (NSO). The NSO designation potentially prevents access to the state and private lands for oil and gas development denying them the economic recovery of oil and gas and enjoyment of the greatest possible good from these vital natural resources. The NDIC strongly recommends that all newly proposed NSO in Alternative 3 of the DEIS include robust waivers, exemptions, and modifications as follow to allow upgrading of existing primary roads, secondary roads, or trails on DPGL managed surface to allow access to state and private lands for oil and gas development: **Waivers.** Upon request of the lessee, the authorized officer shall evaluate whether access to state and private lands for oil and gas development can be provided by upgrading of existing primary roads, secondary roads, or trails on DPGL managed surface. If the evaluation determines that access to state and private lands for oil and gas development can be provided by upgrading of existing primary roads, secondary roads, or trails on DPGL managed surface, the authorized officer shall grant a waiver to this stipulation. **Exceptions** The authorizing officer may grant an exception to this stipulation if the operator submits a plan that adequately mitigates impacts of the proposed action. **Modifications** Upon request of the lessee the authorized officer shall evaluate whether access to state and private lands for oil and gas development can be provided by upgrading of existing primary roads, secondary roads, or trails on DPGL lands. If the evaluation determines that access to state and private lands for oil and gas development can be provided by upgrading of existing primary roads, secondary roads, or trails on DPGL lands the authorized officer shall modify the boundaries of the stipulated NSO area to allow access to state and private lands for oil and gas development.

Response: Many of the NSO stipulations already include waivers, exceptions, and modifications. Within inventoried roadless areas, roads that exist at the time of leasing have a controlled surface use buffer that allows for well pad placement adjacent to the road. Reconstruction of unclassified roads (those not part of the Forest Service transportation system) is not allowed by the 2001 Roadless Rule, except for a road needed pursuant to reserved or outstanding rights (36 CFR 294.12). Private property rights may constitute

such an exception, depending on the specific circumstances, which would be assessed with the Surface Use Plan of Operations.

Authority for Forest Service surface over non-federal minerals

#22-4

Comment: The DSEIS makes a misleading statement that "[m]ineral estate rights override surface estate rights" (p.4). The USFS makes this summary conclusion in error, without acknowledging that North Dakota law provides some recourse under the Surface Owner Protection Act of 1979, which places various statutory requirements on mineral estate owners vis-à-vis surface estate owners. It is critical that USFS acknowledge that the primacy of mineral ownership has certain qualifications and it is the obligation of the federal agency managing surface resources to take action against damaging activity when warranted. The public needs to be assured that mineral estate owners will respect federal public lands in accordance with state law and that the USFS will use its authority to hold accountable mineral estate owners who violate the law.

Response: The statement on pg. 4 of the DSEIS refers only to the ability of the Forest Service to impose our stipulations on oil and gas developers. When the mineral estate is non-federal, the decision to allow oil and gas leasing or development does not rest with the Forest Service or the BLM, and neither an Application for Permit to Drill or a Surface Use Plan of Operations is approved by the federal agencies. When illegal damage occurs on Forest Service land, whether from oil and gas activities or other activities, we endeavor to hold the offending parties accountable and to ensure the damage is repaired.

This analysis concerns oil and gas leasing of federal minerals under Forest Service surface. We provide the explanation so that the public may understand where the decision applies or does not apply.

Additional information on development trends on all land ownerships

#22-5

Comment: Further discussion is necessary in the DSEIS to explain recent trends in oil and gas leasing to the public. Figures 5 and 8 reveal that Applications for Permits to Drill have almost entirely ceased on federal lands; only 29 wells were drilled within the Little Missouri Grasslands in 2017, and all of them were on non-Forest Service lands. This statistic gives the public the impression that lands in the planning area are not being explored. But it would be helpful to have information on whether development has been driven instead to adjacent state or private lands. More explanation is needed to give the reader a sense of the current pressures on the landscape as a whole and not just the specific federal lands at issue in the DSEIS.

Response: The figures referenced come from the Reasonably Foreseeable Development Scenario, which was completed in mid-2017. Please see Oil and Gas Trends, Production and Demographics in the FSEIS (pg 47). A total of 117 wells were drilled by the end of 2017, of which 11 were on Forest Service land, and a total of 166 in 2018 (34 on Forest Service). On State lands within the LMNG boundary, no wells were drilled in 2017 and 10 wells were drilled in 2018.

Socioeconomics

Economic effects of alternative 3

#7-2, 25-2, 26-3, 30-4, 32-19

Comment: The potential economic impacts from adopting the proposed restrictions in Alternative 3 are substantial, and would be felt by the federal, state, and local governments as well as potential lessees and the many industries and local businesses who indirectly benefit from increased energy development. The graphic below presents a conservative estimate of the full scale of development and economic activity that would be impacted by increased restrictions in just one specific zone of the planning area. These calculations include both wells that are on Forest Service lands and adjacent wells that would be included in drilling spacing units and therefore impacted by any restrictions on the USFS wells. Although the restrictions would not preclude all or even most of the economic activity calculated above, they are likely to impact a significant portion. The direct and indirect benefits that are at risk from increased stipulations number in the billions of dollars, illustrating the importance of right-sized management prescriptions.

		North of T138N	Comment
Development	Drilling Spacing Units (DSU's)	269	Standard North Dakota 1,280 acre spaced horizontal drilling unit for the Bakken Formation
	Acres affected (includes leased, unleased, fed, state, fee)	338,560	All acres in the 269 DSUs
	Undrilled horizontal Bakken wells	1,058	Conservatively spaced at 4.0 well density development
Investment	Total Capital Expenditure	\$7.4 bil ion	AFE at \$7.0MM per well
	Tangible	\$1.0 billion	Subject to ND sales tax
	Intangible	\$6.4 billion	Local property and business owners that also pay taxes
Resource	Total Oil Production, bbls	634.8 million bbls	35-yr type curve of 600 MBO/well
	Total gas production, MCF	507.8 bcf	GOR of 800 scf/bbl
	Gross O&G revenue	\$33.8 billion	Avg realized wellhead price of \$50/bbl and \$4/mcf wet gas
Direct Payments	State sales tax	\$52.9 million	5% on tangible capex
	State Production Tax Payments	\$3.1 billion	10% per bbl and 10% MCF production..
	Royalty payments	\$5.9 billion	Average 17.5% royalties to fee, state, and federal mineral
Operating Costs	Life of well operating cost	\$7. 9 billion	Approx \$11/boe lifting costs paid at the lease level Including company labor

*Northern Great Plains Management Plans Revision
Final Supplemental Environmental Impact Statement for Oil and Gas Leasing*

		North of T138N	Comment
	# New Local Employees	80	Based on typical staffing ratios, field level only
	Annual Payroll	\$7.6 million	Based on \$95,000 average annual salaries with burdens
	Federal Corp Income Tax	±\$1.9 billion	Variable depending on tax structure of the participating companies
Miscellaneous	Income tax paid by srvc providers	\$\$	Both capital and Opex related
	Income taxes paid by royalty owners	\$\$	Fee mineral owners
	Income taxes paid by employees	\$\$	Direct employment for operation of wells
	Secondary economic beneficiaries	\$\$	Community at large from increased employment

NOTE: This table estimates economic activity for a single zone of the Bakken pool only. Not included is horizontal activity for additional Bakken zones, downspacing and section line wells, horizontal Mission Canyon development, nor vertical Birdbear/Nisku/Red River development.

Response: The table presents a generalized inventory of the economic activity associated with this zone for all ownerships. We have no way of assessing the accuracy or precision of the inventory. However, there is no assessment or indication of the economic impacts that would supposedly result from the changed stipulations in alternative 3 or 3B. We have completed an analysis of NSO stipulations and have determined that no federal mineral estate with Forest Service surface would be more than two miles from a parcel without NSO stipulations, and most would be less than one mile. Therefore, we conclude that no parcels would be inaccessible to drilling. All mineral owners have some limitations and requirements for how surface oil and gas operations are conducted, which necessarily affect the costs compared to having no limitations. Such operational costs are needed to maintain a multiple use landscape that serves many different users and ecological purposes.

It is not clear that the total (lifetime) economic estimates provided in the table above suggest a significantly different economic effect than the annual estimates made in the existing analysis. However, further note has been made in the analysis as to the increased likelihood of reduced economic activity from alternative 3, relative to alternative 1. This issue is also addressed in the oil and gas analysis section in the SEIS.

Economic impacts analysis is inadequate

#12-3

Comment: 1. The Socioeconomic Specialist Report misrepresents the economic impact of oil and gas leasing in ND by stating: In fiscal year 2016, the 699,600 acres of total federally leased land on the Little Missouri National Grassland yielded a total of \$414,189,240 in oil and gas sales, a total of \$47,386,258 in royalty revenue, and a total of \$321,113 in rent revenue (ONRR 2016). Twenty-five percent of these royalties and rent payments, totaling \$11,846,565, were then returned to the state of North Dakota by the Forest Service for use towards public schools and roads (Hoover 2015). These royalties make up 0.18% of the FY16 North Dakota State Government Budget (North Dakota State Government 2017). This

paragraph of the socioeconomic report implies that the federal funds received for the use of schools and roads are insignificant and a mere a drop in the bucket of public funding in North Dakota. While the calculation of 0.18% may be true, the conclusion is completely misleading and false. The 25% royalty and rent payments do not go to the State of North Dakota, the payments are made directly to the counties as part of the Bankhead-Jones land utilization payments. These funds are a significant portion of Billings County's budget and the other county budgets within the Little Missouri National Grasslands. For example, in 2016, Billings County received \$4,641,618, of this \$350,000 was distributed to the Billings County School District and \$4,291,618 was retained for county roads. The federal payment was 35% of Billings County's Road and Bridge budget. The percentage of funding that the Bankhead-Jones payments contribute to the county road and bridge needs fluctuates from year to year, but it ranges anywhere from 33% to 95%. The average contribution from 2002 to 2017 was 53%. The County requests that the SEIS include this information in the SEIS to correctly identify the impacts oil and gas development has on the local government budgets, not just the State's budget.

Response: The final socioeconomic report has been modified to reflect these important considerations regarding Billings and other counties within the project area. We recognize that, though the proportion of the entire state budget may be relatively small, the effect on local government budgets is hard to overstate.

Economic effects from changes to recreation and grazing industries

#11-21

Comment: The DSEIS would also benefit from further economic analysis taking into consideration the costs of reduced opportunities for traditional users, for example visitors and agriculture, and the impact of that reduction on surrounding communities.

Response: Visitor use on the Little Missouri National Grasslands is only expected to increase with increasing population resulting from oil and gas leasing and all the associated developments. Exact figures cannot be determined. Grazing animal unit months (AUMs) are expected to decrease 0.5 percent, equal to 1,580 AUMs based on the 20-year average. In May 2019, the average retail value per AUM (not the rate charged by the Forest Service) in the counties covered by the project ranged from \$12.10 to \$17.50¹². The values of lost AUMs would eventually range from \$19,118 to \$27,650 once all 620 wells predicted by the Reasonably Foreseeable Development Scenario had been developed.

Air Quality and Greenhouse Gas Emissions

Dust control

#28-6

Comment: We recommend that any emission reduction strategies included in the emission inventory and air quality analysis be carried forward as stipulations. One such measure is the construction of roads that have been surfaced (as with scoria) and watered or treated to reduce dust generated by traffic and wind erosion.

¹² "New record set for North Dakota pastureland values, cash rents." Dakota Farmer, May 3, 2019. Accessed at: <https://www.farmprogress.com/land-management/new-record-set-north-dakota-pastureland-values-cash-rents> May 4, 2020

Response: Fugitive dust controls are primarily under the authority of the State of North Dakota and road permits are issued by the counties. Dust control is also addressed in the conditions of approval for the APD and SUPO. See the document Environmental Protections Incorporated into Drilling Permits and Plans of Operation on the project website.

#28-7

Comment: We recommend that the USFS consider requiring that operations use closed loop drilling, which would reduce emissions associated with heavy-duty truck trips and have co-benefits for water resources. Avoiding the use of highly variable sources of toxic air pollutants during completion and production operations, such as pit flares, is another best management practice USFS may consider.

Response: Requiring additional emissions controls would be a State of North Dakota and BLM decision and is beyond the scope of the SDEIS and Forest Service authority.

Additional air analysis

#28-2, 28-3, 28-9

Comment: We note that recent RMPs prepared by the BLM in Montana (e.g. 2015 Miles City Office RMP) have included a lease notice notifying the lessee or operator that prior to project-specific approval, additional air resource analysis may be required. We recommend the USFS consider whether such a lease notice is appropriate for the Grasslands.

Comment: The 0.25-mile buffer was developed based on an assumption in the model that reduced emission equipment meeting Tier 4 emission rates will be used. We did not find a corresponding stipulation that would require the use of Tier 4 engines. We recommend that the USFS consider opportunities to use Tier 4 drilling and fracturing pump engines to ensure the 0.25-mile buffer is protective. Recent Resource Management Plans (RMPs) prepared by the BLM in-Montana (e.g. 2015 Miles City Office RMP) have required the use of these lower-emitting engines. Using lower emitting equipment would also be expected to reduce regional impacts that could affect AQRVs at Theodore Roosevelt National Park and other areas assessed in the analysis.

Response: A lease notice in alternative 3B would require modeling at the permit stage for any operators proposing to use equipment that does not clearly meet the current emissions standards required by the EPA for non-road diesel engines, as verified and enforced by North Dakota DEQ. Currently Tier 4 equipment is required; the lease notice refers to whatever standards are current at the time of leasing, and so would remain current even if standards become more restrictive.

Modeling for NO₂ and NO_x

#25-16, 11-13, 25-12, 25-22, 25-23, 25-24, 25-25, 26-9, 26-10, 26-11, 28-4, 30-13, 30-19, 30-20, 30-21, 30-22, 32-6, 32-7, 32-8, 32-10, 32-11, 32-12, 30-15

Comment: Specific Concerns with Anderson and Dzomba 2014 Near-Field Nitrogen Dioxide Modeling. NP has several significant concerns with the way in which the nitrogen dioxide modeling results are being used, in part, as rationale to support the lease stipulations in Alternative #3 and the suggestion that a quarter mile fenceline buffer may be appropriate. The Draft EIS Air Quality modeling analysis is documented in the 2014 USFS report "Near-Field\Visibility Air Quality Impact Analysis for the Oil and Gas Development and Leasing Activities on the Little Missouri National Grassland", which is referred to hereafter as "Anderson and Dzomba, 2014." Because of the issues identified below, the proper, best, and

only scientifically supportable course of action is to address the anticipated air quality concerns raised by this Draft EIS and the Anderson and Dzomba 2014 modeling at the permitting stage.

Response: The North Dakota Department of Environmental Quality has primary authority for regulating air quality. In a meeting on November 11, 2018, agency officials shared with the Forest Service their concerns that more updated modeling methodologies may yield different results, and that the modeled exceedances are too marginal to serve as a threshold for action. Actual monitoring conducted by the department indicates that high numbers for volatile organic compounds occur only in very close proximity to sources. In the context of prevention of significant deterioration, the department does not consider temporary sources.

No fence line buffer for air quality is included in any action alternative. Rather a timing limitation prevents other than ongoing maintenance and operations within 0.25 miles of developed recreation sites between May 1 and December 1, to prevent undue industrial impacts of noise, air quality, and general disturbance to recreationists. The only difference between this revised stipulation in alternative 3 and the existing stipulation in alternative 1, which has been in place since 2003, is named recreation sites vs. sites described by development scale.

A lease notice in alternative 3B would require modeling at the permit stage for any operators proposing to use equipment that does not clearly meet the current emissions standards required by the EPA for non-road diesel engines (as verified and enforced by North Dakota DEQ).

#25-20, 25-17, 25-18, 25-19, 25-20, 25-21, 25-22, 25-24, 30-16, 30-17

Comment: The Draft EIS's generalized assumptions and input data used to characterize oil and gas exploration, development and operation activities is generally overly conservative. Specifically, the use of an NO₂-to-NO_x in-stack ratio of 0.1 for all modeled sources. Model-predicted impacts of nitrogen dioxide is highly sensitive to the use of in-stack NO₂-to-NO_x in-stack ratios and the source mixture included in the modeling analysis typically has a wide range of values, as is shown in the references cited by Anderson and Dzomba (2014) on page 6. A value of 0.17 is very high for hydraulic fracturing and drilling engines, the sources that likely are contributing the most to the model predicted impacts. Engine manufacturer and field test data can often support values closer to 0.05.

Response: We concur with the comment. We acknowledge that the analysis documented in Anderson and Dzomba (2014) is inherently general and likely conservative in nature. The Forest Service had no site-specific information or equipment lists to develop the analysis from because this is the leasing stage which predicts a reasonably foreseeable amount of development in the Little Missouri NG but does not specify exact well sites. We researched contemporaneous analyses being conducted to draw inferences of typical equipment used in each phase of the process and reviewed relevant literature to develop ISR's, load factors, hours of operation, well pad configuration, and source dispersion parameters. The modeling scenarios analyzed represented our collective best judgement of a typical operation for North Dakota in 2014. We further acknowledge that these issues could potentially be addressed with use of newer version of AERMOD along with site specific information at permitting stage.

#28-1

Comment: The air quality analysis presented in the Draft SEIS predicts elevated nitrogen dioxide (NO₂) and particulate matter (PM) concentrations near the emission sources, particularly during fracking and completion operations. The analysis predicts impacts to air quality related values (AQRVs) including visibility and deposition at the Theodore Roosevelt National Park. We also found that some components of the analysis do not align with the EPA's Guideline on Air Quality Modeling (Guideline), which could

reduce the representativeness of the analysis. For example, the modeling excluded receptors in areas with public access, the model results were not assessed in a form consistent with the Guideline, and hazardous air pollutants were not assessed in the project area. As a result, the model may under-predict impacts or may not disclose all the potential impacts to air quality in the project area. To address possible impacts to human health from elevated NO₂ and PM concentrations, the Draft SEIS proposes to retain a stipulation establishing a 0.25-mile buffer around developed recreation sites from May 1 to December 1. We are supportive of this proposed stipulation because the approach should reduce the potential for health impacts and address our concerns with the air quality analysis.

Response: The timing limitation around developed recreation sites is carried forward from current management and is designed to mitigate disruption of recreation experiences by noise and industrial activity, irrespective of concern for any temporary exceedance of NAAQS. This stipulation, coincidentally, also helps reduce public exposure to reduced air quality during fracking operations.

We acknowledge the EPA comment and concur with aspects of the comment. At the time the analysis was conducted for this oil and gas leasing analysis, neither specific development site locations nor specific equipment lists were known. As such, there are inherent limitations on the scope of analysis that can practically be conducted as well as conformance of methodology to Guideline recommended procedures. Additionally, it is important to note that while strict adherence to the Guideline on Air Quality Models is not a specific regulatory requirement of NEPA, we tried to maintain conformity with the regulation, current EPA modeling policy, and sound modeling practices wherever possible to lend credence to the analysis. However, given the hypothetical nature of the modeling, judgements must be made when adapting modeling procedures to conform to Guideline recommendations.

EPA identified the exclusion of certain receptors from the modeling analysis as an example. In Anderson and Dzomba (2014), we acknowledged an assumed 300-m exclusion beyond the plant area boundary before receptors were placed in the modeling analysis, so the EPA is correct that certain areas were excluded from the calculation of concentrations in the modeling analysis. It was envisioned this exclusion zone beyond the simulated site would be reflected in surface occupancy requirements as a measure to preclude public exposure the higher NO₂ concentrations predicted by the hypothetical scenario. Preclusion to public access would meet the intent of an area not being considered ambient, and thus not placing receptors in those areas would conform to guideline procedures.

With respect to the air quality related values analysis performed, this also falls outside of the specifics of the guideline and is governed under the Federal Land Manager's guidance per paragraph C to subsection 6.2 of the guideline. For example, a deposition analysis was not performed because deposition is function of site-specific factors such as land use, and meteorology that governs transport from source to receptors. Thus, we deemed it impractical to conduct such an analysis because specific site locations are necessary for characterizing source – receptor relationships (transport) and deposition. The visibility analysis we performed reflected the paucity of site-specific information with respect to Theodore Roosevelt Class I area and we adapted the analysis methodology to try to address disclosure of potential plume blight from development.

Modeling and meteorological data

#25-19

Comment: Similarly, the meteorological data selected for use are not current and potentially not adequately representative of the large area covered by the LMNG. As stated on page 4 of Anderson and Dzomba, 2014 regarding the selection of the meteorological inputs: "[f]ive years (2004-2008) of surface

meteorological data were obtained from the NDDH ftp site (hereafter known as ftp site) for use in the AERMOD analysis". The period used for the meteorological data is over ten years old. Pre-processed surface data and concurrent background concentrations data (including ozone) is available from NDDH for the period 2009-2014. The selected meteorological data is also from some distance away from the northern and southern areas of the LMNG and other sites may be more representative. USFS also has not disclosed the inputs provided to AERSURFACE regarding selection of wet, dry, or average conditions. These inputs can affect the pollutant dispersion in the AERMOD results. These same general concerns extend to the application of background concentrations. Application of temporally varying background is now a commonly accepted approach to estimate 1-hour NO₂ impacts whereby more current versions of the AERMOD model incorporate temporally varying background concentrations to calculate total impacts directly in the model. Again, the best way to address these deficiencies is to update and improve the meteorological and background data, as necessary, during the individual permitting process.

Response: We disagree with the comment. We used the most recent five-year dataset available to us through the NDDH ftp site at the time the analysis was conducted in 2014. The analysis technically meets the requirements of paragraph E to subsection 8.4.2 of the Guideline. In the absence of knowing specific development locations, we were not prepared to conduct a bracketing analysis using multiple meteorological sites that could be considered "representative" for multiple areas under consideration for leasing. Likewise, the AERSURFACE analysis of land use is considered hypothetical and we acknowledge this can influence dispersion, but we were not prepared for analysis of multiple sites in the absence of knowing where leasing might occur. We believe the comment can most effectively be addressed by site specific modeling at drilling permit stage per our response to modeling for NO₂ and NO_x above.

Flaring and greenhouse gas emissions

#30-14, 32-9

Comment: the NDPC sees no applicable evidence there is a need to amend the Draft EIS, especially when it comes to GHG's. There are already stringent regulations in this regard and the industry is bringing down GHG's and are expected to continue to lessen. In terms of GHGs, it is also critical that new or revised lease stipulations not discourage or disincentivize increased gathering and processing infrastructure. One unintended consequence of Alternative #3 is to make it more difficult to build interconnected gathering infrastructure, potentially exacerbating flaring volumes. Thus, as with the remainder of the air quality comments, any concerns about GHG impacts are better addressed through site-specific, permitting processes and the continued lease stipulations under Alternative #1.

Comment: The Draft SEIS's discussion of greenhouse gas (GHG) emissions is similarly lacking. The Draft EIS states that "GHG emissions per well are expected to decline as a result of declining methane flaring as a percentage of production," and acknowledges that "large fluctuations in flared gas volume create uncertainty in making greenhouse gas emissions estimates from oil production sources." GHG emissions will continue to be further reduced through existing regulatory frameworks and consent decree requirements in North Dakota, including methane reduction co-benefits from Leak Detection and Repair Programs (LDAR) (required or implemented as BMPs), use of low- or no-bleed pneumatics, applicable closed vent system requirements, and increased control requirement on storage vessels, among others. Unfortunately, the Draft SEIS remains silent on these measures.

Response: Increased use of natural gas in the electricity sector applies to oil and gas leasing in the Bakken-Three Forks field only insofar as methane is captured and not flared. Rates of flaring are higher and capture of methane is lower in North Dakota than in other oil-producing states. Thus, the natural gas

being produced from much of the development in Bakken-Three Forks augments greenhouse gas emissions, rather than offsets them - and methane is a more potent greenhouse gas than carbon dioxide.

The figures on flaring and the release of methane have been updated in the final SEIS to include information through 2019. New and emerging technologies to reduce methane leaks are acknowledged.

Several recent BLM fossil fuels development decisions were remanded because of lawsuits due to a lack of analysis and disclosure about downstream, or end use, greenhouse gas emissions. An analysis of the greenhouse gas emissions from both production and the downstream use of the expected oil and gas production (full life cycle) is thus required to address these court orders and is included in the final SEIS.

#25-15, 30-15

Comment: The United States has reduced greenhouse gas emissions more than any other industrialized country. This information is important to keep in mind when talking about reducing emissions, keeping reality in perspective. As shown below, this information is largely caused by the reductions of CO₂ from switching previous modes of energy to cleaner burning natural gas. This is important to recognize when deciding on these cases that the United States has been reducing its emissions hugely over the past 15 years. Especially seeing as these changes have been made through advancements made in the oil and gas industry and in development of America's natural resources. Energy Information Administration (EIA) data shows over the last decade that natural gas has delivered a 2,360 million metric ton reduction in carbon dioxide equivalents, 61% of the fuel-switching reductions in the electricity sector, while wind and solar reduced only 1,494 million metric tons, or 39%. The NDPC would like to reaffirm our commitment to protecting the environment and keeping air quality standards high, but the proposed stipulations and regulations of Alternative #3 do nothing to help our industry make technological innovations to help further lower emissions. Instead these regulations put undue burden on the industry forcing very specific means to get to solutions already in line with our values. In other words, the industry wants to lower emissions and keep them at safe and reasonable levels, but the regulatory burdens that inhibit making this goal possible, come in the form of generic requirements provided in Alternative #3 instead of dealing with these issues on a specific case by case basis as in Alternative #1. Despite the reality that the oil and gas industry has been doing more than renewable energy in reducing CO₂ emissions, our industry is met with regulations and stipulations. NDPC is asking that our members have the freedom to continue innovating and driving emissions even lower. Our industry has a four-decade record of success reducing methane emissions. Regulations and stipulations that claim to be about the environment should allow the industry the ability to succeed, not tie energy producers up in further red tape.

In terms of GHGs, it is also critical that new or revised lease stipulations not discourage or disincentivize increased gathering and processing infrastructure... One unintended consequence of Alternative #3 is to make it more difficult to build interconnected gathering infrastructure, potentially exacerbating flaring volumes.

Response: Concerning the comment that greenhouse gas impacts are better addressed through site-specific, permitting processes and the continued lease stipulations under Alternative #1, agency guidance and recent court rulings direct the LMNG to address the effects of the proposed project on total life-cycle greenhouse gas emissions and the effects on the climate change from the proposed project.

Methane is a strong greenhouse gas with proportionately large effects on climate change. Total flaring in the Bakken has increased in recent years. Reductions in flaring as compared to the amount of oil produced do not eliminate adverse effects. We are required to assess cumulative impacts, rather than just the trend of flaring relative to production. Though the gas capture goals set by the State of North Dakota have

increased, the industry has not always met those goals. In June 2019 flaring increased to 687 million cubic feet per day and, though the target was 12 percent, the actual percentage of flaring was 24 percent, as reported by the [Bismarck Tribune](#)¹³.

Stipulations in alternative 3 and 3B are no more or less generic than those of alternative 1. Stipulations are always applied to specific lease parcels, and many existing stipulations from alternative 1 continue in alternative 3 and 3B. Waivers, exceptions, and modifications that accompany stipulations are applied during review of the Surface Use Plan of Operations when the site-specific details of development are proposed. It is unclear how alternative 3 or 3B make it more difficult to build interconnected infrastructure. In trying to achieve the least environmental impact, the Forest Service will generally encourage the use of existing disturbance for well pads, roads, and utility service for new developments. We recognize that such a pattern of development is often less costly to operators and benefits industry, as well as the environment.

#11-13, 11-15, 15-18, 31-4

Comment: Flaring of produced gas is discussed but dismissed as under the authority of the ND Department of Health, Industrial Commission and the EPA. BCA finds this a weak position considering the range of impacts to the Grassland. Air quality is not the singular issue at stake. Disturbance to wildlife, dramatic and avoidable impacts on scenic integrity, waste of a federal natural resource with economic consequences, public health and safety are all additional aspects of USFS management that could and should be used to limit or deny flaring on public lands. We would also point out that the most current ND Department of Mineral Resources data quoted in the DSEIS (page 49) is from June of 2017. The volume of natural gas produced and flared has increased dramatically since that time, with gas capture goals not being met and flared gas volumes nearly two and a half times that reported in June 2017 (<https://www.dmr.nd.gov/oilgas/directorscut/directorscut-2018-12-14.pdf>). In April of 2018 the NDIC further relaxed their flaring policy in favor of industry and to promote expanded development, gas gathering capacity is currently inadequate and likely to remain so despite projected infrastructure improvements, and the NDIC continues to manage by incentive rather than rule of regulation.

Response: Flaring emissions were included in the far field modeling study used in the SEIS and are included in the greenhouse gas emissions analysis. The visual impact of flaring is also discussed in the sections on wildlife and recreation effects.

The North Dakota Industrial Commission's target for gas capture is 88 percent for November 2018 through October 2020, increasing to 91 percent in November 2020. Actual percentages are often less than the target when gathering infrastructure or gas processing plants are not running at full capacity. The Industrial Commission can regulate the amount of oil production, including to reduce the waste of natural gas. See [North Dakota Century Code Chapter 38-08](#). The BLM has sole authority to regulate down-hole operations, so from both a logistical and regulatory perspective, the Forest Service has no practical capacity to limit flaring, except by encouraging the concentration and interconnection of gathering infrastructure. See also the responses above.

¹³ Stromme, T. 2019. Editorial: State let flaring goals slip away. Bismarck Tribune, August 22, 2019. Bismarck, ND. Accessed April 6, 2020.

Mitigation of impacts to visibility

#21-13, 21-6

Comment: Air Quality, as mention above, is negatively and cumulatively impacted by oil and gas development, and the cumulative impacts of oil and gas leasing must be more thoroughly reviewed by the USFS. Visitors to national parks and wilderness areas consistently rate visibility and clear scenic vistas as one of the most important aspects of their experience. Clean air enhances the color and contrast of landscape features, allows visitors to see great distances, and safeguards ecosystem, visitor, and public health. Particulate matter (PM), nitrogen oxides (NO_x), sulfur dioxide (SO₂) and volatile organic compounds (VOCs), which are emitted by activities associated with oil and gas extraction, are haze-causing pollutants that obscure scenic vistas in national parks by impairing a viewer's ability to see long distances, color and geologic formation. They also contribute to the formation of ozone, a pollutant that causes adverse impacts to the environment and public health. Therefore, to adequately protect air quality, the USFS must comprehensively assess the cumulative impacts from oil and gas development in the LMNG prior leasing.

Cumulative impacts to air quality and climate change are not fully addressed in Alternative 3. The DSEIS concedes that "Under Alternative 1 Little Missouri National Grasslands oil and gas development and production emissions would reduce visibility and exceed nitrogen and sulfur deposition analysis thresholds at several Class I and Class II areas". This includes visibility decreases at Theodore Roosevelt National Park. The DSEIS does not state if the stipulation changes in Alternative 3 are sufficient to mitigate these impacts.

Response: Air quality in the LMNG area is considered good and forecast to improve. No stipulations would mitigate impacts to cumulative air quality and climate change. Generally, requiring additional control measures or air quality modeling and monitoring would be a State of North Dakota and BLM decision and is beyond the scope of Forest Service authority. In order to protect air quality the FSEIS, Alternative 3B, will have a new air quality lease notice that will require the lessee/operator to use engines that were manufactured to meet current USEPA NO_x emission standards, or emits NO_x at rates less than or equal to current USEPA emission standards for non-road diesel engines. The new lease notice stipulates that if engines are used that do not to meet current USEPA NO_x emission standards, additional air resource analyses and/or near-field monitoring may be required to demonstrate compliance with the National Ambient Air Quality Standards. The additional analyses and/or near-field monitoring information may result in the imposition of additional project-specific control measures to protect air resources.

#25-14

Comment: The Draft EIS also makes passing mention of potential visibility-reducing emissions via regional haze, but nowhere discusses how the proposed lease stipulations will mitigate any potential impact. Although the visibility impacts of the cumulative oil and gas emissions scenarios exhibited exceedances in some locations (see DEIS at 47), both the cumulative nitrogen and sulfur deposition levels forecast from oil and gas activity were below critical load levels. And none of the forecast activities are estimated to cause any exceedances of prevention of significant deterioration increments. The Draft EIS does not further address the significance (or lack thereof) of these findings, nor does it connect the proposed new and revised lease stipulation restrictions to potential mitigation of "visibility" or "regional haze" impacts.

Response: No new or revised air quality stipulations have been proposed. A lease notice in alternative 3B would potentially direct operators to complete air quality modeling if their proposed equipment does not

meet current state standards. Actions taken under the SEIS are not expected to mitigate potential visibility or regional haze impacts.

Nearfield visibility analysis stayed below default screening thresholds and showed no significant reduction in visibility at Theodore Roosevelt National Park due to Little Missouri National Grassland oil and gas development and production. Far field analysis showed emissions from oil and gas activity due to Forest Service actions in the Little Missouri National Grassland were estimated to cause exceedances of the 0.5 and 1.0 change in deciview visibility thresholds at the Fort Peck, Medicine Lake, and Theodore Roosevelt Class I areas.

Climate change

#11-14

Comment: BCA finds the DSEIS analysis associated with climate change merely perfunctory. Emissions and public costs from the end-use of oil and gas produced on the Little Missouri National Grassland should be analyzed and best estimates disclosed as such information should certainly impact this leasing decision.

#21-7

Comment: NPCA also urges the USFS to fully account for the potential climate change impacts from new leasing in Alternative 3. Dr. Robert Frost, former Associate Director of Natural Resource Stewardship and Science for the National Park Service, noted in a field hearing in Colorado that "[c]limate change is potentially the most far-reaching and consequential challenge to our mission than any previously encountered in the entire history of the NPS." (<https://www.govinfo.gov/content/pkg/CHRG-111shrg52524/html/CHRG-111shrg52524.htm>) NPCA shares this concern and urges the USFS to fully account for the potential acceleration of climate change in the LMNG and THRO as a result of new leasing.

Response: The referenced document in 21-7 is from a 2009 hearing. More recent climate change information is available from many sources. Several recent federal lawsuits concerning BLM fossil fuels development decisions were remanded by the courts, due to a lack of analysis and disclosure about downstream, or end use, greenhouse gas emissions.

We have included such analysis in the FSEIS in the section Greenhouse Gas Emissions and Climate Change. However, this analysis is an assessment of the project's potential overall contribution to greenhouse gas emissions (and by extension to climate change) and is not intended as a downscaled assessment of climate change impacts at the local level. Local emissions account for approximately 10 percent of the total life-cycle emissions. Whether these local emissions have more impact on local climate change, as compared with larger systems, is unknown. We acknowledge the project will contribute to climate change; predicting those effects at the local level is beyond the scope of this analysis. See also response to #30-14, above.

Soils

Erosion and sediment

#1-6, 28-8, 28-18

Comment: Prevent the erosion of exposed soil surfaces and trapping sediments being transported. Examples include, but are not restricted to, sediment dams or berms, diversion dikes, hay bales as erosion checks, riprap, mesh or burlap blankets to hold soil during construction, and immediately establishing vegetative cover on disturbed areas after construction is completed. Fragile and sensitive areas such as wetlands, riparian zones, delicate flora, or land resources will be protected against compaction, vegetation loss, and unnecessary damage.

Given the uncertainty of roadway locations and the large amount of land where erosion risk is high (Table 20), we recommend the Final SEIS assess whether current stipulations and BMPs for this sediment source are adequate to minimize direct or indirect impacts.

To minimize soil disturbance and to increase opportunity for effective controls, we recommend that the USFS consider the consolidation of facilities and pipelines to convey product, gas, and produced water.

Response: At this stage of analysis, no facilities or pipelines are proposed. Therefore, we do not know when, or where on the landscape facilities and pipelines would be proposed. During the site-specific analysis for the APD and SUPO, the location and density of infrastructure will be considered, and Forest Service Best Management Practices (BMPs) will be prescribed to protect soils and sensitive water and terrestrial resources. Please see attachment A below, and the document Environmental Protections Incorporated into Drilling Permits and Plans of Operation on the project website.

In general, both industry and state and federal agencies prefer to consolidate pipelines and transmission lines in or adjacent to the road right-of-way, and, wherever possible, to use existing roads. Such consolidation is both economically and environmentally preferable and will be considered when development plans are submitted for approval.

Surface and Groundwater

Water quality monitoring

#28-19, 31-3

Comment: The Draft SEIS includes a brief description of monitoring required for national BMPs and monitoring that may be required "if there is an issue (i.e. spills, reclamation)" on the Grasslands. The EPA recommends that the USFS consider and discuss a water quality monitoring program in the planning area that would cover prior to, during, and after anticipated development to detect impacts to both surface water and groundwater resources.

The forest service has allowed oil and gas leasing on forest service land near Redwing Road that is within the groundwater monitoring program area of the Tobacco Gardens aquifer. The program is meant to monitor or to prevent contamination of a well or well field supplying a public water system. There is also multiple private oil and gas wells drilled in the wellhead protection areas across the state. In my experience, it's not if these sites are going to leak oil or gas but when. How can we protect wildlife when we don't even protect ourselves?

Response: No explicit monitoring requirements are included in stipulations for oil and gas leasing. However, the Grasslands works in conjunction with the North Dakota Department of Environmental Quality in requiring mitigation or remediation related to any spills or contamination.

Because horizontal drilling and fracturing generally occurs in the Bakken at depths of approximately two miles, impacts such as aquifer contamination and induced earthquakes that have occurred where the oil-bearing formations are shallower, have not been observed and are extremely unlikely in the Bakken. Several thousand feet separates the upper extent of horizontal fractures and freshwater aquifers. We have no evidence or expectation of contamination of drinking water sources from hydraulic fracturing in the Bakken. Please see the discussion on potential for aquifer contamination in the oil and gas section of the SEIS.

Contamination of surface waters by erosion or chemicals is prevented by imposition of stipulations, lease notices and conditions of approval to protect water, wetlands, floodplains, and riparian areas, as well as by the stipulation prohibiting surface occupancy on slopes greater than 40 percent.

Surface water use

#15-22, 11-16

Comment: Page 61: DSEIS says water supply for drilling and fracking will be from offsite, and that there will be no effect caused by surface water withdrawal because the Forest Service does not allow surface water withdrawal on FS lands. The State of North Dakota does allow surface water withdrawal from surface water for drilling and frack water, and is permitting water withdrawals from the Little Missouri River. The Forest Service should assess the impacts from water withdrawal in the Little Missouri River for the oil and gas activities it permits because the State will allow water withdrawal from non-FS lands. This may be an indirect impact, but it is still a result of the FS lease and APD. The Forest Service could stipulate that no Little Missouri River water may be used for fracking on FS lands.

Response: Most of the water used in fracking operations on the Little Missouri National Grassland is surface water purchased from city treatment facilities. The Forest Service can only require that water users obtain the appropriate permits from the State of North Dakota and has no authority to otherwise restrict operators in their use of legally obtained water, whether by purchase or permit.

#15-23

Comment: The State Water Commission is reported to say the average well uses 3.6 million gallons of water to drill/frack a well. Current estimates of water uses and new fracking techniques suggest that as much as 15 to 18 million gallons may be used per well. The DSEIS amount of surface water required for drilling and fracking use is vastly understated.

Response: According to an August 2019 report from the North Dakota State Water Commission on fracking water use, the average oil well uses “approximately 25-acre feet of fresh water for the drilling and hydraulic fracturing process.” One acre-foot equals 325,851 gallons, so 25 acre-feet equals 8.1 million gallons of water. (See http://www.swc.nd.gov/pdfs/fracking_water_use.pdf) The source for the figure quoted by the commenter is not known. Our figures are specific to North Dakota; other areas in different geologic formations may have higher average uses.

Protecting surface waters

#28-10

Comment: To avoid the potential for project activities to contribute to water quality standards violations and to provide a buffer for attenuating or remediating spills and sediment runoff, we recommend the USFS include the following NSO setbacks in the final selected alternative. These setback distances are likely to be protective of planning area water resources in most circumstances. The EPA recognizes that the USFS may adjust setback distances during project permitting to reflect site-specific conditions.

- Minimum 100-foot NSO setback from slopes greater than 30%;
- Minimum 500-foot NSO setback for flowing waters (rivers and streams) or 100-year floodplain, whichever is greater;
- Minimum 500-foot NSO setback for lakes, ponds and reservoirs, wetland and riparian areas and springs;
- Minimum 750-foot NSO setback for CWA Section 303(d) impaired waters;
- Minimum 1,000-foot NSO setback for state or federally designated exceptional waters;
- Minimum 100-foot NSO setback for intermittent and ephemeral streams; and
- NSO within Areas of Critical Environmental Concern or other valued areas where important aquatic resources may be impacted.

For examples of water resource stipulations that have been adopted in the region, we refer the USFS to the 2015 BLM Miles City Field Office RMP and 2017 Fort Berthold Programmatic Environmental Assessment (PEA) for oil and gas development.

Response: The stipulations to protect water, streams, lakes wetlands, and riparian areas on the Little Missouri National Grassland are worded differently but are equally protective as those in the Miles City Field Office RMP. The latter prohibits surface occupancy and use “within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas.” The Forest Service stipulation directs surface use to be located outside of the water’s edge wherever possible and imposes a list of controls on use. For wetlands, floodplains, and riparian areas, a lease notice requires operators stating that “all activities may be highly restricted to comply with Executive Order 11988 - Floodplain Management and Executive Order 11990 - Protection of Wetlands, in order to preserve and restore or enhance the natural and beneficial values served by floodplains and wetlands.” Neither the BLM nor the Forest Service requires other specified setbacks.

We considered the request to add a stipulation with a specific set back distance for woody draws, streambanks, and riparian areas. After thorough review, the Dakota Prairie Grasslands interdisciplinary team determined that existing regulations, direction in the LRMP, and existing stipulations combined provide adequate protection for these areas.

303(d) listed streams

#28-12

Comment: We also recommend that the USFS include a table in the Final SEIS listing all 303(d) impaired waters in the project area, along with the associated waterbody segment ID numbers from North

Dakota's Integrated Report, designated uses, pollutant(s) and pollutant cause (known or unknown), and if a TMDL exists for that waterbody segment.

Response: The hydrology specialist report contains pertinent information on 303(d) listed streams and is part of the project record.

#28-13

Comment: The Draft SEIS states that no direct or indirect effects to Clean Water Act Section 303(d) listed waters are expected from oil and gas project activities (Draft SEIS p. 60, Draft Watershed and Hydrology Report p. 16, 17, 23). We acknowledge that current oil and gas development may not contribute to current impairments. The EPA recommends that the Final SEIS assess whether additional impairments are possible in the future and discuss the measures that will be applied to avoid such impacts.

Response: Most streams on the 303(d) list in the project area are listed for bacteria or impacts to benthic macroinvertebrates. Well development and oil and gas production are not expected to increase these contaminants, and we do not anticipate new impairments resulting from oil and gas development. Best management practices and other conditions of approval are imposed when the site-specific Surface Use Plan of Operations is approved. See Environmental Protections Incorporated into Drilling Permits and Plans of Operation on the project website.

Best management practices for water quality

#1-1, 1-7, 15-20, 15-21

Comment: Care is to be taken during construction activity near any water of the state to minimize adverse effects on a water body. This includes minimal disturbance of stream beds and banks to prevent excess siltation, and the replacement and revegetation of any disturbed area as soon as possible after work has been completed. Caution must also be taken to prevent spills of oil and grease that may reach the receiving water from equipment maintenance, and/or the handling of fuels on the site.

DSEIS suggests that the damage from spills and leaks will be addressed by Best Management Practices (BMPs), but does not describe the BMPs. BMPs do not ameliorate spills and leaks, especially if they are not used, are voluntary, or not enforced.

Response: To mitigate effects of runoff, best management practices, practices outlined in Appendix F of the LRMP (2002), and NSO stipulations (Table 6) would be incorporated at well pad designs and for roads in the LMNG. Commonly applied best management practices used for oil and gas development and associated roads include (but are not limited to) perimeter berms on well pads, gradient terraces, check dams, geotextiles, silt fences, fiber rolls, slope diversions, water bars, and sediment traps. The full list of practices is available in the [National Core BMP Technical Guide](#).

These measures are intended to control the indirect effects of erosion, runoff, and sediment, as well as to control the flow of, or contain any accidental release of chemical on or around the well pads. For these practices to be effective, proper installation, inspection, and repairs would occur regularly. Minerals management staff for the grassland regularly inspect oil and gas operations, and operators are held accountable for spills and other water protections by the North Dakota Department of Environmental Quality. See Environmental Protections Incorporated into Drilling Permits and Plans of Operation on the project website.

State permits and coordination with NDDEQ

#1-2, 1-7

Comment: Oil and gas projects disturbing one or more acres are required to obtain a permit to discharge storm water if runoff from the project will carry eroded material to a water of the state. A permit is not required for oil and gas projects if runoff from the project will not carry eroded material to a water of the state. Further information on the storm water permit may be obtained from the Department's website or by calling the Division of Water Quality (701-328-5210). In addition, cities or counties may impose additional requirements and/or specific best management practices for construction affecting their storm drainage system. Check with the local officials to be sure any local storm water management considerations are addressed.

Response: Federal permits for oil development are contingent on the operator obtaining any necessary state and local permits.

#1-7

Comment: All construction which directly or indirectly impacts aquatic systems will be managed to minimize impacts. All attempts will be made to prevent the contamination of water at construction sites from fuel spillage, lubricants, and chemicals, by following safe storage and handling procedures. Stream bank and stream bed disturbances will be controlled to minimize and/or prevent silt movement, nutrient upsurges, plant dislocation, and any physical, chemical, or biological disruption. The use of pesticides or herbicides in or near these systems is forbidden without approval from this Department.

Response: Stipulations and Best Management Practices will be used in this project to protect water quality consistent with Forest Plan standards.

Groundwater protection

#28-15

Comment: The Draft SEIS does not mention whether there are public water supplies on the Grasslands. If there are none, we recommend the Final SEIS clearly state that there are no public water systems or other groundwater wells (domestic, agricultural, or stock) in the project area

Response: The project area is the entire area within the Little Missouri National Grassland administrative boundary. Over half of the area is owned by private, state, or other federal entities. Many groundwater wells occur throughout the area, associated with ranches and private residences. No source water protection areas occur within the project area. A full analysis of all water resources within the 2.1 million acres is beyond the scope of this document.

#1-3, 28-17

Comment: The proposed project may include numerous individual projects located within several counties. It is possible that some projects may be located over defined glacial drift aquifers, defined sensitive glacial drift aquifers, or within wellhead or source water protection areas. Care should be taken to avoid spills of any materials that may have an adverse effect on groundwater quality. All spills must be immediately reported to this Department and appropriate remedial actions performed.

The Draft SEIS states that operators will not be using groundwater for oil and gas operations and will dispose of waste fluids by underground injection into the Dakota Group formation. The Draft SEIS

explains that a combination of natural barriers and regulatory safeguards are expected to protect underground sources of drinking water (USDWs) from contamination. To clarify this discussion, the EPA recommends the Final SEIS address whether there are any recharge areas in the project area for any of the aquifers that are below the surficial aquifers. If there are recharge areas in the project area, we recommend the Final SEIS describe ways in which possible surface contamination and impacts to infiltration will be minimized. We also recommend outlining a plan for remediating future unanticipated impacts to USDWs.

Response: The entire project area is south of the Missouri River in the unglaciated Missouri Plateau and Little Missouri Badlands landforms. No source water protection areas, as designated by the State of North Dakota, are present in the project area. The Forest Service concurs with the requirement for immediate spill reporting and response.

Analysis of effects of spills

#21-14

Response: Groundwater Quality is negatively and cumulatively impacted by spills caused by oil and gas production, including especially spills of "produced water," a highly saline product that can sterilize soil and can kill livestock and wildlife if consumed. This fact is lightly acknowledged in the document relative to both Alternatives 1 and 3. However, the analysis concludes that, "because spills and failures in safeguards are unpredictable events, effects to groundwater as a result of these types of events are not able to be assessed." This analysis is inadequate, particularly given that the North Dakota Department of Health has maintained a public website for several years that tracks and reports on spill events across the Bakken, and that the Department of Mineral Resources maintains a database of gathering and disposal pipelines. In the same way that traffic fatalities can be measured per million miles of driving, so spills can now be quantified as volume of oil or produced water per miles of pipeline or average volume per well site, based on years of experience.

Response: The Forest Service tracks the occurrence of oil and produced water spills that occur on USFS lands. On the McKenzie District, over a ten-year period there were 469 total spills (counting both oil and saltwater), and the average oil spill lost 1.1 barrels of oil, with the remainder recovered; the average salt water spill lost 6.3 barrels. Minerals management staff on the LMNG report that spills are most common for older oil and gas infrastructure, predating the Bakken oil boom.

Wildlife

Consistency of wildlife stipulations with other agencies

#25-26, 26-12, 30-23, 30-26

Comment: The proposed new and revised lease stipulations under Alternative #3 that are tied to potential wildlife impacts are similarly not warranted, not supported by the record, have not been demonstrated to be needed nor effective, and are likely to severely limit future drilling without adequate assurance that the resource impact mitigation measures will even be effective... As an initial matter, the USFS and the BLM currently are in the middle of revising the associated land management plan amendments to address greater sage grouse and its habitat on USFS and BLM administered land. While these amendments are being revised, it is critical to avoid putting in place inflexible lease stipulations that may conflict with or run counter to the final revised amendments... Moreover, as the Draft EIS acknowledges, "a lease notice, applied to all leases insures that consultation under the [ESA] will occur and specific mitigations will be imposed for oil and gas development" and that "stipulations for other resources may

directly or indirectly benefit listed species." Given the ongoing revisions and the mechanisms already in place to protect potential impacts to sage grouse and its habitat, the Draft EIS should remove from the Final EIS any new, inflexible lease stipulations ostensibly directed at mitigating sage grouse impacts.

Comment: The USFS and BLM are revising the sage grouse land management plan and it would be premature and risk conflict to impose the NSO and timing stipulations proposed; existing NEPA review requires ESA consultation, but there are no active leks on LMNG Forest Service lands; there is no scientific consensus on an adequate lek-buffer distance.

Response: The BLM adopted revised sage-grouse stipulations as a resource plan amendment. The Forest Service did not complete the amendment and is not expected to. Both the Dakota Prairie Grasslands and North Dakota BLM expect to start revising their management plans in 2021 or 2022, with completion expected in approximately 2025.

Consultation with U.S. Fish and Wildlife Service does not apply for greater sage-grouse, as the species is not listed under the Endangered Species Act, with the exception of the Gunnison sage-grouse in Colorado. Regardless of active leks, consultation only occurs for listed species. None of the federally listed species (least tern, pallid sturgeon, piping plover, northern long-eared bat, Dakota skipper) occupy sagebrush habitat, and so consultation for these species would not be expected to affect sage-grouse.

#25-27, 30-26, 32-13, 32-14

Comment: Curiously, the Wildlife Report states that the current stipulations "are inconsistent with stipulations that have been identified for nearby land under different agency management" and that "there is a discrepancy between the current no surface occupancy and that suggested in scientific literature." Yet, neither the Draft EIS nor the Wildlife Report explain these statements any further, cite to the scientific literature referenced, or identify the other stipulations for "nearby land." Cherry-picking one disputed scientific study without any further analysis or discussion does not constitute the "hard look" required by NEPA. See *Consol. Delta Smelt Cases*, 717 F. Supp. 2d 1021, 1061 (E.D. Cal. 2010), citation omitted (holding that an agency may not rely on "ambiguous studies as evidence" to support findings made under the ESA; see also, *Rock Creek Alliance v. U.S. Fish & Wildlife Service*, 390 F.Supp.2d 993 (D. Mont. 2005) (rejecting FWS's reliance on a disputed scientific report, which explicitly stated its analysis was not applicable to the small populations addressed in the challenged opinion). It should also be noted that within the draft document, none of the threatened, endangered, or sensitive species identified are experiencing adverse effects as the result of past oil and natural gas development.

Response: The sage-grouse stipulations in alternative 3 are inconsistent with the current recommendations from the Interagency Sage-Grouse Working Group and current stipulations for BLM land and split-estate lands within and near the project area. They are also inconsistent with recommendations by the North Dakota Game and Fish Department. Sage-grouse stipulations in alternative 3B are consistent with the Interagency Working Group. The author of the Wildlife Report was unaware of controversy associated with the referenced report, and this has been reevaluated for the FSEIS. Manier et al (2014) was used to incorporate by reference the anthropogenic impacts on sage-grouse including oil and gas.

In addition, other grouse stipulations that are in place for similar oil and gas activities have been disclosed.

Cumulative effects of oil and gas production on wildlife

#31-2

Comment: Another study would be to analyze the impacts of both oil and gas production from state and private leasing as well as ranching practices and the combined effect. During the drought several years ago, there was almost no available grass for the wildlife, due to overgrazing from cattle and oil traffic was still high. Roadkill of deer North of Killdeer was the highest I have ever seen. Within that 14-20 mile stretch, I counted over 15 deer killed every week for the duration of winter. The drought and over-grazing practices severely impacted areas south of Interstate I-94, the ground was void of any vegetation. The combined effect is not being measured but exists and is creating an impact much more significant than the analysis demonstrates. If we continue to add oil development to the environment, animals will have nowhere to go except to be pushed to the fringes, boundaries between people and wildlife tend to end poorly for wildlife.

#15-37

Comment: Page 81: The DSEIS states that because multiple wells will be built on multi-well pads or ecopads, there will be less impact. While the NDWF agrees there may be a smaller "footprint" with multi-well pads, there will still be the increased number of semi-truck trips for drilling and fracking operations, and resultant disturbance and potential for vehicle-wildlife collisions.

#15-32, 15-33

Comment: Page 74: The DSEIS makes repeated references to increased well pads, roads and other infrastructure but does not equate that to habitat loss or fragmentation and negative impacts to the numerous wildlife species reviewed or covered in the DSEIS.

DSEIS states that increased road construction will lead to vehicle collisions with wildlife species, habitat fragmentation, disturbance, and the potential for increased poaching, but does not quantify the impacts and makes no suggestions for reducing or offsetting these impacts or losses.

Response: Measurable habitat loss is addressed as the expected footprint of loss resulting from the expected development of 620 wells over a ten-year period at five acres per well or a total of 3,100 acres. This impact is disclosed in numerous sections of the SEIS. Besides the direct habitat loss, the effects of disturbance are discussed in detail and quantified as the number of acres where disturbance may (or may not) potentially occur. Fragmentation is addressed in cumulative effects. We have quantified impacts where such information is available. Extensive research projects would be needed to quantify many of these, which is beyond the capacity of the grasslands.

We have become aware of a recent paper¹⁴ that analyzed all development (not just oil and gas) and habitat fragmentation in and adjacent to the LMNG from 2003 to 2016 and the effects on breeding bird populations. During the study period, the mean patch size declined 3.71 percent from 3.16 to 3.04 km². Road density increased 5.9 percent, edge density decreased 2.73 percent, and the total core area decreased from 86.96 percent of the landscape to 85.93 percent. The authors note that the majority of development occurred in the north and very little in the south but did not segment the analysis. Of the 13 species analyzed, only Sprague's pipit showed a decline in population correlated with habitat fragmentation. This

¹⁴ Bohannon, R. and M. Blinnikov. 2019. Habitat fragmentation and breeding bird populations in western North Dakota after the introduction of hydraulic fracturing. *Annals of the American Association of Geographers*.
<https://doi.org/10.1080/24694452.2019.1570836>

study demonstrates that effects of development on wildlife populations are complex and not easily generalized.

The effects of ranching practices on wildlife is addressed in the cumulative effects analysis for this project. Stipulations and conditions of approval (applied to Surface Use Plan of Operations) comprise the mitigations to reduce impacts. This analysis addresses whether these environmental protections are adequate and such impacts are sufficiently mitigated to comply with the grassland plan.

Sensitive species determinations

#15-38, 15-43, 30-26

Comment: The statement is made that the preferred alternative or Alternative 1 "may affect individuals and their habitats but will not likely contribute to federal listing or a loss of viability to a population or species. This seems to be a low bar of achievement and an extremely weak attempt to avoid impacts to potential T/E species or species of interest and importance in North Dakota. This same conclusion is made for burrowing owl, Baird's sparrow, long-billed curlew, Sprague's pipit, and the Ottoo skipper. This appears to be an attempt to say "we didn't add it to the T/E species list so impacts are acceptable.

Response: As per direction in Forest Service Manual 2672.4, there are three possible determinations for the effects analysis for sensitive species: "No impact", "May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing", or "Likely to result in a loss of viability in the Planning Area, or in a trend toward federal listing." We do not expect a loss of population viability, nor can we conclude there will be no impact. Therefore, the only determination possible is the one that was made.

Threatened and endangered species

#15-35

Comment: Are the conclusions that the preferred alternative "may affect but would not likely adversely affect the numerous T/E species" supported or corroborated by the U.S. Fish and Wildlife Service?

Response: We have completed consultation with U.S. Fish and Wildlife Service, and they have concurred with the determination of "may affect, not likely to adversely affect" each of the federally listed species and that there will be no adverse modification of designated critical habitat.

Definition of the term 'benefit'

#15-40, 15-42

Comment: The DSEIS claims there is some "benefit" to implementation of timing restrictions for some of the described species. A reduction in impacts is not a "benefit" to the species. A benefit would be an action that improves the outlook for the species, not an action that reduces a permitted negative impact.

Response: We disagree. WE are using the term "benefit" in referring to stipulations for other resources that reduce or eliminate impacts to species that are not the target of the stipulation. In this context, the definition of the term benefit is "to receive an advantage." Stipulations identified for other species often provide protection for species that do not have specific stipulations identified for them. For instance, timing limitations that overlap with a non-target species occupancy or breeding period may reduce or eliminate impacts. No surface occupancy would eliminate impacts and provides a benefit to the non-target species, relative to the absence of that stipulation. We have analyzed the full extent of no surface

occupancy for each alternative because a lack of surface disturbance protects all species on those acres, irrespective of the reason for the stipulation. Please see figures 3 through 8 in the FSEIS for the extent of no surface occupancy and limitations on surface use.

Reference recommendation

#15-53

Comment: The North Dakota Game and Fish Department in their May 2011, "Report to the Director on the Potential Impacts from Oil and Gas Development on Selected North Dakota Resources" should be extensively reviewed and used to analyze the impacts on game species, hunting, and recreation as a result of the preferred alternative. As currently drafted the DSEIS is totally inadequate in recognizing, much less describing or mitigating the impacts of the preferred alternative to wildlife, hunting, and recreation.

Response: The Report to the Director on the Potential Impacts from Oil and Gas Development on Selected North Dakota Resources will be considered for the FEIS.

Monitoring recommendations

#31-1

Comment: I want to suggest that part of the study or analysis involved in making that decision is to see what impacts are already being made to wildlife mainly deer and elk, in these sensitive areas and find ways to improve that habit. For example, old and new well sites developed in the prime mule deer/elk habit, release uncalculated quantities of hydrogen sulfide into the atmosphere at an almost uncontrolled rate. Conduct a FLIR camera study in these areas of Tobacco Gardens and west of Grassy Butte and confirm those suspicions. The previous impact study only monitored from fixed locations. I would suggest monitoring localized well sites in various areas of the state and create an average; this would show a generalized impact on the local regions. Can ungulates live or want to live in an unseen cloud of gas? Does this cause further displacement by the noise, traffic and pollution disruptions to their regular pattern?

Response: We disagree with the assertion that "old and new well sites developed in the prime mule deer/elk habit, release uncalculated quantities of hydrogen sulfide into the atmosphere at an almost uncontrolled rate." Minerals management staff regularly visit active oil and gas wells on the LMNG and always carry hydrogen sulfide monitors. Alerts are rare, though not unknown, but generally at odds with the commenters unreferenced assertion. Monitoring well sites in various areas of the state is beyond the authority and mandates of the Dakota Prairie Grasslands.

#21-11

Comment: Wildlife management is one of the "many uses" for which the USFS is required to manage its lands. In the past two years, the Recovering America's Wildlife Act has been introduced into both houses of Congress (H.R.4647 In 2017 and S.3223 in 2018). Both versions are gaining bipartisan support. If passed, the Act will more than double funding for state wildlife management agencies and will allow for more proactive solutions to declining wildlife across the country.³(3 America's declining wildlife requires a proactive solution, report says. The Wildlife Society. March 29, 2018. <http://wildlife.org/americas-declining-wildlife-requires-a-proactive-solution-report-says/>) North Dakota's Game and Fish Department has never had sufficient funding to do the kind of comprehensive analysis that would be required to fully understand the impacts of oil and gas development to wildlife in the Little Missouri River corridor.

Response: If the Recovering America's Wildlife Act were to pass, the Grasslands will collaborate with North Dakota Game and Fish. As is the case with the state agencies, the Dakota Prairie Grasslands is not funded to undertake such comprehensive studies.

Big game species

#15-41, 15-52

Comment: Even in the wildlife section there is no discussion of negative impacts to game species; white-tailed deer, mule deer, elk, and sharp-tailed grouse. The minor discussion on pronghorn only deals with timing limits on the wintering areas. There will be substantial impacts from habitat loss, disturbance, habitat fragmentation, and increased poaching from road development on all or most game species. The DSEIS describes the use of timing limitations (January 1-March 31) to reduce impacts to pronghorn winter habitat yet describes no efforts to mitigate or reduce impacts to migration routes or fawning areas or other factors that may negatively impact pronghorn.

Response: Impacts to the game species listed are discussed in both the SEIS and the Wildlife Report under "Effects Common to All Species." No stipulations to reduce impacts to pronghorn migration routes or fawning areas are proposed, as we have no reliable models for these areas. Please see the discussion under the section Alternatives Considered but Eliminated from Detailed Study, Protections for Wildlife Habitat. Existing and proposed protections for sage-grouse, sharp-tailed grouse, and other species also reduce impacts to pronghorn.

#33-7

Comment: Currently, there are no stipulations for deer, not are any being purposed in the Draft EIS. Mule deer are a highly valued game species in North Dakota, one that is sensitive to habitat loss and fragmentation. Oil and gas development, in particular, has been shown to have both direct and indirect impacts to mule deer populations in a number of states, including North Dakota (Kolar, 2017). Based on an assessment done by the Department in 2011, approximately 18% of the primary mule deer range in North Dakota is moderately affected by oil and gas development; another 1.7% is highly impacted. Because further oil and gas development in the LMNG has the potential to have deleterious effects on the state's population, a more proactive management strategy should be considered. Pronghorn: Pronghorn are another highly prized game species in North Dakota. Each year over 10,000 residents apply for licenses to hunt pronghorn with a gun. Christie et al. (2016) found that, though pronghorn do not avoid oil and gas wells, they do avoid human development and roads. The findings in this study suggest that wells and roads placed in high-value habitat will lead to significant habitat fragmentation for the species which may ultimately lead to population declines. Stronger stipulations than currently stand are needed to safeguard this species from long-term, deleterious effects of development. Recommendations for Pronghorn and Mule Deer: 1. Minimize drilling rig locations (and gravel pits) in primary habitats during winter and fawning/fawn rearing seasons (May 15th through July 15th). 2. Select locations for drilling rigs that are more open (>0.5 km from wooded edge). 3. Select location for drilling rigs that have lower slopes (<15%). 4. Minimize well pads within shrubland/sagebrush habitat. 5. Development in primary habitat should be minimal from November 15th through April 30th. 6. Maintain new development infrastructure near existing roads to avoid increases in overall road density. 7. In areas where multiple wells will be drilled, consolidate wells on fewer well pads to minimize the overall well pad density (i.e. maintain well pad densities <5 mi²). 8. Opt for the shortest, most direct route into well sites that avoid hardwood draws. 9. Avoid areas heavily dissected with washes at the heads of drainage systems. 10. When reclaiming roads and well pads, big sage brush should be a key component in the seed mix.

Response: We reviewed these recommendations but found that some of these recommended stipulations appear to be contradictory (e.g., place drilling rigs more than 0.5 km from wooded edge vs. minimize well pads within sagebrush habitat). Existing stipulations protect mapped pronghorn winter range, and protections for woody draws reduce impacts in mule deer fawning habitat. We have no current models for pronghorn fawning habitat or migration corridors, nor for pronghorn and mule deer “primary habitat.” However, we believe that this habitat is widespread on the grassland so that timing limitations applied from November 15th through July 15th would be impractical.

Many of the other recommendations are already incorporated into a standard approach. The preference for placing new development in existing disturbance, choosing lower gradient slopes, and consolidating wells on fewer well pads is supported by both industry and natural resource managers to reduce costs and minimize disturbance. We are committed to coordinating with North Dakota Game and Fish Department when determining well placement for the Surface Use Plan of Operations.

Regarding fragmentation effects, we have limited data and information. Please see the response to cumulative effects of oil and gas production on wildlife (comments 15-32, 15-33) above.

Bighorn sheep stipulations

#15-9, 15-31, 15-36

Comment: The stipulations for bighorn sheep seem to be weak. Later in the DSEIS, the Forest Service states that the bighorn sheep stipulations are less than what was recommended by the NDGFD.

NDGFD is referenced as saying the April 1-June 15 timing period is inadequate to protect or avoid impacts on bighorn sheep lambing areas, yet the DSEIS makes no mention of alternatives or other stipulations to reduce projected impacts. There are other disturbance or habitat impacts to bighorn sheep in addition to the lambing season. Vehicle-bighorn sheep collisions have also been an issue in the past.

#33-8

Comment: Bighorn Sheep: The draft EIS goes into great detail on bighorn sheep and what the department recommends for management. However, we will reiterate here. Recommendations: 1. Ensure that the NSO stipulations are consistent with primary Bighorn sheep habitat modeled and mapped by the Department. 2. Extend the timing limitations from 6/15 to 7/15.

Response: Alternative 3B in the FSEIS includes a revised bighorn sheep timing limitation from April 1 to July 15, as recommended by North Dakota Game and Fish Department. To our knowledge, our bighorn sheep layer is consistent with NDGF models. The only increase in bighorn sheep vehicle collisions we are aware of occur on U.S. Highway 85, which is primarily outside of federal land and over which the Forest Service has not authority. We note that NDGF raised no concern about increased vehicle collisions for bighorn sheep. We look forward to collaborating with NDGF and adjacent landowners in reviewing site-specific Surface Use Plans of Operation and applying appropriate conditions of approval to protect bighorn sheep habitat.

Eagle stipulations

#33-6

Comment: The current stipulations maintain a no surface occupancy within 1 mile of Bald Eagle nests or winter roosts; however, only half mile for Golden eagle nests. Golden Eagles are a species of conservation priority and should be afforded equal, if not more, protection from disturbance than bald

eagles in this region. Golden eagle primary range follows the Missouri and Little Missouri Rivers and is mirrored closely by the Little Missouri National Grasslands (LMNG) boundaries. Though there was not sufficient time to run analysis on known eagle nest locations and unleased and available parcels of land, the Department believes that further oil and gas leasing within the Grasslands could have significant impacts on the state's Golden eagle population and proactive measures should be taken to avoid such impacts. Recommendation: No surface occupancy within 1 miles of an active Golden eagle nest.

Response: The current stipulations for both bald eagles and golden eagles exceed the guidelines under the Bald and Golden Eagle Protection Act for avoiding disturbance around nest sites. Please see the discussion under Alternatives Considered but Eliminated from Detailed Study in chapter 2 of the FSEIS.

Grassland birds

#33-9

Comment: Grasslands are one of the most endangered ecosystems on the planet, and, consequently, the species that rely on them have suffered. Grassland birds are among the fastest declining birds in North America, and, yet, are still not afforded protective stipulations. Species such as Baird's sparrow, Chestnut-collared longspur, Grasshopper sparrow, Loggerhead Shrike, and Long-billed curlew are closely tied to the grasslands of western North Dakota and their populations may be further negatively impacted by the continued loss and fragmentation of native prairie. Recommendations: We recommend following the Bird Conservancy of the Rockies Best Management Practices for Grassland Birds (2016). In particular, their management recommendations for oil and gas development and road placement.

Response: We have examined the recommendations from the referenced document at <https://birdconservancy.org/wp-content/uploads/2017/03/Bird-Conservancy-BMP-for-Grassland-Birds-CSLB.pdf>. Several grassland bird species are Forest Service sensitive species and thus their habitat is subject to the lease notice for threatened, endangered, and sensitive species. Individual stipulations are difficult to apply because grassland bird habitat is so widespread.

The recommendations for oil and gas development include concentrating well pads in one location to avoid habitat fragmentation and pervasive disturbance. Resource management and industry interests both prefer using existing roads and disturbance footprint for new infrastructure to limit disturbance and costs for construction and maintenance. When a biological evaluation for the Surface Use Plan of Operations finds potential effects, additional environmental protections may be imposed to protect the species or their habitats.

Analysis for Baird's sparrow

#15-25

Comment: Page 70: The DSEIS states that grassland habitat losses will be replaced by successful reseeded of native grasses and forbs, resulting in no impacts to Baird's sparrow. The DSEIS presents no data on the success of the native grass and forb seeding and re-establishment, and given the past history and success of Forest Service attempts at native plant community restoration, there is no reason or data to believe it will happen. Roads, wells pads and infrastructure all fragment existing native prairie communities. So the conclusion that there will be no increase in crested wheatgrass is misleading and the impact analysis for Baird's sparrow is inconclusive or faulty.

Response: Commenter errs in the assumption that crested wheatgrass is currently used or has been used for reclamation in over two decades. All reclamation is accomplished with native seed, as directed by the

grasslands plan. The one exception may be species such as sterile annual rye that is used to quickly establish cover while perennial plants become established. We invite the commenter to tour previously completed reclamation.

We acknowledge that fragmentation is one of the unavoidable impacts of oil and gas development. However, a [recent paper](#) looking at fragmentation resulting from all development in the vicinity of Little Missouri National Grassland found that 12 of 13 bird species, including Baird's sparrow, had no population changes correlated with fragmentation. See the response to comments 15-32 and 15-33, above.

Analysis for burrowing owls

#15-26

Comment: There data no or analyses to conclude that there are only minor impacts to burrowing owls and/or prairie dog communities.

Response: Local empirical data for species impacts is seldom available. Effects are inferred from scientific literature, internal reports, professional opinion, and informal observation. Direct and indirect effects of the project are analyzed in the Wildlife Report.

Analysis for loggerhead shrike

#15-28

Comment: DSEIS attributes declines in shrike populations and numbers to degradation of native prairie habitat and sage brush. Oil and gas development through well pads, roads and other infrastructure does precisely this.

Response: Direct and indirect effects of the project are analyzed in the Wildlife Report, specifically the effect common to all species from all alternative section. We have concluded the project may affect individuals but is not likely to lead to federal listing under the Endangered Species Act.

Analysis for long-billed curlew

#15-29

Comment: Long billed curlew - DSEIS recognizes that oil and gas development affects curlews but does not describe the magnitude or scale of the impact.

Response: As discussed in FSEIS Wildlife section, Affected Environment for long-billed curlew, breeding bird survey data for the Badlands and Prairie Region indicates an increase of 2.26 percent per year for the period 1966-2013. We cite threats that have been reported in the scientific literature, but these are limited to generalized descriptions. We have no data on the scale or magnitude of oil and gas development and no of none that exists.

Greater sage-grouse

#12-9, 15-8, 15-12, 15-27, 15-39, 33-3, 33-4

A number of commenters expressed concern that stipulations for greater sage-grouse in alternatives 1 and 3 are not consistent with State of North Dakota plans and interagency guidelines for sage-grouse management and do not provide adequate protection.

Response: Alternative 3B provides an alternative stipulation for greater sage grouse that prohibits surface occupancy in priority sage grouse habitat areas, as determined by the Interagency Sage Grouse Working Group. Waivers, exceptions, and modifications to this prohibition may be granted in consultation with North Dakota Game and Fish Department. The Dakota Prairie Grasslands has committed to working in consultation with the Department to ensure the least impact to suitable sage grouse habitat, as well as to reducing impacts to other species, such as bighorn sheep and sharp-tailed grouse.

Please see the analysis for alternative 3B in the FSEIS and the final wildlife report regarding greater sage grouse stipulations and the environmental effects of oil and gas leasing.

#15-19

Comment: The map on page 52 indicates new leasing in the southwestern portion of the State in potential or historic sage grouse habitat. Yet the DSEIS repeatedly states that there will be no or minimal impacts to sage grouse.

Response: The map on page 52 shows land available for leasing. However, these lands are outside the Bakken formation, and have seen little to no development since accelerated drilling began in the Bakken in 2008. Stipulations for greater sage grouse in alternatives 1 and 3 would prevent or mitigate impacts to sage-grouse to varying degrees; stipulations in alternative 3B denote no surface occupancy in priority sage-grouse habitat, covering all these lands in the southwest corner of the Medora Ranger District.

The Little Missouri National Grassland is at the far edge of the current range of sage-grouse and no one has documented sage-grouse presence in over five years. For unclear reasons, the range of sage grouse has been contracting, even though relatively little oil and gas development has occurred in the southwest corner of the LMNG.

#30-25

Comment: Another of the deficiencies is the lack of acknowledging the fact that oil and gas development is not responsible for creating a decrease in the population of sage grouse. See Wildlife Report and Biological Evaluation at 18 (listing the reasons for the decline, none of which relate to oil and gas development). Additionally, sage grouse aren't now or in the past, widespread throughout North Dakota. In fact, their present home is in the Southwestern part of North Dakota. To our amazement there aren't even active leks in the LMNG, "no leks on National Forest System lands [that] remain active" and it would only be after hypothetically reintroduction that it would even be theoretically possible for sage grouse to survive. See Wildlife Report at 31 ("if sage-grouse were to occur on the LMNG"); see also *Weyerhaeuser Co v. U.S. Fish and Wildlife Service*, 139 S.Ct. 361 (2018) (holding that an area is eligible for designation as a "critical habitat" under the ESA only if it is actually "habitat" for the species). Given this evidence, serious questions must be considered in making all of these regulations to protect a species that on this record are not even there.

Response: The Forest Service provides protections for sensitive species, such as sage-grouse, as well as for federally listed species. The goal of sensitive species management is to ensure that the species does not trend toward becoming federally listed. The comment regarding critical habitat is not relevant, because the designation of critical habitat is applicable only to species listed under the Endangered Species Act. Stipulations are not regulations but are decisions about how leasing will occur for those federal minerals under the leasing authority of the Little Missouri National Grassland.

#32-15

Comment: The record does not support the new timing and NSO lease stipulations focused on sage grouse mitigation. It also does not explain why the current conditions are inadequate. The lack of active leks in the planning area, and the relatively sparse population in North Dakota writ large, supports the choice of Alternative 1 in the final SEIS. Common sense also counsels against adopting new or revised lease stipulations while the USFS and BLM are finalizing the agencies' sage grouse amendments.

Response: The stipulations for sage grouse in alternative 1 are not consistent with sage grouse management that has been recommended and adopted by the Interagency Sage-Grouse Working Group in the last two decades. The stipulations in alternative 3 are more consistent with recent work, and we are further modifying sage grouse stipulations in cooperation with BLM and North Dakota Game and Fish.

The BLM completed an amendment to the North Dakota Resource Management Plan in 2015 for sage grouse management. The NSO stipulation is consistent with BLM stipulations. The Forest Service has suspended its efforts to finalize sage grouse amendments to the land management plan and will be addressing changes during plan revision.

Stipulation recommendations for sharp-tailed grouse

#15-11, 33-5

Comment: Nearly 31% of the continental Sharp-tailed Grouse population falls within North Dakota and declines to the state's population will likely lead to range-wide population declines. Sharp-tailed Grouse are a high-valued upland game bird, and because research indicates that prairie grouse may be adversely affected by energy development, careful consideration of management strategies is imperative. The suggested stipulations for sharp-tail grouse are currently too weak to offer substantial protection to the species. Though the EIS cites Williams (2009) as support for current stipulations, the conclusions drawn from this study are only applicable at low levels of oil and gas development. Development densities are substantially higher in much of the Little Missouri National Grassland and equivalent stipulations may not be enough to protect the species from long-term, deleterious impacts. Recommendations: 1. An NSO distance of 2 miles from an active sharp-tailed grouse leks, and remove "line of sight" wording from stipulation, as the rationale for avoiding leks includes minimizing risks to nests, which are not necessarily in line of sight from active leks. 2. Timing limitation of March 1 to July 15 to also take protect nesting activities, which are likely to occur within 2 miles of sharp-tailed grouse leks. 3. Timing limitations to prohibit surface activities that create noise at 20 decibels above ambient measured at the perimeter of an active lek should be from March 1 to May 15 to span the entire displaying season. 4. Timing limitations on road and trail maintenance within 2 miles from the perimeter of active leks should be from March 1 to May 15 to span the entire displaying season.

Response: We have analyzed the suggested 2-mile buffer for sharp-tailed grouse leks. According to our current map layer, such a stipulation would cover 81 percent of unleased acres. In contrast, the most restrictive alternative (3B) imposes no surface occupancy on 55 percent of unleased acres from all stipulations combined. When extended to all Forest Service surface acres, whether leased, unleased, or unavailable, the stipulation would cover all but 15,825 acres.

Sharp-tailed grouse leks are common and spread throughout the LMNG, and such widespread stipulations do not appear warranted, given this common occurrence. Our current timing limitation for sharp-tailed grouse leks (common to all action alternatives) prevents surface use from March 1 through June 15 within 1 mile of the center of the lek and no surface occupancy applies within 0.25 miles. Operations and maintenance activities cannot be restricted by timing limitations.

Analysis for Sprague's pipit

#15-30

Comment: DSEIS cites published data that Sprague's pipit avoid habitats up to 350 meters from oil pads, yet describes no impacts to Sprague's pipit populations.

Response: The impacts reported were for individual birds. Inferring these limited results to population effects would be speculative. The development of multi-well pads is generally conducive to the recommendations from this study, and the Grasslands encourages new oil and gas development and infrastructure to be sited within the footprint of existing disturbance whenever practical.

A recent paper by Bohannon and Blinnikov (2019) found that Sprague's pipit was the only one of 13 grassland bird species studied that showed a decline in populations correlated with increased fragmentation. (See the response to comments 15-32, 15-33 above.) The information in this paper will be used when reviewing proposals for Surface Use Plan of Operations and developing conditions of approval through application of the lease notice for threatened, endangered, and sensitive species that applies to all parcels under all action alternatives.

Botanical Resources

Rare plant species

#15-48, 23-2

Comment: The North Dakota Natural Heritage biological conservation database has been reviewed to determine if any plant or animal species of concern or other significant ecological communities are known to occur within an approximate one-mile radius of the project area. Please see the attached spreadsheet and map for more information on plant and animal species of concern, and significant ecological communities. Because this information is not based on a comprehensive inventory, there may be species of concern or otherwise significant ecological communities in the area that are not represented in the database. The lack of data for any project area cannot be construed to mean that no significant features are present. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. Regarding any reclamation efforts, we recommend that any impacted areas be revegetated with species native to the project area.

Response: The spatial and temporal context for direct and indirect effects boundaries for sensitive plants are limited to those areas where there is the potential for surface disturbance (Botanical Resources Report, p.7). The cumulative effects boundary is the same as the direct/indirect effects boundary. This is due to the low motility of plant species, and the need for actions to overlap in time and space with direct/indirect effects to produce cumulative effects.

Page 1 of the Botanical Resources Report details our direction for determining which species to analyze, "Forest Service Manual 2672.42 specifies that a biological assessment and a biological evaluation be prepared to determine if a project may affect any U.S. Fish and Wildlife Service threatened, endangered, or proposed species and their designated or proposed critical habitat and USDA Forest Service sensitive species. This biological assessment and evaluation is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (16 U.S.C. 1536 (c)). "Reclamation would be done in accordance with Forest Plan Guideline J.6 (p. 1-20)," 6. Where technically and economically feasible, use genetically local (at the ecological subsection level) native plant species in re-vegetation efforts. To

prevent soil erosion, non-native annuals or sterile perennial species may be used while native perennials are becoming established. The spreadsheet provided will be considered.

While general habitat information for animal species of concern is considered for the leasing analysis, the likely presence or absence must be addressed at the exploration and development stage. Plant species of concern (U.S. Forest Service sensitive species) are mapped and avoided during exploration and development. Plant species with very limited distribution have no surface occupancy, extending to a 200-foot buffer around the population.

#16-3

Comment: Alternative 3 proposes to add "no new surface occupancy allowed within 200 feet of mapped populations for Dakota buckwheat, nodding buckwheat, and sand lily." Petro-Hunt is concerned that the USFS will be reducing the authority of the authorized officer by creating an NSO for these species. For example, if the new NSO requires a proposed road to be shifted due to proximity to the species, consequently adding an additional 500' of road be built across native ground to avoid species, the authorized officer should retain ability to choose the least detrimental alternative to all resources. If moving the road within the proposed 200' NSO will not impact the species community and create less total disturbance than re- routing roads, the USFS should not limit their ability to choose.

Response: The 200-foot buffer around mapped populations ensures that the population will not be impacted by direct disturbance and will reduce potential impacts from fugitive road dust. The full extent of plant populations is often not apparent, as conditions such as drought or unusually cold weather may limit plants visible above-ground in a given year, even though root stocks remain viable. Thus, the buffer is necessary to ensure that populations are not impacted.

Both the acreage and number of populations for these three species are small. A gross total of 88.35 acres is affected by this stipulation, spread among 20 mapped populations. For some of these acres, another NSO stipulation also occurs, so the net increase in NSO is 77 acres.

Analysis of noxious and invasive species

#21-15

Comment: Rare plants exist in a very fragile environment in the badlands. The DSEIS makes a clear case that at least 10 sensitive plant species are at high local risk for extirpation in North Dakota. See DSEIS pp. 86 - 90. That situation, combined with the negative impacts of invasive species, cannot be over-stated in such an arid environment.

Response: The affected environment section for the rare plants analysis (DSEIS pp. 86-92) takes into account the current condition and habitat preferences of species. Competition from noxious weeds and the indirect effects of the arid environment through fugitive dust are discussed on page 96 of the DSEIS.

#11-17

Comment: In relationship to Invasive Plant Species, we would also cite:

- Recent monitoring of oil and gas sites on the Little Missouri National Grassland found that a large percentage of the sites were infested with noxious weeds and/or invasive species (Botany Files 2018). (DSEIS, page 93 in reference to oil and gas development sites.)
- Newly created edges experience changes in microclimate conditions, which may alter plant communities (Collinge 1996).

- Effects associated with weed population expansion may include changes in plant community composition, structure, and function (Mack et al. 2000), which:
 - ◆ may alter nutrient and fire cycles (Brooks 2008),
 - ◆ result in declines in native plant diversity,
 - ◆ degrade soil properties (Ehrenfeld 2003),
 - ◆ decrease the quality and availability of forage for wildlife (Thompson 1996),
 - ◆ reduce the aesthetic value of the landscape and scientific values of wilderness areas (Montana Department of Agriculture 2017),
 - ◆ increase encroachment upon rare plant populations and their habitats, and produce an overall decline of ecosystem health (Vitousek et al. 1996).

Response: For this analysis, potential soil disturbance was determined by identifying available unleased land that was not under a no surface occupancy stipulation. This included areas of no stipulation, along with those areas that fell under timing limitations (seasonal restriction) or controlled surface use stipulations. P. 99- The conclusion states: Alternative 3 has slightly less potential disturbance to known noxious weed species. The total number of locations that could be impacted by ground disturbance did not change, but five species had a total reduction of 127.68 acres of known infestations that could be impacted by ground disturbance. Thus, approximately nine percent less acreage would potentially be disturbed in alternative 3 compared to alternative 1. These species were Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), black henbane (*Hyoscyamus niger*), hoary cress (*Cardaria draba*) and common burdock (*Arctium minus*).

#15-45

Comment: The threat of noxious weeds or invasive plants is not limited to just the 7,590 acres of well pads, but to roads and pipelines and any disturbed soil infrastructure, and to all the native grass habitats that may be invaded by these sources. Based on survey data reported in the DSEIS, that only 13 % of surveyed sites have no noxious weed or invasive plant species problems, past history of the Forest Service, and personal experience in looking at the National Grasslands would suggest that this will be a severe problem. Stipulations alone will not prevent noxious weed and invasive plant species problems on the 216,300 acres on National Grasslands proposed for leasing and "indirect" oil and gas development.

Response: Pages 93-98 in the DSEIS describe the full effects of noxious weed invasion. The present analysis uses known and mapped weed populations and examines the potential risk of spread for each alternative. Since the locations of the wells aren't known yet, the only area not considered for impacts on noxious weed spread were those that had no surface occupancy stipulations. Therefore, the analysis looked at all known noxious weed populations that overlapped with the 141,200 acres available for oil and gas development with surface disturbance.

Effects of fugitive dust on vegetation

#15-34

Comment: Page 75: DSEIS references that "fugitive dust" will impact plant growth and seed/fruit development and that efforts to reduce dust on road with chloride solutions may lead to plant growth and soil sterility problems. Similar impacts are mentioned with the impacts from disturbance and lights at night. Yet no mitigation measures are described.

Response: Dust abatement is generally included as a condition of approval for the Surface Use Plan of Operations, and dust is also regulated by the State of North Dakota as particulate matter. See Environmental Protections Incorporated into Drilling Permits and Plans of Operation on the project website. Page 39 of the FSEIS states that fresh water is generally used for dust suppression. Road watering is the mitigation for fugitive dust. However, chloride solutions are often used as an additive to water in dust abatement programs, since the chloride helps bind the fines in soils and results in less fugitive dust. Further discussion of fugitive dust as it relates to rare plants can be found in the section on botanical resources of the FSEIS and in the Botanical Resources Report for the project.

A 2017 report by McGranahan et al. suggests oilfield traffic generates substantial amounts of fugitive dust, and while most of it is concentrated within 30 m of roadways, non-negligible deposition rates occur up to 100-200 m into fields. However, we have little evidence that dust exposure harms crop physiology and no evidence that dust exposure affects post-defoliation recovery of perennial grasses. Report title: Fugitive dust impacts on plants and landowner/citizen perceptions of Bakken development <https://www.ag.ndsu.edu/DickinsonREC/documents/mcgranahan-et-al-fugitive-dust-final-report-v2.pdf>

Setback stipulation for woody draws

#33-10

Comment: Woody Draws: Currently, the only stipulation to protect wooded draws reads: "Try to locate activities and facilities away from the water's edge and outside the riparian areas, woody draws, wetlands, and floodplains". This is vastly insufficient, as it does not afford any protection for wooded areas within the grasslands. Native woodlands are a unique and rare habitat in North Dakota, a state dominated by prairie. Furthermore, based on a USFS songbird monitoring program report, over 84% of the landbirds found on the LMNG are dependent at some level upon woodland habitat types (Hutto 1995). Hopkins et al. (1986), reported that aspen stands on the LMNG to be by far the most important woodland type (i.e., over juniper, pine, and cottonwood stands) for both nesting and foraging sites of landbirds. Only approximately 2% of the state is comprised of woody vegetation and this number may only be decreasing as forest regeneration has been a concern in some areas of the state. As this valuable habitat is already so scarce, it should be protected from development and degradation. Recommendation: Development, both roads and wells, should be placed outside of wooded draws.

Response: The current direction is that woody draws over 400 meters wide must be avoided by moving facilities up to 200 meters. In practice, woody draws have been avoided during activities. Application methodology: Use this stipulation in riparian areas, woody draws, wetlands, and floodplains that are greater than 400 meters wide. Regulation 43 CFR 3101.1-2 includes measures to relocate operations up to 200 meters and to delay operations up to 60 days in any lease year. Therefore, use standard lease terms for areas less than 200 meters from edge.

We considered the request to add a stipulation with a specific set back distance for woody draws, streambanks, and riparian areas. After thorough review, the Dakota Prairie Grasslands interdisciplinary team determined that existing regulations, direction in the LRMP, and existing stipulations combined, provides adequate protection for these areas.

Rangeland Resources

Effects to grazing industry

#15-44, 15-47

Comment: No analysis of the impacts on livestock grazing is described or attributed to the preferred alternative, yet later the DSEIS states that 7,590 acres of grassland will be converted to well pads and an undetermined acreage will be converted to roads or other infrastructure. This will have a reduction in grazing and in AUMs.

The loss of 0.5 % of the AUMs is described as a temporary loss. What is temporary about the conversion of 0.5 % of the grassland to well pads and roads? This represents a permanent, or at best 50-100 year loss of forage to the livestock industry.

Response: The figure of 7,590 acres refers to current disturbance from 1,518 wells that have been developed, based on an estimate of 5 acres of disturbance per well pad. As wells stop producing and are shut down, reclamation for the well pad and all other disturbance is required using native species. We have continued to use the conservative estimate of 5 acres per well for future development, but disturbance per well will likely be lower because horizontal drilling is most efficiently done with multi-well pads. We conservatively estimate that 3,100 additional acres will be disturbed.

We are not aware of any wells that continue to produce for 50 to 100 years. A loss of 0.5 percent of available animal unit months must be weighed against other multiple uses of national forest lands.

#15-49

Comment: The DSEIS goes on to state that the grazing lands have been reduced by a high degree in the past by oil and gas development, but does not recognize any impact in the future by this leasing alternative or any of the yet to be developed oil and gas production on already leased but yet undeveloped oil and gas.

Response: The analysis of impacts in the Rangeland Resources section refers strictly to future impacts expected from leasing an additional 216,300 acres of federal mineral estate. We have provided both qualitative and quantitative assessments.

Recreation

Stipulations for recreation sites of development scale 3 – 5

#16-4, 25-28, 26-6, 26-7, 26-13, 30-27, 32-16, 32-17, 32-18

Comment: Alternative 3 proposes new stipulations for NSO within sites classified as Recreation Site Development Scale 3 through 5. As of 2018 these sites included: Birnt Hills Interpretive Site, Burning Coal Vein, Buffalo Gap, Sather Lake, CCC Campgrounds and Summit, Whitetail Picnic Areas, and the four Maah Daah Hey Trail overnight camps, Wannagan, Elkhorn, Magpie, and Bennett. This stipulation applies to all recreation sites whose development scale is classified as 3, 4, or 5 at the time of leasing. Alternative 3 also adds a timing limitation where surface use is prohibited from 5/1 - 12/1 within ¼ mile of the established boundaries of sites classified as Recreation Site Development Scale 3 through 5. Petro-Hunt would like clarification on Table 1 of the DPG DSEIS for Oil and Gas Leasing: Executive Summary, for the NSO & TL on for Developed Recreation Sites, under Alternative 3 "Specific Sites

Named and Future Sites Included for Development Scale 3-5." This table appears to include future sites which contradicts the Draft SEIS document where it appears to include only established sites, or sites determined at the time of leasing. Does adding "future sites" create blanket coverage on all future leases?

The lack of clarity in the record regarding the scope of potential consequences of the new and revised recreation lease stipulations also prevents an accurate assessment of how impactful these restrictions will be to future development. Specifically, both the timing and the NSO stipulations extend to future recreation sites with a Development Scale 3-5. But there is nothing in the record that allows for an assessment of where these future classifications might occur, how big they will be, or with what frequency they may come into existence. Instead, the Recreation Report provides two rudimentary maps (see pages 14, 15), a description of what each development scale number means (page 12), and a list of current recreation site scale scores (page 13).

Response: Each campground on NFS lands is categorized with a development scale ranging from 1 to 5. This range includes very primitive with no facilities (1), to highly developed and having major site modifications (5). The new NSO stipulation would protect any future development of campgrounds or trailheads which are rated as a development scale of 3-5. The Grassland has provided a list of sites with the current development scale for reference. The only sites currently being protected are those listed by name. If a new campground were to be developed in the future, it would not be protected and a well pad could be located within the newly developed campground, conflicting with the recreation experience. This stipulation protects recreation sites that may not be currently listed but may be developed in the future.

At the time of leasing, the proposed well site would be evaluated for recreation development. If none exist, no stipulation would apply. If a proposed site contains a recreation site with development scale 3-5, then the NSO stipulation would apply. This stipulation applies at the time of leasing. If a lease were already granted, the stipulation cannot be retroactively applied.

Current locations of recreation sites are known and can be protected from future oil and gas development. Recreation sites that may be built in the future would need that same protection. If a parcel were leased prior to the development of a recreation site, the stipulation could not be retroactively applied, as stipulations are specified in the lease contract when it is issued.

The Grassland currently has no plans for future recreation development; however, if that ever occurred, NEPA would be conducted prior to construction, and the public, including oil and gas interests, would be able to comment on the proposed project. Currently leased parcels would likely be considered undesirable for proposals for new recreation sites.

Industrial impacts for recreation sites

#11-13a, 20-3, 25-13

Comment: According to the DEIS, preferred Alternative 3 "prohibits surface use (including fracking) from occurring during the May 1 - December 1 timeframe for any recreation sites with a development scale of 3 through 5." The revised stipulation also purports to "limit surface use activities (such as fracking) that may impact air quality to distances greater than 0.25 miles from those developed recreation sites considered likely to have concentrated public use, in order to limit public exposure to unhealthy air pollution. This second revision (limiting surface activities to distances greater than 0.25 miles from certain recreation areas) is not clearly reflected as a "new" or "revised" lease stipulation in either Table 3

of the Executive Summary or Table 4 of the DEIS. NP requests clarity on the exact scope and requirements of timing and distance revisions being proposed to mitigate potential air quality impacts.

Comment: While the stipulation for recreation sites does provide timing limitations and a quarter-mile buffer for scales 3 through 5 (existing and future), this provides no level of protection for livestock, wildlife, hunters, ranchers or dispersed recreationalists. We might assume that living things would avoid fracking operations, but that is certainly not true in all cases. Curiosity actually can be a draw in some cases. Further education of the public is required regarding these findings and we cite this as one more cause of "user displacement" by oil and gas development. As an aside, NDCC 38-08-05 allows for well locations to be sited as close as 500 feet from an occupied dwelling (<https://www.legis.nd.gov/cencode/t38c08.pdf>). BCA holds that the US Forest Service has an obligation to share their fracking emission analysis with appropriate North Dakota governmental departments and with the State Legislature currently in session.

Response: The timing limitation for recreation sites in alternative 3 is clearly denoted as "revised" in column 3 of table 4 in both the DSEIS and the FSEIS. The only revision in the timing limitation within 0.25 miles of developed recreation sites is whether those sites are specifically named (alternative 1) or described by the level of development (alternative 3), which is related to the number and concentration of visitors. The statement regarding limiting air quality impacts is not a revision, but is a statement about effects of the stipulation, and is applicable to both action alternatives. The purpose of the timing limitation within 0.25 miles of developed recreation sites is to reduce impacts of industrial activities, including noise, air quality, traffic, etc. during the primary recreation season.

We have shared the near-field modeling data with North Dakota Department of Environmental Quality, Air Resources Office and obtained their comments and recommendations from several meetings and conference calls. We acknowledge ND DEQ as the regulatory authority that enforces national ambient air quality standards and are committed to continued cooperation with the Department.

#15-50, 33-11

Comment: We applaud the Forest Service for considering the impacts of oil and gas development on recreation, but do not believe the stipulations are sufficient. The "impact zone" of sight and sound disturbance extends beyond .25 miles from an active well. To safeguard the intrinsic value of this cherished landscape and to ensure the people of North Dakota can continue to experience its unspoiled grandeur, stronger protections should be considered. We recommend the boundary should be extended from .25 miles to .5 miles.

Response: Both alternative 1 and alternative 3 prohibit surface use between May 1 and December 1 (with exceptions for ongoing maintenance and operations) within 0.25 miles of developed recreation sites. Well drilling and completion entail much higher disturbance than ongoing operations, thus the desire to limit such activity near developed recreation areas during the prime occupancy for camping and hunting. The Grasslands has had very few complaints regarding well-pads near developed recreation areas (R. Schilling, Recreation Program Manager, personal communication, August 2019). See the discussion on increased buffers for developed recreation sites in the section Alternatives Considered but Eliminated from Detailed Study in the FSEIS.

Hiking and hunting

#15-51

Comment: In the discussion of impacts to recreation, there is only discussion on campgrounds, developed sites, and trailheads. There is no analysis of description of impacts to hiking, photography, or hunting.

Response: There would be no direct impacts to any of these recreational activities by simply leasing land, but the effects of oil and gas development would be similar to the other activities outlined in the report, including noise impacts, sights and sounds of human activity, and effects to scenic integrity (see scenery report). These categories of recreation fit are implicitly discussed in the context of dispersed recreation, as well as the recreation settings opportunities and experiences. It is not necessary to list out recreation activities specifically, since many can be categorized into developed recreation and dispersed recreation.

#15-55

Comment: Trailheads have some NSO protection, but not the trails. There are numerous instances where wells and infrastructure have been developed within feet of the existing national recreation trails. The true impacts to hikers and other forms of recreation have not been recognized or analyzed.

Response: Standard lease terms protect areas from development or allow for coordination in authorizing new development. NEPA would occur and any proposed operations would have conditions of approval and standard lease terms attached. In some situations, trails have been re-routed in order to avoid oil and gas leasing operations. The effects on trail users would be analyzed when a new lease operation is proposed in the future with site-specific locations. These direct impacts from oil and gas operations to specific recreation users can only be generally predicted since the time and place of oil and gas infrastructure is currently unknown. Spacing units are 1260 to 2520 acres in size, and a fully developed site for multiple wells may be only 10 acres, thus allowing for flexibility of placement within a spacing unit.

Special Areas

Analysis of scenic integrity objectives

#11-12, 23-1

Comment: Scenic Resources play a role that goes beyond what is pretty and they also serve as one of the top illustrations of the level of disturbance across the Grassland landscape. BCA finds that this section of the DSEIS makes incorrect assumptions. On page 120 of the DSEIS, it is stated: The scenic integrity objectives assigned high or moderate in the area of the proposed National Forest System lease parcels are less than 32 percent of the total area, which indicates that scenic integrity is of moderate priority for resource management consideration in compared to other management needs. For those of us that participated in the NEPA process that resulted in signing of the Land and Resource Management Plan for the Dakota Prairie Grasslands, we are aware that "scenic integrity" at that time was not an issue in the same way that it is today. One could have stood on a butte top across much of the Grassland without seeing any sign of human activity except livestock fences and the occasional ranch site or stock pond. The boundaries of Theodore Roosevelt National Park itself were visually undefined. To assume that that 32% high or moderate Scenic Integrity Objective reflects an actual desired condition is a skewed assumption. Similarly, the Incomplete and Unavailable Information (1-the absence of any usable Scenic Attractiveness

data or mapping, and 2-the absence of GIS Data for viewing platform information or listings of routes and sites of concerns) cited on page 16 of the Scenic Resources Report may be inexcusable but is also aptly reflective of the degree to which disturbance to scenic vistas and integrity was a moot point, largely irrelevant and non-existent at that time. Additionally, BCA finds no support for the conclusion made on page 126 of the DSEIS: Under the reasonably foreseeable development scenario, exploratory drill rigs would likely be visible from the trails in foreground, middle ground and background, which could reduce the quality of the scenic experience for individuals visiting the trails. Depending on the level of development, this could be considered incompatible with the purpose for which the trails were established. While views of oil and gas development might reduce the quality of the experience for some trail users, it would probably not displace users. It is the "probably not displace users" that we find fault with. Rather, we find that users of a wide variety, including recreationists, hunters, and of particular concern, ranchers, have great potential to be displaced. National Visitor Use Monitoring has not been adequate to make such a statement. In fact, visitation figures specifically for the Little Missouri National Grassland are unavailable (DSEIS, page 103). The many anecdotal reports of previous visitors that no longer see the Grasslands as a chosen destination for hunting or recreation ("guess we'll have to find somewhere else to go") or approach visiting BCA members with local ND license plates to complain or despair over state and federal laxity for protections of "their" public lands are contrary to the conclusion here.

If not carefully planned, Oil and gas development can have potential significant impacts to the viewshed of Sully Creek State Park, the Theodore Roosevelt Elkhorn Ranch Natural Area, the Little Missouri River and the Maah Daah Hey trail. These remote, scenic resources are key to the state's tourism industry and contribute significant economic benefit to the western ND economy. The supplemental EIS must recognize the critical importance of protection of these resources.

Response: During this stage, a programmatic analysis was done as this decision does not authorize any oil and gas drilling operations at any specific location. When the Application for Permit to Drill and Surface Use Plan of Operations are proposed, the site-specific analysis would occur, and effects to scenery (including viewshed analysis from sensitive viewing platforms) would be analyzed in detail for any site-specific activities or actions.

The SIO statement on Page 120 of the DSEIS has been updated in the FSEIS to not lessen the importance of maintaining all Scenic Integrity Objectives and the desired landscape character.

Regarding the desired scenic condition, the Scenic Resource Report reflects the current grasslands plan and existing SIOs. The Forest Service plans to begin a Forest Plan revision starting 2021 where a scenic character assessment, updates to SIO's and further protections to scenic resources would be included. During this process the Forest Service will work with Theodore Roosevelt National Park and others to identify sensitive scenic areas and viewsheds (including night sky) in conjunction with making updates to the SIO boundaries, classifications, and the desired scenic character of the area.

The final Scenic Resource Report has been changed to reflect that some users may be displaced. The above statement is specific to those using trails and scenic quality and does not address the functioning of ranching operations or hunting locations. However, we also note that the increase in workers, residents, and businesses that are directly and indirectly associated with oil and gas development also likely increases the number of visitors wishing to recreate on the LMNG.

Inventoried roadless areas

#12-8

Comment: The SEIS states that by providing a no surface occupancy ("NSO") stipulation for inventoried roadless areas, the USFS is acknowledging the priorities of protecting these areas from disturbance as found in the DPG LRMP and in compliance with the 2001 Roadless Area Conservation Rule. However, the Roadless Rule [and] the DPG LRMP, allows oil and gas development to occur in all but four inventoried roadless areas. Further, only half of the roadless areas are restricted from the construction of new roads under the DPG LRMP, but this does not limit the use of existing roads for oil and gas development. The proposed NSO stipulation (SEIS at 18, 113) could completely prohibit oil and gas development if the resources cannot be reached by horizontal drilling due to restrictions on neighboring lands and topography. ... There are also several inventoried roadless areas in North Dakota that contain County roads and do not qualify as "roadless."

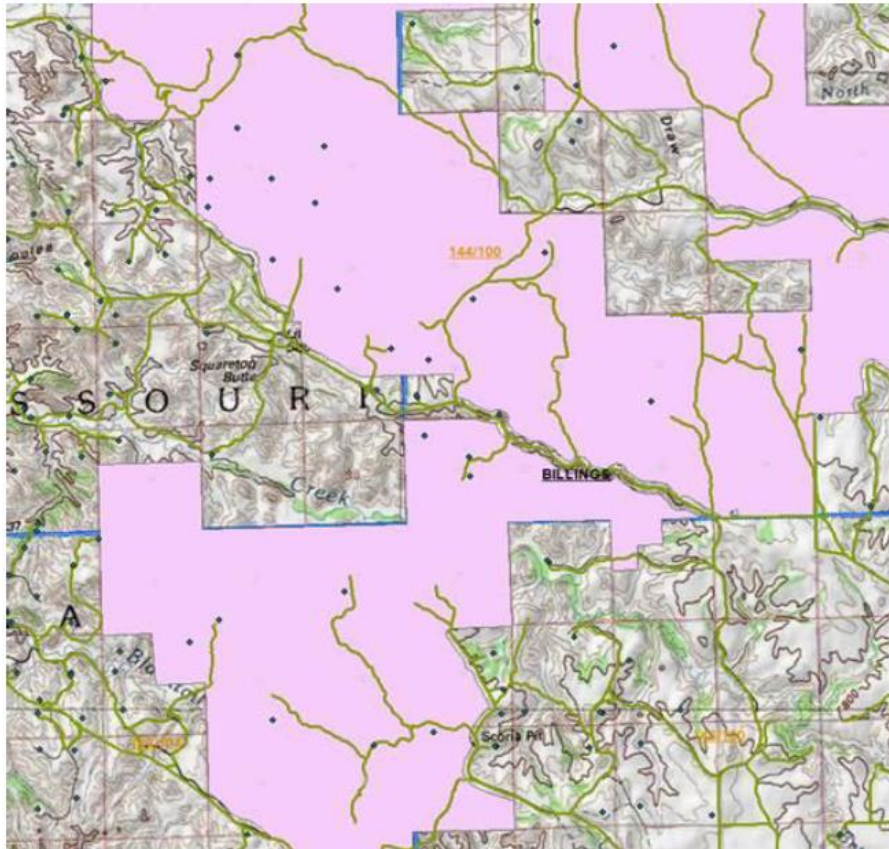
Response: The commenter is mistaken that "only half of the roadless areas are restricted from the construction of new roads under the DPG LRMP." For inventoried roadless areas, the 2001 Roadless Rule prohibits construction of new roads with few specified exceptions. See 36 CFR 294.12(b). Those exceptions include when "a road is needed in conjunction with the continuation, extension, or renewal of a mineral lease on lands that are under lease by the Secretary of the Interior as of January 12, 2001 or for a new lease issued immediately upon expiration of an existing lease" (36 CFR 294.12(b)(7)). We are aware of no such leases within inventoried roadless areas that have not already been developed.

Alternative 3B provides a controlled surface use buffer of 0.25 miles on either side of existing maintenance level 3-5 roads within inventoried roadless areas, to correspond to the 2001 Roadless Rule. We have mapped the expected CSU buffers in roadless areas (figures 28 and 29 in the FSEIS). However, actual buffers will be determined based on the existing roads when a parcel is offered for lease. The buffers could change over the years because roads may be reclaimed if production ceases on a well and the road is not otherwise grandfathered in.

We have completed an analysis of NSO stipulations and have determined that no federal mineral estate with Forest Service surface would be more than two miles from a parcel without NSO stipulations, and most would be less than one mile. Therefore, we conclude that no parcels would be inaccessible to drilling.

#26-5, 26-13

Comment: This map illustrates one of many areas where existing roads and well locations (blue diamonds) are active in the inventoried Roadless Areas. The new NSO lease stipulation would shut down future development of these existing leaseholds, severely impacting operators and non-federal mineral owners.



#30-27

Comment: The new and revised lease "recreation-based" stipulations are grounded entirely on an unsubstantiated, future, and unknown potential for adverse impacts. There is no way to account for these impacts and no analysis can fix this. The new NSO lease stipulation would shut down future development of these existing [roadless area] leaseholds, which is a very significant area. The Draft EIS does not explain why such draconian and severe measures are necessary, nor does it detail why the current framework is insufficient to mitigate the impacts in these inventoried areas. These stipulations are based on general, speculative, and uncertain potential future development. There is no evidence of a need to create more stipulations or why it is necessary to adopt such stringent stipulations. Recreational use of the land is supported by NDPC, but as laid out in the Draft EIS, it is unsupportable. Increasing regulations and stipulations using speculative and uncertain information would result in nearly 20% increase in NSO-designated areas, placing almost 60% of federal mineral ownership into NSO designation. NDPC reiterates that site-specific flexibility allows for a collaborative effort resulting in the best decision being made using current information and existing regulations. It is important to note that the Recreation Report acknowledges that Alternative #1 along with pre-existing processes imposed by NEPA are sufficient mitigation. "The undeveloped character of the land would be largely protected" and that "[m]ost of the [] indirect effects would be mitigated through the current stipulations, lease notices, and the conditions of approval." Recreation Report at 23. There is a plethora of documentation of existing mitigating regulations that are in effect, and the Draft EIS does not contradict this information. See Recreation Report 24-26. The justification for these new stipulations imposed by Alternative #3 are based on "only if" scenarios.

Response: The Roadless Rule allows the construction of well pads, as long as no new roads are built, thus effectively limiting well pads to locations adjacent to existing roads. Linear construction features, such as pipelines and transmission lines are generally allowed by the Roadless Rule anywhere on the landscape. As written, the stipulation for roadless areas in alternative 3 was inconsistent with the Roadless Rule, because it allowed for no waivers, exceptions, or modifications. Alternative 3B provides a controlled surface use buffer of 0.25 miles on either side of existing maintenance level 3-5 roads, to correspond to the 2001 Roadless Rule. We have mapped the expected CSU buffers in roadless areas (figures 28 and 29 in the FSEIS). However, actual buffers will be determined based on the existing roads when a parcel is offered for lease. The buffers could change over the years because roads may be reclaimed if production ceases on a well and the road is not otherwise grandfathered in, or roads could be improved, if there are valid rights that predate the 2001 Roadless Rule.

#20-2

Comment: 1. A second concern is the large blocks of new NSO in Alternative 3 of the DEIS that could potential place mineral resources out of reach of current drilling technology. Thank you for providing the special analysis that allowed identification of the 21 sections of land that would require a minimum two mile horizontal lateral or directional well for mineral development. While current drilling technology is capable of reaching minerals two or more miles from the surface location, this is not the case for many formations located at depths of less than 10,000 feet, and the economics of several North Dakota oil and gas plays will not support the cost of this technology. The NDIC strongly recommends that new NSO designation be removed from small areas of proposed new NSO. This would provide corridors for access to sections of land requiring more than 1 mile of directional drilling for access from non-NSO surface. Alternatively, the NDIC recommends waivers, exemptions, and modifications as follow that would provide for leasing with surface occupancy if the inability to develop oil and gas resources due to technology or economic limitations is properly documented: **Waivers** Upon request of the lessee, the authorized officer shall evaluate whether technology at the time of leasing is not capable of accessing otherwise economic oil and gas resources located at depths of less than 10,000 feet. If the evaluation determines that technology at the time of leasing is not capable of accessing otherwise economic oil and gas resources located at depths of less than 10,000 feet, the authorized officer shall grant a waiver to this stipulation. **Exceptions** The authorizing officer may grant an exception to this stipulation if the operator submits a plan that adequately mitigates impacts of the proposed action. **Modifications** Upon request of the lessee, the authorized officer shall evaluate whether technology at the time of leasing is not capable of accessing otherwise economic oil and gas resources located at depths of less than 10,000 feet. If the evaluation determines that technology at the time of leasing is not capable of accessing otherwise economic oil and gas resources located at depths of less than 10,000 feet, the authorized officer shall modify the boundaries of the stipulated NSO area to provide access to otherwise economic oil and gas resources located at depths of less than 10,000 feet.

Response: We generally agree with the comment and acknowledge that, as written, the lack of waivers, exceptions, and modification for no surface occupancy in inventoried roadless areas in alternative 3 would not comply with the 2001 Roadless Rule. The stipulation for inventoried roadless areas in alternative 3B provides a buffer where well pads may be sited along existing major roads for better conformance with the 2001 Roadless Rule. We also acknowledge that, while prohibiting the construction of new roads, the Roadless Rule does not prohibit the placement of pipelines or transmission lines within inventoried roadless areas.

#16-2

Comment: Alternative 3 increases no surface occupancy (NSO) by 43% to 107,800 acres. It appears that the largest increase is a new stipulation of no surface occupancy in inventoried roadless areas. It is stated on pg. 7 of the SEIS that "Historically, no surface occupancy has been permitted for mineral estate within inventoried roadless areas, based on lease notices. However, codifying this protection in the lease stipulations strengthens it." Petro-Hunt does not agree with this assessment. There are existing roads in the inventoried roadless and currently new pads can be built within existing road disturbance. Petro-Hunt is not in favor of any blanket stipulation that increases NSO in Roadless Areas. Will the addition of a well to an existing pad within a Roadless Area be approved under this alternative if there is no new disturbance?

Response: The 2001 Roadless Rule specifies that the development of well pads is allowed within a roadless area, but no new roads may be constructed. Linear features, such as pipelines and transmission lines are also permissible. We have clarified the stipulation for inventoried roadless areas in alternative 3B to more accurately reflect allowances in the Roadless Rule. The addition of a well to an existing pad would not be prohibited, and we have clarified in the FSEIS that there should always be a preference for putting new infrastructure within the footprint of existing disturbance.

The intent of the IRA lease notice in alternative 1 and the stipulations in alternatives 3 and 3B are to comply with the 2001 Roadless Rule, insofar as it prohibits new road construction and also allows for mineral development. The Roadless Rule allows new roads to be constructed for oil and gas development within roadless areas only when the lease was granted prior to 2001. For leases granted after 2001, existing roads may be used. We recognize that the stipulation for roadless areas in alternative 3 would not adequately comply with the Roadless Rule. In alternative 3B, the controlled surface use buffer would allow for well pads adjacent to existing roads. In combination with no surface occupancy outside this buffer, these stipulations fully comply with the Roadless Rule and provide better certainty for lessees. Linear construction features, such as pipelines and electrical transmission lines are allowed under the Roadless Rule. However, both industry and the Forest Service generally prefer the placement of such infrastructure within existing road prisms or developed corridors.

Although the acreage explicitly designated as no surface occupancy increases under alternatives 3 and 3B, surface occupancy of well pads and all road building was previously prohibited through required conformance with the Roadless Rule. The primary difference now is that such acreage is identified by stipulation, whereas under alternative 1 (and since 2001) it was enforced by lease notice.

#27-1

Comment: Due to the rapid loss of roadless habitats within the Grasslands, it is imperative that the Forest Service and state work together to protect what little remains of these unspoiled discrete sites, including prohibiting any surface occupancy, temporary roads or other non-natural uses within the inventoried roadless areas; for example, Bullion Buttes and many others. This would also help protect mapped populations of threatened plants as noted in the Summary.

Response: The Forest Service complies with the 2001 Roadless Rule. State and county governments are not constrained by this federal rule. We are committed to collaborating with state and local governments, as well as private landowners to minimize environmental impacts wherever possible and to improve landscape-level management.

#18-9

Comment: BHA also recommends that the Forest Service analyze in detail the effects of oil and gas leasing on the status of Inventoried Roadless and Non-Motorized Areas in the LMNG. Special attention should be provided to these areas to maximize their protection and natural value.

Response: The final SEIS includes an analysis of the effects on roadless characteristics and the wilderness attributes of inventoried roadless areas for alternative 3B, where well pads may be sited within 0.25 miles of existing roads. We also conducted a review of adjacent unroaded areas and an analysis of whether these areas contributed to the roadless expanse of the IRA. See the analysis of special areas in the recreation section and the Recreation Report.

Theodore Roosevelt National Park

#15-10

Comment: The stipulation says there will be NSO stipulations within one mile of Theodore Roosevelt National Park. The NDWF suggests that there may be topographic situations where one-mile NSO will be more than adequate, and situations where one mile will not be an adequate buffer to protect the Park. The one-mile NSO stipulation should be used on a site by site permit process. The same is true for a one-quarter mile (1/4) NSO stipulation for the Little Missouri River. That may not be an adequate buffer or distance in some cases.

Response: No one-mile NSO stipulation is proposed, but there is an existing controlled surface use stipulation for high scenic integrity areas where surface occupancy and use are subject to operational constraints to maintain the landscape character intact. During this stage, a programmatic analysis was done, as this decision does not authorize any oil and gas drilling operations at any specific location. When the Application for Permit to Drill and Surface Use Plan of Operations are proposed, the site-specific analysis would occur, and effects to scenery (including viewshed analysis from sensitive viewing platforms) would be analyzed in detail for any site-specific activities or actions.

Stipulations are geographically specific and are incorporated into lease contracts associated with each parcel. Waivers, exceptions, and modifications may be applied to lessen a stipulation when site-specific development is proposed, but additional more restrictive stipulations may not be imposed. Conditions of approval are applied to ensure that the development meets the standards of the grasslands plan. Please see attachment A Steps to Approving Oil and Gas Leasing on National Forest System Lands at the end of this document and Environmental Protections Incorporated into Drilling Permits and Plans of Operation on the project website.

#21-10

Comment: Theodore Roosevelt National Park has been inundated by oil and gas development in the LMNG. Well pads, pump jacks and flaring can currently be seen in all three units of the park. Protections must be secured to ensure there is no further damage to the park - including its viewsheds - from leasing. Any available leases near the three units of THRO should be extensively reviewed and any impacts to park air quality, viewshed, noise, and night skies should be mitigated prior to leasing. The Elkhorn unit of the park is of specific concern, as it is the smallest unit of the park and is engulfed by oil and gas development. The USFS should do more analysis on potential mineral withdrawals and exchanges in lands surrounding the Elkhorn to effectively protect this national treasure.

Response: When the Application for Permit to Drill and Surface Use Plan of Operations are proposed, the site-specific analysis would occur, and effects to scenery (including viewshed analysis from sensitive viewing platforms) would be analyzed in detail for any site-specific activities or actions.

The Forest Service plans to begin a forest plan revision starting 2021 where the scenic integrity objectives and protections to scenic resources will be re-evaluated. In this process, the Forest Service will work with NPS and others to identify all sensitive viewsheds (including night skies) of all three units of Theodore Roosevelt National Park in conjunction with making updates to the scenic integrity objective boundaries and classifications. Regarding mineral withdrawals and exchanges, they are not part of the scope of this project but may be addressed during plan revision, at least as lands administratively available for leasing, which is made at the area or forest-wide level (36 CFR 228.102(d)). The current analysis is for the leasing decision for specific lands (36 CFR 228.102(e)), which specifies the stipulations that will be applied and authorizes the BLM to offer the specific lands for lease.

#28-5

Comment: The proposed stipulation identifies recreation site classifications for which the timing limitation applies. We recommend including a reference to the site classification descriptions since it is unclear what existing and future recreation sites would be protected by the stipulation. To reduce possible impacts to human health in the most heavily visited areas, we also recommend that the stipulation include a buffer for inhabited structures and the border of Theodore Roosevelt National Park.

Response: Please see the response above regarding comments on stipulations for recreation sites of development scale 3-5. Theodore Roosevelt National Park is protected by a one-mile wide controlled surface use stipulation for high scenic integrity objectives. This stipulation is more restrictive, in some ways, in that a proposed well pad may be moved to comply with the stipulation, based on collaboration and input with TRNP staff. In contrast, the timing limitation only prohibits drilling and completion for well pads within 0.25 miles between May 1 and December 1, but does not limit their locations. Drilling in proximity to inhabited structures is regulated by the State of North Dakota. See [North Dakota Century Code Chapter 38-08](#).

#22-1, 22-3, 22-6

Comment: In managing oil and gas leasing in the Dakota Prairie Grasslands we urge the United States Forest Service (USFS) to enhance protections in the landscape surrounding the [Theodore Roosevelt National] Park and Elkhorn Ranch. We urge the USFS to place particular emphasis on potential impacts to historic and cultural resources when considering all aspects of drilling operations, including the placement of roads, limitations on flaring, and pipeline development. As Applications for Permits to Drill (APDs) are received, the USFS should inform applicants that compliance with the National Historic Preservation Act is required prior to the approval of drilling plans. The USFS must make clear that it maintains the authority to deny plans for operations that would cause adverse effects to historic and cultural resources.

While we generally support the USFS effort to update lease stipulations, we are disappointed that the agency has not included within the DSEIS a robust discussion of how stipulations can be tailored to protect heritage resources associated with Theodore Roosevelt's legacy in the region. At a minimum, lessees should be made aware that particular cultural resources will be a factor when USFS decision-making occurs at the application stage. This creates greater predictability for lessees and will assure the public that the significance of sites like the Elkhorn Ranch landscape is not confined to the specific boundaries previously listed in the National Register of Historic Places. We urge USFS to develop

stipulations for parcels in the vicinity of the Park and Elkhorn Ranch that specifically reference these resources and reflect their importance to our nation's heritage.

The USFS maintains an existing one-mile buffer of high scenic integrity objective around each of the units (see p. 121 re Special Areas and Designations). The USFS should conduct an analysis of whether this one-mile buffer is sufficient and should consider expanding these protections in accordance with its heritage stewardship responsibilities.

Response: The current lease stipulations already require that lessee comply with NHPA by completing all necessary inventories. Furthermore, there is a no surface occupancy stipulation within any National Register eligible cultural sites that states the following: "Use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values." These stipulations will remain in place under any alternative.

Since these current stipulations already prevent exploration, use, or development on any National Register eligible (or unevaluated) site, no further heritage stipulations were deemed necessary. TRNP is also surrounded by a 1-mile wide high scenic integrity stipulation for controlled surface use, designed to ensure that the landscape character is not more than slightly altered. Specific conditions of approval are designated at the Application for Permit to Drill (APD) stage, when effects to scenery and heritage would be analyzed at project level for any site-specific activities or actions. This would include detailed analysis of sensitive viewsheds, recreation areas and heritage sites.

Regarding the sufficiency of the one-mile high scenic integrity buffer around Theodore Roosevelt National Park, the Forest Service plans to begin a Forest Plan revision starting 2021 where the scenic integrity objectives and protections to both scenic and heritage resources will be re-evaluated. In this process, the Forest Service will work with NPS to identify sensitive viewsheds to and from all three Theodore Roosevelt National Park units in conjunction with making updates to the scenic integrity boundaries and classifications, if deemed necessary. The National Park Service is a cooperating agency for this supplemental environmental impact statement. The agency has stated a preference for working directly with operators in siting well pads and other infrastructure at the APD stage to ensure scenic integrity around the national park units. The agency did not propose or request any new or revised stipulations.

Wilderness suitability and designation

#11-22

Comment: BCA also finds that under the current scope and scale of industrial oil and gas development in the Little Missouri National Grassland the Forest Service has an obligation to honor its pledge should the Grassland's ecological integrity be threatened, and therein, officially recommend those rare and limited acres of Management Area 1.2A for formal Wilderness designation.

#14-1, 17-1, 21-12

Comment: Wilderness areas, also part of the USFS mandate, need a comprehensive review. The areas within the LMNG administratively managed as "suitable for wilderness" are quite modest in size. Should they all end up ringed by well pads, tank farms, and dusty gravel roads, their value as potential Wilderness will be much diminished? Each one of the Wilderness areas within the project area would benefit from an inter-agency and inter-jurisdictional process. If nothing else, several sections of minerals under land controlled by the North Dakota Trust Lands Department could be exchanged for federal minerals elsewhere and the surface could be added to the 'suitable for wilderness' blocks. In addition, land

that separates two 'suitable for wilderness' areas should in particular be removed from leasing, e.g., the river valley between Bullion Butte and Kendley Plateau.

Response: Congress is responsible for formally designating Wilderness. Commenter would need to contact their representative in Congress in order to start the process of designating areas as Wilderness. A wilderness suitability study was conducted during the 2001 grasslands plan revision. A wilderness suitability study will be again required when the plan is revised. This process is expected to begin in 2021 or 2022. These areas will be re-evaluated for wilderness character and land allocations decided. The assessment of wilderness suitability is outside the scope of this project.

Mapping and Technical Edits

Correct ownership maps

#12-5, 12-6, 12-7

Comment: The pdf copy of Alternative 3 was georeferenced by the county to analyze the USFS parcels that would be affected by the stipulations proposed in the preferred alternative (https://www.fs.usda.gov/nfs/11558/www/nepa/92388_FSPLT3_4525449.pdf). The County determined that several private land parcels in Billings County have been included in the acreage for the SEIS (see Attached Map) - this is contrary to what the USFS told the public at the public meeting and within the SEIS documents. See SEIS at 5; 10 (The decision would only apply to operations on lands with federally owned minerals within National Forest System surface ownership.). The 216,300 of "available and unleased" acres (see id. at 8) have been repeatedly stated as being federal surface over federal minerals. Id. at 5, 10. We found 79 private land parcels for a total of 16,387 acres in Billings County that may be wrongfully included in the SEIS analysis. The amount of federal and private mineral estates (split estates) in these parcels is unknown and not readily calculated in the time available.

The USFS must revise its maps and total acres subject to the proposed amendments to reflect only those lands that contain federally owned minerals within National Forest System surface ownership.

Response: The Forest Service and Billings County GIS specialists have worked together to verify surface ownership and make corrections for the FSEIS. The cooperation of the County is greatly appreciated. The accuracy of geodatabases changes and evolves over time, and the accuracy of the portrayal of ownership is limited by the size of the display. Actual lease parcels are verified by cadastral information.

Map location of Theodore Roosevelt National Park

#15-6

Comment: Page 12: The map on Page 12 should show the location of the three units of Theodore Roosevelt National Park, so the reader can view the impacts to the Park.

Response: The locations of these units have been added to the maps for the FSEIS.

Correct designation of Theodore Roosevelt National Park units

#2-1

Comment: The National Park Service (NPS) is a cooperating agency on this project, and provided resource and visitor use information that was incorporated into the document. The DSEIS gives readers an

accurate representation of Theodore Roosevelt National Park's affected environment, visitor use, potential impacts, and resource preservation efforts. The only change suggested for the final document would be that the NPS refers to the three distinct Theodore Roosevelt National Park areas as units, not districts (North Unit, South Unit, Elkhorn Ranch Unit).

Response: This edit has been made for the FSEIS.

Use 2016 report for impaired streams

#28-11

Comment: The Draft SEIS refers to North Dakota's 2012 Integrated Report for Clean Water Act 303(d) Listed Waterbodies. The EPA recommends that the USFS refer to North Dakota's 2016 Integrated Report for the latest available information on impaired waters within the project area

Response: The surface water analysis has been updated to include the 2016 report for impaired streams in North Dakota.

Out of scope

Opinion

#3-1, 10-1, 35-1

Comment: There was good reason NOT to allow oil and gas development 15 years ago and it was ignored. The situation is definitely much more serious now so I sincerely hope that USFS chooses alternative #2 and stops offering leases for oil and gas development in the ND Grasslands.

Response: Comments comprising opinion with no specific supporting reasons are outside the scope of the analysis. We recognize that many people have preferences for one decision or another. However, NEPA is an analytical process, not a vote. Regulations from the Council on Environmental Quality (40 CFR 1503.3) state that "comments on an environmental impact statement shall be as specific as possible and may address either the adequacy of the statement or the merits of the alternatives or both."

Crew camps

#28-14

Comment: The Draft SEIS refers to several waterbodies impaired for E. coli. The Draft SEIS also states: "Pollution from sewage and wastewater is mainly caused by undersized wastewater treatment plants in small affected communities and development of new crew camps where sewage disposal is becoming an increasing problem" (p. 57). Improper sewage disposal from crew camps could be a potential contributor to E. coli impairment, or contamination in an unimpaired waterbody. Such contamination may pose a potential hazard to both the crew and recreational users. We recommend the USFS clarify whether crew camps may be used and, if so, how regulations and stipulations will be applied to avoid the potential impacts from sewage to impaired waterbodies.

Response: No crew camps are proposed on USFS land as part of this action, and the construction of such semi-permanent facilities serving private industry is generally outside the multiple use mandate of the Forest Service. The permitting and construction of such camps on private land is controlled by state and local regulations and zoning.

Public water systems

#28-16

Comment: We also note that existing recreation sites have water on site and may qualify as noncommunity public water systems. If surface or groundwater are supplying these recreation sites with drinking water, the EPA recommends the USFS make land use decisions and apply appropriate BMPs to protect the water sources to avoid future loss or treatment. Some protective measures that are commonly seen near recreation sites include restricting activities near the well or surface water intake; proper siting and selection of toilets, wastewater pump out stations, and septic system components; and management of grazing animals to keep them away from the well or intake.

Response: Currently, Best Management Practices are used at recreation sites to protect water quality. Improvements and design of recreation sites are not part of this decision.

Expand analysis to include all mineral activity in North Dakota

#11-8

Comment: While referencing the "new information and changed circumstances" influencing the need for this project, nowhere does the specific, stand alone "Bakken" appear. BCA suggests that since it has now been 17 years since the last official environmental review, the Forest Service should be incorporating all existing industrial development in weighing oil and gas impacts in the Little Missouri National Grasslands, and that includes the oil and gas industry associated potential for mining of sand for fracking proppants, as well as current interest in rare earth mining. Considering the length of time it has taken to get to this point in the process and North Dakota's political/economic climate, all potentially transformative issues and users of the resource should be included in analysis.

Response: Commenter errs in stating the last environmental review was 17 years ago. Dakota Prairie Grasslands completed a review of NEPA adequacy and a supplemental information report in 2008. Commenter's suggestion that all mineral activity in the state of North Dakota should be included in this analysis is outside the scope of decision. Newer references from 2019 are noted; however, we find these references state only a theoretical potential for future development, as opposed to a reasonably foreseeable expectation of development.

#11-9

As stated in the ND Geological Survey's January 2017 publication of Geo News: North Dakota has experienced commercial oil and gas production from 19 different geologic formations over the past 65 years. Most of these productive formations have experienced spotlight attention from the oil and gas industry at one time or another, and, whether for a few months or years, were considered a "hot play" to explore and develop. The unconventional Bakken-Three Forks development is a current example of a play that brought oil and gas activity in the state to record levels and has sustained drilling activity even in a depressed oil and gas market. As the oil and gas industry transitions beyond the Bakken over time and begins to spend more time evaluating the other 17 productive non- Bakken/Three Forks Formations, additional oil and gas plays will emerge across western North Dakota.

(<https://www.dmr.nd.gov/ndgs/documents/newsletter/2017Winter/Oil%20and%20Gas%20Potential%20of%20the%20Red%20River%20Formation,%20Southwestern%20North%20Dakota.pdf>). See also the latest January 2019 issue of Geo News for further information on proppants and rare earth mining.

(<https://www.dmr.nd.gov/ndgs/newsletter/2019Winter.asp>) Fluctuating prices have driven industry to concentrate on core areas. A good deal of the Little Missouri National Grassland is not in the Bakken core

area. As the core is fully developed, industry is expected to move more readily throughout the Grassland. Recent changes to the ND Industrial Commission's gas capture policy (April 2018) specifically encourage development in townships outside the core area.

Response: The concentrated development in the Red River, as portrayed in the January 2017 article from Geo News, is well outside the boundary of the Little Missouri National Grassland. The article identifies current technical limitations on the potential for production outside the current core area, and merely speculates as to the potential for development if technical challenges were solved.

Adequate staffing and reclamation to address oil and gas impacts

#11-9, 21-16

Long term public interest calls for constrained oil and gas development. Furthermore, review of the DSEIS analysis suggests that "the purposes for which the National Forest System land are managed" are at risk long term, not only as the result of impacts due to oil and gas development itself, but quite possibly changes in the economics of the industry into the future that will hamper full reclamation, leaving us with a degraded Grassland. Considering the range of directions the energy industry may take over the upcoming years and decades, there is a substantial risk that the Little Missouri National Grassland will be left holding the bag for proper reclamation and restoration... Oil and gas development must not exceed USFS staffing capabilities. If that be the no leasing alternative, so be it.

Agency staff, time and resources need to be analyzed to ensure leases can be properly managed. The USFS should not lease more than the limited staff can effectively manage.

Response: Dakota Prairie Grasslands employs full time field-going minerals management staff to regularly inspect producing wells and maintain contact with field operators. Timely reclamation is required by the regulations at 36 CFR228.108(g) and bonds to cover reclamation costs are authorized at 36 CFR 228.109. The BLM also imposes bonds to cover reclamation costs. These issues are not part of this decision but are decided by law and regulation.

Timing of SEIS

#11-10

Comment: Staffing at the Dakota Prairie Grasslands and Impacting the Little Missouri National Grassland. Sometime between 2006 and 2008 is generally considered the beginning of the Bakken Boom in North Dakota. Yet, it was not until 2012 that the first NOI was published in the Federal Register for this project, revised in 2015, with the release of the DSEIS in November of 2018. That is a long time in the making; a time during which oil and gas development created large scale frenzy and chaos, went nearly bust, and rose again to what it is today. In many ways, this DSEIS is too late, but it is what we have.

Response: The Dakota Prairie Grasslands conducted an environmental review of oil and gas leasing activity and the adequacy of leasing stipulations in 2008 and published a supplemental information report, finding that analysis for the existing 2003 decision remained relevant. The Energy Policy Act of 2005 directs a reexamination of environmental analysis for leasing stipulations every five years. The publication of the first notice of intent in 2012 was intended to comply with this direction and a new RFDS was completed in 2013. The sharp downturn in oil and gas activity in 2014 called into question the accuracy of the 2013 RFDS; therefore, the analysis was suspended. When drilling activity and demand began to climb again, the Grasslands re-prioritized completing an updated analysis.

Advocating for best practices on non-federal acres

#11-11

Comment: Repeatedly within the DSEIS, the Forest Service dismisses the ability and opportunity to truly make a difference for the future of the Badlands. Yes, the intermingling of private, state and federal surface and split estate issues complicates things; and yes, there are areas of concern such as excessive flaring that may be under the authority of State or other federal entities; but to claim you therein have no skin in the game is negligent. The land within the administrative boundaries of the Little Missouri National Grassland is a neighborhood - dependent economically, socially, ecologically on each other and the larger whole. As the neighbor holding a majority interest in surface ownership, the Forest Service has an obligation to take a leadership position which will protect itself by advocating for best practices across the whole. Therein, deeper analysis must be done PRIOR to any leasing decision.

Response: The priority given to oil and gas leasing among the many multiple-use mandates of the Forest Service is the prerogative of the administration. The current administration has placed a high priority on such activity. While siting of well pads and other infrastructure may be done collaboratively to place impacts where the least environmental impact will occur, the Forest Service has no authority or mandate to restrict or influence leasing and development of state and private mineral estate, which comprises over half of the land within the administrative boundary of the Little Missouri National Grassland. National Forest System surface lands also comprise less than half of the 2.1 million acres within the LMNG administrative boundary.

The Forest Service endeavors to negotiate with the non-federal mineral owner and the developer to achieve the objectives specified in the Land and Resource Management Plan in cases of NFS surface over non-federal mineral estate. We also will work with adjacent landowners to allow waivers of NSO stipulations where legally allowed and where more valuable habitat may exist on non-federal surface within a spacing unit.

#33-2

In 2016, the Covenant Consulting Group (CCG) conducted a stakeholder assessment, funded partially by the Forest Service, to better understand the perceptions of stakeholders regarding oil development in the badlands and to create strategies for how to responsibly develop mineral resources. After this assessment the Badlands Advisory Group was created to address the critical issues brought forward through CCG's analysis, including larger landscape planning and reclamation standards that are best practices. The three strategies that were suggested for future actions were 1.) A collaborative process including all parties 2.) Regulatory and statutory changes 3.) A landscape pilot project that includes all parties. The Department sees the Forest Service's failure to consider these critical issues and suggested strategies as a fatal flaw in the Draft Supplemental Environmental Impact Statement.

Response: The strategies suggested are outside the scope of this analysis. Regulatory and statutory changes are wholly outside the control of local grassland managers and can only be initiated at the department level or, for statutory changes, by Congress on its own initiative, or in response to department initiative. The pilot project described on page 44 of the 2016 stakeholder assessment describes a process that spans land ownership boundaries, articulates consideration of a broad range of approaches (e.g., land exchanges, mineral exchanges, etc.) and is focused on stakeholder engagement to examine landscape scale strategies associated with oil and gas leasing. An effort such as the pilot project would be more appropriately pursued as part of a LRMP revision.

Outside of agency authority

#5-1

Comment: Please consider more protections for previously leased land that has not yet been developed. Oil people rape our land and leave.

Response: When a lease is sold, the stipulations in force at the time of sale become part of the contract under which the lease may be developed. The lease lasts for 10 years. During that time, stipulations may not be added or changed. If the lease is not developed during the 10-year timeframe, it expires. New stipulations would apply if it were leased again.

#11-7

Comment: BCA holds that Bureau of Land Management (BLM) minerals under private surface should be given equal consideration for withdrawal as those addressed in the DSEIS and that the Forest Service should be working in advisement with its cooperating agency, the BLM, to identify such potential withdrawals.

Response: The BLM plans to address oil and gas leasing and the lands available during the upcoming revision of the North Dakota Resource Management Plan, expected to start in 2021. The Forest Service has no authority over lands with federal mineral estate and non-federal surface. Such split-estate lands are not covered in the current analysis.

Attachment A

Steps to Approving Oil and Gas Production on National Forest System Lands

Introduction

The Forest Service considers oil and gas exploration and development to be an important part of its mission and management of National Forest System lands. Various laws and regulations support making mineral resources on federal lands available for production and encourage development of mineral resources to meet national, regional, and local needs. The Forest Service recognizes that mineral exploration and development require careful consideration and management, and that these activities can be compatible with the other multiple uses for which National Forest System lands are managed.

Agency Responsibilities for Oil and Gas Leasing

The Forest Service and the Bureau of Land Management (BLM) share responsibility for authorizing oil and gas development on National Forest System lands, as outlined in the Federal Onshore Oil and Gas Leasing Reform Act.

- The Forest Service is responsible for identifying and managing the aboveground surface use of National Forest System lands that are available for oil and gas leasing.
- The BLM is responsible for managing the underground oil and gas resources along with the administration and issuance of fluid mineral leases.

For oil and gas development to occur on National Forest System lands, the Forest Service must first evaluate the lands being considered for leasing with an environmental analysis. After the analysis, the Forest Service may decide to authorize¹⁵ the BLM to offer available lands for lease and subsequently issue leases for parcels sold.

Laws, Regulations, and Management Direction

Both the Forest Service and the BLM have land management plans that determine which Federal lands are administratively available for leasing. Forest Service land and resource management plans contain goals, objectives, standards, and guidelines that impose constraints (stipulations, lease notices, or conditions of approval) on activities such as the operation and development of a fluid mineral lease that may affect surface resources. When specific lands are nominated for leasing, the Forest Service must analyze the proposal, identify needed resource protection measures for the areas considered through appropriate environmental analysis, and issue a decision regarding the availability of the lands for leasing.

Federally owned oil and gas on public domain minerals (those that have never passed out of Federal ownership) are leased under authority of the **Mineral Leasing Act of 1920**, as amended and federally owned oil and gas on acquired minerals are leased under the authority of the Mineral Leasing Act for Acquired Lands of 1947. The 1987 **Federal Onshore Oil and Gas Leasing Reform Act** amended the Mineral Leasing Act, which granted the Secretary of Agriculture the authority to regulate all surface-

¹⁵ The terms “authorize” and “consent” may be used interchangeably. Forest Service regulation at 36 CFR 228.102(e) uses the language “. . . authorize the Bureau of Land Management to offer specific lands for lease. . .” The BLM may not lease National Forest System land over the objection of the Forest Service (30 U.S.C. 226(h); 43 CFR 3101.7-1(c)). Obtaining authorization, or “consent,” from the Forest Service to lease is a means of documenting that the Forest Service does not object to leasing for purposes of meeting the statutory requirement.

disturbing activities conducted in relation to any lease on National Forest System lands. The Act also requires that oil and gas on reserved public domain may not be leased over the objection of the Secretary of Agriculture. The Mineral Leasing Act for Acquired Lands of 1947 requires Secretary of Agriculture consent for leasing lands within the National Forest System.

Forest Service regulations regarding the agency's surface management authorities are found at 36 CFR parts 228 (subpart E) and 261. These regulations require the Forest Service to conduct a national, grassland, or area-wide environmental analysis of reasonably foreseeable post-lease development to determine which lands are available for oil and gas leasing and to identify needed and justifiable constraints to mitigate potential effects to surface resources. The BLM typically participates with the Forest Service in these analyses because they have an independent decision to make regarding leasing the mineral estate.

Overview of the Federal Leasing and Permitting Process

Leasing Stage

The leasing process consists of the following steps:

1. The Forest Service conducts a leasing analysis identifying areas open, conditionally open, or closed to leasing; this is most commonly completed as part of a land and resource management plan (land management plan) revision.
2. the Forest Service makes an area-wide or grassland-wide decision on leasing availability;
3. the Forest Service verifies the adequacy of the leasing analysis and its consistency with the land management plan, decides if constraints (stipulations or lease notices) are needed to mitigate effects to surface resources, and determines whether to authorize the BLM to offer leases for specific lands;
4. the BLM makes an independent assessment and decision to offer lands for lease;
5. the BLM offers lands for competitive lease subject to Forest Service and BLM constraints in the sale notice;
6. the BLM issues the lease, incorporating Forest Service constraints.

Once Federal lands are leased, the leases provide the leaseholder the right to use Federal land to explore, develop, and produce oil and gas under the terms of the lease (43 CFR 3101.1-2). Leases are granted for a period of 10 years. However, the lease may be "held in production" for as long as the lease produces oil and gas in paying quantities. The Forest Service regulates surface activities in cooperation with BLM and BLM regulates all subsurface activities associated with exploration and development under the lease through authorizations to be approved after the lease is issued, in response to a proposal from the leaseholder to develop the lease.

Exploration and Production Stage

After a lease is issued, an operator may only conduct exploration and development after first receiving approval through the permitting process, which consists of:

1. an application for permit to drill or a sundry notice¹⁶ submitted by the lessee to the BLM and the Forest Service; accompanying the application for permit to drill is a surface use plan of operations.

¹⁶ A sundry notice is a written request to perform work not covered by another type of permit, or to change operations in a previously approved permit.

2. a site-specific environmental review and approval of a surface use plan of operations by the Forest Service;
3. a final approval of the application for permit to drill by the BLM; and
4. additional applications submitted from the lessee before conducting field development activities.

During the process for an application for permit to drill and the surface use plan of occupancy, lease stipulations may be modified through **waivers, exceptions, and modifications**. There are changes to lease stipulations that may occur, under specified circumstances, depending on how the stipulations are written. Definitions are given below.

- **Waiver:** Permanent exemption from a lease stipulation. Waivers can be granted if the condition described in the stipulation no longer applies anywhere in the leasehold.
- **Exception:** Case-by-case exemption from a lease stipulation. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criterion applies.
- **Modification:** Modifications are similar to exceptions, but broader in scope, and involve a fundamental change to the provisions of the stipulation. They can be granted either temporarily or for the duration of the lease. A modification may include an exemption from or alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria applied.

Resource Protection Measures and Constraints Important to the Leasing and Permitting Process

A variety of resource protection measures and constraints are applied during the oil and gas leasing and permitting process.

During the Lease Authorization Process

The **2002 Dakota Prairie Grasslands Land and Resource Management Plan** specifies where oil and gas leasing is available throughout the grasslands. It also contains standards and guidelines specific to mineral leasing (see the [land management plan](#), page 1-12), as well as protecting other national grassland resources that could be impacted.

During the environmental analysis process to determine specific lands decision to authorize leasing, the Forest Service develops **stipulations** (such as timing limitations, no surface occupancy, and controlled surface use) and **lease notices**—these are applied to certain locations or conditions within the grassland. The Forest Service determines whether the lands to be leased will be subject to only standard lease terms or if additional constraints (stipulations or lease notices) are needed. Leasing of the land grants the leaseholder certain property rights to extract oil and gas. Subsequent operations must comply with the terms of the lease, and the Federal Government must allow access to the oil and gas per the terms and stipulations of the lease.

The decision to lease Federal minerals within National Forest System surface ownership and the application of environmental stipulations for oil and gas production are made by the Forest Service responsible official, and the BLM then offers leases with the stipulations approved by the Forest Service. Stipulations and lease notices, along with standard lease terms, become a part of the lease contract and do not change for the duration of the lease. However, some stipulations may include options for waivers, exceptions or modifications. No Federal or state permits are needed for the BLM to implement the leasing decision.

During the Exploration and Development Process

When a leaseholder wishes to develop a lease, they submit an **application for a permit to drill (APD)**, which includes a **surface use plan of operations (SUPO)**, describing how they will comply with the stipulations attached to the lease and the details of development for well pads and supporting infrastructure. During this process, the Forest Service works with the operator to identify any design criteria that may be incorporated into the SUPO. These are included into the SUPO or added as specific **conditions of approval (COA)** that are included in the permit. These conditions are required to ensure compliance with standards and guidelines of the land management plan and the requirements of regulations at 36 CFR 228 subpart E.

Such design criteria are intended to mitigate potential site-specific impacts that cannot be anticipated prior to submission of a lease development plan. Depending on the specific development plan, additional federal permits may be required to implement the drilling decision. Obtaining such permits would be the responsibility of the operator. Conditions of approval can evolve as necessary in response to changes in technology or to address new conflicts as they arise. Operators must comply with all conditions specified in a permit to drill.

The BLM is responsible for approving the drilling plan (the downhole portion) of an application for permit to drill and approves the application package as a whole once it receives an approved surface use plan of operations from the Forest Service. The Forest Service's review and approval of the surface use plan of operations is subject to site-specific environmental analysis and decision making under the Forest Service environmental analysis procedures.

Associated activities, such as access roads, pipelines, electrical transmission lines, and staging areas, are permitted as part of the SUPO. Under circumstances where such infrastructure is needed that is associated with a private or state lease that needs to cross federal land, the Forest Service authorizes those activities under its special use regulations at 36 CFR 251. Commercial use of roads managed by the Forest Service are subject to road use authorization under agency policy in Forest Service Manual 7700.

Additional approval of the spacing unit and drilling plans is required by the North Dakota Industrial Commission (NDIC).

The North Dakota Department of Environmental Quality (ND DEQ) registers upstream well heads, and permits midstream and downstream oil and gas facilities. Upstream facilities consist of exploration and productions. Midstream facilities transport or store oil and gas. Downstream facilities consist of refining, distribution, and retail sales.

Control of emissions from oil and gas well production facilities are outlined in [Chapter 33.1-15-20](#) of the North Dakota Air Pollution Control Rules. The provisions of this chapter apply to any oil or gas well production facility. This chapter includes requirements for control of production facility emissions, registration, reporting and permitting requirements.

Midstream and upstream facilities are permitted by ND DEQ under their [Construction Permit](#) and [Operating Permit](#) programs which they use to review proposed development in relation to the aforementioned Air Pollution Control Rules and the requirements of the Clean Air Act.

During Operations

Once an application for a permit to drill and a surface use plan of operations is approved, construction, drilling, and fracking can begin, followed by ongoing extraction. Once such development occurs, the

lease term date is superseded, and the lease is said to be “held in production.” Leases may be held in production for many years, even decades, before extraction and final reclamation are completed.

Inspection and Compliance. If operations are established on a lease, the Forest Service routinely inspects to ensure that operations are conducted consistent with lease stipulations for surface resource protection and conditions of approval on the approved surface use plan of operations. Operators are notified of noncompliance issues and offered opportunity to correct them.

Reclamation. Once the drilling is completed and the well is in production, interim reclamation begins to reduce the area of disturbance to only those areas needed for long term production of the well. Final reclamation activities occur either when an exploration well does not encounter producible quantities of oil or natural gas, or when a production is completed and the well is plugged and abandoned. Final reclamation includes plugging the well and reclaiming the land surface.

Overview of Operations

Of the 893,200 acres of the Little Missouri National Grassland with National Forest System surface lands over Federal minerals, 629,200 acres are currently under lease or held by production and 47,700 acres are administratively unavailable for leasing. Approximately 3,425 oil and gas wells have been drilled on private, state, and federal lands within the LMNG administrative boundary through December 2018. The total figure includes approximately 1,850 plugged and abandoned wells (54 percent) and approximately 1,575 active, inactive, and temporarily abandoned wells (46 percent).

Horizontal Drilling and Hydraulic Fracturing

Horizontal drilling involves drilling down vertically and then making a curve to drill parallel to the surface. New technology, called extended reach horizontal drilling, made it profitable for oil companies to extract oil and gas from shale rock formations. Extended reach horizontal drilling has made it possible to drill down two miles and then angle the instrument horizontally for another two to three miles. This technology has made it possible to access more of the oil in shale formations while disturbing less land on the surface. Hydraulic fracturing is the process of using water under pressure to fracture, or crack, deep underground rock so that trapped petroleum can be recovered.

Vertical Drilling

Some formations within the LMNG are accessed from vertically drilled wells. This process requires the well pad to be located within a limited space above the target zone. These wells may not require fracturing for their development.

Well Pad

A well pad is a specific location, which houses the wellheads for one or more well bores either vertically or horizontally drilled. In many cases, horizontally drilled wells are located together on one multi-well pad. Other production infrastructure is often associated with a well pad, especially for multi-well pads.

Water Consumption

The typical new Bakken well is requiring three to eight million gallons, nine to twenty-four acre feet, of water to drill and complete. The vast majority is surface water purchased from city treatment facilities. By comparison the average application rate is 2.48 acre-feet per acre for center pivot irrigation in the United States.

Produced Water

Water naturally occurs within oil and gas deposits. Such water often contains high concentrations of salts and other minerals. The saltwater is pumped to the surface as a by-product during oil well production operations. This saltwater is separated from the oil and gas on the pad and requires disposal. The water can be disposed on site using injection wells into vacant pore spaces or transported by truck or pipelines to offsite commercial facilities or injection wells. Saltwater is often produced at a 3:1 saltwater to oil ratio and generally the ratio increases over the life of the well.

Oil Transport

According to North Dakota Pipeline authority, the majority of oil is transported via pipeline. Road and rail infra-structure are not as robust in North Dakota, so pipelines are used for economic and logistical reliability. About 72 percent of the crude oil produced within the state is transported by pipeline, while 17 percent is transported by rail, 6 percent is refined in the state, and 5 percent is trucked to Canada where it is transferred to Canadian pipelines.

Natural Gas

When oil is removed from underground, natural gas also comes to the surface. The majority of the natural gas is piped to gas plants, some is used to operate equipment at the site, and some is flared, or burned.

Capture of natural gas resources involves containment of the gas at the production site and moving it to the market through a series of pipelines and compressor stations. Capture is dependent on existing infra-structure or economics of building needed infra-structure to transport natural gas to gas plant.

Flaring of natural gas occurs when natural gas is burned on location due to lack of gathering pipeline infrastructure or economic alternatives. When capture is not possible, flaring or the release of the gas must occur to ensure safety at the well site. Flaring of natural gas is the preferred method of handling the natural gas than simply venting into the atmosphere and is considered the least harmful to air quality and greenhouse gas emissions. Flaring the gas converts the methane to carbon dioxide. Some flaring occurs during the drilling phase to provide for safety of the workers. The North Dakota Industrial Commission revised the 2014 natural gas targets for Bakken and Three Forks as follows:

- 74% capture in 4th quarter 2014
- 77% capture in 1st quarter 2015
- 80% capture in 2nd quarter 2016
- 85% capture in 4th quarter 2016
(as of December 2016 87% was being captured)
- 88% capture in 4th quarter 2018
- 91-93% capture in 4th quarter 2020

Index

A

air quality

dust, 61, 103, 142, 180, 251, 252, 279
emissions, ii, iii, 60, 61, 62, 64, 66, 71, 72,
73, 76, 184, 185, 233, 259
National Ambient Air Quality Standards,
25, 59, 60, 64, 66, 68, 225, 258

alternative 2 (no new leasing), iii, 8

alternative 3 (revised stipulations), 8

B

Bureau of Land Management, i, ii, v, 1, 3, 6,
9, 10, 11, 18, 23, 24, 41, 43, 47, 48, 49,
50, 64, 80, 158, 164, 174, 185, 212, 215,
216, 221, 228, 230, 233, 297, 298

role in oil and gas development, 39

C

climate change, i, 61, 63, 69, 71, 74, 76,
179, 182, 233, 245, 257, 258, 259

conditions of approval, 13

cultural resources, 167, 168, 169, 291

cumulative effects, 50, 57, 59, 68, 77, 80,
81, 82, 89, 94, 114, 125, 126, 128, 131,
133, 143, 149, 164, 167, 171, 172

D

Dakota Prairie Grasslands Land and
Resource Management Plan (grasslands
plan), iii, 1, 4, 5, 6, 12, 13, 14, 33, 184,
230, 234, 300

Dakota skipper, i, 5, 95, 97, 107, 108, 113,
114, 266

developed recreation sites, ii, 9

E

employment, iv, 54, 56, 58

F

Federal mineral estate, 1, 3, 4, 39, 40, 41,
80, 90, 132, 133, 208, 209, 231

Federal mineral leasing process, 4

fossils (paleontology), iii, vii, i, 9, 37, 169,
170, 221, 229

fracking (hydraulic fracturing), 43, 93, 179,
186, 302

chemicals used, 45
earthquakes, 44
public health risks, 43, 44

G

grazing, 115, 130, 227, 251

animal unit months (AUMS), 130, 131,
132, 251, 280

greenhouse gases, ii, i, ii, 8, 59, 69, 173,
180, 183, 185, 251, 259

H

human health risks, 57, 58

I

income, iv, 55

inventoried roadless areas, ii, 8, 24, 141,
158, 217, 222

L

lands not administratively available, iv, x, 3,
20, 22, 41, 47, 49, 90

lease notices, ii, 8, 18, 211, 212

leases

acres of Federal estate, 41

N

Native American Tribes, i, 7

nonnative plants, 103, 120, 124, 126, 277

northern long-eared bat, 97, 107

P

paleontological resources, iii, 9

plants

sensitive plants, 115, 121, 122, 126, 129

populations, iv, 54

effects to low income and minority
populations, 55, 57, 58, 177, 185

Q

quality of life, 56, 58

R

reasonably foreseeable development
scenario, i, 5, 6, 39, 53, 68, 70, 77, 79,
80, 90, 102, 110, 114, 126, 162, 165

recreation, vii, ix, x, i, ii, iii, iv, 20, 30, 34, 36,
126, 133, 135, 136, 137, 138, 142, 145,
149, 150, 158, 160, 163, 166, 167, 173,
174, 179, 190, 191, 203, 217, 218, 227,
280, 281, 282, 284, 286, 289

dispersed and developed, 138, 142, 157,
162

trails, 143, 150, 158, 163, 167

revenues from oil and gas, 52, 250

riparian areas, 89

roads, 24, 88, 89, 103, 125, 126, 131, 163,
182, 272

S

scenery
effects, 157, 159
scenic integrity, x, 20, 152, 157, 160, 164,
201, 215, 242, 283, 284

soils, 79, 81

split estate, 3

standard lease terms, 18

stipulations, iv, i, ii, 14, 22, 187, 245

2002 Land and Resource Management
Plan and 2003 decision, 14

acres affected by alternative, ii, 51

alternative 1, ii, 19

alternative 1 acres affected, iii, 13, 47

alternative 3 acres affected, 23, 48

controlled surface use, 14

lease stipulations, 14

no surface occupancy, 14

protecting recreation sites, rare plants,
roadless areas, iv, 22

sage-grouse, 22

timing limitations, 14

surface ownership (National Forest System),
iv, v, 4, 6, 13, 22, 240, 292, 300

T

traffic from oil and gas development, 55

W

water

303(d) listed streams, 85, 86, 88, 90, 91,
262, 263, 293

aquifers, 91

disposal, 93

drinking water, 92, 93, 97, 107, 261, 265,
294

groundwater, i, ii, 44, 46, 91, 92, 173,
177, 183, 260, 264, 265

pollutants, 85

supply, 89

surface water, i, 33, 44, 46, 82, 173

water quality, 85, 86, 88, 181, 260, 264

withdrawals, 92

wells
number of wells in the grassland, 40

wetlands, 85, 89, 105, 106, 107, 189, 215,
262

wildlife
bald eagle, viii, 19, 98, 108, 198, 271

big game species, 111

bighorn sheep, viii, ix, 10, 19, 23, 37, 100,
108, 176, 179, 181, 186, 193, 196, 207,
208, 209, 224, 271

Dakota skipper, 97, 107, 108

disturbance, vii, 10, 13, 36, 103, 104, 114,
176, 257

fragmentation and corridors, 102, 103,
123, 267

least tern, 95, 105, 185

management indicator species, 112

migratory birds, 112

northern long-eared bat, 97, 107

pallid sturgeon, 95, 105, 106, 185

piping plover, 96, 106

raptors, 111

sage-grouse, ii

sensitive species, 98, 108, 110

species of interest, 111

threatened and endangered, 95

Williston Basin, i, 5, 39, 40, 50, 60, 74, 103,
176, 179, 182